The Capital Region of Denmark
New North Zealand Hospital

REGION

VOLUME I
VISION AND
FUNDAMENTAL PRINCIPLES


YOUR
BLANK
CANVAS


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IS IT

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PREFACE

Dear competition entrants – and all other readers of this brief

This competition brief outlines the vision for New North Zealand Hospital that is now to be designed, detailed and specified. Apart from a number of fundamental requirements that must be met, competition entrants have a great deal of freedom in their design of schemes: there is plenty of room for creativity and innovation, and the hospital will even be built on greenfield land in an area of natural beauty. That is why we call the brief *This is it: Your blank canvas.*

Building a brand new hospital on pristine land is a once in a lifetime opportunity for most. This project allows us to be innovative and think out of the box, to build for the future and for patients, patient families and staff, without any trammels. We wish to have a functional, interesting architecture, innovative solutions, good logistics and well thought-out work procedures, which should be visible to and benefit everyone going to New North Zealand Hospital.

The competition brief is a three-volume work of reference in which we share our ambitions with you. Entrants are asked to present the best possible solutions, always with a clear focus on the interests of patients. The brief includes a number of requirements that must be met to ensure that New North Zealand Hospital will be able to provide the best possible service to its patients. The brief contains a wealth of information in the form of references to other buildings, hospitals and industries that have served as inspiration in the process and in the form of requirements and conditions relating to the hospital's core services.

Explore the brief on your tablet, watch the videos and let yourself be inspired by the pictures. One of the things you will learn more about is how users have been involved in the process and how this contributed to the formulation of the vision and wishes for the new hospital.

We have very high hopes for the outcome of this competition, and we look forward to receiving seven interesting proposals for the future hospital in North Zealand.

We have put a great deal of work into preparing this brief, which we hope will serve as a good source of inspiration now that we hand over the challenge of designing the hospital to you. This is it: Your blank canvas.

We hope you will enjoy reading the brief.

Suzanne Aaholm
Hospital CEO

Early morning at the competition site

Mid-morning at the competition site

HOW TO READ THIS BRIEF

Our fundamental ambition in preparing this competition brief was to communicate factual details about the future hospital functions and floor areas in the simplest and clearest way.

In connection with our preliminary studies in preparation for this stage of the planning, we collected information that could serve as inspiration as well as knowledge that we would like to share. This information formed the basis for the specifications and choices we present in this brief. In addition to specific requirements, the brief contains background information and reference photos from study visits, conferences and general desk research. References are made to industry and other sectors that we use as inspiration in rethinking the future functions of the hospital. This brief is based on all of these things and more, and we hope they will help competition entrants understand the choices made and wishes stated.

For ease of overview, we have divided the brief into three volumes:

- Volume I: Vision and fundamental principles
- Volume II: Programmatic requirements
- Volume III: Competition regulations and project basis

The above-mentioned supplementary material is included in the text as follows in all three volumes:

- Information intended as inspiration
- Factboxes
- Tables

In addition, there is a list of annexes at the end of Volume III.

Volume I
This volume contains information about the vision-formulation process that started the planning of New North Zealand Hospital. It was based on the political objectives defined by the Capital Region, and it set out five fundamental principles to govern future developments.

There is also a description of the basis for responses to the brief and an outline of the general guidelines that apply to the physical location, design and structure of buildings.

Volume II
Volume II contains a description of all hospital functions and sets out the relative distribution of areas and the twenty concepts that specify the principles applying to the use of areas.

The concepts are based on the space management principles that govern all decisions concerning the use of areas in the new hospital. No deviation from these principles is possible without it having an impact on the general future use of the hospital floor area as a whole.

Volume III
The design competition regulations are set out in Volume III together with information about the site selected and future planning constraints. ■

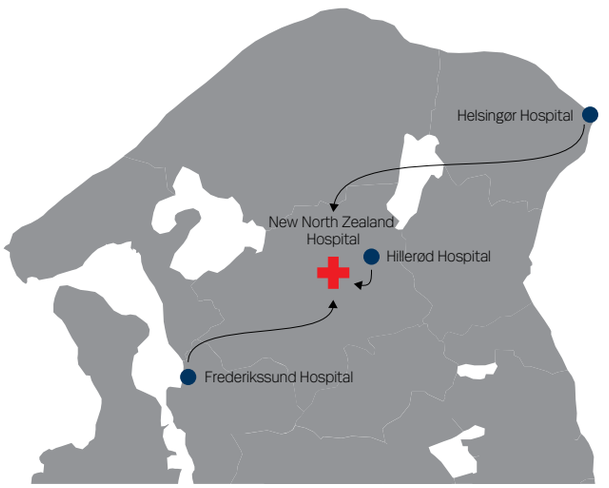
The Capital Region has prepared a hospital and psychiatry plan that takes a new look at the health-care system in the region and is a first step towards providing coherent healthcare services in the region. According to the Hospital Service Plan, several treatment specialties will be concentrated at fewer hospitals than is the case today to enhance the professional quality of treatment and provide a better basis for research and development.

THE FIRST STEP

INTRODUCTION

With the adoption of the 2020 Hospital Service Plan, it was decided to merge the three hospitals currently located in North Zealand, ie the hospitals in Hillerød, Helsingør and Frederikssund, and combine them in a new acute hospital in Hillerød: New North Zealand Hospital.

The new hospital is scheduled to open in late 2020. It will be a modern acute hospital located in an area of natural beauty off the Overdrevsvejen road in Hillerød, which is a new urban development area with a good infrastructure. The hospital will include an emergeny department and have about 662 beds in single patient rooms. It will cover 24 specialist areas and offer state of the art and effective services to patients, patient families and staff in a physical environment conducive to best practice in patient care and treatment, as well as in education and research. The total floor area of the hospital will be approximately 128,000 m2, and the total construction sum will be in the region of DKK 3.8 billion.



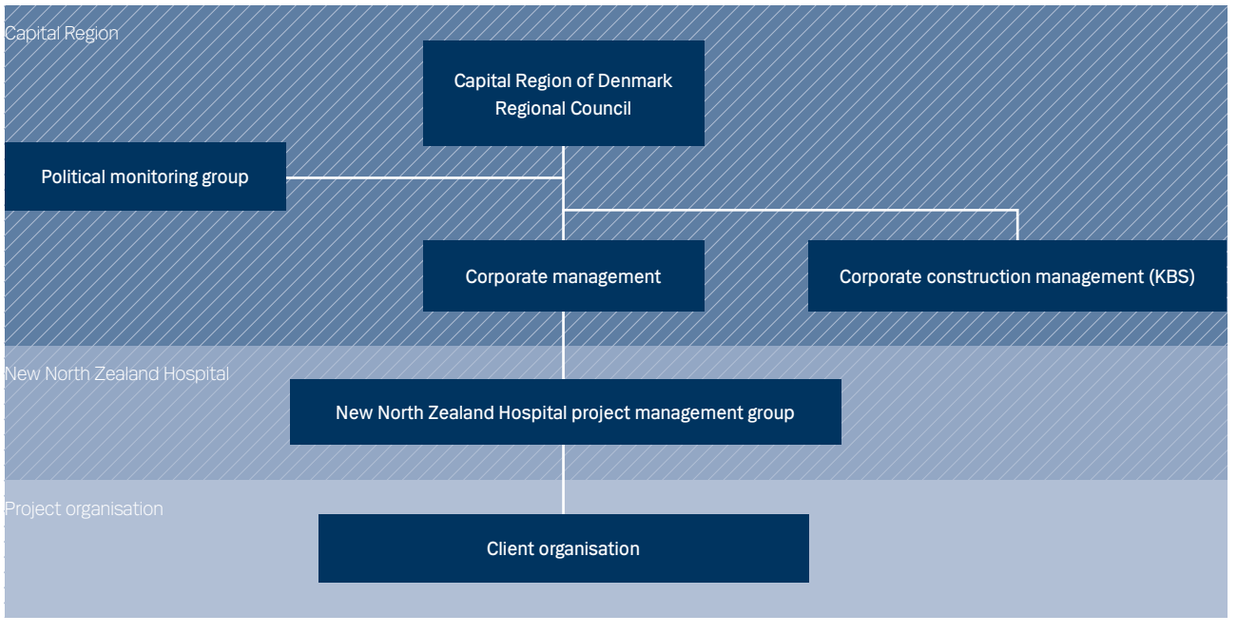
HOPP2020

http://www.regionh.dk/NR/rdonlyres/6FCD2B17-0A68-4BEB-AAA0-3CD519AC055C/0/Hospitals_og_psykiatriplan_2020_endelig_version.pdf

Overall political basis for building projects in the Capital Region, May 2011

http://www.regionh.dk/NR/rdonlyres/4C58B815-B910-414C-BCE9-A44CF45129AB/0/Politisk_grundlag_for_byggeri_i_Region_Hovedstaden.pdf

FACTS: Project set-up, Capital Region of Denmark. Project organisation: One of six quality fund projects.



The hospital is the only one of the Region's six quality fund building projects that will be built on greenfield land. The other projects are:

- New Hospital Herlev
- New Hospital Hvidovre
- New Hospital and Psychiatric Centre Bispebjerg
- New National University Hospital (Rigshospitalet)
- New Forensic Psychiatry Centre Sct Hans

THE REGION'S OBJECTIVES

The Capital Region desires a uniform quality at all future hospitals in the region. The new buildings must be optimised to serve their purpose: in other words, the initial capital investment must ensure that the long-term costs, ie the actual cost of operating the hospital, will be as low as possible.

The political manifesto for building projects in the Capital Region issued in May 2011 lists the objectives under the following headings:

- Focus on patients
- Staff's preferred workplace
- A physical environment that is modern, healing, sustainable and flexible
- Public-private innovation – development and growth in the Capital Region

The report compiles and sets out the common basis for the building projects planned in the region and governs the planning of the individual projects.

TODAY'S HOSPITALS IN THE NORTHERN PART OF THE REGION

The main strategic objectives defined for the three currently existing hospitals state that, up to 2020, the focus should be on adapting the organisational framework with a view to creating 'patient-safe' hospitals. The current facilities should be used to test selected concepts in order to gain experience that can make it possible to benefit fully from the new buildings immediately after their opening. ■


VISI

1 CHAPTER

An initial step in the planning of New North Zealand Hospital was a vision-formulation process with the purpose of defining a number of fundamental values that would be sufficiently robust to govern the planning of the new hospital and, later on, its operations.

NEW TIMES, NEW CONDITIONS

The vision-formulation process involved the hospital management, staff, patients and residents in the region. Some of them were familiar with the clinical context, while others based their input on experience gained in completely different circumstances.

In order to describe the forthcoming large-scale and complex task of creating the new hospital, five overall principles were defined under the heading NEW TIMES, NEW CONDITIONS.

The five principles have governed and will continue to govern the planning and organisation of the building project. In the following text, which is the direct output of the vision-formulation process, the significance of the five principles for patients, staff and the physical environment is described. ■

Kick-off for the vision

THE FIVE GUIDING PRINCIPLES

At the North Zealand Hospital, our focus is on people in our provision of optimum care and treatment. Patients are treated in an operationally efficient healing environment, where we do what we do best 24 hours a day, seven days a week: providing effective, professional patient pathways in a welcoming environment characterised by respect for individual human beings. We are specialists in frequently occurring disorders. We offer our staff a professional work environment and we work broadly with patients, patient families and other treatment facilities, just as we work across professional boundaries to offer the best treatment to each individual patient.

The hospital that offers the best treatment

- **Patients** receive treatment of high professional quality in well-organised treatment pathways. Patients experience an atmosphere of respect and a great deal of focus on their situation and specific needs.
- **Staff** have access to the tools and facilities they need in their work, including fast access to relevant data and the new technology necessary to provide effective, highly competent and evidence-based treatment.
- **The physical environment** is based on optimised logistics so that the functionality of the buildings promotes seamless work interfaces between different competence environments, thus ensuring the best and most effective treatment.

The effective and professional hospital

- **Patients** have access to timely and correct treatment and information when they are physically or digitally in contact with the hospital.
- **Staff** have a high level of professional competence, with research and development integrated into everyday activities. Digital access to information, data and communications tools allow interdisciplinary patient pathways with speedy diagnoses and treatment decisions based on well-founded professional approaches.
- **The physical environment** eases patients' way through the hospital. The layout enables optimised logistics and ensures a good utilisation of all resources through a focus on flexibility, functionality and anticipation of future needs and requirements.

The safe hospital

- **Patients** are protected to the greatest possible extent against injury, accidents and adverse events while they are at the hospital and receiving treatment.
- **Staff** can trust that their physical and psychological working environment is a matter of concern to the hospital.
- **The physical environment** rests on evidence-based solutions that enhance the safety of everyone at the hospital.

The welcoming hospital

- **Patients** are treated with dignity and with respect for their individuality and relationships. Patients should feel secure and welcome in the hospital setting. On discharge, they should feel confident and well prepared to leave the hospital.
- **Staff** are acknowledged as professional and individual human beings in an environment that expresses appreciation.
- **The physical environment** is conducive to the healing, treatment and wellbeing of people. The hospital is accessible and aesthetically pleasing and engenders a sense of security in people. The physical environment promotes a relationship of equals between patients and staff, and it takes into account that people are different and have different needs.

The hospital that works across conventional boundaries

- **Patients'** and their families' competencies are taken into account in a partnership between them and the healthcare professionals. Treatment pathways have no noticeable transitions to other areas of the healthcare and treatment sector.
- **Staff** enter into professional relationships with relevant outside players such as local authorities, the primary care sector, educational institutions, the business sector, and research and development environments.
- **The physical environment** facilitates interdisciplinary collaboration, development and the sharing of knowledge between competence environments both inside and outside the hospital.

INFORMATION!

IN-DEPTH INTERVIEWS WITH MEMBERS OF STAFF

It can be difficult to put one's thoughts and feelings into words. That is why the project group decided in 2010/11 to give a representative sample of staff members at the three hospitals digital cameras and asked them to take pictures and collect stories about their hospitals as they were then and as they would be in the future. The result was more than 70 hours of in-depth interviews, a huge collection of pictures and twenty photo collages and stories.

About **patients,** the staff said: It's about people as human beings, not just the diagnosis. Interaction with patients should be characterised by closeness, comfort, respect and human decency, combined with the possibility of catering to individual needs. Patients should be motivated to take part in and assume responsibility for their own treatment and their own health.

About **work conditions**, the staff said: Collaboration across units, specialities and hospitals is key to our success. Such collaboration must be supported by well-functioning IT and logistics.

About the **physical environment,** the staff said: The physical environment should be a good working environment with good patient flows and interdisciplinary collaboration. Patient safety and infection control must be taken into account.

WORKSHOP WITH PATIENTS AND PATIENT FAMILIES

What are the thoughts and wishes of current patients and their families regarding New North Zealand Hospital? This question was answered by patients and their families at a workshop in February 2011.

About patient needs, they said: Patient pathways are very important. We want to feel that we are being taken by the hand and helped along. The hospital should look at patients as individual human beings, not as diagnoses. Good patient pathways should be characterised by a high level of security and personal control. Both the treatment and the patient pathway should be well considered from the moment the patient arrives at the hospital till the time after discharge when the focus is on preventing recurring disease.

WORKSHOP WITH FUTURE STAFF AND PATIENTS

What are the thoughts and wishes of future staff and users of New North Zealand Hospital? This question was answered by a group of medical students, trainee nurses, architectural students, students from Roskilde and Copenhagen universities and students at the Technical University of Denmark at a creative workshop in February 2011.

About the **patients** of the future, they said: Patients should be looked at as human beings, not as defective machines. We must build a hospital that is active in the prevention of disease and involves patients, giving them influence and responsibility. The hospital should be a life coach rather than an institution for the treatment of the sick.

About the **staff** of the future, they said: Staff in a hospital of the future will want a workplace that gives them opportunity to upgrade their professional skills and qualifications, facilitates dialogue and furthers interdisciplinarity.

About the **physical environment,** they said: The physical environment should be seen as part of an integral healthcare system that facilitates smooth transitions and is part of the local community and society in general.

EXPERIENCE GAINED IN THE USE OF THE ZMET METHOD

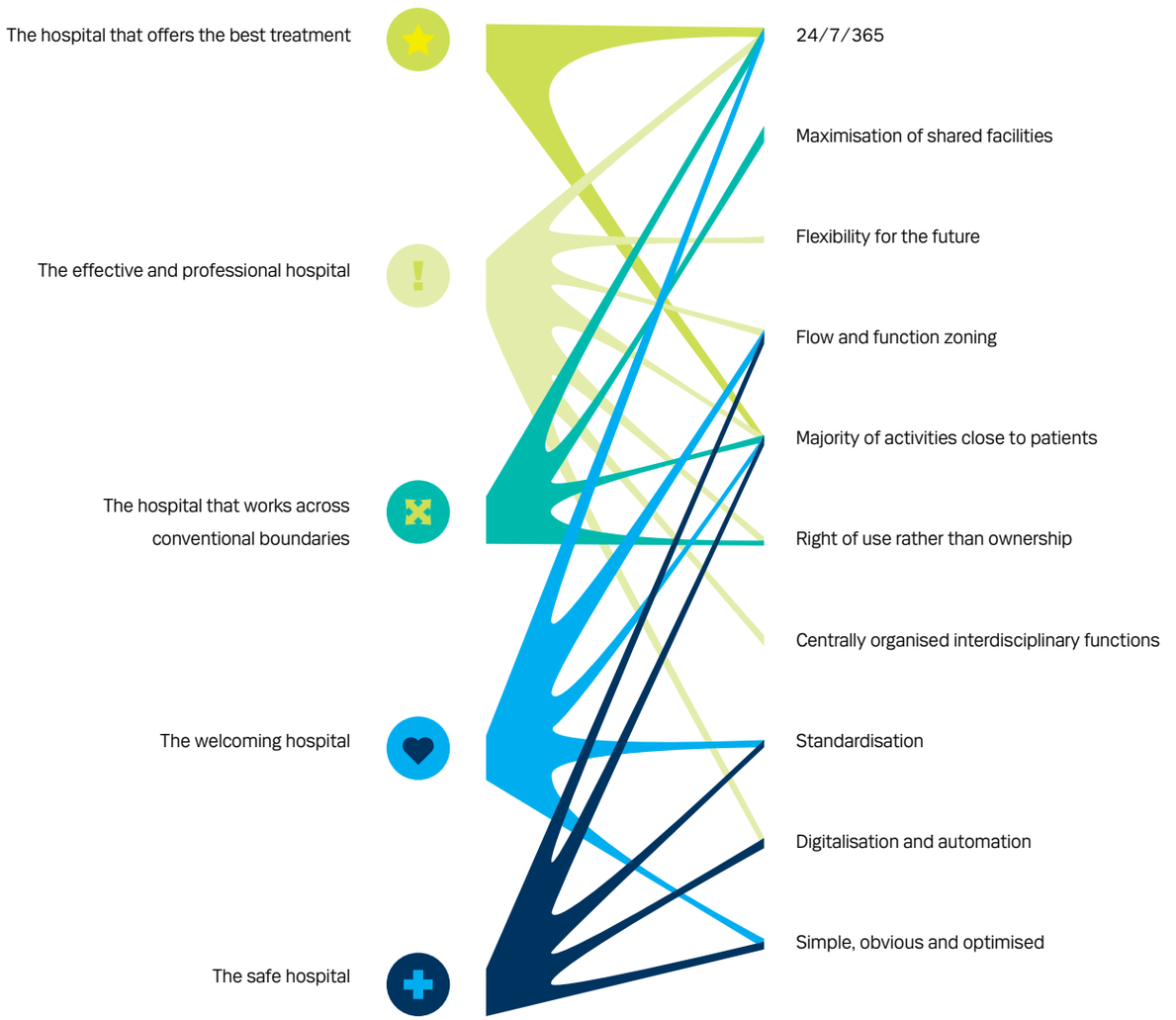
ZMET is a data compilation method that uses pictures, stories and metaphors to help people put words to their feelings and thoughts about a certain subject. In 2010 a representative group of staff from the three hospitals were asked to collect pictures and narrate stories that illustrated their thoughts about the current hospital and the hospital of the future. Their stories and pictures were used in formulating the vision for the new hospital.

Workshops on future scenarios

THE VISION-FORMULATION PROCESS FOR NEW NORTH ZEALAND HOSPITAL

The five guiding principles

Space management principles
The ten principles on the use of floor areas were developed on the basis of the five principles governing development at New North Zealand Hospital. See next page.



SPACE MANAGEMENT PRINCIPLES

From vision to design
A number of space management principles have been formulated to guide the connection between the vision and the guiding principles on one hand and the actual design of the hospital on the other.

The new hospital should be designed within a framework of a floor area of about 128,000 m2. The layout and organisation of the hospital must therefore be carefully considered, and for that purpose we have set up a number of space management principles that will ensure good use of the floor areas.

The ten principles are clear indicators of how a given floor area should be organised in the new buildings when the needs and requirements defined are translated into physical facilities. Deviation from the principles is not allowed, as it would affect compliance with the total floor area plan for the project.

Space management principle 1

24/7/365

The hospital's acute function will be a pivotal point as regards:
- Treatment
- Flows
- Staffing
- Layout of premises

Space management principle 2

Maximisation of shared facilities

Optimal use must be made of the hospital's capacity. This should be ensured through the following approaches:
- Multipurpose rooms
- Shared use of functional areas
- New approaches to work routines to avoid single-use areas

Space management principle 3

Flexibility for the future

The layout of the facilities should be conducive to later extensions and functional changes, which should be feasible without any negative impact on operations.

Space management principle 4

Flow and function zoning

The utilisation of space is based on a division into different zones, and the following principles apply:
- Separate flows for goods, patients and patients' families.
- On-stage/off-stage philosophy, ie people can 'relax' when they are off stage, but their entire focus must be on the patients when they are on stage.
- Function zones in rooms and units for patients, patients' families and staff respectively.
- Zoning of areas based on needs for individual shielding and access.

Space management principle 5

Majority of activities close to patients

The single-patient rooms must be used optimally, for example for the following purposes:

- Sample taking
- Bed washing
- Conversation
- Rehabilitation
- Examination
- Dictation
- Eating
- Ward rounds
- Record keeping

Space management principle 6

Right of use rather than ownership

The hospital is a single entity, which means that:

- The unit 'owns' the patient, not the bed
- Office workstations are available, but not personal
- Ancillary rooms, kitchens, break and lounge areas, and equipment are communal and thus shared by all units

Space management principle 7

Centrally organised interdisciplinary functions

Both clinical and non-clinical interdisciplinary support functions should be organised centrally, but carried out locally to adhere to the principle of having as many activities as possible close to patients.

Space management principle 8

Standardisation

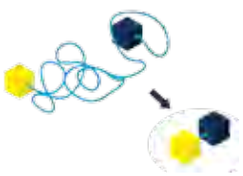
- Standard room sizes
- Standard layout and furnishing
- Standard installation levels

Space management principle 9

Digitalisation and automation

- Technological optimisation of work procedures and processes
- Automation wherever relevant

Space management principle 10



Simple, obvious and optimised

Smart solutions, clear systems and logical connections should characterise all planning and layout.


ASSIGNMENT

CHAPTER 2

Entrants in this design competition are requested to prepare a masterplan that complies with and furthers the new basic structure of the Capital Region. The masterplan must illustrate and describe the physical foundation for the future activities of the new hospital.

South view from the competition site

The masterplan must present proposals for a new somatic hospital to be built on greenfield land and feature the following facilities:

Wards	23,220 m2
Outpatient clinic and day ward	5,593 m2
Surgery including various scopic examinations	3,980 m2
Other interdisciplinary functions	8,850 m2
Research and education	1,998 m2
Offices and administrative facilities	7,560 m2
Logistics, supplies and service functions	12,799 m2
Total	**64,000** m2
The gross/net floor area factor is set at 2.0,	
which results in a total gross floor area of	**128,000 m2 brutto**

Competition entries must include proposals for optimisation of the areas used for hospital functions, as maximum flexibility in the use of the areas is required. The ten space management principles set out in Chapter 1 must govern the design and layout of the physical environment. Chapter 8 of Volume II contains descriptions of a number of concepts that can be used to translate the space management principles into practice.

FACTS

The competition is a two-stage competition.

In Stage 1 (this design competition), up to three winning entrants are selected and invited to participate in Stage 2, the negotiated procedure.

Entries should generally present arguments for and illustrate the logistic, functional and architectural choices made, and should also show how the facilities can be adapted in the short and long term.

Entries should provide responses to following questions:

- How can a new acute hospital with a gross floor area of about 128,000 m2 be laid out optimally so that it is possible to offer patients good, coherent treatment pathways and staff optimal work procedures?
- How can the organisation of the areas for the various functions be reconsidered to ensure compliance with proximity and interrelationship requirements?
- How can it be ensured that the overall architectural concept of New North Zealand Hospital is so powerful that it will set the standard for new hospital buildings?
- How can it be ensured that the building is robust and based on optimal guiding principles for load-bearing structures, supply lines, installations and logistics?
- How should the building structure be designed so that it can continue to accommodate new needs and requirements and the resultant changes that are characteristic of hospital buildings?
- How should the hospital be located on the site, in the urban context and in the landscape to ensure optimal traffic and transport conditions (including public transport, car parking and bicycle parking facilities) in combination with visionary landscaping of the open areas around the hospital?
- How can the service village be laid out optimally in the built-up structure?
- How can the production kitchen be trimmed down to a food reception kitchen?
- How can a water treatment plan be laid out and integrated optimally in the built-up structure?
- How can a possible helicopter pad be integrated optimally in the built-up structure?
- How can it be made possible to unite psychiatric facilities in Planning Area North? (On this point, competition entrants need not stay within the boundaries of the competition site but may use the future extension area [see Chapter 11]).
- How can the project be realised in stages when dividing the total building and construction projects into smaller, manageable entities?


LOGIST


ICS
3
CHAPTER

The focus at New North Zealand Hospital is on ensuring optimal patient pathways supported by building logistics that ensure optimal patient and work flows. To achieve this, optimisation and streamlining of logistic processes are required, just as staff workloads should be reduced to a manageable level.

In this context, 'logistics' means both internal and external logistics in the following sub-areas:

- Flows of people
- Flows of goods
- Production areas
- Asset management
- Waste handling

Future logistic structure

The most important success criterion with respect to logistics is that it is possible to provide the right service in the right quality and at the right time. Consequently, it is important that the hospital be provided with a logical infrastructure that ensures the following:

- That distances are short everywhere and that the location of the various facilities is such that it is possible to apply work procedures that allow savings in manpower and operating costs, while at the same time ensuring good working conditions for staff.
- That operations and security of supply are highly reliable, that health, safety and hygiene standards are optimal, and that correct storage and transport system s are conducive of high patient safety levels.
- That work procedures are efficient and the quality of services is high, so that patients and their families feel secure and feel they are receiving a high level of service.
- That systems are supported effectively and that processes are transparent so that operating costs are optimised and productivity increased.

In the masterplan for New North Zealand Hospital, the requirements concerning layout and the organisation of processes and connections should be reflected in the logistics structure chosen by the entrant in the form of quality, professionalism, high standards, coherent flows, technology and communication.

The following is required:

- A separate service centre/separate storage facilities optimised for the purpose.
- A centrally located goods reception area.
- Coordinated and automated distribution of goods, samples, linen, food and uniforms.
- Logistics and transport connections based on the on-stage/off-stage principles with separation of clean and dirty items and separation of goods, patients and staff.
- An efficient ordering and inventory management system allowing tracking and financial optimisation of operations.
- Technological system solutions that are robust and can be adapted to future needs related to changes in the hospital's primary functions.

SPACE MANAGEMENT PRINCIPLE 4

Flow and function zoning

SPACE MANAGEMENT PRINCIPLE 9

Digitalisation and automation

We must learn from the world around us. Flow control and control of supply at the hospitals of the future share many features with similar activities in other industries.

“THERE MUST BE ROOM FOR THINGS **WE HAVEN’T EVEN INVENTED YET”**

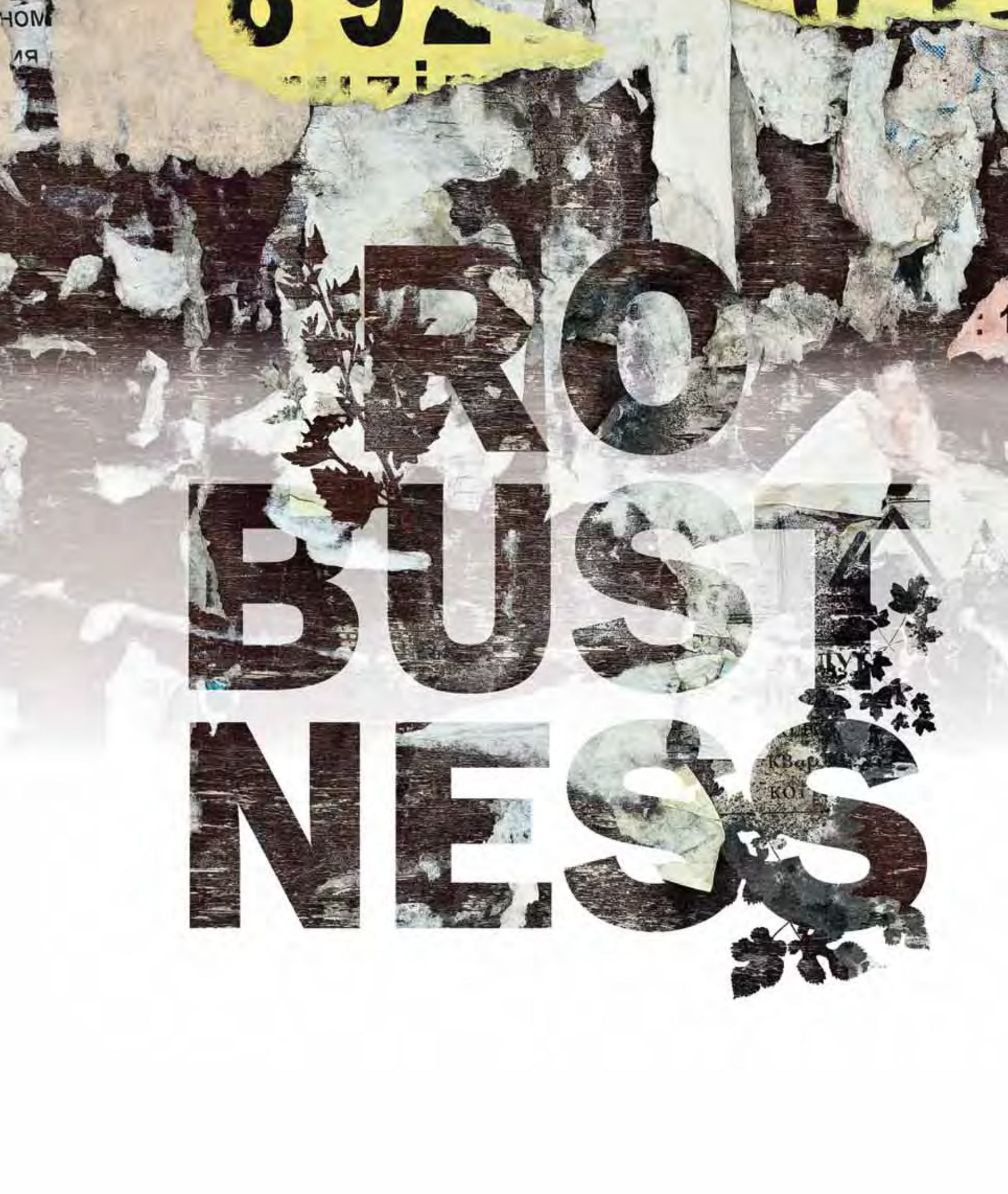
Quote from the 2012 User Process

Bed storage at Hillerød Hospital.

INFORMATION!

Bellevue Clinic, Seattle Children's Hospital. Working closely with the staff of the future clinic, American architects NBBJ designed a new outpatient facility at the hospital campus, using a LEAN approach throughout the process. There was a great focus on ensuring efficient floor plan solutions and including multipurpose rooms in order to reduce walking distances and time consumption, but an additional benefit was a 20% reduction of the overall floor area of the facility. Nevertheless, there was room for separate flows for patients/patients' relatives and staff, which also helped ensure optimal efficiency and fitness for purpose.

Using the Integrated Project Delivery (IPD) and Continuous Performance Improvement (CPI) methods, the planners were able to keep a clear focus on efficiency and space optimisation. The pay-off of the project was more service in less space.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МЕБЕЛЬ НА ЗАКАЗ:
Шкафы-купе, Кухни
Детские, Стенки
Гардеробные

4

CHAPTER

ROBUSTNESS

All three hospitals as they stand today are designed to have many bed-ridden patients. In future, a much larger share of patients will be outpatients. Also, an increased number of inpatients will be very ill, and their disease pathways will be more complicated. However, this does not mean that patients will be passively lying in their beds: many activities will take place around the individual patient, and activity space will generally be needed. It is crucial that the floor areas of the future hospital be optimised so that the hospital can cater to this new treatment approach and the various complex treatment pathways. There should also be a great deal of emphasis on ensuring a high level of architectural quality.

A key element in any good response to the competition brief is how the proposed scheme integrates and interprets the concepts of future proofing and buildability.

Future proofing

"Planning for Uncertainty – Designing for Change"

Susan Francis, NHS

Challenges and opportunities change quickly in the healthcare sector. New treatments and therapies will inevitably emerge over time. When creating a new physical environment most likely to be fully functional for the next 50-100 years, designers should base their design on robust strategic planning that leaves room for changes as yet unforeseen.

At present, the line between hospital and home is no longer clear-cut. Technology provides new opportunities, which mean that treatment need not necessarily take place in hospital. Furthermore, new, accelerated treatment methods and new applications of information technology continue to be introduced.

In addition, the demographic trends mean that planning should also take into consideration a relatively near future in which it is highly likely that there will be fewer human resources to provide care and treatment.

Against this backdrop, it seems obvious that future investment in new buildings must involve a great deal of focus on ensuring that the buildings can be adapted to new uses. However, it must also be borne in mind that some areas will remain static due to their special layout or installations. The buildings must be able to adapt to extensions and conversions that become necessary after the facilities are opened, and must be able to do so without any detrimental effect on the architecture, infrastructure or functionality of the facilities.

A number of principles have been defined to help ensure a robust physical environment that is able to embrace possible future changes and cater to new needs and requirements.

Entrants are asked to design a building that is particularly robust in the three following respects.

Elasticity
It must be possible to expand or reduce the floor area of the building to meet changing requirements.

Previously a hospital was considered to be flexible if its capacity could be increased whenever necessary, but this is not necessarily the case today. Some areas may become superfluous, but it should be possible to use them for other purposes, allow them to be used by other sectors, or remove them completely. Conversely, new patterns of disease or new treatments may increase floor area requirements at the hospital.

The schemes submitted should take into account possible variations during a day, week or year. Certain types of somatic illness are seasonal (eg pulmonary diseases in the wintertime); others vary from day to day (eg fractures when roads are slippery). Needs also vary over the course of a day: outpatients are the predominant patient group during the daytime, whereas acute admissions take place in the afternoon and evening.

Generality
The building design must feature standard solutions so that modifications can be made without changing load-bearing structures, technical installations, general access routes or connections.

Entrants are asked to provide differentiated documentation of the benefits of such flexibility, as it may be necessary to base the building project on the highest common denominator, for example as regards technical installations.

Flexibility
It must be possible to remodel or change the physical environment quickly and easily to meet new requirements and serve new purposes while avoiding any loss of operating efficiency.

BUILDABILITY

High architectural quality in no way precludes the use of simple buildable solutions. Entrants' choice of structural principles and construction approaches should reflect this philosophy, and it must be ensured that the potential for creating high quality offered by the fact that the building is to be located in a protected environment is tapped and influences the overall solution. It is also important to focus on optimal solutions in terms of construction logistics, use of repetitive elements, building integration solutions and the use of integrated product supplies and prefabricated elements.

An essential parameter in relation to buildability is the possibility of erecting the building as a sequence of several small modules. This parameter should be taken into account in the design of the entire hospital. ■

INFORMATION!

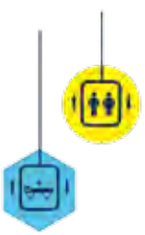
An analysis of prefabricated elements can be made by assessing each individual element on the basis of the following criteria:

- Several identical entities with a high level of repetition
- Time savings in installation
- Flexibility needed: What is the likelihood of the room function changing?
- Easy incorporation of building elements into the carcass structure
- Cost

Entrants should endeavour to use prefabricated elements that obtain high scores in relation to these criteria so that an attractive solution is achieved in terms of overall costs.

Several hospitals are designed with a great deal of focus on repetitive elements and pre- or semi-fabricated products. From elements to systems. We should not create constraints that will restrict future use.

SPACE MANAGEMENT PRINCIPLE 3



Flexibility for the future

“IT FEELS GOOD TO BREATHE IN FRESH AIR. THE SKY IS HIGH AND THE HORIZON WIDE. THERE IS ROOM FOR MANY THINGS.”

Quote from the 2012 User Process

The competition site

INFORMATION!

INO PROJECT, INSELSPITAL BERN
The 50,000 m2 hospital includes an intensive-care unit, a surgery department and an acute admissions unit.

The Open Building method was used in the planning of the hospital, which is an example of a systematic method to handle change that makes the physical building structures adaptable to new needs and requirements over time.

The building facility is divided into three autonomous systems based on planned lifetime. The systems will be planned and tendered separately.

01 Primary: Building carcass/structures with a lifespan of 50-100 years
02 Secondary: Building envelope with a lifespan of 15-50 years
03 Tertiary: Hospital equipment and furniture with a lifespan of 5-15 years

It should be noted that an assessment of the usability of this method need not necessarily include all systems, which may help reduce the number of interfaces. This is an important aspect, as all transitions and interfaces require a high level of monitoring in a complex building structure such as a hospital.


LANDS
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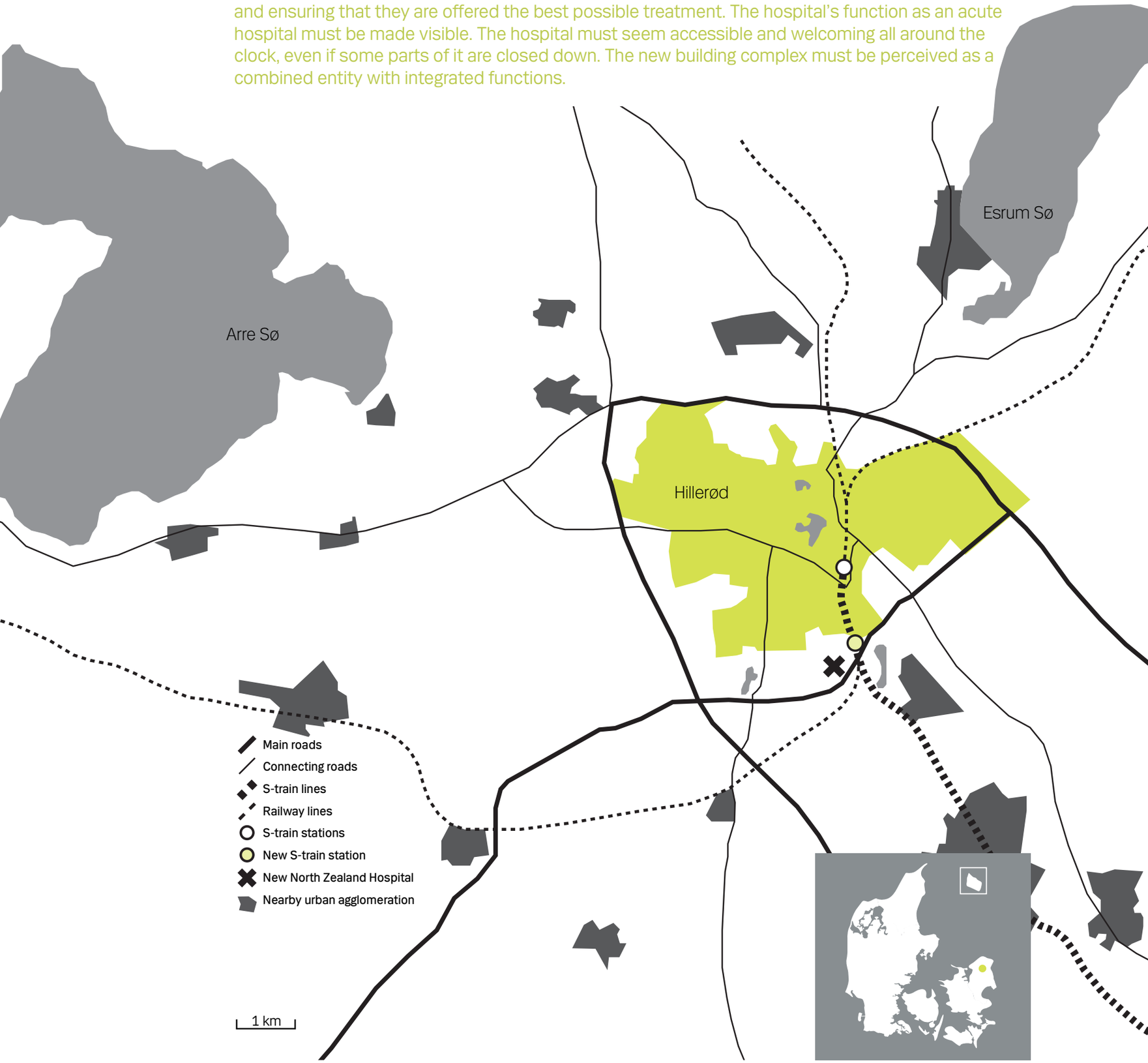
CHAPTER
5

A new building built on greenfield land will offer numerous opportunities to create an optimal physical setting for the hospital. Efficient logistics, a rational plan layout and optimal technical solutions can be combined with good architecture and thus further the objective of giving centre stage to patients and ensuring that they are offered the best possible treatment. The hospital's function as an acute hospital must be made visible. The hospital must seem accessible and welcoming all around the clock, even if some parts of it are closed down. The new building complex must be perceived as a combined entity with integrated functions.



Map of the area in which the new hospital will be located

North view from the competition site.

1. Wayfinding is facilitated by views of the surroundings. **2.** "Balancing Barn" by MVRDV places itself daringly in the landscape. **3.** New Martini Hospital - study visit, April 2012 - The hospital is set around an inner yard with benches carefully installed on the lawn.

LANDSCAPE

Located on the fringe of Hillerød on a site with good future road and train connections, the new hospital will have a central location in North Zealand.

The site of the new hospital covers an area of about 30 hectares located to the north of the Overdrevsvejen road and to the south and west of the Salpetermosen marsh and the S-train line that connects Hillerød with Copenhagen.

Further information about the site and relevant planning is provided in Chapter 11 of Volume III.

Blending in with the landscape
The building of the new hospital is the first step in the development of an area that used to be farmland, and this will greatly influence the future nature of the area. Since the area has been zoned as a new urban development area in Hillerød, it will change over the next few decades, becoming increasingly urban. The landscaping of the area is thus very important: it should ensure that the hospital and the site on which it is located are a pleasant distraction, just as it must provide good views from the buildings – also in the future when the area is fully developed.

A characteristic feature of the competition site is that it contains shallow dipped areas, small ponds and water streams that add great variation to the landscape. The architectural design should take these special characteristics into account and use them to help create an array of experiences. For example, low-lying areas could be used as wetland areas that ensure drainage of the site and contribute to the recreational experience of landscape and buildings.

As a whole, the site features a varied landscape: the proximity of woodlands is clearly felt, and the structure of the landscape provides varying harmonious visual experiences. It is important that the landscape and the buildings be designed as an organism in which the various elements complement each other and lend support to the future character of the area.

The hospital must be situated so that it does not obstruct views of Frederiksborg Castle from the grounds around it.

Traffic and general infrastructure
The infrastructure must be laid out and designed on the basis of the landscape context and the planned development of the area. It should be perceived as being easy to understand, intuitive and accessible, and entrants should focus on avoiding traffic bottlenecks.

Traffic to and from the hospital must be as smooth as possible, which means that access to the hospital site from the ordinary roads should be easy for ambulances, patients, patients' families and staff. Heavy vehicles must be segrated from other road-users, and there must be unobstructed passage for ambulances and other emergency vehicles. In general, there must be safe road crossing areas for vulnerable road users. Circulation should be safe for pedestrians, cyclists, car drivers and lorry drivers alike. Finally, it should be possible for all road users to orient themselves easily in the area.

Entrants are requested to indicate principles for the organisation of bus traffic, including appropriate locations of bus stops, which should be easily accessible from the paths in the area. A kiss-and-ride lane, a taxi lane and a bus lane must be located close to the main entrance.

In general, priority should be given to ensuring good conditions for pedestrians and cyclists. On-site bicycle lanes and footpaths should be connected to external lanes and paths. They should be well lit, and all crossings and passages must be step-free.

A number of recreational footpaths with purpose-fit surfacing should be established from the northern to the southern end of the site.

Roads, paths and other connections must comply with all applicable rules and regulations and dimensions so that they can be used for the expected peak period traffic loads (see Chapter 11 of Volume III).

Entrants must indicate where a helipad could be located close to the emergency department. There must be easy access between the helipad and the emergency department, but the helipad should be located where the noise from helicopters will cause a minimum of nuisance to hospital activities.

SPACE MANAGEMENT PRINCIPLE 4

Flow and function zoning

Should also be used in the layout of outdoor connections.

PARKING

Required parking spaces:

- At least 2,800 car parking spaces
- At least 1,200 bicycle parking spaces

All parking must be in outdoor car parks, so it is important that the parking areas are well incorporated into the landscape and form part of the overall architectural concept.

Good connections based on a logical and intuitive wayfinding system must be established between the parking areas, the system of paths at the site and the entrances to the hospital. The system should be a natural continuation of the system used inside the hospital buildings. Paths leading to and from car parks must have hard surfacing and be accessible to everyone.

Bicycle parking areas should be concentrated close to hospital entrances, and covering structures should be consistent with the overall architecture of the hospital complex.

Outdoor areas
Open areas around the hospital should be well integrated into the overall scheme and easily accessible. It must be evident which areas are open to everyone and which are reserved for patients with special needs. Activities in adjacent areas should be drawn into the hospital site to provide distraction and recreation to hospital users.

The areas must be used strategically and contribute to the overall experience of the hospital. Visitors should feel that they can intuitively find their way to their destination.

Entrances and in-house connections
The main entrance is a pivotal point, as it is where patients and their families first meet the hospital. It is therefore key in the communication of the general wayfinding system as well as an essential element in the overall perception and experience of the architecture of the building complex.

The main entrance and adjacent areas should be laid out in such a way that they stand out clearly from the rest of the building complex. The location of the main entrance should be convenient and functional in relation to the infrastructure at the hospital as a whole.

SPACE MANAGEMENT PRINCIPLE 2

Maximisation of shared facilities

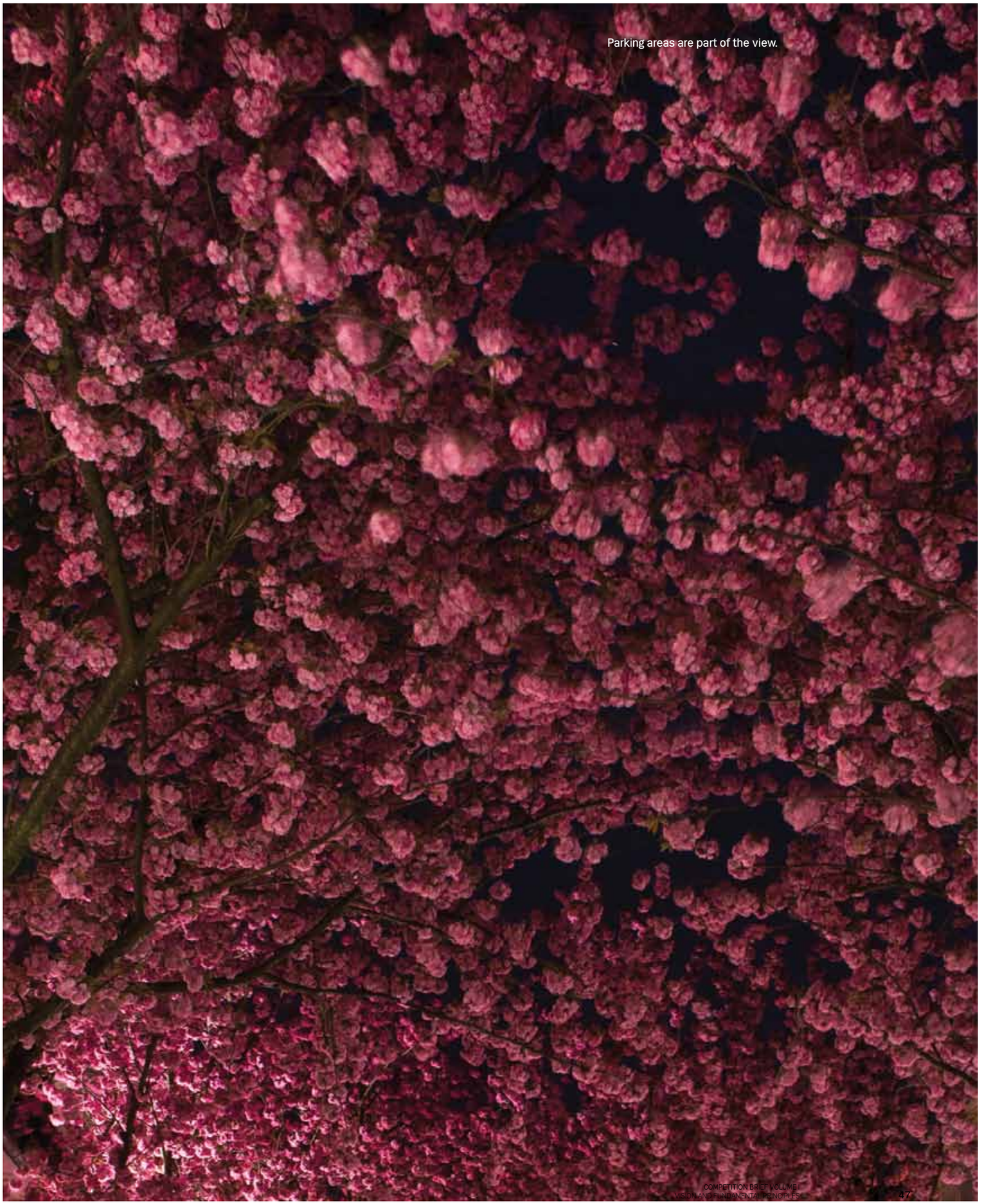
A distinctive, well organised main entrance providing a natural focus for distribution to other functions

INFORMATION!

ON STAGE/OFF STAGE: FOCUSING ON THE PATIENT EXPERIENCE.

The concept of on stage/off stage is taken from experience economy terminology and is widely used by organisations such as the Disney Corporation. It has also been embraced by several hospitals in recent years as a new way of looking at their service and management strategies.

On stage is where staff meet patients and patients' families with hospitality, attention and care.
On stage is where patients are spared commotion, unnecessary noise and clutter, where time spent waiting is made attractive, and where the physical setting contributes to the quality perceived by the patients.
On stage is **not** where patients are in a lift with a waste cart and two nurses on their way to the staff changing rooms after their night shift.
Off stage is where practice reigns and where things are accessible.
Off stage is where staff can take off their shoes, let off steam and unwind.
Off stage is **not** where patients' families are taken to be given a serious message or where bedridden patients are parked because it is an easy solution in a tight spot.



Parking areas are part of the view.

Examples of useful wayfinding elements in addition to signage

- Views of outdoor areas
- Characteristic building elements
- Colour coding
- Art

The main entrance area should provide ease of overview, be spacious and make people want to linger. It must serve as a natural central distribution area with easy access to the primary hospital functions. It should guide people along in a flow with clear connections and points of orientation, both horizontally and vertically.

Other entrances and connections should clearly show whether they are for the general public or reserved for staff and support activities. Connections of the latter type should be appropriate for their purpose and help make distances short and flows easy.

BUILDINGS

The design of the North Zealand Hospital should be based on the building functions and infrastructural systems combined with a visionary and innovative architecture. The hospital and its context should be developed on the basis of a strong architectural concept with a viable idiom that can be adapted over time.

The building complex should be characterised by a logical overall structure that facilitates optimal patient pathways.

Facades should be nuanced and reflect their surroundings. The materials and details must help meet the requirement of a low-maintenance building with surfaces that preserve their appearance for many years after the opening of the new facilities – or even acquire a more attractive appearance.

Underlying functions and logistics must be easy to decode in the design and structure of the building complex so as to make the building easily accessible and facilitate wayfinding. It is crucial that the architectural design and the layout of functions help ensure that individual users perceive the hospital as welcoming and easy to navigate, and feel they are met with respect.

Flexibility and generality must be inherent features in the overall layout of the hospital and in the individual functions. Physical restructuring will be required in connection with future changes and new needs and requirements. Such restructuring must be possible within the framework of the architectural concept proposed.

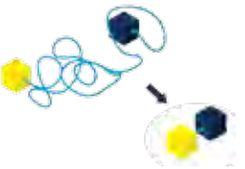
When preparing the overall architectural concept, entrants are asked to apply sustainability principles and principles ensuring optimisation of hospital operations. The principles applied must be based on the principles defined by the Capital Region.

Interior courtyards must have light-coloured facades, and they must be welcoming and easily accessible.

Visible roof surfaces should contribute positively to the overall appearance of the hospital.

The architectural concept and overall layout should indicate that the hospital is efficient and welcoming, and that it respects its users.

SPACE MANAGEMENT PRINCIPLE 10

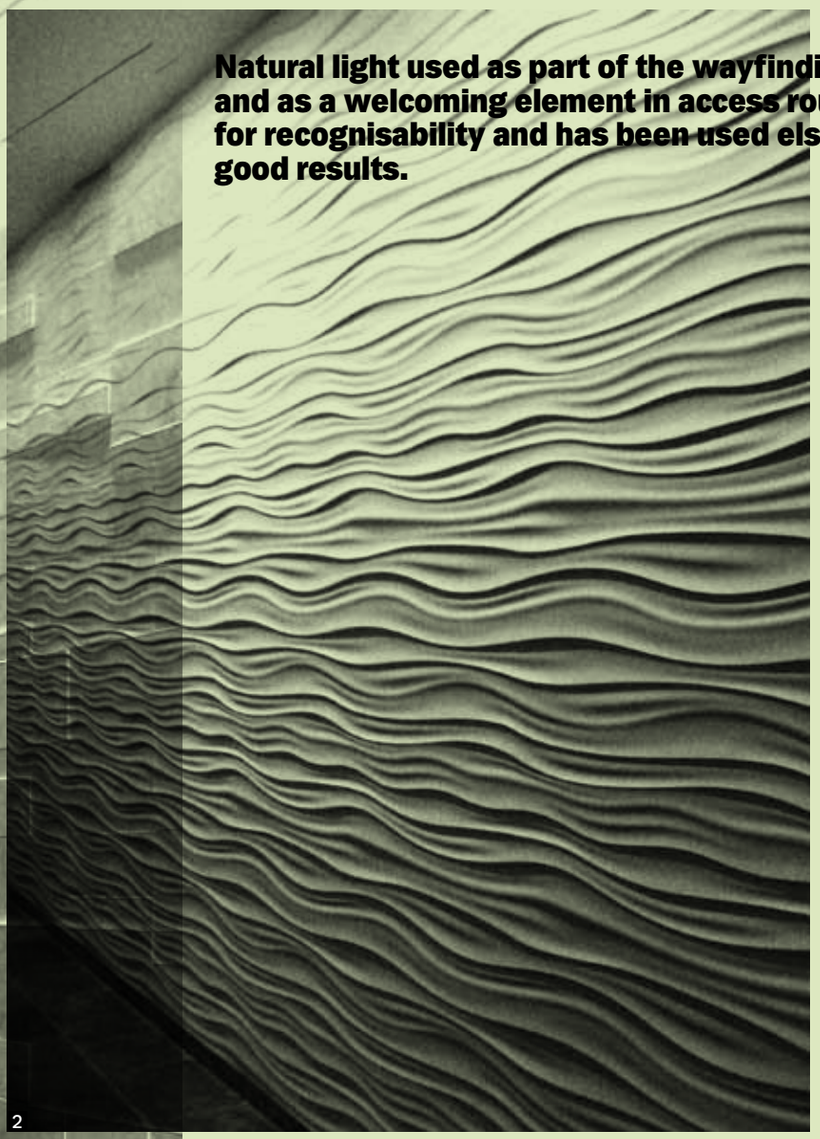


Simple, obvious and optimised

1. Study visit in connection with HCD10 conference. Las Vegas VA Medical Centre under construction. The facades feature built-in solar panels and heat-rejecting composite panels. **2.** Examples of exterior solar screening. Melbourne City Council.

One of the reasons why natural light works well as a wayfinding element is that moving sunlight and shades have a great impact on people's ability to orient themselves.

1



Natural light used as part of the wayfinding system and as a welcoming element in access routes makes for recognisability and has been used elsewhere with good results.

2

3

4

1 & 2. Study visit to Florida, November 2009. Gainesvilles Shands Hospital. **3 & 4.** 21st Century Museum, Japan, designed by SANAA. The large glass facades almost remove the boundary between outside and in.

Interiors

The interior design of the buildings must be consistent with the functions of the rooms and encourage appropriate behaviour, just as it should make the rooms easy to clean and maintain. Well-organised flows of spaces are important: natural light and volumes should enhance an already powerful architectural idiom. Communal areas should have a spatial organisation that makes people want to stay in the rooms, as well as enhance patients' and staff's wellbeing and perception of quality.

Light

Both natural and artificial light are very important in determining the way people perceive their surroundings. This is true of patients, relatives and staff alike. Lighting must be differentiated, not only from room to room but also within each room, and it should also be possible to vary the lighting for different functions.

Both Danish tradition and Danish rules and regulations require the intake of natural light in rooms, but the intake should be subtle and a source of wellbeing rather than a nuisance.

Where it is difficult to achieve diurnal light levels, the light sources should provide lighting similar to natural light and that the intensity of the light can be changed to simulate diurnal light.

Artificial light should be differentiated, provide correct colour rendering, support the form and function of the room, and help generate a both attractive and secure atmosphere.

INFORMATION!

Patient rooms should be a secure and comfortable zone for patients and their families, and they should be well suited for confidential talks with healthcare professionals. Light in the rooms should be pleasant, and it must be possible to see and read people's facial expressions clearly. Nurses have to be able to dispense medicine and draw blood samples in the patient rooms, so correct colour rendering and enough light to select the right colour pill and draw blood samples without problems are important. Furthermore, the lighting should be bright enough for housekeeping staff to see even the smallest amounts of dust and grit so they can clean patient rooms properly in preparation for the next patient.

Obayashi House, Tadao Ando and Olafur Eliasson - Close collaboration between architect and artist.

Sound

Patients need quiet patient rooms where they can sleep undisturbed. This is very important to the healing process.

Patients and staff need rooms they can use to pass on messages and talk. These rooms should be laid out so that the activities in them can take place without disturbance, and the needs of people with hearing impairments should be taken into account in their design. Staff need acoustically comfortable areas close to patients where they can relax during breaks and 'recharge their batteries'. In active clinical areas, it is vital that the acoustics allow people to hear what is said and eliminate unnecessary noise.

Well considered furnishing of rooms, appropriate surfaces and noise-reducing measures are other important aspects of a healing environment for patients and staff alike.

Various sound sources can be used artistically as part of the hospital's wayfinding system and as a good distraction for patients. Such sound sources could include water, wind, music and various direction-indication sounds.

Acoustic regulation and noise reduction must be taken into account at an early stage of the design process so that technical installations and the materials chosen support and complement the architecture and functionality.

Air

There should be access to fresh air and outdoor spaces both from lounge areas and patient rooms. Furthermore, adequate ceiling heights should help create a positive experience of spaces and provide a good indoor environment with natural ventilation wherever appropriate.

SPACE MANAGEMENT PRINCIPLE 2

Maximisation of shared facilities

SPACE MANAGEMENT PRINCIPLE 5

Majority of activities close to patients

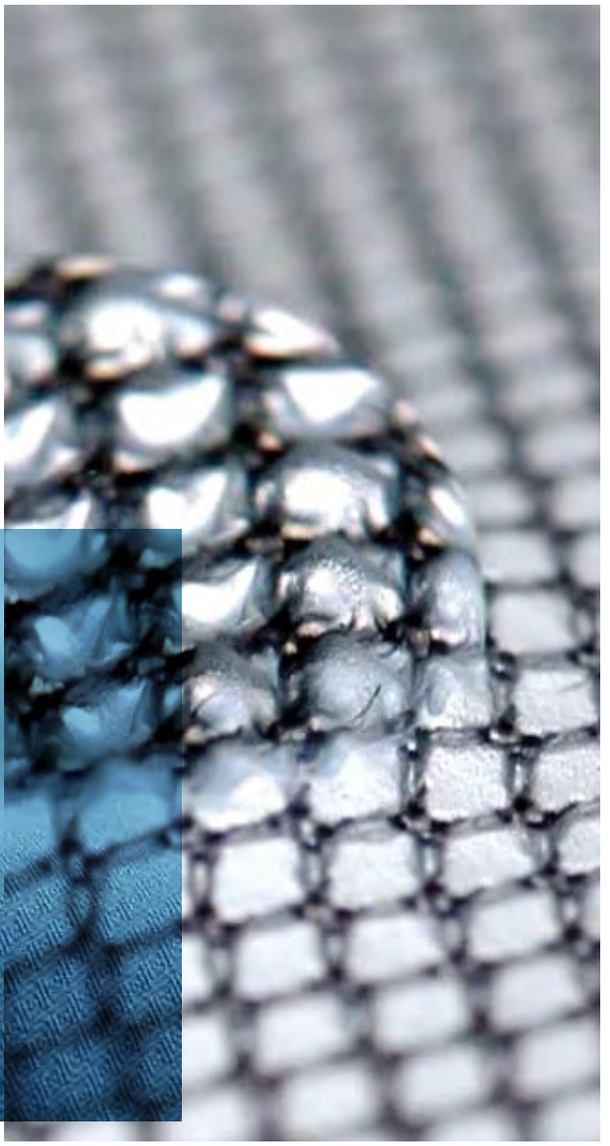
„SILENCE, IS [...] SOMETHING YOU CAN ACTUALLY HEAR.“

HARUKI MURAKAMI,
KAFKA ON THE SHORE

Materials and colours

The materials and colours chosen by entrants should be supportive of functions. It should be taken into consideration that different patient groups may have different needs and preferences. Colours may be conducive to a specific activity. For example, what is needed in a lounge or eating area will differ from what is needed for clinical areas.

Good hygienic standards are a universal requirement. Consequently, the cleaning of the facilities must be facilitated both through design and details and through materials, surfaces and colours. The colour scheme should be such that it is easy to see when cleaning is needed. Natural surface materials should be used wherever



‘Intelligent textiles that show when they are infected’

Study visit in January 2012 to Universitätsklinikum Hamburg-Eppendorf. Patient room with oiled wood block flooring.

DS 3028 ‘General accessibility’, must be complied with

http://www.sbi.dk/tilgaengelighed/bygningsindretning/tilgengelighed-for-alle

DS 105 ‘Outdoor areas for everyone’, must be complied with

http://www.sbi.dk/tilgaengelighed/ubebyggede-arealer/udearealer-for-alle

possible. Furthermore, it should be possible to use new technologies in the fields of cleaning and materials.

Accessibility
Everyone should be able to use the hospital. This is a simple statement, but also one that is open to many interpretations. The Regional Council emphasizes that special attention should be paid to people with disabilities in the design of the facilities. A clear focus on accessibility can contribute greatly to achieving this objective.

The hospital must be physically, visually and mentally accessible.

- Physical accessibility is necessary to ensure that all patient groups can use the hospital without the help of others.
- Visual accessibility is necessary to ensure that the architecture provides orientation points both indoors and outdoors, like a lighthouse.
- Mental accessibility is necessary to ensure that everyone feels welcome when they arrive at the hospital and when they are received in outpatient clinics, wards and individual patient rooms. The building must be welcoming, and patients should be treated with respect as equals.

Structures
The location of vertical load-bearing elements should be such that subsequent change to the interior layout of the buildings is possible.

The design of walls and slabs should take into account that it may become necessary to extend pipes, ducts and cableways for technical installations at a later date.

Structures must be prepared for pipes, ducts, etc for technical installations.

Storey heights must provide sufficient space for pipes, ducts, etc above suspended ceilings and/or under raised floors. The design must take crossing installations, pitches and structural tolerances into account. Room heights should be chosen to provide room for possible natural ventilation systems.

When designing apertures and openings, entrants should take into account the size of the medical equipment to be located in the individual rooms.

It must be possible to dismantle some facade elements and underpin transport routes in certain areas to allow replacement of large-sized and heavy equipment.
It must be possible to replace large-sized equipment in individual rooms without otherwise disturbing hospital operations elsewhere.

TECHNOLOGY

Supply systems and technical installations must be designed and executed on the basis of these two important criteria:
- Security of supply
- Minimisation of energy consumption

In future stages, analyses must be made for the various systems to determine how these criteria can best be met within the framework of the project – also to determine whether they should be centralised or decentralised systems.

The following is a description of supply systems and technical installations functioning at expected levels which will have to be verified in later stages.

Supply systems
The following external supply systems must be established:

- Water supply system
- Heating supply system
- Drainage system for wastewater and rainwater
- Power supply system
- IT supply system
- Cooling system

The technical supply systems must ensure that the hospital can function all around the clock throughout the year. They include the following systems:

- Rain- and wastewater systems
- Utility water and treated water systems
- Medical gas and vacuum systems
- Process energy systems
- Cooling systems
- Heating systems
- Ventilation systems
- Sprinklers and fire hydrant systems
- High-voltage and emergency power systems
- Low-voltage systems; IT, surveillance, security and backup systems; and patient communication systems
- Special systems/transport systems

Power supply
Power will be supplied from the Dong Energy grid. The power supply is considered the most important utility supply to the hospital.

The amount of power required is likely to mean that the power supplied to the hospital site will be in the region of 10kV. From the connection points, the voltage will be converted to the levels relevant for the hospital. Power will be supplied to the site at two separate supply points, both of which will be able to supply 100% of the power needed.

Security of supply must be ensured through three different types of supply: daily supply, emergency supply and no-break supply. The emergency supply should be provided via an independent emergency power generation system that can supply enough power to cover the entire hospital. It should provide power at 10 kV level and be composed of a group of relatively small standard units so that a defect or error in one unit will not affect the overall security of supply, and also to allow expansion. The current estimate for the no-break system power requirement is about 500 kVA, but the capacity will have to be verified regularly at the various stages of the project.

The distribution network will be at 10 kV level. It should be a ring main system with its own distributing and transformer sub-stations.

The in-house main power supply up to the section board and distribution board should be designed so that all critical areas have redundant supply with respect to both supply sources and cabling.

Water supply
Water is supplied by the Hillerød Forsyning A/S waterworks.

The water supply to individual points of consumptions should be designed in a way that prevents microorganism growth.

The water supply for utility water, fire water and sprinkler system water must come from at least two independent public transmission lines connected as a ring main to ensure security of supply.

The water supply must be separated into utility water, treated water and fire water.

Wastewater and rainwater
Wastewater and rainwater should be discharged into the public sewer owned by Hillerød Forsyning A/S. Wastewater must be separated into critical and non-critical wastewater.

The public authorities focus a great deal on the types of environmentally unsustainable substances discharged from the hospital. Special measures for the collection and/or treatment of particularly critical wastewater flows may therefore be required. The Ministry of the Environment is currently preparing regulations on wastewater from hospitals which should be taken into consideration in the design and planning of the wastewater systems.

New requirements may include collection, aerobic digestion and disposal or the establishment of a pre-treatment system that will reduce the risk of discharging medical waste and critical bacteria. The exact scope of such measures cannot be determined until a later project stage.

There have been initial discussions with Hillerød Forsyning about the possible responses to such requirements. One suggestion in that connection was to set up an on-site treatment plant to treat all wastewater from the hospital, ie both critical and non-critical wastewater. Entrants are therefore asked to indicate an area within the site boundaries where such a plant could be located.

Rainwater must be handled locally at the hospital site either in the form of percolation systems or in the form of rainwater basins. See also the requirements set out by Hillerød Forsyning concerning the handling of rainwater (Chapter 11, Volume II).

Heating supply
Heating will be supplied by the district heating system owned by Hillerød Forsyning A/S. En energy central should be set up as part of the service centre, from which heating is distributed at the hospital site through an annular pipe, from which heating ducts run to plant rooms in the individual building sections. An emergency heating system must be installed, possibly in the form of an independent emergency heating station and possibly in collaboration with Hillerød Forsyning.

Cooling
The cooling needed at the hospital site is generally expected to be generated at the hospital's own energy central and directed to an annular pipe and local cooling pipes to technical plants in the individual building sections.

To ensure security of supply, the system could be based on the N+ principle so that it can supply 100% of the cooling needed at the hospital in the case of the failure of a standard unit or during system maintenance.

The cooling solutions chosen must be optimal in terms of total cost and sustainability.

Initial discussions have been conducted with Hillerød Forsyning about the possibility of the company being in charge of the supply of cooling. Further clarification of this matter is expected in the future project stages.

TECHNICAL SYSTEMS

Ventilation, heating and utility water
Ventilation, heating and utility water systems should be designed with a view to minimising the energy consumed to operate the systems. This should be done with due consideration of the requirements applying to indoor climate, patient safety and hospital equipment, as well as regulatory requirements concerning cleanliness, pressure, etc. In this connection it should be endeavoured to achieve the lowest possible total cost of ownership, while at the same time taking into consideration that the systems will probably have to be modified regularly.

Fire protection installations
Fire protection systems and installations are required that comply with the fire protection strategy that will be developed for the hospital in future design and planning stages.

Medical gases
A reliable supply of medical gases is an important parameter in the design of the systems, and could be ensured as described below, for example. It is also important that any built-in components be designed so that repair and maintenance is possible during operation and so that medical gases can be supplied from an alternative source.

Oxygen: The supply of oxygen should be provided by three mutually independent systems in a connected ring system, for example two cryo systems and a cylinder system for medical oxygen. Furthermore, a decentralised oxygen supply is needed at all floor levels.

Medical compressed air: There must be two production systems, each of which is able to supply 100% of the compressed air required. The systems must comply with applicable standards and be supplemented by an emergency supply of compressed air cylinders. The distribution system should be a built-in system, and the emergency supply of compressed air between buildings must be possible in a two-way system.

Medical vacuum: There must be two production systems, each of which is able to supply 100% of the medical vacuum required. The systems must comply with applicable standards. The distribution system should be a built-in system, and the emergency supply of medical vacuum between buildings must be possible in a two-way system.

Low-voltage and security systems
All the low-voltage and security systems needed to ensure proper hospital operations must be installed, including systems for the safeguarding of patients, staff, buildings and technical systems.

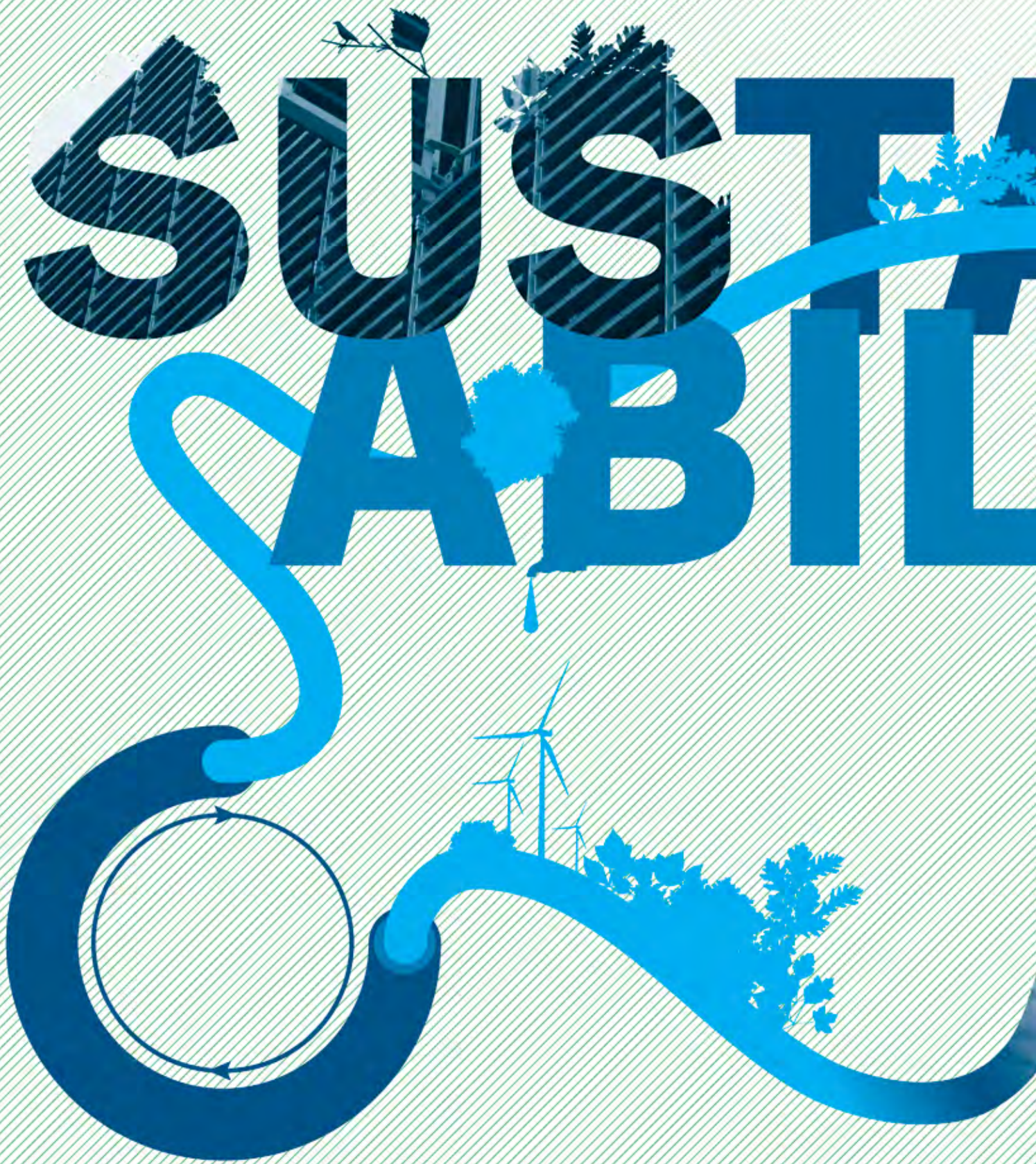
There must be a building management system (BMS) to which all other systems can be linked, to ensure that all systems are monitored and regulated. The ability to monitor consumption in individual areas and units is important.

Information and communications technology
The IT system should consist of three mutually independent redundant fibre ring networks, for example one exterior ring in the ground, one intermediate ring in the main duct and one inner ring between the various buildings. It must be ensured that all buildings are connected to two mutually independent fibre rings at each end. Distribution boxes in buildings should be supplied from to mutually independent fibre connections. Decentralised racks in separate locked rooms supplied with UPS must be established, and there must be a system in place to prevent overheating of the racks. Cabling must be installed in the individual building sections, with cabling from two separate racks to allow redundant connection of medical equipment.

Pipe and cable installations
Pipe and cable installations must be set up with redundancy leading to the individual units and so that the possibility and security of supply are not jeopardised when individual sockets or consumers are moved. Modifications should not cause disruption to day-to-day activities or to the use of the systems in question in the unit(s) concerned.

Pipe and cable installations should be split up into sections to ensure that any conversion or expansion for individual hospital units will not jeopardise the supply to the other units during the conversion or expansion process.

Vertical pipes and ducts must be divided into wet and dry pipes and ducts. ■


SUSTA
ABIL

CHAPTER 6

In its broadest sense, sustainable construction is based on social, economic and environmental sustainability. Given the primary functions of the hospital, the social aspects will be given the highest priority in an overall assessment of the hospital's sustainability. This section focuses on environmental sustainability, but the other aspects are covered in other sections of this competition brief.

New North Zealand Hospital must meet the Capital Region's general sustainability requirements. These requirements are grouped into a number of focus areas and are aimed at ensuring the general sustainability of the buildings. Based on a combination of the focus areas and the desire to create a healthy building framework for the hospital functions and the hospital users, a number of visions have been formulated for a sustainable New North Zealand Hospital.

Visions for a sustainable New North Zealand Hospital:

- The buildings should form a healthy, inspirational framework for the everyday activities of patients, patient families and staff and should further interaction and collaboration through a good indoor climate and high health and safety standards. Both the hospital's primary functions and its operations-related activities and aspect such as logistics, accessibility and safety are important in this respect.
- The hospital's consumption of energy and emission of greenhouse gases should be kept to a minimum without compromising on the quality requirements applying to the hospital. The energy design should be based on passive design parameters such as shape, orientation, wind adjustment, optimisation of natural light, ceiling height, energy storage in structures, etc.
- The special need for stable, adequate process energy for the primary activities of the hospital should be provided for. Furthermore, the building design should allow optimisation of energy needs and energy consumption for those activities through a clear concept of demand management and energy sharing. However, such optimisation should not compromise the activities or the comfort of the buildings.
- The architectural concept and the materials used should be based on reusable, degradable and abundant resources, so that the hospital will be a healthy climate- and resource-conscious facility throughout its lifetime. The architectural design should be such that any future new needs and technological requirements can be accommodated and embraced through modification and conversion of the facilities without any unnecessary use of resources.
- The volumes of clean drinking water consumed at the hospital should be kept to a minimum, and rainwater should be collected in a sustainable manner and used to create an attractive outdoor environment.
- The client expects New North Zealand Hospital to be certified as compliant with the Gold criteria set out in the DGNB sustainability system.

FACTS

In realising New North Zealand Hospital, priority should be given to the following focus areas relating to environmental sustainability (from 'The Capital Region: Sustainable buildings'):

Energy consumption and greenhouse gas emissions

- Control and minimisation of total annual greenhouse gas emissions in the construction phase and subsequently in connection with hospital operations.
- Control and minimisation of total annual energy consumption in connection with hospital operations.

Materials, products and services

- Control and minimisation of the use of materials that are harmful to the environment or human health, both in the construction phase and in subsequent hospital operations.
- Control and choice of environmentally sound materials, products and services, both in the construction phase and in subsequent hospital operations.

Water consumption and water balance

- Control and minimisation of the total annual consumption of utility water in hospital operations.

The following paragraphs contain further details of the vision in the form of objectives and requirements applying to New North Zealand Hospital.

Energy and greenhouse gases in the operating stage
Energy consumption must be optimised in all respects to minimise CO2 and other greenhouse gas emissions in the operating stage and to reduce operating costs. This applies both to energy consumption related to the buildings as such and energy consumption related to operation of the primary hospital functions.

New North Zealand Hospital must comply with the requirements applying to Low-energy Class 2015. Entries should also consider the possibility of upgrading to LE2020 and include an account of the means that would be used to achieve a low level of energy consumption.

To achieve the desired minimisation of the energy use, the hospital should encourage and support sustainable user behaviour in everyday activities; the hospital should also be organised, fitted out and controlled in a way that is optimal from a sustainability point of view and independent of user behaviour.

Energy savings should not take priority over the need to provide sufficient energy for the hospital's primary functions relating to patient care and treatment, ie the processes that, in principle, fall outside the scope of the building regulations and the project.

CO2 is regarded the most important greenhouse gas, but other gases contribute to the greenhouse effect as well and should as such be limited: eg powerful greenhouse gases in cooling and heat pump systems.

When choosing the type of energy to be supplied to the hospital, entrants are asked to avoid scarce energy sources insofar as possible and use renewable energy instead.

Energy and indoor climate
The amount of energy consumed by a building is closely related to the requirements that apply to a good indoor climate. The overall energy and indoor climate design of the hospital should therefore take needs management and the use of passive energy into account, but without compromising on indoor climate requirements and the ability of users to regulate the indoor climate locally based on their own needs and requirements. In this context, the term 'indoor climate' covers both air (air quality and temperature) and lighting (natural light, artificial light and views out of the buildings).

Healing architecture and a good working environment are dependent upon a good interplay between all these parameters, which should be facilitated by the overall architectural concept. This will, for example, be the case when views out of the buildings and a utilisation of natural light without any undesirable glare are ensured through the design and orientation of the buildings rather than through solar screening. Together with the use of intelligent low-energy lighting, such an approach also helps minimise energy consumption.

As regards temperature and air quality, entrants are asked to consider whether it would be a good idea to use natural/hybrid ventilation in certain parts of the buildings. This should include consideration of the impact of traffic noise, however, as the hospital is located close to a heavily trafficked road. The need for comfort ventilation and cooling must be kept to a minimum through the building design, including the orientation of the building and solar screening.

The design of the building complex is also the basis for needs management and zoning of the ventilation system, so that it can be ensured that ventilation volumes match the actual need in the individual zones. The zoning must be planned so that some rooms can be without

Methodology to ensure a focus on sustainability

http://www.regionh.dk/NR/rdonlyres/3DC41AE5-5FA2-4515-91D2-B0937970FC36/0/Baeredygtighedsvaerktoej_Metodik.pdf

The Capital Region's basis for sustainable design

http://www.regionh.dk/NR/rdonlyres/BF96BCD2-2D8D-4FE4-902C-71F37BAB29B5/0/Krav_til_miljoemaessig_baeredygtighed_i_byggeprojekter.pdf

active ventilation from time to time. The final zoning will be determined at a later design and planning stage. The acoustics should first and foremost support and be adapted to the various functions in terms of reverberation times, noise attenuation and sound insulation, so that only desired sound is heard and perceived as being pleasant.

Energy and greenhouse gases in the construction phase
Construction methods, overall structure choices and specific selection of materials are very important in determining total energy consumption and greenhouse gas emissions in the construction phase.

Entrants are requested to endeavour to minimise energy consumption and greenhouse gas emissions from the early design and planning stages by choosing low-energy structures and materials characterised by a small carbon footprint in production and transport. This is particularly important in the case of large and generally highly energy-consuming building elements such as carcass structures and facade elements. See also the section on materials below.

Furthermore, entrants are asked to focus on construction methods that permit resource and energy management.

Materials, products and structures
Keeping the use of substances that are harmful to human health to a minimum and using materials that are environmentally friendly from a lifecycle perspective should be top of mind in all respects, from overall design to the choice of specific materials. Although most materials will be selected at a later stage of the design and planning process, early decisions concerning materials will generally determine the range of possible choices. Consequently, such decisions should not impede compliance with the objectives formulated for New North Zealand Hospital.

Limiting the use of harmful substances
No materials or products containing any of the substances included in the Danish Environmental Protection Agency's 'List of undesirable substances' as updated at the Agency's website may be used. Furthermore, no materials containing PVC may be used in the buildings.

Harmful substances and materials should insofar as possible be replaced by less harmful substances and materials, or their use should be kept to a minimum. Health and safety at the building site – and in connection with subsequent conversion activities – should be taken into account in the choice of building materials, structures and work methods.

Environmentally friendly materials, products and structures
Entrants are generally requested to choose materials that help keeping resource consumption to a minimum (which also includes energy consumption, as described above). Priority should be given to using reusable, abundant and renewable resources, low-maintenance materials, and structures that allow reuse in connection with later renovation or demolition work.

The possibility of reusing materials should be ensured by avoiding construction methods, assemblies and composite products that make it impossible to separate and reuse the individual fractions. Waste of building materials should be kept to a minimum.

Well-documented materials and products should be used, ie products that have been subjected to a lifecycle assessment using a recognised method such as the DGNB method. Entrants are encouraged to adopt an innovative approach based on the cradle-to-grave principle in relation to the building design.

Available environmental data in the form of environmental descriptions or environmental labelling information should be used.

As far as robustness is concerned, entrants' choice of materials and structures should be based on necessary lifetime rather than long lifetime, which means that the resources used in production and the possibility of reusing the materials are the most important factors in relation to building components that are likely to be replaced or renovated during their period of use. Easy-to-clean and low-maintenance materials also contribute to ensuring robustness in practice.

Water consumption and water balance in hospital operations
The objective is to have a facility that uses the smallest possible quantity of clean drinking water and handles waste- and rainwater in a way that is as environmentally sound as possible.

The consumption of clean drinking water can be minimised both through water saving (water-saving installations and water-saving behaviour) and by limiting the use of clean drinking water as a resource.

The hospital site is characterised by a sensitive natural environment and great amenity assets such as wetland and woodland areas. Making active use of collected rainwater in the outdoor environment would be seen as a plus. ■

Water Temple by Tadao Andos


PATIENT SAFE
CONTROL &
SAFET

ETY, INFECTION & HEALTH AND TY AT WORK

CHAPTER 7

Safety: A fundamental aspect of running a hospital is safety – the safety of patients, the safety of treatment and the safety of staff at work. That is why it was decided as early as in the vision-formulating process that one of the guiding principles in the design and use of New North Zealand Hospital would be the **'safe hospital' principle.**

'I believe it is important that we measure the quality of our patient-centred services.'

Quote from the 2012 User Process

As is the case with the hospitals in the northern part of the region today, the safety standards at New North Zealand Hospital must be such that they can meet the accreditation requirements of the Danish Quality Model.

FACTS

Danish Regions has identified ten key areas for joint activities in hospital building projects:

01 Joint purchasing for hospital construction
02 Medicine
03 Production of sterile items
04 Total cost correlations
05 Shared building process tools
06 Formulation of current best practice at room level
07 Communication of examples of best practice at room level
08 Transport technologies
09 Traceability of instruments, equipment, patients and staff
10 IT-supported interaction with patients and their families

Safety is particularly important in relation to items 1, 2, 3, 6, 7, 8, 9 and 10.

Since 2010, Hillerød Hospital has been involved in the Safer Hospital Programme, a pilot project aimed at reducing the number of injuries and deaths at Danish hospitals. One insight resulting from this programme is that there should be a greater focus on communication, fall risks, medication errors, and data- and performance-driven management. All these parameters are affected by the physical setting. Inadequate light, too much noise and too little space to work in prevent the achievement of the objectives formulated. The experience gained from the programme will be implemented and built upon in the new physical setting at New North Zealand Hospital.

To provide the best conditions for patients, patient pathways must be optimal and well considered so that work relating to patients can be carried out without interruption and with the necessary monitoring of the patients' condition. This should be reflected in the specific design of the concepts applied to bed areas in wards and the layout of outpatient clinics.

Standardisation – one of the ten space management principles – is vital in terms of reducing the risk of errors caused by confusion regarding the position or location of equipment or the lack of equipment. This risk can be reduced through a uniform layout of rooms and equipment being kept in the same spot at all times.

Finally, the requirement of single-patient rooms is crucial in relation to patient safety. The risk of infection and the spread of disease from patient to patient is reduced when each patient has his or her own bath and toilet. Furthermore, single-patient rooms mean less noise, which benefits not only patients but also staff, who can work and communicate with patients without disturbance. In addition, fall risks are reduced when patients do not have to be considerate towards other patients and can turn the light on at night and move about more freely and safely.

Infection control

The room layout at New North Zealand Hospital should be innovative and have a positive impact on people's behaviour so that healthcare staff, patients and visitors will all behave in an optimal manner in terms of infection control.

SPACE MANAGEMENT PRINCIPLE 8

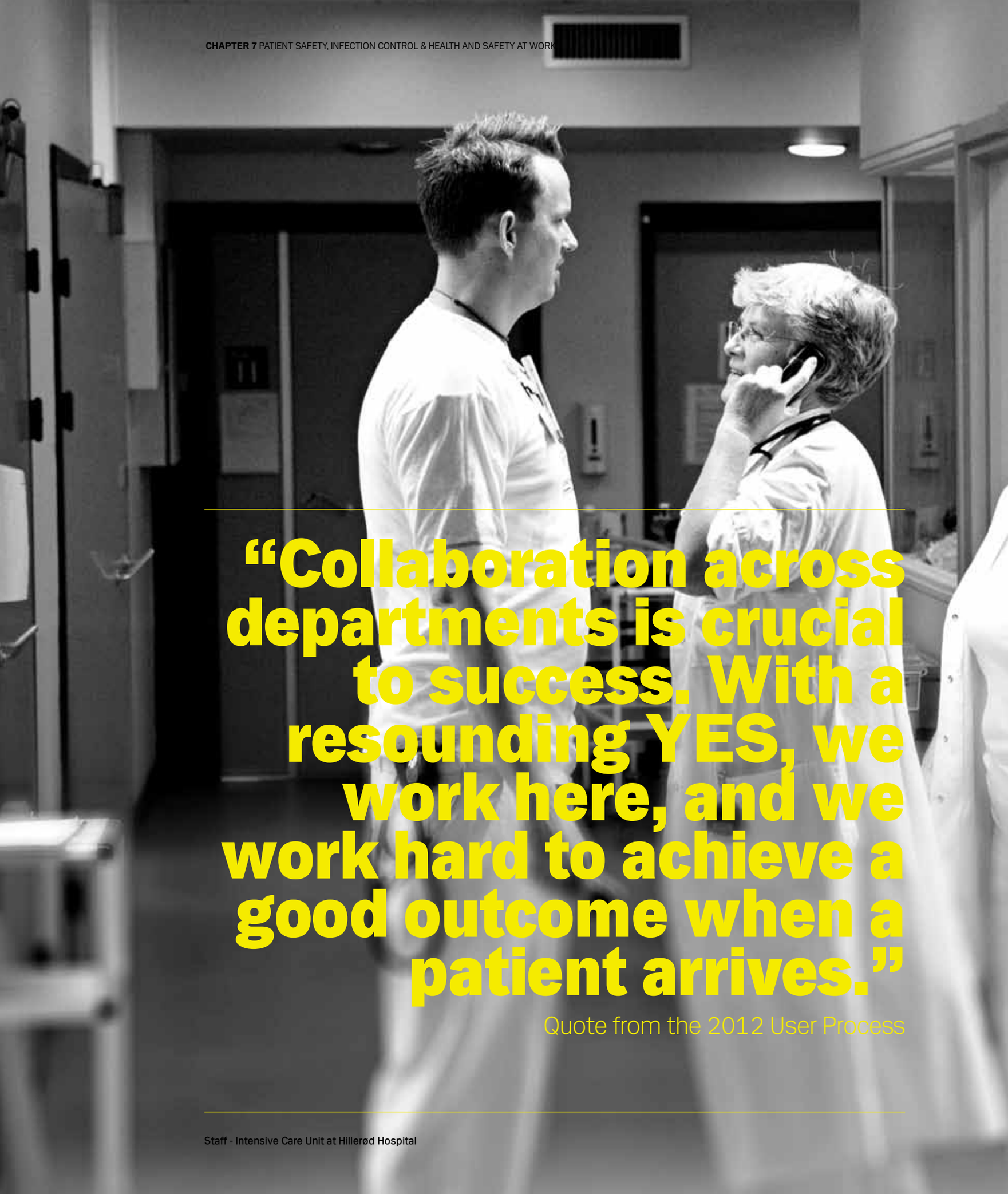
Standardisation

Link

www.godtsygehusbyggeri.dk

Patient safety

http://patientsikkerhed.dk/index.php?id=770



"Collaboration across departments is crucial to success. With a resounding YES, we work here, and we work hard to achieve a good outcome when a patient arrives."

Quote from the 2012 User Process

Staff - Intensive Care Unit at Hillerød Hospital

The prevention of hospital-acquired infections can first and foremost be achieved by reducing the formation of infection reservoirs and interrupting the routes of transmission of infection. This calls for attention to behaviour, furnishing, design and materials. In addition to encouraging behaviour that is appropriate in terms of infection control,it is important that the design, the materials used and the furnishing of rooms prevent the formation of reservoirs of dust, grit and microorganisms and allow regular effective cleaning (using chlorine) without damage to surfaces, etc.

An important space management principle in this respect is the principle of flow and function zoning to ensure separation of flows.

It is important that the buildings and rooms can be used for many years without causing any infection control problems. The new buildings will have to meet infection control standards and comply with relevant national guidelines.

Staff health and safety
The objective of New North Zealand Hospital as regards health and safety at work is for the hospital to be an attractive workplace, with a pleasant and stimulating working, education and training environment and with a physical and psychological environment that enhances staff professional satisfaction, health and safety.

The aim is to take health and safety conditions into account in decision-making and in the determination of priorities. Such considerations must be an integral part of the basis for decisions made in connection with drafting the building programme, during the design and execution phases, and in the operations of the hospital after it opens.

The objective can be met by ensuring an effective incorporation of health and safety standards into all concepts and phases of the project and by making the best possible decisions on the design and utilisation of the buildings in the process.

The final choice of plan solutions and technological solutions must be conducive to achieving the hospital's health and safety objectives. ■

SPACE MANAGEMENT PRINCIPLE 4

Flow and function zoning

“The very first requirement in a hospital is that it should do the sick no harm”

Florence Nightingale

The Capital Region of Denmark

New North Zealand Hospital
Hillerød Hospital
Dyrehavevej 29
3400 Hillerød

Phone: +45 48 29 48 29
E-mail: nythn@regionh.dk
www.regionh.dk/nhn

The Capital Region of Denmark
New North Zealand Hospital

REGION H

VOLUME II
PROGRAMMATIC REQUIREMENTS

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8
CHAPTER

The project organisation has prepared **20 concepts** that provide detailed information about the requirements applying to the new building facilities, requirements that must be met to enable hospital operations from the end of 2020 and many years ahead. The concepts include clinical concepts, professional concepts, design concepts and support concepts. The twenty concepts translate the overall vision for the hospital, the five guiding principles and the ten space management principles (see Chapter 1, Volume I) into actual operations activities to be performed at New North Zealand Hospital.

THE 20 CONCEPTS

New times, new conditions

The 5 guiding principles

The hospital that offers the best treatment

The effective and professional hospital

The hospital that works across conventional boundaries

The welcoming hospital

The safe hospitall

The 10 space management principles

24/7/365, emergency department

Maximisation of shared facilities

Flexibility for the future

Flow and function zoning

Majority of activities close to patients

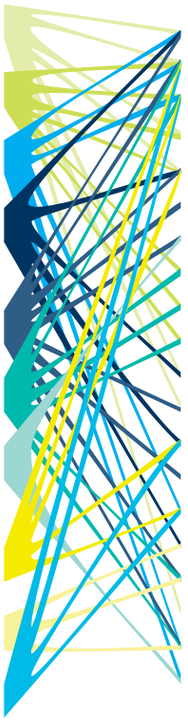
Right of use rather than ownership

Centrally organised interdisciplinary functions

Standardisation

Digitalisation and automation

Simple, obvious and optimised



The 20 concepts

Emergency department (FAM)
Wards and departments
Outpatient clinic operations
Surgery and other invasive procedures
Intensive care
Rehabilitation
Diagnostic functions
Office and meeting facilities
Research
Human resources
Public spaces
Architecture and art
Facility management
Education and training
Technical infrastructure
Service and distribution
Medication and medicine distribution
Food
IT and point of care
Medical technology

The reference to 'hospital operations' is not only a reference to the clinical services provided to patients but to all the activities and functions that together make up hospital services. This includes everything from the operation of wards to the use of art and the way food is supplied to the patients. The new physical setting makes new demands on both organisation and work procedures compared with the way things are done today.

The 20 concepts set out how we want the new hospital to work. They make it possible to translate visions and principles into an appropriate physical setting that can be adapted to future needs and requirements.

Based on the overall framework conditions laid down by the Danish government, the Capital Region and the hospital management, the 20 concepts were developed in compliance with the fundamental principles formulated for the project and the ten space management principles, which provide guidelines for compliance with the framework floor area allocation. All 20 concepts can be linked directly to one or more of the space management principles.

In the next stages of the project, the number of concepts will increase, and the concepts will be further specified in collaboration with the consultants selected and the future users of the hospital.

Clinical concepts

- Concept for the emergency department
- Concept for wards and units
- Concept for outpatient clinic operations
- Concept for surgery and other invasive procedures
- Concept for intensive care
- Concept for rehabilitation
- Concept for diagnostic functions

Professional concepts

- Concept for office and meeting facilities
- Concept for research
- Concept for education and training
- Concept for staff facilities

Design concepts

- Concept for public spaces
- Concept for architecture and art

Support concepts

- Concept for facility management
- Concept for technical infrastructure
- Concept for service and distribution
- Concept for medication and medicine distribution
- Concept for catering
- Concept for IT
- Concept for medical technology

The first four clinical concepts are so important to the core activities of the hospital that they will have a determining impact on the other concepts.

When preparing their proposals for the design of the new hospital, entrants must take these concepts into account in their organisation of the floor area framework applying to the main functions. ■

INFORMATION!

The 2012 User Process focused on the emergency department and its impact on the structure of the new hospital and on the other clinical concepts.

The outcome was identification of the most important proximities and professional relations at the new hospital. Several user meetings with representatives of the hospital departments were held, as were several workshops that set the stage for the presentation of key points of view concerning synergies between the acute admissions unit and the rest of the hospital.

Workshops

User reports

http://www.regionh.dk/NR/rdonlyres/17259A9C-94EA-489D-9DEE-E5799F572136/0/Brugerproces2012_rapport.pdf

Summary and conclusions from workshops

http://www.regionh.dk/NR/rdonlyres/F6A0193C-E435-4C7B-95B4-90502B6CFA67/0/PersonaleworkshopsNHN_Sept01_2012.pdf

CONCEPT 1

EMERGENCY DEPARTMENT (FAM))

Description

- Regional concept applied.
- Centrally located, visible and easily accessible entrance to the unit.
- Children received in a separate zone in the waiting area.
- Buffer zone included in adjacent function areas.
- Patients should experience progress in waiting times and be in visual contact with staff.
- Different couches/beds must be available.
- Ordinary FAM patient rooms as set out in the standard patient room concept.
- Out-of-hours doctor area and diagnostic unit included in shared facilities, integrated into the FAM unit.
- FAM should be designed also with prehospital care in mind.

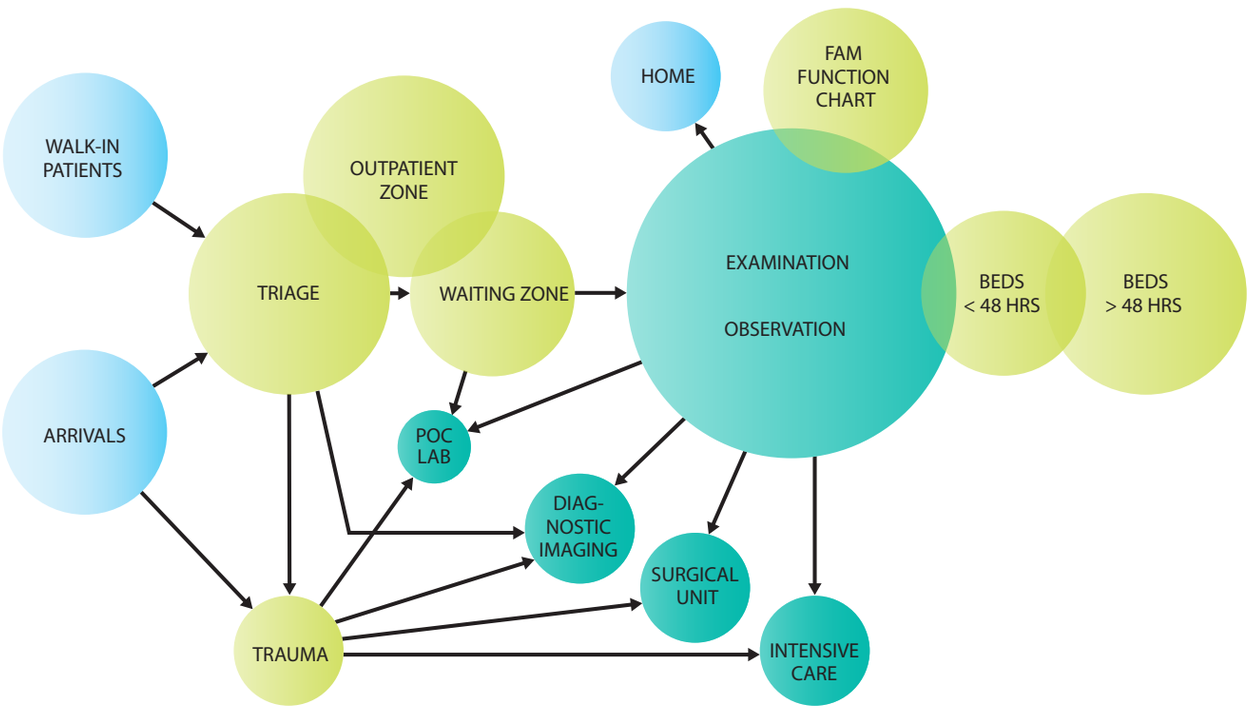
Emergency department

The emergency department (FAM) receives all unscheduled patients: patients arriving by ambulance as well as walk-in patients. It is based on the regional concept for Emergency department in the Capital Region: see '2020 Hospital Plan for the Capital Region'. The FAM concept ensures that patients are offered uniform high-quality services and that the clinical logistics are adapted to standardised patient pathway descriptions.

The FAM functions as a central independent competency unit working closely with other specialties. The set-up of a structure that brings together specialists from different areas in the emergency department ensures highly competent and faster diagnosis and treatment of unscheduled patients all around the clock. The emergency department at New North Zealand Hospital must be organised on the basis of this concept.

The concept was developed to serve as a basis for a coherent patient pathway that ensures patients are offered safe and optimal diagnosis and treatment. The emergency department will be the 'heart' of New North Zealand Hospital and, because of its central location, it will provide easy access to other specialties and functions.

FAM function chart



Patients are divided into two groups (two tracks): walk in-patients/patients seen by a doctor and ambulance arrivals (emergency calls). The arrival and reception of these two groups of patients must be separated.

In the initial triage, the patients are categorised on the basis of their symptoms and the level of treatment needed. Based on the triage, the patients are sent to an examination area (bed, couch or recliner) where their treatment pathway is determined. Once the required treatment has been determined, the patients are admitted to a ward, sent to the surgical unit for operation, transferred to another hospital or discharged after completed observation and treatment in the emergency department.

Patients not yet allocated remain in the emergency department until they have been diagnosed or a treatment plan has been prepared. The expected average examination and diagnosis time is 11 hours, and the maximum time expected for examination and diagnosis is 48 hours. ■

Recommendations for emergency department in the Capital Region

http://www.regionh.dk/NR/rdonlyres/AAF931CF-7581-4CD9-8FBF-BDD64D93445A/0/RapportFunktionsplanl%C3%A6gningaff%C3%A6llesakutmodtagelserdecember08.pdf

http://www.regionh.dk/NR/rdonlyres/F197335E-9797-4A32-A22C-AD927DE5E033/0/Akutmodtagelseroktober07.pdf

Basic clinical structure

http://www.regionh.dk/NR/rdonlyres/8455A7E2-EB10-4D55-8CE9-8CD1600853EA/0/RapportAnbefalingerKliniskGrundstrukturHovedstaden-Feb11.pdf

‘I think that we should bear in mind that the hospital is open non-stop […] There is still a very old-fashioned focus on offering many of our core services within standard working hours, ie from 8 am to 3 pm.’

Quote from the vision-formulating process

CONCEPT 2

PATIENT ROOMS AND WARDS

Description

- All patient rooms are single-patient rooms.
- Beds are located around decentralised nursing stations in a unit.
- Nursing stations have an intake of natural light.
- Nursing stations have on-stage reception areas that are welcoming and accessible to patients and their families, and they also have off-stage areas where staff can work without being disturbed.
- Units are shared by departments as needed.
- Department locations are based on medical relations.
- One unit = 8 beds.
- Ancillary rooms are shared by 4x8 beds.
- Four units = 1 ward
- Communal facilities are shared by 2x4 units.
- Adjacent wards share communal functions.
- Wards are laid out so that staff walking distances are kept to a minimum.
- Patient rooms feature separate zones for staff and patients, as well as overnight facilities for one patient relative.
- Patient rooms always have an ensuite toilet and bathroom.
- All bathrooms are laid out to handle patients who need extensive personal hygiene assistance.
- All patient rooms are identical, with the exception of rooms for paediatric, neurological and intensive-care patients.
- Patient rooms are laid out so that there is visual contact with them from the nursing station or corridor.
- Patient rooms are adapted to the needs of bedridden patients in a way that facilitates a gradual transition to a higher level of activity.
- Patient rooms are laid out so that patients have control over their immediate surroundings, including the intake of fresh air from the outside.
- Beds are distributed between departments as needed.
- Social activities for long-term patients are possible, eg television, social interchange, physical exercise.

The concept for patient rooms and wards should underpin and support the new structure, ensuring that patients are offered coherent treatment pathways of high quality throughout the process.

With the new structure, base departments hand over beds to the emergency departments so that, in future, patients can be admitted anddischarged directly from the emergency department. Standardised general wards permit rational operation of the wards.

Based on the space management principle 'Right of use rather than ownership', the units will be shared by the various departments on the basis of their actual needs so different specialties can work across wards and an optimal utilisation of space is achieved. To make this possible, the wards must be located and organised on the basis of their medical relationship with each other.

Wards should be combined in small units around decentralised nursing stations, and the focus should be on making it easy for nursing staff to monitor patients. This is particularly important at night to ensure optimal utilisation of staff resources.

The units will form part of a resource-sharing scheme with regard to shared facilities and support functions. Each ward comprises 32 patient rooms. When distributing ancillary rooms, entrants should take into consideration any concurrent peak hours or requirement peaks in the wards, as such peaks will generally follow the same 24-hour patterns.

In each ward, there must be one patient room for patients who need more than the average amount of space, eg bariatric patients or patients with many family members. This patient room should be able to accommodate two patients in case of overcrowding.

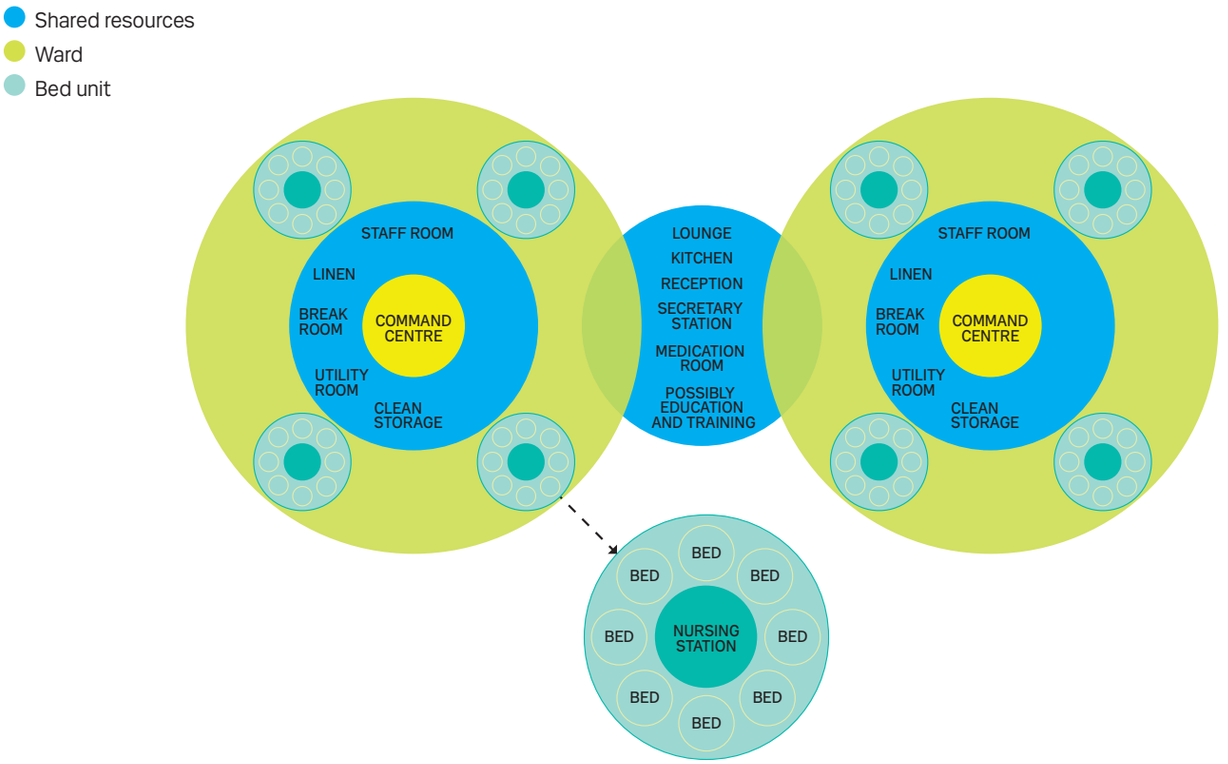
All patient rooms should be standardised in terms of functionality to ensure that they can be adapted to new needs and requirements in the future. Standardisation also increases the degree of recognisability, which will unquestionably improve both patient safety and staff working conditions.

However, there are three exceptions to the application of this concept: patient rooms for paediatric, neurological and intensive-care patients require other functionalities

List of regulatory requirements

www.fremtidenssygehuse.dk/dwn67091

Standard catalogue and ward



and thus other floor area standards. These special requirements are set out in the chapter on the main hospital functions.

It is well documented that patient rooms laid out for a single patient at a time reduce the risk of infection. Such patient rooms are easier to clean as they can be completely disinfected after each patient, which is a crucial factor in terms of infection control.

In addition, there will be less noise to disturb the patient in a single patient room, which increases patients' chances of having a good night's sleep and resting without being disturbed, which again reduces stress levels and ensures faster recuperation. Single-patient rooms also makes confidential patient-staff conferences possible, just as they can be used for examinations and taking samples. For these reasons, all patient rooms at New North Zealand Hospital are to be single patient rooms.

From each patient room there must be direct access to an ensuite toilet/bathroom. These facilities must meet the requirements of the Danish Working Environment Authority (AT) regarding the layout and fitting out of bathrooms and toilets for patients who need special care and assistance, but entrants are asked to carefully consider the floor area allocated to this purpose.

Patient rooms must be dimensioned and laid out so that there is ample room for staff to nurse and treat patients. Compliance with good health and safety standards for staff working with patients will result in fewer staff errors. Patients' rooms should have enough room for both conversation and examinations. The area close to the patient should be laid out so that it is possible to respond adequately in emergencies.

In each ward (32 beds), there must be a command centre based on the on-stage/off-stage principle.

The on-stage zone primarily has to do with patients and should be open, welcoming and accessible: where patients are met on their own conditions. The off-stage zone should be relatively secluded without direct contact with patients to allow staff to work without being disturbed.

The space management principle 'Maximisation of shared facilities' should serve as a basis for the design of lounge areas for patients and staff across wards. The standard is for two wards to share a communal area designed for both patients and staff. ■

CONCEPT 3

OPERATION OF OUTPATIENT CLINICS

Description

- Combined into large units with at least 20 rooms.
- Shared booking, reception and staff facilities and shared ancillary rooms.
- Outpatient premises are divided into zones for examination, counselling and changing clothes.
- All outpatient clinic rooms have their own toilet.
- Outpatient clinic rooms are allocated on the basis of actual need.
- Each clinic should be 80% standard rooms and 20% special rooms.

The units share resources in terms of facilities and support functions. Each unit consists of at least 20 outpatient clinic rooms located around a communal reception area. The units are shared by the various departments on the basis of actual need.

All outpatient clinics should be uniform, with identical functionalities to ensure flexibility. This will make it possible to adapt them to new needs and requirements in the future, and it will also unquestionably improve recognisability, patient safety and the health and safety of staff.

Optimised patient pathways should help reduce waiting times to an absolute minimum.

Twenty per cent of each outpatient clinic should be examination rooms fitted out for special examinations and treatments that require space for special equipment and a special layout. The actual distribution of special rooms appears from the individual descriptions in the chapter on main functions.

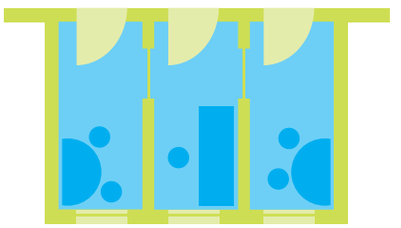
The outpatient zones should be located close to offices and wards.

Room layout
Outpatient clinics should be dimensioned and laid out so that there is ample space for staff to perform their work and treat individual patients. When determining how

Mayo Clinic's Jack & Jill concept

Before

After



The Mayo Clinic's outpatient clinic concept. Mayo Clinic research reveals that 80% of a patient visit to an outpatient clinic is conversation, which often takes place next to a computer, whereas only 20% of the time is spent on the actual examination. It has also shown that patients have difficulty concentrating on the information given to them when they are not wearing their ordinary clothes, and feel all the physician's focus is on the computer screen. As a result of this research, Mayo Clinic has changed its outpatient clinic concept and has separated conversation and examination. Two conversation rooms share an examination room, which means that patient-perceived quality has been enhanced without any increase in floor area.

The Mayo Clinic Jack & Jill concept

http://www.youtube.com/watch?v=Yw5TBjyefog

http://www.mayo.edu/center-for-innovation/what-we-do/design-thinking

the area as a whole should be organised, entrants should consider how the various activities for which the rooms are used can be incorporated into a context that caters to patient needs. Entrants are asked to propose a layout that provides space for administration, counselling, conversation, examination and diagnostics, as well as clothes-changing facilities. Patients should feel they are well cared for and treated with discretion in both reception and examination areas.

It is also important that patients feel it is easy to find their way to the outpatient clinic and that the reception area is logically situated, friendly and open, and they should also feel that the waiting area grants them some privacy, especially in outpatient areas where patients are in beds. The waiting zones should also be attractive to patients who have to wait for clinical reasons and who may need to rest. In this connection, the 'flow and function zoning' principle should be applied in designing the layout of the area used for this purpose.

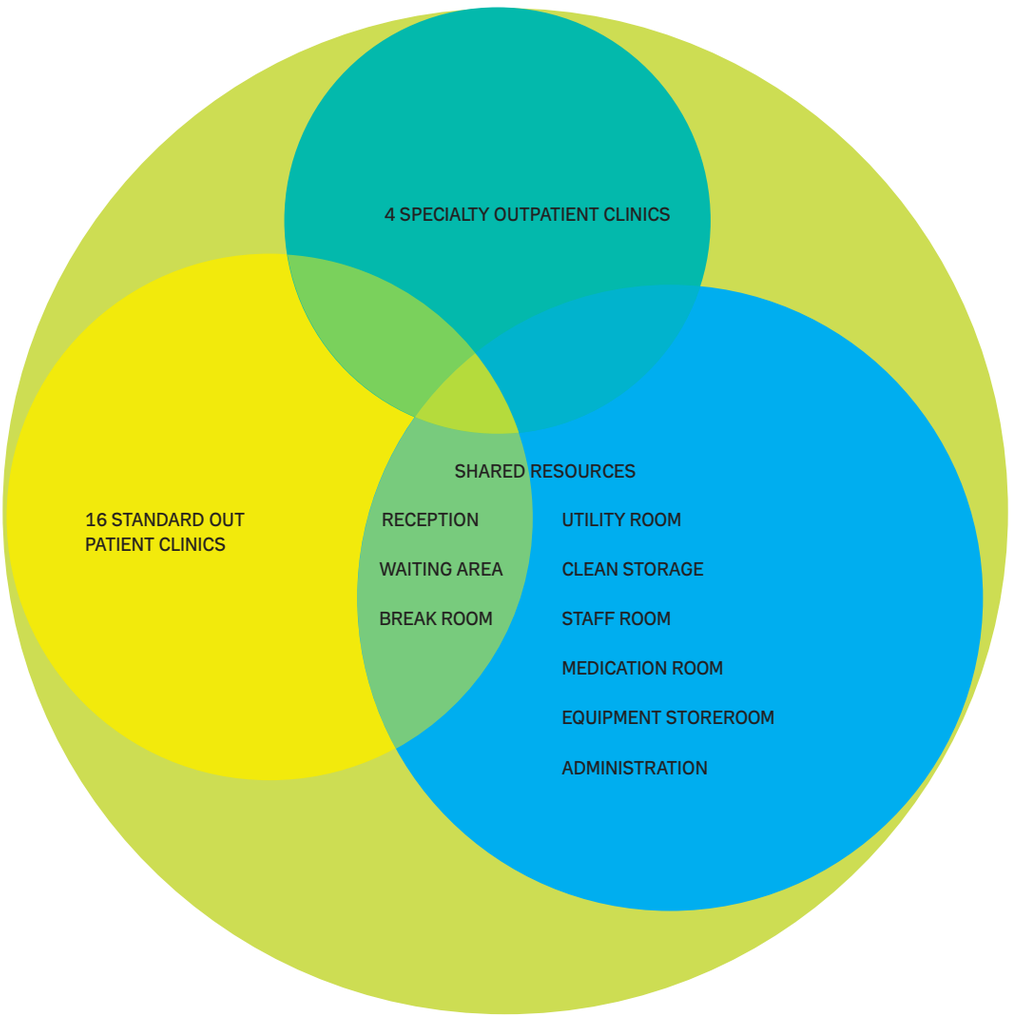
Examination rooms
The floor area allocated for this purpose should be organised so that it reflects the differentiated use of the spaces.

Area standard for examination rooms

- A standard examination room has a floor area of 30 m2.
- A special examination room has a floor area of 50 m2.

Outpatient clinic operations

Outpatient clinic operations

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Study visit to the Netherlands in April 2012. VuMC in Amsterdam has carried out a project called 'Brightsides' in which they upgraded all shared areas and outpatient clinic areas to a very high standard. Staff have attended courses, for example by the Disney Corporation, to learn more about the provision of service. **1.** Day surgery, waiting area. **2&3.** Oncology clinic with beds and reclining chairs in separate booths.

INFORMATION!

ANTHROPOLOGICAL FIELD STUDY

In the autumn of 2011 the project organisation carried out an anthropological field study of the use of waiting and lounge areas at Hillerød Hospital.

The observations were collated under the heading 'I'm not going to live here; it's just a short visit'.

Some examples from the report:

The physical surroundings play an important but not crucial role in patients' perception of the quality of waiting and lounge areas. However, if patients have to wait for unexplained reasons, it influences their perception of these areas, and they tend to wish for better facilities the longer and more frequently they stay in the rooms.

A need to create one's own space/private sphere has been observed. Patients and families are not a homogenous group, but people expressing differentiated needs.

Waiting rooms and lounges are an essential part of the hospital experience. People with chronic diseases, for example, spend relatively long but explained periods of time there between examinations or waiting for lab results.

Staff may have a different perception of what a well functioning waiting room is and may prioritise ease of overview and opportunity to work safely and without being disturbed in the patient reception area. ■

Link to the report

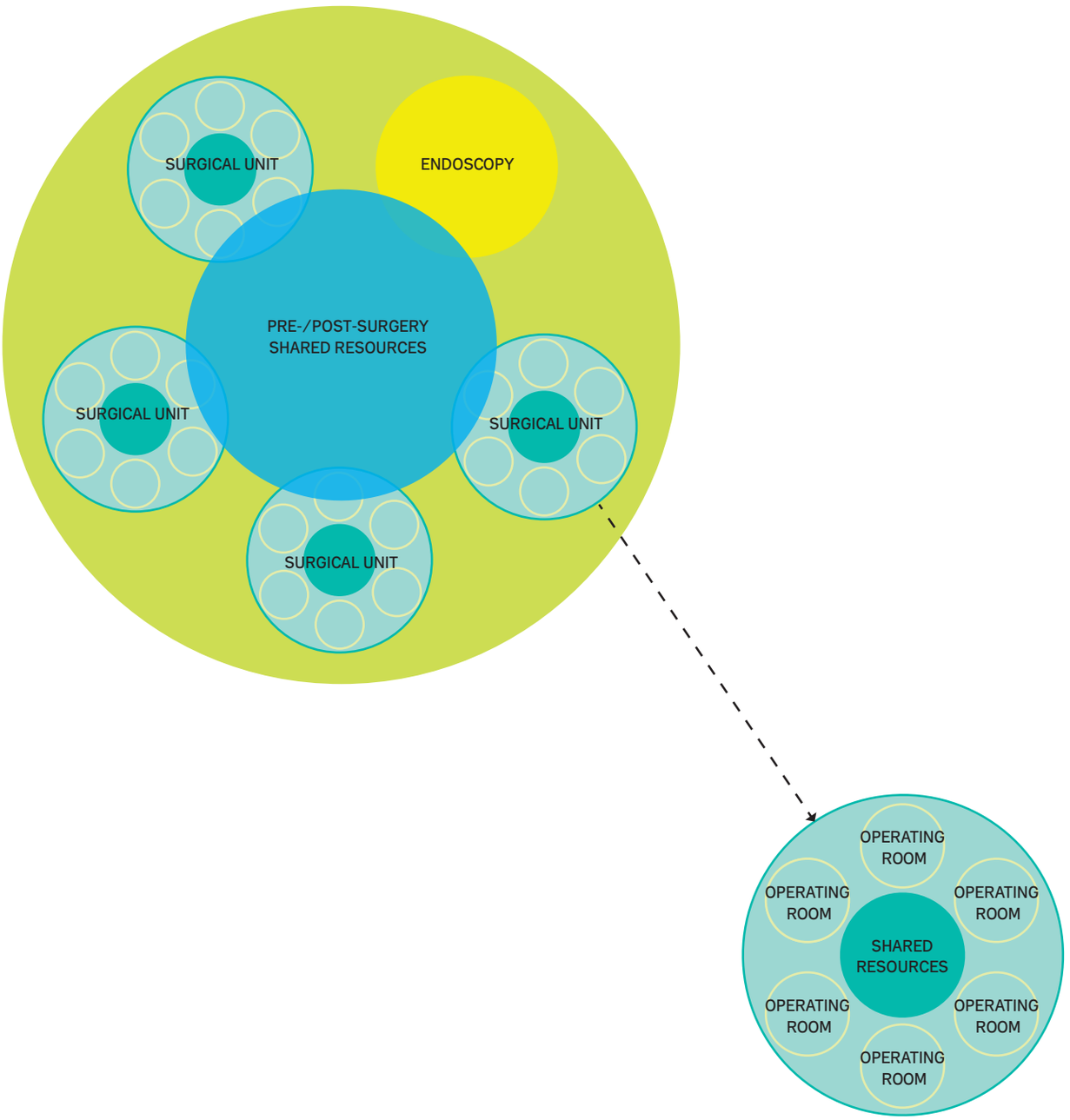
http://www.regionh.dk/NR/rdonlyres/785D284C-BF90-459D-91D7-24B34982F15F/0/Antropologisk_feltstudie.pdf

CONCEPT 4

SURGERY AND OTHER INVASIVE PROCEDURES

Operating rooms

- Surgical ward
- One unit = six operating rooms



Operating room with natural light. Brandenburg Havel Klinikum.

Description

- The surgical unit (OP), day surgery unit and endoscopy unit are combined into a single physical unit.
- Surgical units are shared as needed.
- All operating rooms feature the same functionalities.
- Ancillary rooms and recovery rooms are shared facilities.
- Flows and functions are separated.
- Operating rooms are laid out in functional units with six operating rooms each.

The surgical unit, day surgery unit and endoscopy unit should be combined into a single physical unit in which the various functions should be organised separately. The surgical units will be shared by the various departments as needed. The departments should be located and laid out as appropriate in relation to their internal medical relations. The units share resources with respect to communal facilities and support functions.

Operating rooms should be uniform with identical functionalities in order to ensure the functional flexibility needed for adapting the rooms to new needs and requirements in the future. Recognisability will unquestionably increase patient and staff safety.

The dimensions and layout of operating rooms must provide ample space for staff to work and treat patients. Facilities for the reception, preparation and discharge of patients must promote the objective of ensuring discretion and protection of patients' dignity.

Surgical units should be laid out optimally from a point of view of hospital operations and with due consideration given to the future organisation of the hospital with regard to patients, staff and goods.

Surgical units should generally be divided into functional units of six operating rooms each.

Operating rooms

- Operating rooms:
- Operating room (120 m2) + 40 m2 for pre-/post-surgery activities.
- Day surgery: 110 m2 + 56 m2 (3.5 spaces of 16 m2 each for each operating room) for pre-/post-surgery activities. ■

CONCEPT 5

INTENSIVE CARE

Description

- All patient rooms are single rooms.
- All intensive-care patient rooms are identical.
- Patient rooms in a unit are located around a command centre.
- There is natural light in the command centre.
- One unit = 12 beds + ancillary rooms.
- Two units share communal functions.
- The intensive-care unit is laid out in a way the keeps staff walking distances to a minimum.
- Patient rooms have separate zones for staff and patient, as well as an area where a family member can stay overnight.
- There is direct access to either a toilet or utility room from the patient rooms.
- There is no direct access to a bathroom from patient rooms.
- Intensive-care patient rooms have an observation space for staff, and it is possible to monitor patients from the command centre.

Seriously ill patients are treated in the intensive-care area, which should feature tranquil and welcoming surroundings that can to some extent compensate for the serious atmosphere there will always be in an intensive-care unit. Patients' families should be able to withdraw to more tranquil areas to rest and talk. Furthermore, the area should be laid out so that the families of individual patients are not unnecessarily involved in the condition and treatment of other patients. At each patient room there should be an observation area, and the area must include a command centre where staff can contact each other quickly and where patient monitoring has top priority.

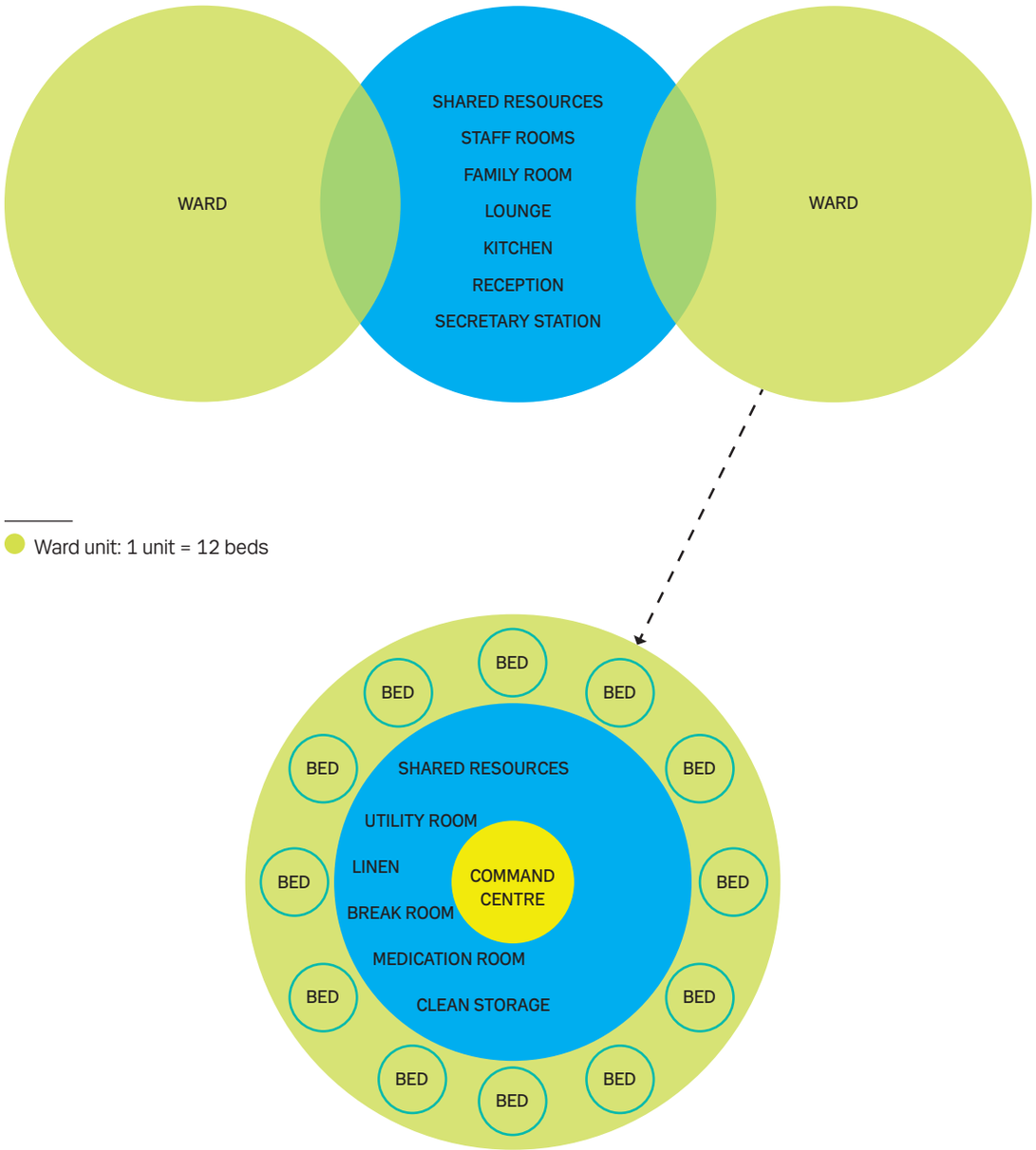
Area standard

50 m2 for an intensive-care bed, including related ancillary rooms and shared facilities.

Intensive-care beds

- 12 beds in a unit.
- 2 x 12 beds around the shared facilities. ■

Ward



A blog that describes a ward round, using a robot with a camera and a screen. Read more in the Hvidovre Hospital ideas catalogue entitled 'Hospitals of the future'.

http://innovationlab.dk/blog/fremtidens-hospital-robotterne-kommer

Future technology: Hvidovre Hospital's catalogue of ideas concerning the hospitals of the future

http://www.regionh.dk/NR/rdonlyres/B8D50007-59DD-4979-A2E3-4E5A9672696B/0/Fremtidens_teknologi_Hvidovre_hospital.pdf

UK version

http://www.regionh.dk/NR/rdonlyres/B4052789-5948-48C1-88DC-04F7C9C68CA1/0/Hvidovre_Hospitals_Rapport_Engelsk_Web.pdf

CONCEPT 6

REHABILITATION

Description

- Exercise rooms are located near the units that use one most frequently.
- One-to-one training takes place in patient rooms.
- The hospital's communal areas are generally laid out with a view to activation and rehabilitation, including corridors and staircases.

The rehabilitation concept should promote and support the new hospital structure, which should offer patients good, coherent treatment pathways and optimise staff working procedures. In addition, it should take advantage of the new opportunities for individual exercise and training afforded by the single-patient rooms. This means that one-to-one training can take place in patient rooms in known and quiet surroundings.

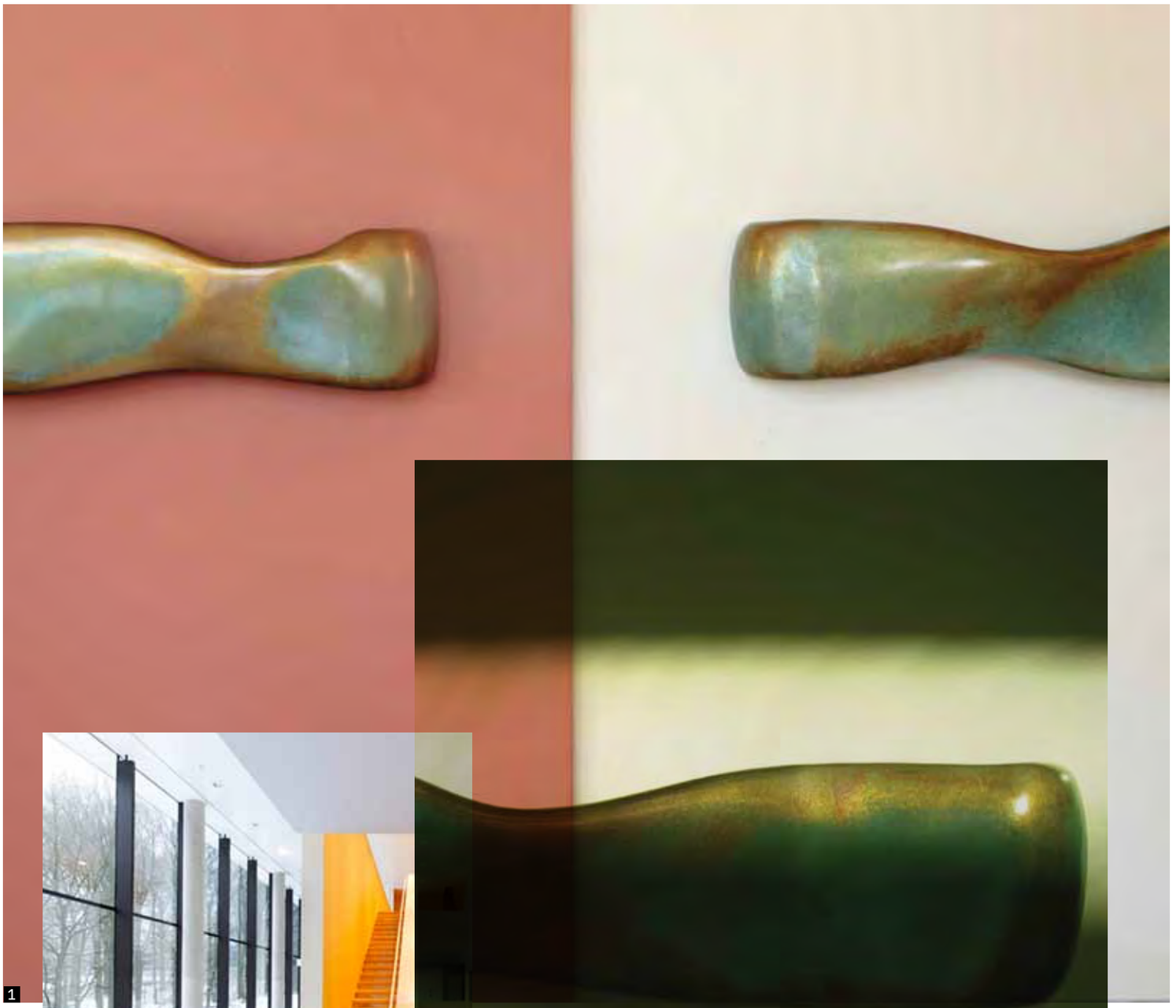
The rehabilitation function involves interdisciplinary specialties which together represent an important aspect of the rehabilitation of patients. Rehabilitation is provided by physiotherapists and occupational therapists together with neurologists who treat patients with neurological problems and patients suffering from the aftereffects of stroke.

Training facilities should be located where there is easy access to them from the departments to which their activities are crucial as elements in the patient pathway. The proximity requirements are set out in the chapter on main functions.

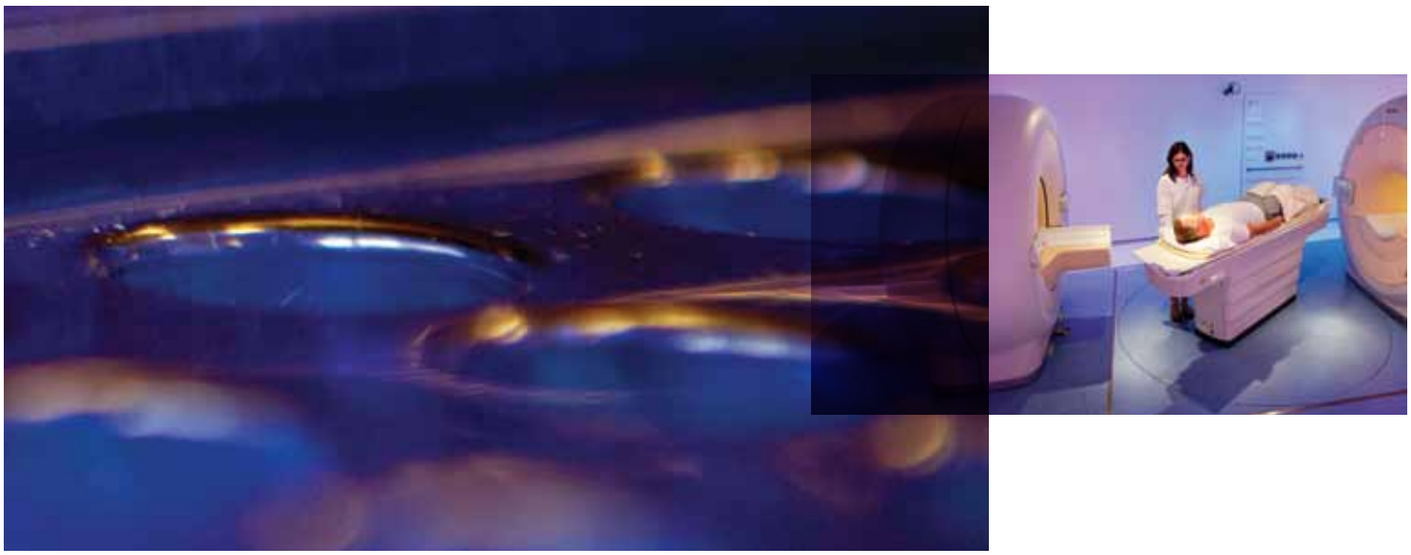
Communal areas in the hospital should be laid out in a way that encourages activity and rehabilitation. This also applies to the layout of corridors and staircases. ■

SPACE MANAGEMENT PRINCIPLE 5

Majority of activities close to patients



1. Study visit to Laguna Honda, San Francisco, a rehabilitation facility focusing of the integration of exercise and training facilities in all areas of the hospital. The bronze handrails are beautiful, easy to grasp and self-disinfecting. **2.** Study visit to Groot Klimmendaal: The stairs in this rehabilitation centre in Arnhem are deliberately made so narrow that patients feel protected against views from the outside, just as they can easily be used for support, which adds to patients' feeling of security. The fact that this building is 100% accessible to everyone is not evident from its architecture.



1. Automated blood sample analysis at Hillerød Hospital. **2.** PET/MRI scanner. Diagnostic methods are constantly improved, and so is the equipment used. The large MRI scanners require special consideration in fitting them into the building layout.

CONCEPT 7

DIAGNOSTIC FUNCTIONS

Description

- There is focus on good logistics in order to avoid bottlenecks.
- Diagnostic functions with special building volume requirements are located centrally to facilitate patient pathways.
- As many activities as possible take place in patient rooms.
- There is easy access to the outpatient clinic zones that use the diagnostic facilities most.

Diagnostic functions include a number of interdisciplinary specialties which together represent a significant element of patient diagnosis. The support functions include activities such as lab testing, sample taking and diagnostic imaging. The concept should support the clinical structure, which is aimed at offering patients a good treatment pathway and optimising staff working procedures.

Diagnostic functions should be located centrally so there is easy access to them from the departments in which their services are essential to the patient pathway. The functions should generally be laid out as central units, as they require many ancillary rooms and technical installations. The organisation of the area set aside for this purpose should take into account that it must be possible to replace equipment seamlessly, without any negative impact on operations and without causing any disturbance in other areas. The units will share a number of facilities and support functions with other units.

Services that could be mobile, such as sample taking in patient rooms and ultrasound examinations, can be linked to a more decentralised function. ■

SPACE MANAGEMENT PRINCIPLE 7

Centrally organised interdisciplinary functions

CONCEPT 8

OFFICE AND MEETING FACILITIES

Description

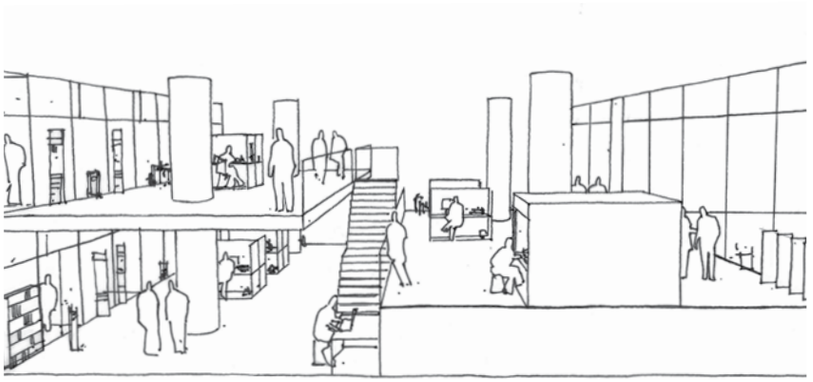
- There is a focus on the facilitation of knowledge sharing, meeting activities and a good clinical environment.
- Everyone has access to a workstation, but all workstations are flexible.
- Offices are located in units with up to 32 workstations.
- Office zones are located close to outpatient clinics and wards.

Ensuring functional flexibility and standardisation are important elements in planning New North Zealand Hospital. Given this, a concept for a new office and meeting culture has been created. This new concept is comprehensive and affects all levels. Its point of departure is spaces for administrative activities that are function-specific rather than person-specific, as this will permit a more flexible use of the spaces, which again means a higher rate of utilisation.

In addition to gathering these activities together in larger entities, entrants should focus on designing well laid out facilities with rooms for meetings, confidential consultations and personal immersion.

Offices should be laid out in units of a size that will form a good basis for knowledge-sharing between specialties.

Furthermore, administrative workstations should be available in the clinic, for example for secretarial work. ■



SPACE MANAGEMENT PRINCIPLE 2

Maximisation of shared facilities

SPACE MANAGEMENT PRINCIPLE 6

Right of use rather than ownership

INFORMATION!

Study visit to Orbis Mc, Sittard, December 2012. At this Dutch hospital the shared outpatient facilities and the day case surgery facilities are located on two storeys along a large public distribution space. At the back of these facilities there is direct access to knowledge zones in which all the hospital's administrative facilities are located. The areas are laid out in four zones with half inserted storeys in double-height rooms, which creates an attractive professional environment with a focus on knowledge-sharing across specialties and staff groups. The zones contain only flexible workstations and offer good facilities for both personal immersion and meeting activities.

CONCEPT 9

RESEARCH

Description

- The clinical environment will be a key driver of research activity.
- There are research zones in office areas.
- Central facilities with meeting and conference facilities are easily accessible for research-related activities.

The new hospital setting should promote optimal environments and provide optimal conditions for clinical research in a targeted way.

The clinical environment will basically be the key driver of research activity at New North Zealand Hospital. In addition, the concept is based on spaces allocated to research purposes being function-specific rather than person-specific, as this will permit a more flexible use of the spaces, which again means a higher rate of utilisation.

Specific research zones must be established in the office areas. They should include spaces for immersion and knowledge sharing, and there should be access to medical reference books.

There should be central meeting and conference facilities based on the office concept and suitable for research activities.

Proximity requirements

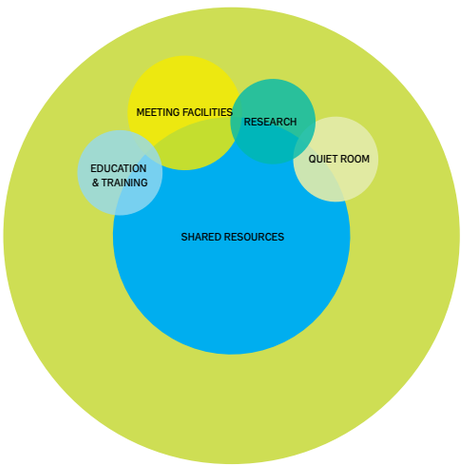
- Office zones and training/education zones

Research facilities

- Auditorium
- Shared research and healthcare library
- Office workstations ■

Shared offices

Shared office facility: 1 unit = 32 office workstations



Florida State University.

CONCEPT 10

EDUCATION AND TRAINING

Description

- The clinical environment is the key driver of education and training activities.
- There is a focus on offering space for immersion and knowledge sharing.
- Shared education and training facilities are located where they help create a good learning environment.
- There are education and training zones in office areas, but no personal workstations.

New North Zealand Hospital has an obligation to provide education and training to a number of people, including medical students in the clinics.

The education concept is based on function-specific rather than person-specific rooms, as this will permit a more flexible use of the spaces, which again means a higher rate of utilisation.

Educational zones must be established in the office areas. They should include spaces for immersion and knowledge sharing, and there should be access to medical reference books.

Based on the office concept, central meeting and conference facilities must be established. They should be suitable for education and training activities.

Proximity requirements

- Office and research zones

Education and training facilities

- Flexible individual study areas
- Resource sharing, including office and research zones
- Shared research and healthcare library
- Auditorium with seating for 200 people ■

CONCEPT 11

STAFF FACILITIES

Description

- Shared facilities, eg cloakrooms and changing rooms, are located appropriately with respect to flows and work procedures.
- Service facilities for staff are located in public zones insofar as possible.
- Decentralised break rooms close to departments are shared by functions and departments as needed.
- A staff lounge is located close to the acute admissions unit.

In order to create an attractive and efficient working environment, there is an increased focus on the layout and organisation of staff facilities. Changing rooms should be located appropriately in relation to flows and work procedures. There must thus be a logical way from the arrival point to the uniform collection point and then the changing rooms, and from there the distance to the clinical work areas should be short.

Service facilities for staff, such as the canteen, are part of the public zone and the public services. Entrants may consider separate access routes to the area under the space management principle 'Flow and function zoning'.

There should be decentralised break rooms, shared by different departments and functions as needed. Such resource sharing will provide a useful basis for knowledge sharing between different specialities and generate social relations. When determining the location of these rooms, entrants should take into consideration that they will also be used by staff who need to 'recharge their batteries' and want to have a short break without being disturbed. The staff break rooms must offer views of the outdoor surroundings and weather, just as they must offer natural light, depending on the time of the day. These elements are important for staff wellbeing.

A number of central duty rooms must be established where there are short distances to the areas where staff may be required to assist, included the acute admissions unit.

Changing room facilities

- Automated uniform service
- 2800 lockers: at least 250 per unit.
- 1 shower booth per ten lockers. ■

SPACE MANAGEMENT PRINCIPLE 4

Flow and function zoning

‘I would like to bring some of the good things along to a new building. **One of those things is my view out of the window.’**

Quote from the vision-formulation process

CONCEPT 12

PUBLIC SPACES

Description

- All hospital areas, indoors as well as outdoors, have a function and are used strategically.
- Public spaces help enhance the patient experience, ensure a clear and understandable connection between hospital functions and serve as positive distractions.
- Public spaces are laid out so that they support the hospital's function as an acute hospital.
- There is smooth and easy passage between indoor and outdoor facilities.

The public spaces should underpin and support the hospital's function as an acute hospital. The design of these areas will be considered essential elements in the architecture of the building and the perception of it. All public spaces are part of the patient experience and should help enhance it. They should provide space for recreational activities from the very moment people step out of their cars in the car park until they reach their destination in the hospital.

Easy access to outdoor areas from public indoor zones is important. Geographical orientation and weather conditions should be taken into account in the layout of outdoor areas.

A clear, well-defined structure should intuitively lead hospital users to their destinations. To ensure this, all outdoor and indoor public spaces should be perceived as connecting elements, and they should be used strategically in the organisation of the hospital. The public spaces should help strengthen connections between the various hospital functions.

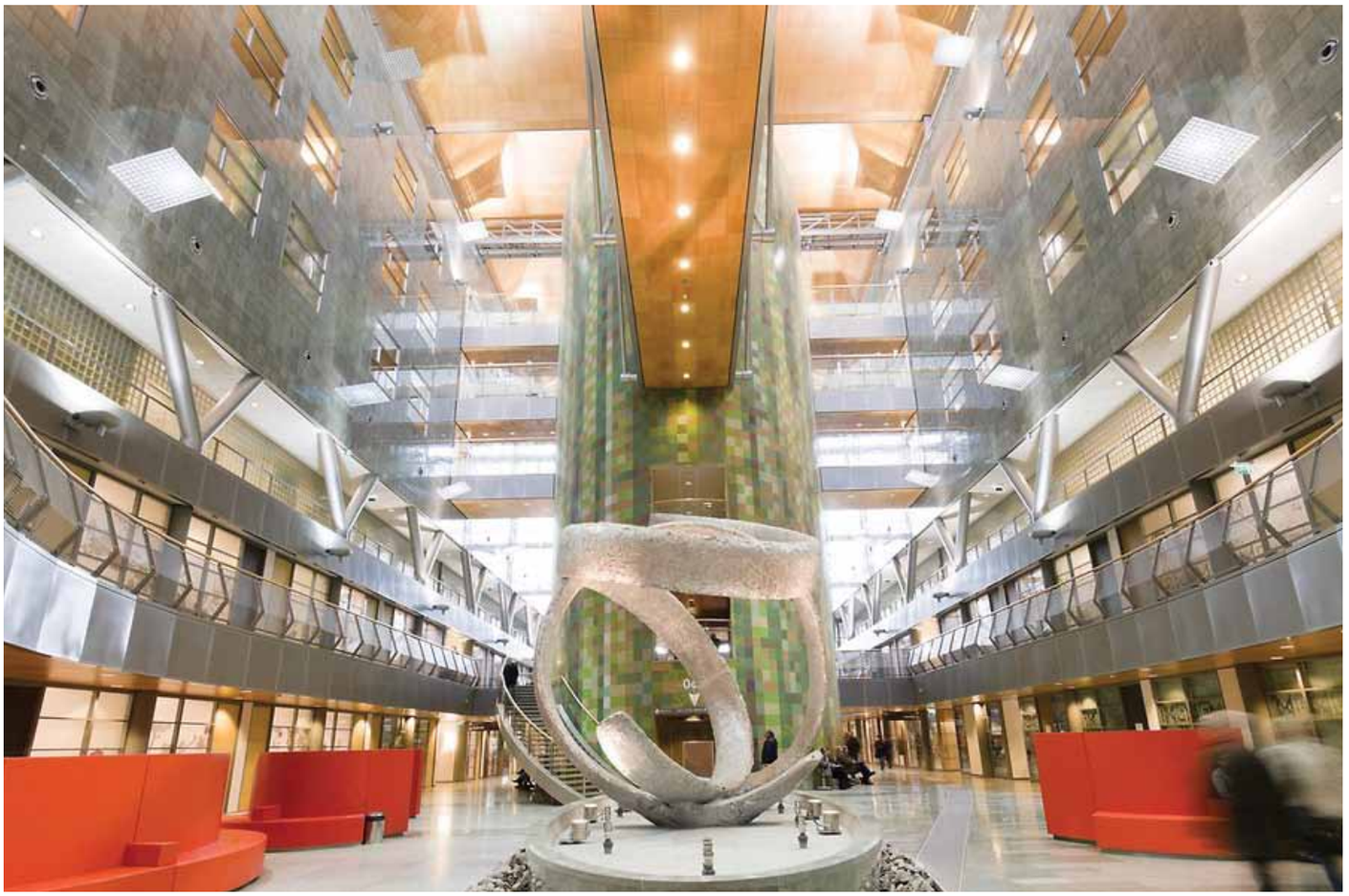
Views of outdoor areas and access to natural light in hallways and distribution areas will help make orientation easy for hospital users. It should also be possible to use the areas for various activities, eg rehabilitation. The concept for public spaces is closely related to the concept for architecture and art. ■

SPACE MANAGEMENT PRINCIPLE 1

24/7/365

Film about public spaces in hospitals which explains how value can be added in areas that connect the clinical facilities.

http://www.youtube.com/playlist?list=PL54758DF37948FEFF



Study visit to Orbis MC, December 2012. Dutch hospitals typically have large public lounge and circulation spaces with direct access to outpatient facilities. These spaces include cafés, shops and other offerings to patients, patient families and staff.

CONCEPT 13

ARCHITECTURE AND ART

Description

- The main architectural concept is so strong that it is able to accommodate changing uses and adapt to new needs and requirements.
- All patient-related rooms help provide positive distraction, a higher patient-perceived quality and faster recovery.
- Art and artistic decoration should be planned in the context of the buildings and the architecture and should preferably have an integrated function.
- The wayfinding system is supported by the architecture and not just considered a signage system.

Healing architecture
The philosophy that the physical setting has an impact on the people in it is far from new, but it remains as essential as ever.

Based on extensive experience, it has been documented that what is referred to as 'healing architecture' has a genuine effect. Entrants are asked to take this experience into account, but also to be open to testing new solutions, just as they are encouraged to rethink existing solutions so that functions can be optimised in a visionary, well thought out hospital architecture within the framework given.

Views from patient rooms and work areas of beautiful, well-integrated outdoor surroundings should enable patients to follow the rhythm of the day and the changing seasons. Life outside the hospital should be visible and serve as a joyful distraction. However, views of nature are not enough.

Healing architecture is also well-designed functional architecture, and it is safety and a good working environment. Adequate light and areas where staff can work without being disturbed when necessary reduce the number of errors and benefit patient safety.

Healing architecture provides opportunities to engage in reflection and personal immersion, but it also offers space and areas for activity and experience. Different needs should be reflected in the architecture and be part of a natural overall context.

Patients should be offered the possibility of controlling the environment around them, and their surroundings should help ensure a speedy recovery. The quality perceived by patients is an essential focal point. So is staff's perception of the quality of their working environment.

Space and function
All rooms for patients and staff should be designed in line with the guidelines set out in the Capital Region's report on healing architecture and should be based on 'The Nine Recommendations' (see page 107).

1. American artist James Turell uses and articulates the ability of light to change our perception of our surroundings. He uses light phenomena to create spaces and volumes and invites spectators to relate actively to his works as part of a new 'reality'. **2.** In 'The Tilty Barn'. John Pawson invites the natural environment around the building into the interior spaces.

Cologne Cathedral. Glass mosaic by Gerhard Richter.

Facts: The nine recommendations

1. Single patient rooms with ensuite bath and toilet
- Retain patients' right to privacy and make private conversations and family visits possible.
- Ensure that patients can enjoy peace and quiet, sleep undisturbed, and reduce stress factors so as to promote faster recovery.
- Give patients control of their immediate surroundings (including light, sound, ventilation and social interchange).
- Facilitate better communication with carers.
- Reduce the risk of infection and the number of patient room changes.

2. Art
- Create visual distraction and experiences for patients, patient families and staff.

3. Architecture and design that support the function
- Help make patients feel safe and secure as well as confident that they will receive the right treatment.
- Create ease of overview.

4. Good infrastructure and effective wayfinding
- Provide an easier and calmer arrival to the hospital for patients and patient families.
- Make it easy to come to the hospital and find one's way around.
- Avoid adding to the stress of patients and patient families.

5. Patient safety: design and equipment that reduce the number of injuries
- Reduce risk of falling.
- Reduce risk of infection.
- Safe dispensing and administration of medicine.
- Positive identification of patients.
- Reduce hospitalisation times caused by hospital-acquired injuries.
- Ensure easy overview of patients' condition for carers.

6. Good acoustics
- Reduce undesirable noise and thus patient and staff stress.
- Enable effective communication.

7. Good indoor climate
- Reduces airborne infection.
- Lessen fatique and discomfort caused by poor air quality, for patients and staff alike.

8. Good lighting that supports functions
- Follow the diurnal rhythm for patients.
- Reduce errors in medication and patient records.

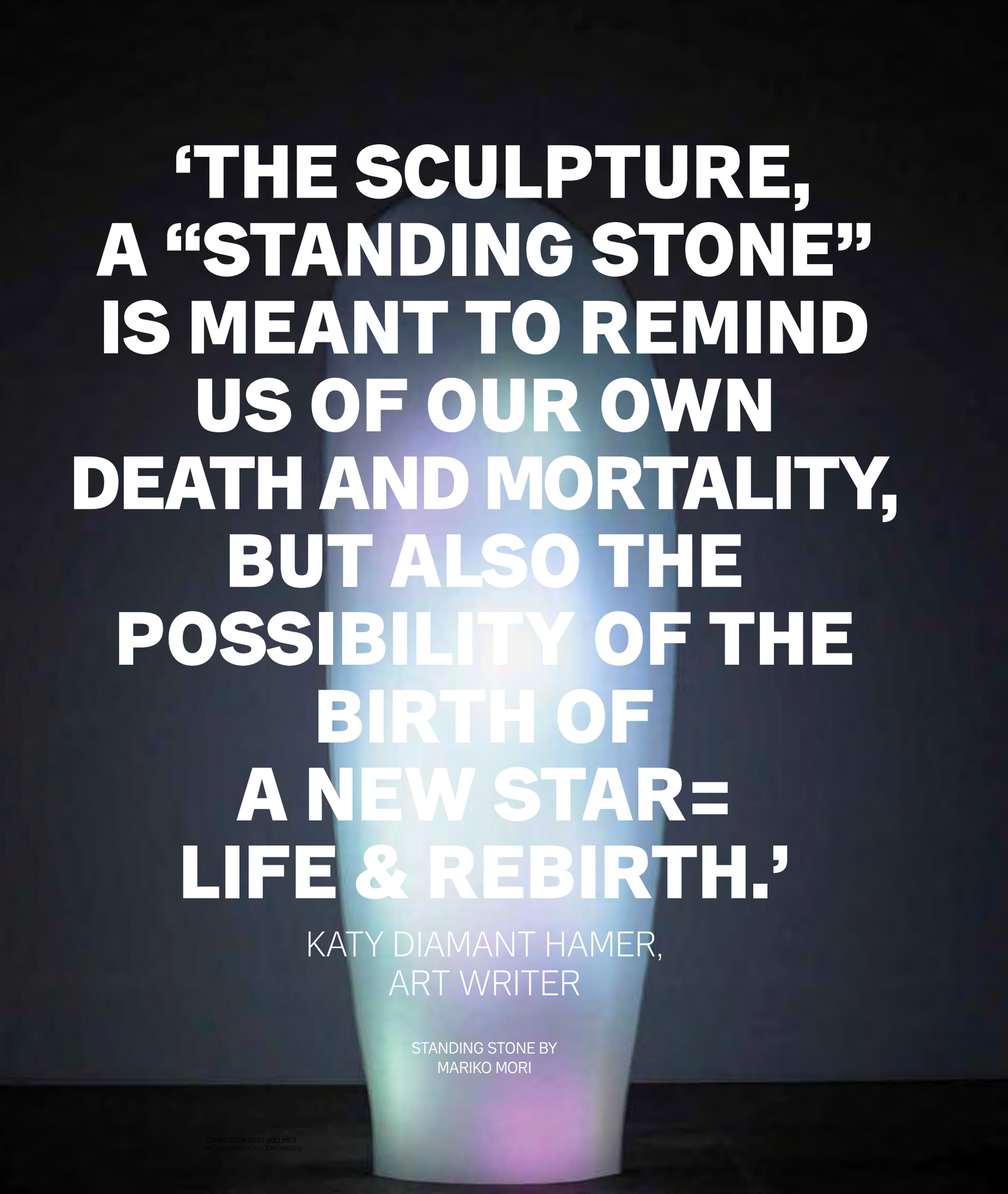
9. Positive distraction and contact with nature/outdoor areas
- Create distraction and experiences for patients and their families.

The Capital Region's recommendations for healing architecture

http://www.regionh.dk/NR/rdonlyres/0445BAE1-2CA5-414F-AF9C-B59FBEFDA1F9/0/SamletRapportHelendeArkitektur.pdf

The Centre for Health Design database

www.ripple.healthdesign.org


‘THE SCULPTURE, A “STANDING STONE” IS MEANT TO REMIND US OF OUR OWN DEATH AND MORTALITY, BUT ALSO THE POSSIBILITY OF THE BIRTH OF A NEW STAR= LIFE & REBIRTH.’
KATY DIAMANT HAMER, ART WRITER
STANDING STONE BY MARIKO MORI

Art

Given that art plays an important role in the healing and recovery of hospitalised patients and given the close interplay between architecture, colour schemes and light, 1% of the budgeted construction costs has been earmarked for art in the new quality fund buildings in the Capital Region.

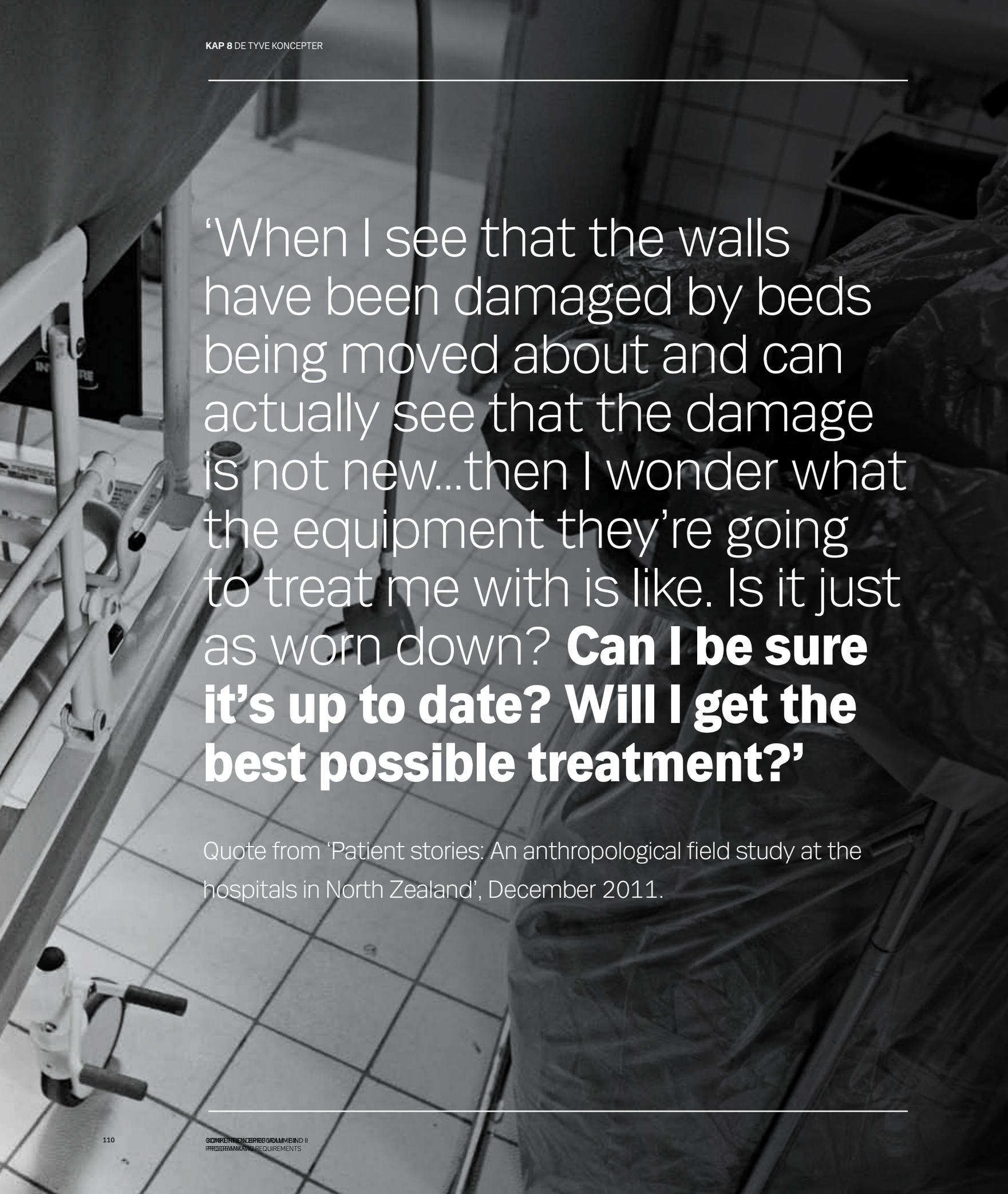
This means that art is included in the budget and that it is possible at an early stage of the project to initiate working relationships and make specific decisions as to how the desired effect can be ensured in the planning stage, ie to increase the perceived quality of the new buildings. Through its presence and integration in the architecture, art should underpin the perception of the hospital as highly professional. One way of doing this would be to let art serve as a positive distraction, as part of the wayfinding system, as an architecture-enhancing element or as a means to differentiate between functions.

Art can always be discussed. It is perceived individually, but in this project it should please and benefit many people. This is a fundamental requirement which is best met if art is taken into account from the very beginning in close collaboration with the other parties involved in the project.

Since patients come from different backgrounds and their art preferences are also different, diversity is an important aspect on which there should be a great deal of focus in the planning phase to ensure that the art used will meet the objective set out above.

It should be ensured that no one is offended by the art and that the art is conducive to the recovery of the patients and serves to distract them as long as they stay in the hospital. ■

Installation by Chinese artist Ai Wei Wei: a static illustration of movement, a labyrinthine experience of space that changes depending on the angle it is seen from. Created as a commentary on China at a time when the bicycle was a symbol of freedom.



‘When I see that the walls have been damaged by beds being moved about and can actually see that the damage is not new…then I wonder what the equipment they’re going to treat me with is like. Is it just as worn down? **Can I be sure it’s up to date? Will I get the best possible treatment?’**

Quote from ‘Patient stories: An anthropological field study at the hospitals in North Zealand’, December 2011.

CONCEPT 14

FACILITY MANAGEMENT

Description

- Constructional solutions are flexible so that they can accommodate future needs for changes and extensions.
- Buildings are characterised by easy access to services.
- Buildings are based on buildability principles that do not compromise on quality and durability.
- The emphasis is on lifecycle considerations in the selection of materials.
- Areas of possible optimisation are taken into account in the planning.
- The use of resources (electricity, water, etc) in the building facilities is monitored.

The solutions chosen should be optimal from a total cost point of view, which means that both the construction costs and the costs of operating the facilities throughout their lifetime are taken into consideration. Maintenance, cleaning, power, water and heating costs should be included in operating costs.

The subsequent operating and maintenance costs must be taken into consideration in the choice of materials and technical solutions and should be a platform for client decisions.

Health, safety and accessibility must generally be taken into account to ensure that safe and appropriate facility management, including cleaning, is possible. Technical rooms and installation ducts should provide easy access for service and maintenance throughout the hospital. The systems should be designed for continual energy optimisation and so that technical maintenance can be performed in a way that is ergonomically and hygienically sound. It must be possible to inspect and maintain the installations with no or only a minimum of disruption of supply, ie it should be possible to perform such work during the day.

It is important that technical systems can be maintained without maintenance staff having to go into the hospital units. Technical rooms and systems must not present an obstacle to the general flexibility of the hospital.

Central monitoring (CTS) of systems is important: because there is a great deal of focus on energy and energy use, it is necessary to involve hospital staff in energy optimisation activities and everyday energy-saving routines.

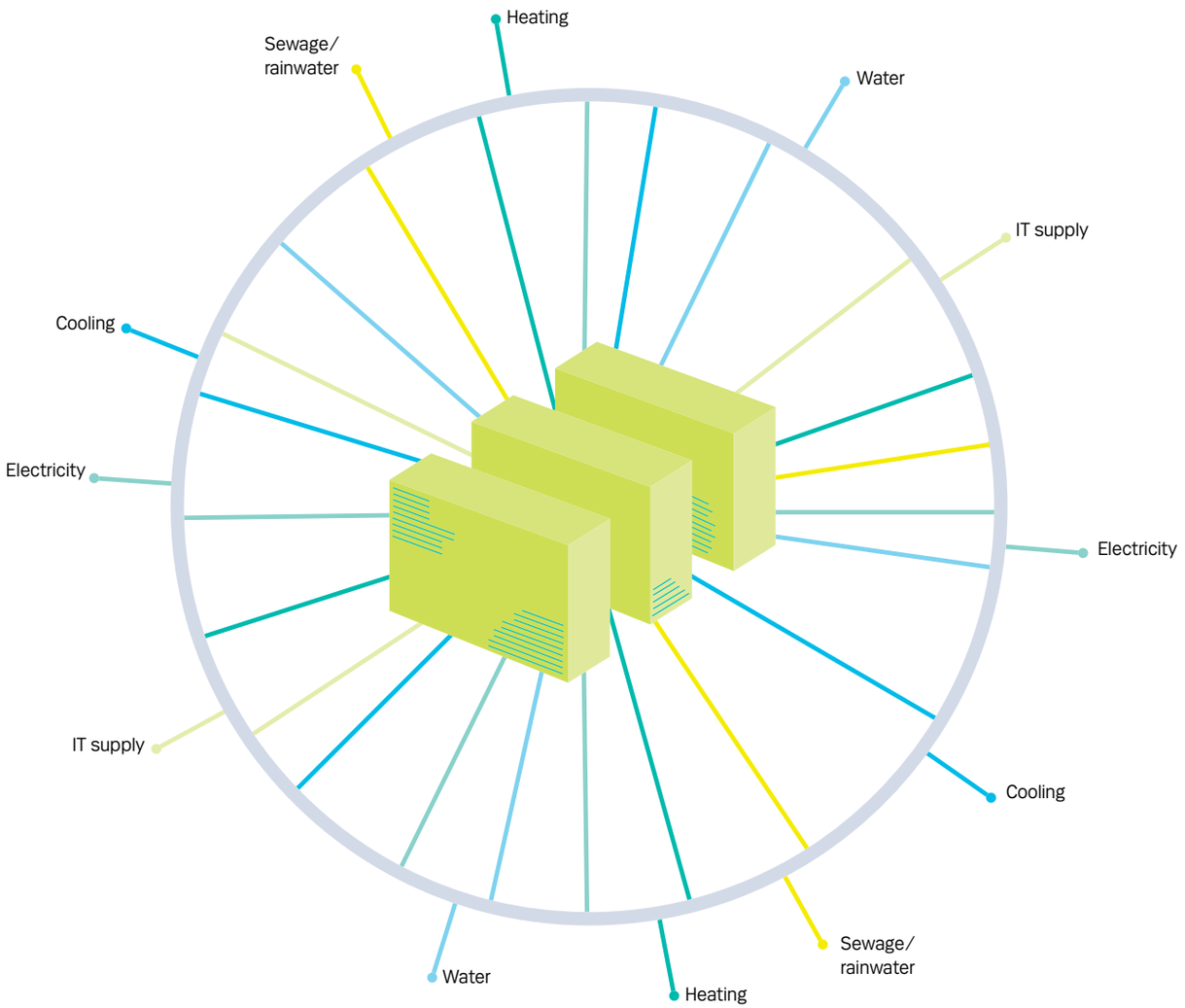
Building and system data should be provided in open digital standards similar to the standards used when the construction of the building facilities is finished. Entrants should consider integration with the maintenance and operation system currently in use in the region. Central and decentralised service units should be considered, as some medico-technical equipment cannot be transported, necessitating local repair and maintenance. ■

CONCEPT 15

TECHNICAL INFRASTRUCTURE

Main supply ring

- Main supply ringg
- Electricity
- Heating
- Cooling
- Water
- Sewage/rainwater
- IT supply



Description

- Robust and secure supply is important.
- Open-ended installations make it simple to expand and modify.
- Standard solutions are incorporated across all room types.
- Ducts, shafts, pipes, etc are designed to accommodate future unknown technology.

New North Zealand Hospital must be efficient, quality-conscious and focused on wellbeing.

Consequently, physical and technological solutions must be conducive to flexibility, collaboration and engagement. A high level of service and quality in the treatment offered will be ensured, which makes special demands on the function and design of the building facilities. The design should be based on new technology, contemporary working procedures and modern hospital operations to ensure a high level of competence in medical treatment and care and a high level of safety for patients, patient families and staff.

New North Zealand Hospital will be constructed on a greenfield site, which means that there are no constraints imposed by already existing buildings. This allows entrants to think outside the box, be innovative and ensure optimal conditions in terms of all vital supplies and their distribution.

Utility supplies and technical systems should be in line with the intentions set out in the space management principles and the sustainability objectives for New North Zealand Hospital.

New technologies and new treatment methods will continue to be developed, and with general developments in society – plus ever-stricter requirements with respect to sustainability, resource savings, patient safety, etc – it is crucial to take this into consideration when technical supplies and the associated distribution principles are planned, designed and executed.

Supply strategy and security
Security of supply at the hospital is vital to patient and staff safety, so it is important to ensure that critical installations are operational all around the clock. This can be ensured by adopting a strategy based on a ring line. The main utility supplies to this ring line must come from at least two sources, just as there must be at least two supply lines from the ring line to the individual building sections (see the illustration of the principle below).

A high level of supply security is important in all areas close to patients, to ensure that patient safety remains high during outages and maintenance of main technical systems and installations. The intention is to site a decentralised technical room close to each unit/department to ensure that the unit or department in question is provided with water, heating, ventilation, power, etc.

Robustness and future-proofing of supply systems and installations
New treatment types, changed treatment capacities and new treatment methods must be expected to emerge in the future as new technologies and new technical aids are adopted.

For this reason, it must be possible to change the function and use of building sections, and the technical installations must be flexible enough to be adapted to such changes without requiring any costly and extensive modifications or long-term disruptions to hospital operations.

Technical installations should generally be open-ended installations, if possible based on standard solutions, also across different room types. The materials chosen should provide flexibility in the layout and use of spaces, and they should allow and support future changes.

The structure of the systems should allow continual energy optimisation.

The dimensions of ducts, pipes and shafts should allow future expansions and/or reductions. It is important that entrants adopt innovative methods for the routing of installations. The space for installations above ceilings and technical rooms should be optimised/minimised as much as possible without jeopardising robustness. ■

SPACE MANAGEMENT PRINCIPLE 3

Flexibility for the future

CONCEPT 16

SERVICE AND DISTRIBUTION

Description

- Products are at the right place at the right time.
- Distribution is automated.
- There is a focus on traceability.
- Logical subconcepts are developed for individual function areas.
- A service village is to be established.

Products at the right place at the right time

A major transformation has taken place in the field of service and distribution over the past ten years. New types of logistics and new ways of organising production are now outcompeting conventional methods of mass production and storage. The 'Just In Time' concept sets out how the right product should be delivered when it is to be used. If implemented, this principle would mean that there would be no surplus products in storerooms and that fewer products would be scrapped. As a consequence, less storage space would be needed in the individual units.

Automated distribution

Automated transport and production solutions should be considered for all tasks that are not directly related to patients, and they should be weighed in terms of costs, operations, infection control, health and safety requirements and other requirements. An important parameter is the reliability of operations and security of supply, which suggests that it would probably be best to use tried-and-tested systems.

Focus on traceability

In connection with the daily handling of products and equipment, IT solutions and inventory technology should be set up that can support the concept of cost-effective logistics management and improve the traceability of the flows of products relative to instruments, equipment, technical aids, etc. The solutions and technology should also comply with the sixth space management principle: 'Right of use rather than ownership'.

Logistical subconcepts

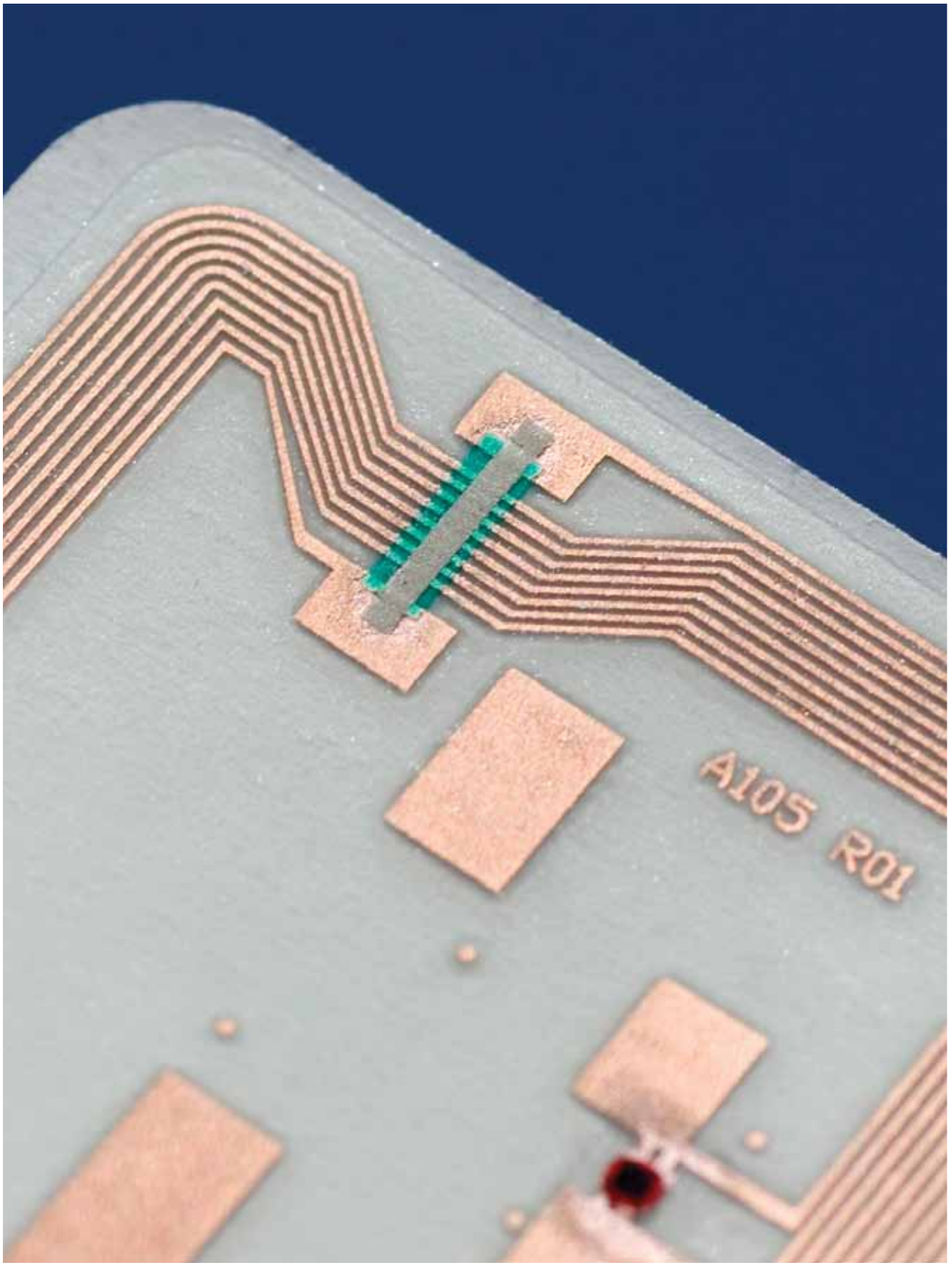
A number of logistics concepts that help ensure the quality required in future diagnostics, treatment and care and also optimise staff's work routines should serve as a foundation for the clinical functions. The requirements are a high level of quality and solutions that are financially sustainable and enable clinical staff to focus on their core services.

SPACE MANAGEMENT PRINCIPLE 6

Right of use rather than ownership

INFORMATION!

Forth Valley Royal is a new hospital in Scotland that has decided to place a great deal of emphasis on technological solutions and automated distribution of waste, products, medicine and food in separate flows. Twelve AGVs are used for transport, equipped with RFID tags with incorporated temperature and movement sensors that allow tracing of equipment, food and linen. An automated system is also used to dispense medicine, and this has cut the number of medication errors to a minimum and reduced operating costs considerably.



RFid tag.

Pneumatic post is a tried-and-tested automated transport system used at many hospitals throughout the world.

The logistical concepts set out the general principles governing distribution and production in connection with the following logistical flows:

- Depot items
- Linen and uniforms
- Medicine
- Sterile items
- Samples and blood components
- Beds
- Technical aids
- Food
- Waste

Depot items

Depot items should be handled in accordance with the following principles:

- The supply of depot articles should be based on the Just in Time principle, with articles supplied from the Capital Region's central warehouse in Glostrup, where the consumption-based commissioning of articles takes place.
- A single central delivery area should be established to serve as the interface between internal and external logistics.
- Internal distribution of depot articles should be automated as much as possible.
- Depot functions in wards and units should be part of the resource-sharing system that is part of the standard concept for wards and outpatient clinics.

Linen and uniforms

Linen and uniforms should be handled in accordance with the following principles:

- Linen is received in the central goods delivery area in department-specific parcels delivered by an external supplier.
- Niches for carts for patient clothes and bed linen should be established, which is a solution preferred to specific linen storerooms.
- Uniform-dispensing machines should be located close to clothes-changing facilities for staff.

Sterile items

Sterile items should be handled in accordance with the following principles:

- Located off the hospital site.
- Disposable items supplied in sterile packages by the manufacturer and resterilised instruments are received in the central goods delivery area.
- In-house distribution of sterile items should be automated to the greatest possible extent.
- Niches for case carts should be established in the surgical unit.
- Areas for emergency resterilisation of sterile items and the washing of endoscopy instruments should be established as decentralised facilities at the hospital site.

Samples and blood components

Samples and blood components should be handled in accordance with the following principle:

- In-house distribution of samples and blood components should be automated to the greatest possible extent.

Beds

Beds should be handled in accordance with the following principles:

- There should be a bed-washing system that ensures that clean beds are available as needed, but also keeps the transport of clean and dirty items across departments and public spaces to a minimum.
- A decentralised storage area for clean beds should be established in the shared acute admissions unit.

Technical aids

Technical aids should be handled in accordance with the following principles:

- There should be a central storage facility for technical aids with associated cleaning and workshop facilities.
- Storerooms for technical aids should be established at a departmental or unit level and should be part of the resource-sharing system set out in the standard concept for wards and outpatient clinics.

Waste

Waste should be handled in accordance with the following principles:

- There should be a system for the sorting of waste at the source, and it should be possible to remove and sort packaging material when the articles arrive at the central good reception area.
- The collection of waste should be automated as much as possible.
- Waste rooms at a departmental/ward level should be part of the resource-sharing system set out in the standard concept for wards and outpatient clinics.
- The central waste handling station should be designed and located so that it can be adapted to new transport types and new regulatory requirements concerning the handling and treatment of waste. ■

INFORMATION!

REPORT

As part of a Danish Association of Construction Clients development project entitled 'From Idea to Programme', in which New North Zealand Hospital was a general case project, a number of workshops were held concerning the future operation of the hospital. The workshops involved a number of lead users from the existing facility management organisation.

Link to the report

http://www.regionh.dk/NR/rdonlyres/E54B52E1-3A4E-4806-8A6E-58469652D4FA/0/Ide_til_program_brugerinddragelse_med_leaduser_driftperspektiv.pdf

CONCEPT 17

MEDICATION AND MEDICINE DISTRIBUTION

Description

- The dispensing of medicine doses is automated.
- Medication rooms and IV mixing rooms are shared by several departments.
- Medication rooms are able to cater to the need for PRN medication (medication which is administered as needed and not packed in fixed doses) and 24-hour supply of peroral medication (medication that is swallowed).

Medicine for New North Zealand Hospital is supplied on a daily basis by the central hospital pharmacy at Herlev Hospital. Medicine deliveries are received in the central goods delivery area.

An automated dose-dispensing system is expected to be implemented at New North Zealand Hospital. Dose-dispensed medicine is medicine packed for individual patients in disposable bags, each bag with the medication to be administered at a certain time. The hospital pharmacy is in charge of dispensing the doses and packing the medicine for each individual patient in accordance with the physician's instructions. The medicine is dispatched from the hospital pharmacy via an automated transport system or delivered by car.

Medication rooms and rooms for the mixing of fluids for intravenous injection (IV) are part of the resource- and function-sharing concept and should be located centrally in relation to two wards. The medication rooms must meet the requirements applying to PRN medications and 24-hour supplies of peroral medicine. ■

CONCEPT 18

FOOD

Description

- Patients, staff and patients' families have access to food and drink all around the clock.
- The focus is on the last 50 metres of the food chain in order to facilitate an optimal nutritional intake by patients.
- A production kitchen forms part of the service village.
- Eating areas are shared by eight wards/64 beds.

An independent production kitchen must be established as part of the service village. Entrants are requested to focus on establishing good connections to the other hospital functions and ensuring that these functions can be serviced efficiently. The kitchen should be laid out so that it can be adapted to new developments in the field of hospital catering.

A food serving area for hospital staff must be established as an extension of a café area in the public zone so that the café and staff area is a combined function in the hospital lobby. ■

'My dream is for everything to be centred around the patient and that there is a flow which is also transparent to patients from the beginning of their treatment.'

Quote from the vision-formulation process

Automated medicine storage room.

INFORMATION!

Chief consultant Henrik Højgaard Rasmussen, PhD, at Aalborg University Hospital has documented that 40% of inpatients are undernourished and that the percentage grows the longer the patient has been hospitalised. One result of this is a higher mortality rate, more frequent infections, ensuing complications and longer hospitalisation times.

More focus on better food for inpatients will reduce patients' length of stay and enhance their quality of life considerably.

Link to the report:

http://www.sst.dk/Sundhed%20og%20forebyggelse/Ernaering/Underernaering.aspx

CONCEPT 19

INFORMATION TECHNOLOGY

Description

- The hospital is a paper- and wireless hospital, and all information is digitalised.
- The solutions facilitate the communication and information processes that will be used in the digitalised hospital of the future.
- There is full access to all relevant data.
- Patient empowerment is ensured through patient supervision of and access to data.
- There is real-time data registration and full data mobility.
- The solutions chosen support the 'Right of use rather than ownership' space management principle, and the focus is on traceability.

The influence of the above-mentioned strategies on building design is highly indirect, and there are no physical influences, as many IT-supported healthcare systems are used from the IT workstations known from currently existing hospitals. However, the trend is towards an increased number of mobile solutions, which means that the need for physical stationary systems will be decreasing.

CONCEPT 20

MEDICO-TECHNOLOGY

Description

- Installation-intensive functions that require many ancillary rooms are centrally located.
- The layout of the facilities can accommodate as-yet unknown technologies.
- There are point-of-care units with mobile equipment.
- Telemedicine solutions are implemented.
- Medico-technical equipment is decentralised to a greater extent than in the current hospital setting (with a more central location and use).

The new hospital buildings should be so robust that ongoing implementation of new medico-technical solutions is feasible.

IT interface
IT is currently an integral part of medico-technical equipment, and the functionality and effectiveness of such equipment is thus conditional upon IT. The interface between IT and medico-technology is constantly changing, just as the need for systems integration and data storage is sharply on the rise. ■

'The worst thing about our job is when that **IT crap** doesn't work!'

Quote from the vision-formulation process

Given this, New North Zealand Hospital should feature state-of-the-art IT solutions and medico-technical technologies. Furthermore, the underlying technology of the IT infrastructure should be chosen as late as possible in the process in order to allow benefit from the most recent tried-and-tested technology. Such technologies include central control and management systems (CTS); facility management systems; drawing and document archives; alarm, access control and surveillance systems; multimedia systems; videoconferencing systems; interactive systems; and electronic patient record systems. ■

Automated blood sample analysis at Hillerød Hospital.

MAIN FUNCTIO

ONS

CHAPTER 9

This chapter describes the main functions of the new hospital. Main functions are the clinical departments and service functions that, together, will constitute the new hospital. A total floor area requirement has been defined for each main function area, and this floor area should be used in compliance with the concepts described in the previous chapters. The concepts serve as guiding principles for the layout and organisation of the total floor area.

SPACE CONSTRAINTS

The floor areas required for the main functions have been calculated on the basis of a number of general requirements set out by the Danish government and the Capital Region.

Gross/net factor
The gross/net factor indicates the ratio between the total (gross) floor area of a building and the interior usable (net) area of all rooms with the exception of corridors, staircases, lifts, technical rooms, etc.

A gross/net factor of 2.0 is used to convert from net floor area (as calculated by means of area standards and the number of rooms required given the assumed capacity utilisation) to gross floor area (including all corridors, staircases, lifts, technical rooms, etc in the hospital).

AREA STANDARDS

An area standard comprises both the primary room (patient room, examination room, etc) and the necessary ancillary rooms (workstation rooms for staff, storerooms, staff lounges, staff toilets, waiting rooms, public lounges, patient toilets, etc).

NUMBER OF BEDS	NET FLOOR AREA (M2)
Beds (standard, adults)	34
Beds (children)	40
Beds (observation area in the Emergency Department)	30
Beds (intensive care, neurology)	50
Hotel beds	26
EXAMINATION/TREATMENT	
Outpatient clinics, standard rooms	30
Outpatient clinics, special rooms	50
Dialysis	23
SURGERY	
Operating room	120
Pre-/post-surgery area	16
DAY SURGERY	
Operating room	110
Pre-/post surgery area	16
DIAGNOSTIC IMAGING	
Diagnostic imaging room	90
DELIVERY ROOMS	
Delivery room	70
TOTAL FLOOR AREA REQUIRED	
Wards and outpatient clinics	28,813
Interdisciplinary functions	22,388
Logistics, supplies and service functions	12,799
Total	**64,000**
Total (gross/net factor 2.0)	**128.000 m2 brutto**

MAIN FUNCTIONS

How to read the descriptions
The objective is to provide a description of the hospital's functions as a whole to give entrants a good overview of the activities these functions involve, so they can consider and interpret the functions in a new context that is consistent with the space management principles presented.

First, a brief general description of the main function is given, followed by a list of the floor areas allocated to the function. The floor areas are broken down into a number of general room types such as outpatient clinics, patient rooms and offices.

If a department contains special functions such as an endoscopy unit or a dialysis unit, a description of those functions is given. This provides an overview of the organisation and scope of each department, and it also makes it possible to rethink the functions in question and their interconnections.

The specific location of the various rooms must always comply with the overall concepts applying to the functions and described in the previous chapter, for example when a function is part of a shared outpatient clinic, a bed pool or diagnostic pool. The indication of total floor areas for individual departments thus does not necessarily mean that they have to be physically connected. Furthermore, when rethinking the space allocated to different functions, entrants are asked to do so in the context of the space management principle of 'right of use rather than ownership', which removes all fixed boundaries between the departments to ensure a rational utilisation of the floor areas.

The proximity requirements applying to a function are also outlined, and at the end of each main section there is a description of typical patient flows as well as an outline of the outlook for the area in question.

This chapter begins with a description of the clinical hospital departments:

01 Emergency Department (FAM)
02 Mother and child specialties
03 Surgical departments
04 Internal medicine departments
05 Interdisciplinary clinical departments
06 The service village (the centre for the hospital's supply of products and logistics)
07 Other functions: administration; research, education and training; canteen; lobby.
08 Overview: All floor areas are set out in a table that lists the individual elements of the building facility and the total gross floor area to be provided. ■

FACTS: Projections

- Projected bed days: a 1.7% decrease per year (equivalent to a drop of 20% in 2007-2020).
- Projected outpatient calls: a 3.2% increase per year (equivalent to an increase of 50% in 2007-2020).

FACTS: Activity and capacity requirements

- Bed occupancy rate of 85%.
- 245 days a year/7 hours a day/30-45 minutes per outpatient call.
- 20%/80% split between special rooms and general outpatient clinic rooms.
- Diagnostic imaging capacity: 8 hours per day.

MAIN CLINICAL FUNCTIONS

EMERGENCY DEPARTMENT (FAM)

Core function
New North Zealand Hospital will be the acute hospital in Planning Zone North, and the Emergency Department will be the main pivotal point in the new hospital.

This means that the Emergency Department will be the primary entrance for unscheduled patients who need treatment at the hospital. The catchment area comprises about 312,000 people. The main function of the Emergency Department is to diagnose and treat unscheduled patients who come to the hospital.

The objective is for up to 70% of the unscheduled patients who come to the hospital to be treated in and discharged from the Emergency Department, which will therefore play an important role as the hospital's face to the outside world. The Emergency Department will also play a key role in the new hospital's efforts to offer even more efficient high-quality patient pathways.

The Emergency Department is generally a triage area where unscheduled patients will be sorted systematically and assigned to the correct treatment track.

Furthermore, the Emergency Department should include a number of examination and treatment rooms, as well as a range of different beds (ordinary bed/couch/resting chair) that will serve as the patients' base during their stay in the unit. It is expected that 80% of the patients will be offered further examination or treatment within two hours. Patients should expect to stay in the Emergency Department for up to 48 hours, or they may be admitted to a relevant hospital department.

To ensure speedy diagnosis of patients, a point-of-care laboratory should be established to provide rapid test results for blood samples.

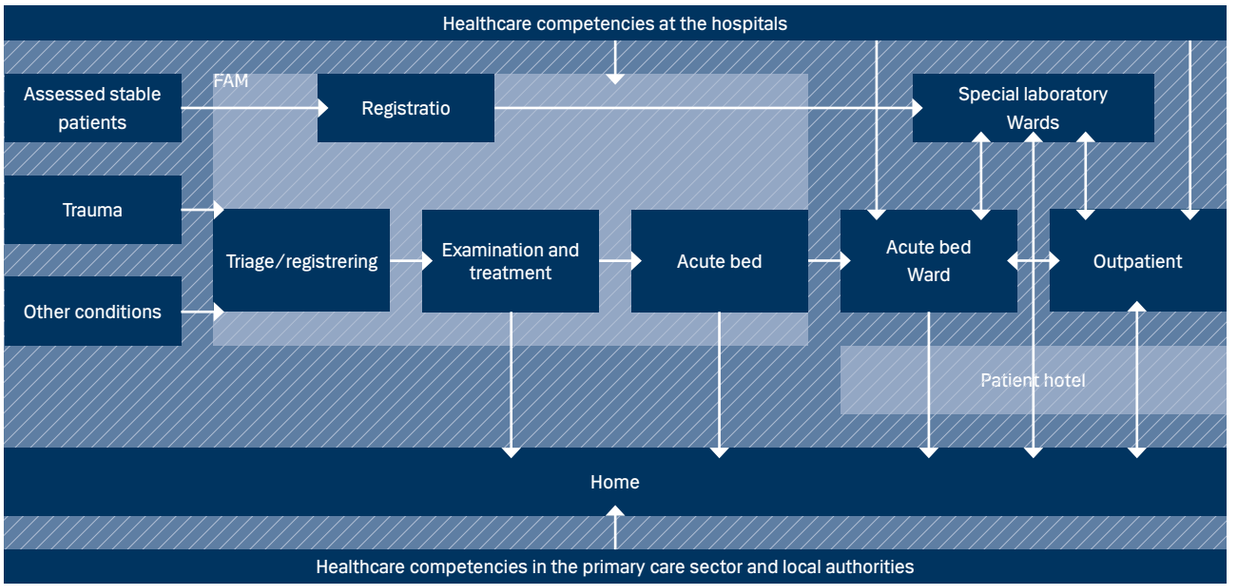
In connection with the Emergency Department, space should be allocated to a diagnostic unit that serves as an outpatient clinic unit for patients with evidently serious conditions whose assessment has not been completed. Outside normal working hours, the diagnostic unit will be used by out-of-hours general practitioners, and there should be a direct flow to this area from the Emergency Department

In addition to patients who present on their own, the Emergency Department will receive patients with various degrees of acute conditions (from chronically impairing to acute life-threatening conditions). For this purpose, there should be a number of trauma rooms in which it should be possible to have at least three patients at the same time.

Children will be sent to a special waiting area. It is important that children whose treatment can best be completed in the Emergency Department are treated in a special unit that caters to the needs and requirements applying to the treatment of sick children. The layout and interior design should reflect children's needs, while at the same time ensuring that both the child and the child's family benefit from the fact that experienced doctors representing several specialties are present and that facilities for speedy diagnosis are not far away, just as the surgical unit is within easy reach.

EMERGENCY DEPARTMENT (FAM)	NUMBER	M2	TOTAL FLOOR AREA
Beds	90	30	2,700
Examination rooms	23	30	690
Trauma rooms	2	50	100
Diagnostic imaging, CT	1	90	90
Diagnostic imaging, conventional X-ray	2	90	180
Laboratory stations	4	15	60
Out-of-hours rooms, diagnostic unit	4	30	120
Duty room	4	15	60
Mortuary	1	30	30
Office facilities			385
Total			**4,415**

FACTS: General patient flows in the Emergency Department



Children with acute conditions who are assessed to need hospitalisation for more than 48 hours will be sent directly to the wards of the Paediatric Department.

Proximity
To ensure that the new hospital can function optimally and that the Emergency Department will have the desired effect, it would be best to locate a number of departments close to the unit.

As regards the interdisciplinary clinical departments, this is particularly the case with the Surgical Department, the Intensive Care Unit and the Diagnostic Imaging Department. The Biochemistry Department will provide fast blood sample test results by pneumatic mail and point-of-care units and thus does not have to be located close to the Emergency Department.

However, the Emergency Department will work closely with hospital departments that receive a large proportion of unscheduled patients: the Internal Medicine Department, the Surgical Department, the Orthopaedic Surgery Department and the Paediatrics Department.

There will be close collaboration between doctors in the Emergency Department and doctors in these departments, just as there will be a transport of patients between these areas.

Outlook
Shared Emergency Departments are in a process of continual development in Denmark.

As the acute hospital in Planning Zone North, New North Zealand Hospital is ambitious in what it would like to see from the future shared Emergency Department. The objective is for the new Emergency Department to bring the treatment of acute patients to a new level.
This means the following:

- Faster and better diagnosis of patients: faster diagnostic response times accelerate the treatment process, and patients at New North Zealand Hospital will be assessed by specialist doctors all around the clock.
- Faster initiation of the right treatment reduces passive time spent in hospital beds and medically unnecessary waiting time.
- As few transitions in the patient pathway as possible between responsible staff/responsible departments minimises the risk of errors and optimises patient pathways.
- Expanded interdisciplinary collaboration wherever it is relevant for the patient. Patients with complex symptoms will be assessed by multidisciplinary teams, and the process will be dynamic and simultaneous instead of sequential with pauses and transitions.

It is expected that all these elements can be realised in the future Emergency Department. Patients will be serviced at a new level, and the hospital will make optimal use of its facilities and resources. ■

WOMAN-CHILD SPECIALTIES

Core function
Another key element in the Capital Region's hospital plans is to gather all childbirths and all paediatric departments – including neonatal departments – at the acute hospitals. This means that the specialty fields of gynaecology, obstetrics and paediatrics will be offered at fewer hospitals with a well-founded patient base in each catchment area.

Department of Gynaecology and Obstetrics
This specialist field has two different tracks. One is gynaecology, ie the examination and treatment of women with abdominal disorders. These women are generally treated surgically on an outpatient basis. The other track is obstetrics, ie ambulatory examination of pregnant women and observation of and assistance provided to women during childbirth, possibly combined with acute surgical intervention. The department also treats childless couples. The two tracks are described separately below.

The list of floor areas for this specialty is included at the end of this section, as the two tracks function as a single department with shared areas.

OBSTETRICS

The anticipated annual number of childbirths in Planning Zone North is 2,700, and they will be handled by New North Zealand Hospital.

In general terms, the Obstetrics Department will be organised as follows:

- Pregnant women will follow a normal procedure involving about five visits to a midwife and one or two medical check-ups by a doctor before childbirth. The midwife consultations will take place at local, decentralised midwife clinics outside the hospital and at an outpatient clinic at the hospital.
- Women who are to deliver a baby will be received together with their family in a special reception unit in the hospital's labour ward. The actual delivery will take place in a delivery suite.
- After the birth of the child, the family may stay in the maternity ward, or they may be sent home directly from the labour ward.

Proximity requirements
The labour and maternity area will be atypical for a hospital, as the women who will come here are generally healthy individuals and not people with a medical condition. The hospital's job is to give each newborn child a start in life that is as calm and harmonious as possible and to introduce the family to their new situation in an equally calm and harmonious way.

At the same time, however, a number of crucial proximity requirements apply in one of two situations where special intervention is needed in connection with the birth of a child. One situation is when it is necessary to perform an emergency C-section. In this case it is crucial that the labour ward is located close to the surgical department, as it must be possible to perform the C-section within a very few minutes.

The other situation relates to prematurely born infants, who will be sent to a special neonatal ward. Also in this situation it is important that the labour ward is located close to the neonatal unit and the surgical department. Furthermore, the Obstetrics Department – in charge of the treatment of the mother – and the Paediatric Department – in charge of the prematurely born child – must be able to work closely together.

Outlook
The current trend is that there is a greater focus on the family, both in connection with uncomplicated childbirths and in connection with children with a medical condition. This trend will undoubtedly continue and become even more manifest.

It is also expected that the level of 'service' in a broad sense that modern-day families expect of the hospital will continue to rise.

The hospital must therefore be able to offer optimal and comfortable settings for families who are having a baby and families with a sick child. The physical setting and the treatment offered should cater to their expectations. Finally, outpatient childbirth is expected to become increasingly common when appropriate, making it possible for women to return to their own home after childbirth without being admitted to a ward.

GYNAECOLOGY

Gynaecology is the second track in the specialty area. This department will examine and treat women with abdominal diseases. The women may be unscheduled patients arriving via the Emergency Department or they may be

elective patients, ie patients referred to the hospital by their general practitioner or a practising gynaecologist.

Several gynaecological conditions are treated with surgical procedures, and the department will carry out many such procedures both in the central surgical unit and in the day surgery unit.

Proximity requirements

Several patients will come to the department via the Emergency Department, for example because of abdominal haemorrhage or pain. In such cases, collaboration – and consequently proximity – is required between the Emergency Department and the Gynaecology Department. Just like the other surgical departments, the Gynaecology Department will work closely with the Anaesthesiology Department, and a relatively large number of patients will have to be transported to and from surgical procedures. The Gynaecology Department will also draw on the services of the Diagnostic Imaging Department and use ultrasound to a great extent, albeit most frequently inside the department itself.

Outlook for Gynaecology

The trends seen in relation to the surgical specialties in recent years are expected to continue.

The specialty is expected to continue to develop as follows:

- Increased involvement of and information to patients.
- Optimised use of mild anaesthesia and a minimum of invasive surgical procedures in collaboration with the Anaesthesiology Department.
- Optimised pain relief and rapid mobilisation after surgical procedures.
- Continuous technological development in the field of surgery, for example increased use of robotic surgery and diagnostic imaging in connection with invasive procedures.

All these elements are expected to result in accelerated patient pathways in the field of surgery. This may lead to less need for beds and a greater need for day surgery and outpatient activities in the long term.

Net floor area allocated to the department

OBSTETRICS/GYNAECOLOGY DEPARTMENT	NUMBER	M2	TOTAL M2
Obstetrics			
Beds	35	34	1,190
Delivery rooms	6	70	420
C-section room (plus one in the surgical dept)	1	160	160
Outpatient clinics midwife consultation rooms	10	30	300
Gynaecology			
Beds	14	34	476
Outpatient clinics	4	30	120
Outpatient clinics, special rooms (procedures, clinic for rape victims)	2	50	100
Office facilities, shared			432
Total			**3,198**

‘It is simply nice to be able to stay here at night, because the nurse may come in and have to wake up my son, and that can unsettle him.’

Quote from anthropological field study
Hillerød Hospital, December 2011
‘Patient stories’

PAEDIATRIC DEPARTMENT INCLUDING NEONATAL UNIT

Core function

The Paediatric Department will diagnose and treat diseases in children, including newborn babies. It is a broad speciality that is not organ-defined, but includes diseases in children in the age group from 0 up to and including 17 years.

The Paediatric Department will receive both elective and non-elective patients.

The flow of non-elective patients will begin in the Emergency Department, where families will arrive and quickly be referred to a special area for children within the unit. Children who can best be assessed by the multidisciplinary team in the Emergency Department, where there is easy access to diagnostics, will stay in the unit. If the treatment of a child is expected to last more than 48 hours, the child will be transferred to the Paediatric Department as quickly as possible.

The flow of elective patients comprises children who are examined and/or treated in outpatient clinics and children who need an invasive procedure in the day surgery unit or a stationary surgical unit.

Net floor area allocated to the department

PAEDIATRIC DEPARTMENT	NUMBER	M2	TOTAL M2
Beds, including about 16 neonatal beds	32	40	1,280
Outpatient clinics	5	30	150
Outpatient clinic, special room (threadmill test)	1	30	30
Outpatient clinic, special room (day treatment)	1	50	50
Outpatient clinic, urology	1	30	30
Office facilities			361
Total			**1,901**

Beds: A total of 32 beds are allocated to the department, including the neonatal beds. No breakdown of the number into neonatal beds and ordinary beds for children has yet been made. The point of departure should be a net floor area of 40 m2, which is more than the net floor area allocated to the other wards. The reason for this higher number of square metres in this standard is that the Paediatric Department should be laid out in a way that caters to the special needs of families staying at the hospital.

Proximity requirements

The Paediatric Department will work closely with the Gynaecology and Obstetrics departments and, as mentioned above, it is important that the delivery area, the neonatal unit and the Paediatric Department are located close to each other.

The Paediatric Department will also work closely with the Emergency Department whenever non-elective child patients begin their pathway through the hospital there. However, it should be noted that the requirements applying to the Labour Ward and the Paediatric Department are such that those areas should not be located immediately adjacent to the Emergency Department.

It is thus important that patients and their families can be received in a calm and harmonious atmosphere in the Labour Ward and the Paediatric Department. The Labour Ward should be laid out and decorated so that it provides the optimal setting for 'the beginning of life', which means that it must be conducive to relaxation, tranquillity and systematic planning. Landscape, colours, interior decoration and arrival areas must all add to this sense of calm.

A special requirement in relation to the children is that their patient rooms should also be their refuge. That is why the space management principle of ensuring that the majority of activities are close to patients does not apply as far as these patients are concerned. Instead, other areas for sample taking and examination should be established elsewhere, but close to the patient rooms.

Outlook

It is crucial that the Paediatric Department, including the neonatal unit, is laid out in a way that caters to the needs of families. It is expected that it will be a fundamental future requirement that space is available for one of or both a child's parents to be together with the sick child.

It is also important that the Paediatric Department is laid out so that it can cater to the different special needs and requirements of a patient group aged 0 to 17, ie ranging from prematurely born babies to almost adult teenagers. Children should be protected and stimulated. The physical setting should encourage patients to lead a life as close to a normal life as possible, characterised by play, time together with family, and recovery.

Children who need surgery should be offered calm surroundings and a process they feel comfortable with and which is adapted to their special needs. Many invasive procedures can be performed as day case surgery, and it is important to take into account that the patients are children and that they will need to spend time with their parents during much of their stay at the hospital. ■

THE SURGICAL DEPARTMENTS

Below are descriptions of the surgical departments at New North Zealand Hospital: the Surgery Department, the Orthopaedic Surgery Department, the Ear, Nose and Throat Department and the Ophthalmology Department (the last one a satellite function). Gynaecology is also a surgical speciality, but for the reasons outlined above, the Gynaecology Department belongs with the mother and child specialties.

The descriptions of the departments follow the structure of the descriptions of the other departments, ie an outline of each department's activities is given, as is a list of the floor areas allocated to that department. Important requirements of proximity to other areas in the hospital are also mentioned.

SURGERY DEPARTMENT

Core function

The Surgery Department will diagnose and treat oesophageal and gastrointestinal diseases, and will also treat liver diseases, pancreatic diseases and diseases of the biliary tracts. These diseases will be treated both medically and surgically in the department.

An important role of the department will be to diagnose colorectal cancer in Planning Zone North and to perform the related surgical procedures.

Net floor area allocated to the department

SURGICAL DEPARTMENT/ GASTROENTEROLOGY	NUMBER	M2	TOTAL FLOOR AREA
Beds	81	34	2,754
Outpatient clinic, standard	5	30	150
Outpatient clinic, special room (colostomy clinic)	1	30	30
Outpatient clinic, special room (day case treatment)	1	50	50
Endoscopy rooms	5	50	250
Office facilities			394
Total			**3,628**

As appears from the table above, a special area should be set aside for the department's endoscopy activities. The space management principles dictate that this area should be located close to the surgical ward. In the endoscopy area, patients' gastrointestinal systems will be examined by means of a flexible scope equipped with a mini-camera that is inserted into the patient either orally or anally. One area in which the endoscopy function will be in focus is in connection with colon cancer screening programmes.

Proximity requirements

A large share of the patients in the Surgery Department will be non-elective, but there will also be a flow of elective patients. Non-elective patients will be received in the Emergency Department, so these two departments will work closely together.

Elective patients in the Surgery Department will typically include patients referred to the hospital by their own general practitioner. They will be outpatients coming to the department's outpatient clinics and patients coming for day surgery or endoscopy procedures.

There will also be a good number of elective patients who need surgery in the central surgical ward.

The department will thus have flows of both elective and non-elective patients with different starting points and different treatment pathways. The Surgical Department's key cooperative partners will be the Emergency Department, the Anaesthesiology Department and the Diagnostic Imaging Department. In addition, the Surgical Department will collaborate broadly but less extensively with several other departments at the hospital, including the Internal Medicine Department and the Paediatric Department.

Outlook

The outlook for all surgical activities is set out at the end of this description of the surgical departments.

ORTHOPAEDIC SURGERY

Core function

The Orthopaedic Surgery Department will diagnose and treat diseases and injuries of the musculoskeletal system. The activities of the department can be divided into elective and non-elective activities.

Non-elective activities primarily involve patients with bone fractures, hip fractures, sprains, etc. All these patients will be received in the Emergency Department, where they will be diagnosed and where, in the case of some of the patients, their treatment will be completed. The department has a special function in the field of hand surgery.

In addition, the department will receive many elective patients who have been referred to the hospital by their general practitioners to be diagnosed and treated in the outpatient clinic, day surgery units or in the central surgical ward. An important treatment area in the field of elective orthopaedics is alloplastic surgery, where joints or parts of the musculoskeletal system are replaced.

Net floor area allocated to the department

ORTHOPAEDIC SURGERY DEPARTMENT	NUMBER	M2	TOTAL FLOOR AREA
Beds	77	34	2,618
Outpatient clinic, standard	15	30	450
Outpatient clinic, special room (plaster cast room)	1	50	50
Office facilities			434
Total			**3,552**

Proximity requirements

The non-elective patients in the department will be admitted through the Emergency Department. This unit, the Diagnostic Imaging Department, the Orthopaedic Surgery Department and the Anaesthesiology Department will therefore work very closely together. These departments will form the axis in speedy and effective patient and treatment pathways in the field of non-elective orthopaedics.

Many non-elective procedures in the field of orthopaedics can be performed without keeping patients in bed for a very long time. However, this does not apply to hip fractures. Hip fracture patients are generally elderly people who are likely to have to stay in bed for several days after surgery, although this is also changing.

The process is different for elective patients. They are referred to the hospital by their general practitioner and will typically go through an examination procedure involving visits to the outpatient clinic and diagnostic imaging. Patients who need surgery will come directly from their homes to the surgical ward or the ordinary ward in the department. After surgery, these patients will typically need extensive physical rehabilitation involving physiotherapists and occupational therapists.

Outlook for orthopaedic surgery

The outlook for all types of surgery is described at the end of this section.

EAR, NOSE AND THROAT DEPARTMENT INCLUDING AUDIOLOGY

The Ear, Nose and Throat Department at New North Zealand Hospital will provide services to an extended catchment area with a population of close to 800,000 people. The ear, nose and throat – or otolaryngology – specialty diagnoses and treats head and neck diseases. The department will be focused on all kinds of treatment of ear, nose and throat conditions in adults and children.

Surgical activities will include adenoidectomies; tonsillectomies; invasive procedures to treat chronic inflammation of the middle ear; sinus disorders; ear, nose and throat disorders; and examinations to detect tumours in the head and neck.

The audiology clinic will examine and follow up upon patients with hearing disorders, carry out preliminary examinations of candidates for the treatment of deafness with a cochlear implant or a bone-anchored hearing device, and conduct ordinary hearing aid services and training in the use of such aids. This will take place in a specially fitted out outpatient room. Various workshop facilities are connected with this activity.

The audiology clinic will also conduct hearing screening of all newborn babies in Catchment Area North.

The department will perform many surgical activities and have a very high level of endoscopic activity.

In recent years, audiology clinic activity levels have been on the increase.

Net floor area allocated to the department

EAR, NOSE AND THROAT DEPARTMENT	NUMBER	M2	TOTAL FLOOR AREA
Beds	17	34	578
Outpatient clinic	17	30	510
Outpatient clinic, special room (ear wax removal technology)	2	50	100
Office facilities			210
Total			**1,398**

Proximity requirements

The department is a surgical speciality area and is therefore closely related to the Anaesthesiology Department and the Diagnostic Imaging Department. It will also work closely with the Paediatric Department as regards children who have had surgery. In this connection, speedy access for ear, nose and throat specialists to the wards of the Paediatric Department is vital.

Outlook for the Ear, Nose and Throat Department

The outlook for all types of surgery is described at the end of this section.

OPHTALMOLOGY DEPARTMENT

Organisationally, the Ophthalmology Department at New North Zealand Hospital will be under Glostrup Hospital. It will not have any beds at New North Zealand Hospital, but will see many outpatients there and also perform many surgical procedures. Its activities at New North Zealand Hospital will primary concern elective patients.

Net floor area allocated to the department

OPHTHALMOLOGY DEPARTMENT	NUMBER	M2	TOTAL FLOOR ARE
Outpatient clinics	7	30	210
Outpatient clinic, special room	1	50	50
Office facilities			81
Total			**341**

Proximity requirements

The Ophthalmology Department will work together with the Anaesthesiology Department, but will otherwise not be very dependent on a location close to other departments.

Outlook for the Ophthalmology Department

The outlook for all types of surgery is described at the end of this section.

SUMMARY REGARDING THE MAIN SURGICAL FUNCTIONS: OUTLOOK AND TYPICAL PATIENT FLOWS IN THE HOSPITAL OF THE FUTURE

As mentioned in the descriptions of the surgical departments, the outlook for these activities is dealt with in a general section on surgery. Such an outlook will of course be of a very general nature and cannot include everything that is relevant to the individual specialties. However, it is expected that the design of the physical setting for these activities in the new hospital will be able to support and optimise the lines of development outlined.

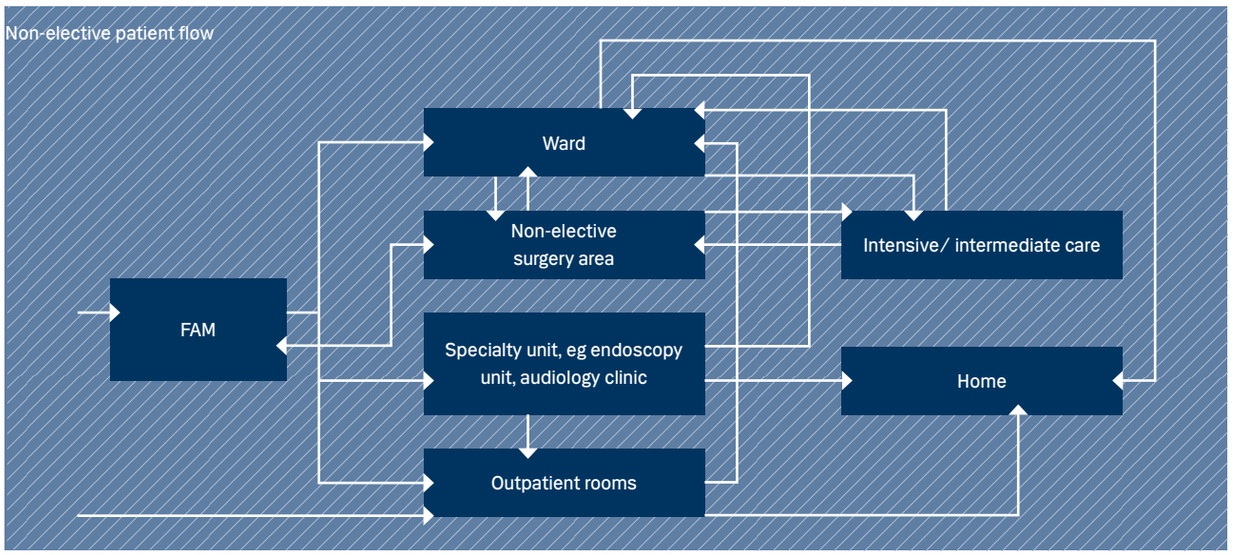
Outlook 1

The trend that has been predominant in the field of surgery for many years will continue. It involves the following:

- A continued focus on involving and informing patients.
- A continued focus on using milder anaesthesia and a minimum of invasive surgery, which will also reduce hospitalisation times or involve a shift to outpatient treatment.
- Continued optimisation of post-operative procedures with enhanced pain treatment and fast mobilisation after surgical procedures.
- Continued technological development, one outcome of which is expected to be increased use of robotic surgery and increased use of diagnostic imaging in connection with invasive procedures, etc.

All these elements are believed to result in accelerated patient pathways in the field of surgery, which will reduce the number of beds needs and increase the need for day case surgery and outpatient activities.

FACTS: Principle diagram of patient flows of surgical specialties



Outlook 2
It also appears from the preceding sections that the surgical area generally has two overall patient flows that must be taken into account in connection with building a new hospital with a centralised surgical ward: elective and non-elective patients.

1. Non-elective patient flow
Patients will be received in the Emergency Department, where they will quickly be assessed by the unit's multi-disciplinary teams and where there is access to speedy diagnostics.

After the assessment, non-elective surgical patients can continue along one of these routes:

- Discharge, because it was a minor problem or there was no severe condition.
- Surgery, because – following diagnostic imaging – it is believed that it will alleviate the problem.
- Admission to a ward, either an observation bed in the Emergency Department or a bed in a stationary ward, because the patient has not been finally diagnosed, has a serious condition or needs to be admitted for some other reason. In this case, too, it is often necessary to supplement with diagnostic imaging.

The future of non-elective surgery should be seen in close connection with that of the Emergency Department.

The objective is for non-elective patients arriving via the Emergency Department to have surgery as soon as possible and with as few transitions as possible and then be discharged to their home. It is believed that streamlining these procedures involves a great potential and can reduce waiting times caused by non-medical reasons.

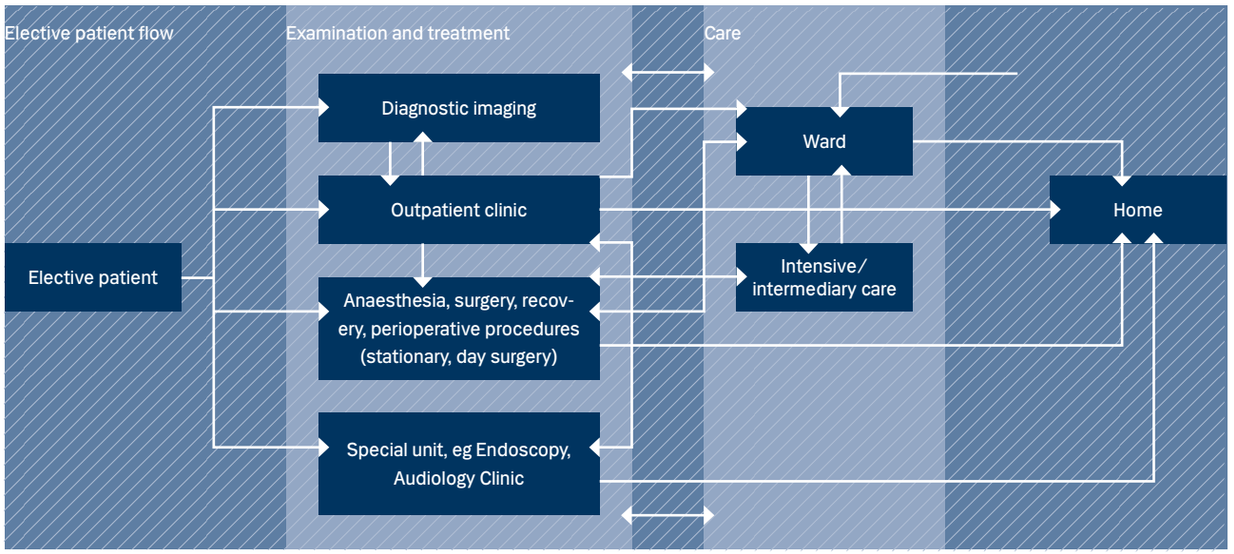
2. Elective patient flow
These are patients who originally consulted their own general practitioner, who referred them to further examination at the hospital.

These patients will be assessed in the outpatient clinic and, because of fast responses from the interdisciplinary clinical departments (one-stop diagnosis), it will be possible to quickly set up a treatment plan.

The objective in relation to elective patient flows is to adopt a different approach to the patient pathway by bringing together what patients may today perceive as a fragmented process – involving visits to the outpatient clinic and interdisciplinary assessment that may take days or even weeks – and turning it into a more compact process.

The aim is basically to have the same physician, who sees the patient the first time in the outpatient clinic, receives the results from the interdisciplinary departments the same day, and then together with the patient decides what to do next.

FACTS: General patient flow for surgical specialties



It would therefore be expedient if it were easy and uncomplicated for patients to move from the outpatient area to the diagnostic imaging area, the area where blood samples are taken, etc. With such a set-up, the entire assessment of a patient can take place in a seamless flow in the course of a single day.

This is of course not feasible in all cases, but when it is, it can lead to great efficiency gains. An additional benefit is that patients will experience a better patient pathway.

If a patient needs surgery after assessment, a time and date for the surgical procedure can be agreed upon immediately, both in the case of a procedure in the day case surgery unit and in the case of surgery in the central surgical ward.

In future, elective surgery should be organised so that the various procedures can take place without being interrupted and disturbed by non-elective activities. In this way, a sound basis for highly streamlined and well-organised 'production' can be provided. There will also be an increase in day case surgery production, and the service level as perceived by elective surgery patients will be considerably higher.

Elective surgery is planned surgery, which means that it is possible to predict most of the activities. This enables the hospital to plan a pathway that the patient will experience as highly service-centred and efficient.

As a whole, the building facility should thus help ensure that enhanced patient pathways and better work regimes are created in the treatment of patients.

Overall requirements applying to the building design in relation to surgical activities and the two outlook scenarios for surgery

In summary, the first outlook scenario indicates that the trend of accelerated pathways in the field of surgery will continue. As regards the building stock, this means that it must be possible to easily convert a ward to suit other purposes and that it must be possible to easily expand the day case surgery, endoscopy and outpatient functions at some future date.

The second outlook scenario indicates that the building facilities can and should actively promote better work procedures and better patient pathways in both elective and non-elective surgery. ■

INTERNAL MEDICINE

The following text contains descriptions of the internal medicine departments and specialties that will be part of New North Zealand Hospital. Internal medicine at the new hospital will comprise cardiology, nephrology, endocrinology, pulmonary medicine, infectious disease epidemiology, neurology, rheumatology and oncology. In addition, there will be a special unit for dementia and palliative care.

This is clearly a very broad field of specialities with different characteristics and very different patient populations. In general, internal medicine is characterised by a large proportion of elderly patients, many of whom have multiple diagnoses, although they have been admitted to hospital for a specific medical problem. Another characteristic of this specialty is that almost all beds in internal medicine wards are occupied by non-elective patients.

This means that internal medicine will work closely with the future joint Emergency Department, which is where all non-elective patients are received and admitted. Demographic trends mean that the number of elderly people will grow in Planning Zone North. Consequently, there is a very great potential for resource savings in organising the new hospital so that patient and treatment pathways are optimised for internal medicine patients.

The field of internal medicine will comprise the following departments at the new hospital:

CARDIOLOGY, NEPHROLOGY, ENDOCRINOLOGY AND INTERNAL MEDICINE DEPARTMENTS

Core function

These departments treat cardiac diseases, renal diseases, hormonal disorders and glandular disorders. The departments will thus cover a very broad spectrum of patients, ranging from acute cardiac patients brought to the Emergency Department by ambulance to patients with chronic renal disorders who receive long-term continuous dialysis at the hospital.

The Cardiology Department will assess and treat acute, subacute and elective cardiac patients and thus work with patients with acute, life-threatening conditions and with non-acute patients who come to the hospital for check-ups, treatment and rehabilitation in the outpatient clinics. This department will also implant pacemakers.

The Nephrology Department will assess and treat patients with renal diseases. A very large proportion of these patients are on haemodialysis because of renal failure that requires regular 'cleaning' of their blood in a dialyser, which is often done on an outpatient basis. These patients come to the hospital very frequently. Patients with several renal conditions are admitted to this department's wards for periods of time, but ambulatory dialysis is enough for many patients.

The Endocrinology Department will deal with a number of different diseases and disorders, of which metabolic disorders, diabetes and osteoporosis are the most frequent. These diseases are generally treated with medicine.

Beds: As appears from the preceding paragraphs, the internal medicine specialty will treat a broad group of patients. Acute patients will occupy a very large proportion the beds in internal medicine wards, so these departments will work closely with the Emergency Department.

Outpatient clinics: The assessment of patients referred to the hospital by primary care physicians and a very large group of chronic patients will result in a great deal of ambulatory activity. Patient schools and rehabilitation will therefore be focus areas. In addition, medical treatment of day patients is a growing activity, and four special rooms should be set earmarked for this purpose. The Cardiology Laboratory will be used for the implantation of pacemakers, and X-ray facilities must be associated with this laboratory.

Dialysis unit: A total of 40 bays should be provided for haemodialysis patients. These patients will generally receive treatment in recliners and will be monitored in larger clusters.

Net floor area allocated to the internal medicine departments

CARDIOLOGY, NEPHROLOGY, ENDOCRINOLOGY AND INTERNAL MEDICINE DEPARTMENT	NUMBER	M2	TOTAL FLOOR AREA
Beds	137	34	4,658
Outpatient clinics	24	30	720
Cardiology laboratory and day hospital	4	50	200
Dialysis unit	40	23	920
Office facilities			943
Total			**7,441**

Proximity requirements

Cardiology naturally needs to be close to the Emergency Department and the Intensive Care Unit. Acute cardiologic patients will start their patient pathway in the Emergency Department and are some of the few 'rush-by' patients that today are sent from Emergency Department on to the cardiology ward, where they receive special monitoring and treatment.

Nephrology will not have the same need to be close to the other function area as many of the other specialties. Some nephrological patient pathways involve smooth transitions from outpatient to inpatient treatment, so proximity between the dialysis unit and wards may be useful.

The dialysis unit will deal with a special group of patients who come to the hospital very frequently and therefore have a great deal of focus on easy access to the facilities. The storeroom for liquids should also be close to the unit.

Outlook

The outlook for all the departments is described at the end of this section about the field of internal medicine, as was done above in relation to surgery.

PULMONARY MEDICINE AND INFECTIOUS DISEASE DEPARTMENT

Core function

Another large department in the field of internal medicine is the Pulmonary Medicine and Infectious Disease Department.

This department will provide treatment in fields such a respiratory failure (COPD), general internal medicine and severe acute or chronic infectious disease.

The vast majority of patients in the department will be non-elective patients, many of them elderly patients with multiple diagnoses. Both specialties are characterised by great seasonal variation in the number of patients: there are generally many patients in the winter months, whereas fewer beds are needed in the summer months.

Net floor area allocated to the department

PULMONARY MEDICINE AND INFECTUOUS DISEASE DEPARTMENT	NUMBER	M2	TOTAL FLOOR AREA
Beds	61	34	2,074
Outpatient clinics	7	30	210
Outpatient clinics, special room (pulmonary function)	1	30	30
Bronchoscopy	1	50	50
Office facilities			165
Total			**2,529**

Proximity requirements

The department will have many acute patients, many with comorbidities (multiple simultaneous diagnoses). There is thus a natural need to be close to both the Emergency Department and the Intensive Care Unit.

It would be useful to be able to establish a non-permanent isolation area with direct access from the outside for one or more wards that can be used in the event of the breakout of certain infections.

Outlook

The outlook for all the departments is described at the end of this section on the internal medicine departments.

Study visit to El Camino Hospital in Silicon Valley in November 2010. This hospital combines state-of-the-art technology with healing architecture. A few patient rooms are designed for bariatric patients and patients with large families, for example patients from the large Chinese and Mexican communities in the area.

NEUROLOGY DEPARTMENT

Core function

The Neurology Department will assess and treat patients with central nervous system disorders, receiving non-elective patients typically admitted to a ward. Such patients will continue to come to the hospital via the Emergency Department. They may show up because they suspect cerebral haemorrhage, cerebral thrombosis or some other acute neurological disorder.

The department will also see a large group of primarily elective patients, most of whom need long-term treatment. They will include patients suffering from dementia, epileptic patients, patients with multiple sclerosis and patients with various types of headache disorders.

In addition, the department plays an important role in rehabilitation, supplied by the department's physiotherapists and occupational therapists.

Net floor area allocated to the department

NEUROLOGY DEPARTMENT INCLUDING PHYSIOTHERAPY AND OCCUPATIONAL THERAPY	NUMBER	M2	TOTAL FLOOR AREA
Neurology			
Beds	35	34	1,190
Outpatient clinics	5	30	150
Outpatient clinics, special room (lumbar puncture, etc)	1	30	30
Office facilities			255
Neurorehabilitation			
Beds	31	50	1,550
Office facilities			141
Physiotherapy and occupational therapy			
Physiotherapy and occupational therapy			1,460
Total			**4,776**

A total of 31 rehabilitation beds will be required, based on a higher area standard. Ample space is needed in these patient rooms, including space for equipment and technical aids such as tilt tables, ceiling hoists, electric commode chairs, etc.

An area has also been set aside for physiotherapy and occupational therapy activities relating to this department. This area should be laid out as set out in the rehabilitation concept outlines in the preceding chapter.

Proximity requirements

The Neurology Department will work closely together with Diagnostic Imaging. For acute neurology activities, it is crucial that a CT scan can be performed quickly at any hour of the day or night and subsequently be assessed by a specialist in radiography.

Diagnostic imaging services will also frequently be used for elective patients.

The Neurology Department and Neurorehabilitation will work closely together with the physiotherapy and occupational therapy units. Rehabilitation facilities should be located where many specialities other than neurology can use them, including rheumatology, orthopaedic surgery and internal medicine, eg for cardiac patients.

Outlook

The outlook for the department is described at the end of this section on the internal medicine departments.

RHEUMATOLOGY DEPARTMENT

Core function

The Rheumatology Department will assess and treat outpatients suffering from rheumatic or arthritis disease or certain types of back pain. The department will only see outpatients who come for ambulatory treatment and only during the day. The department will work closely

with the physiotherapy and occupational therapy units as regards its patients. An important element in the treatment of arthritic patients is the intravenous administration of medicine.

Net floor area allocated to the department

RHEUMATOLOGY	NUMBER	M2	TOTAL FLOOR AREA
Outpatient clinics	6	30	180
Outpatient clinics, special room (daytime treatment)	1	50	50
Office facilities			103
Total			**333**

Proximity requirements

The Rheumatology Department will work closely with the Diagnostic Imaging Department and the Clinical Biochemistry Department, as these specialities are frequently used to diagnose and monitor patients with rheumatic diseases. The department will use an automated transport solution to submit blood samples for analysis. Furthermore, the department will work closely with the physiotherapy and occupational therapy units and with the Orthopaedic Department as well.

Outlook

The outlook for the department is described at the end of this section on the internal medicine departments.

ONCOLOGY AND PALLIATIVE CARE DEPARTMENT

Core function

The Oncology and Palliative Care Department will provide therapy and care to patients with cancer.

In very general terms, it can be said that the treatment of cancer is traditionally based on three therapy scenarios: surgery, radiation and medication in the form of chemotherapy.

All surgical treatment of cancer in the Capital Region is now concentrated at fewer locations, each covering a specific area. At New North Zealand Hospital, cancer-related surgery will be performed in the fields of gastrointestinal surgery and ear-nose-throat surgery. All radiation therapy in the region takes place at Rigshospitalet in Copenhagen and at Herlev Hospital. This means that New North Zealand Hospital will not be receiving patients needing radiation therapy.

At New North Zealand Hospital, medicine-based cancer therapy (chemotherapy) and not least the care of cancer patients will take place in the Oncology and Palliative Care Department. A special function will be a palliative care unit dedicated to the treatment and care of patients who are terminally ill.

The department includes a large day case unit in which ambulatory chemotherapy is provided. Differentiated up-to-date facilities are required to cater to patients' increasing needs for privacy and joint monitoring.

Net floor area allocated to the department

ONCOLOGY AND PALLIATIVE CARE	NUMBERL	M2	TOTAL FLOOR AREA
Beds	28	34	952
Outpatient clinics	6	30	180
Outpatient clinics, special room (acute room)	1	50	50
Day case treatment area, chemotherapy	18	15	270
Office facilities			173
Total			**1,625**

Proximity requirements

The Oncology and Palliative Care Department will work closely with the Diagnostic Imaging Department, the Clinical Biochemistry Department and the laboratory. Blood samples and lab results are thus key in the organisation of medicine-based cancer therapy. Diagnostic imaging is to make diagnoses and to monitor the therapy provided. As regards blood samples and the need for fast response times from the laboratory, entrants are asked to carefully consider how this requirement can best be met, for example by means of a fast track system or a fast-response unit.

Outlook

The outlook for the department is described at the end of this section on the internal medicine departments.

SUMMARY REGARDING INTERNAL MEDICINE: OUTLOOK AND TYPICAL PATIENT FLOWS

Internal medicine is an area that comprises many different patient groups with widely different characteristics and needs, and it involves several different specialities.

It may seem unrealistic to attempt a summary of the outlook for an area that covers such a broad spectrum of activities, and it might be a better idea to try to identify a number of general trends that apply to all these activities and should be taken into account in the forthcoming design and planning of the new hospital.

General trends in the field of internal medicine

Non-elective patients and the Emergency Department

About 60-65% of the bed capacity at New North Zealand Hospital will be earmarked for internal medicine patients, and the vast majority of them will be non-elective patients. The Emergency Department (FAM) will undoubtedly represent a substantial opportunity to improve patient pathways for the internal medicine patients who are admitted to the hospital via this department. In many cases, the main priority will be fast test results from blood sample analysis and diagnostic imaging. In other cases, specialist physicians will assess the patients, either alone or – if the patient's clinical picture is diffuse – by a multidisciplinary team. These two elements to be introduced at New North Zealand Hospital are believed to be crucial in greatly improving patient treatment in future.

It means that many patients will receive the right treatment faster and that some of the patients currently admitted to the internal medicine wards will no longer be sent to these wards. Instead, their treatment will be completed in the Emergency Department. It also means that most patients who are admitted to base departments in future will have been initially assessed before they come to those departments. However, it implies that patients in base departments will have a condition that is worse than is generally the case today. On the other hand, base departments will be in a better position to offer targeted treatment, as all patients with minor diseases will have been screened out and completed their treatment in the Emergency Department.

More day case patients and fewer admissions

Another general trend will be increased use of day hospital services, which will lead to fewer admissions. Many studies show that elderly patients in particular become much weaker if they stay inactive in a hospital bed for long periods of time. There is thus a potential in offering day hospital services to the greatest possible extent, allowing the patients to continue their everyday lives and remain able to cope on their own for as long as possible.

Telemedicine and other technological means will support this trend and make it easier to monitor, treat and rehabilitate internal medicine patients in ambulatory regimes, thus avoiding hospitalisation.

Personalised medicine

The term 'personalised medicine' refers to a new medication approach in which drugs are tailored to the special condition of each individual patient and to his or her genetic profile. Recent years have seen developments in applying this approach to cancer therapy, but also to other major disease areas such as brain disease, and this trend is expected to continue.

There is a great deal of potential in personalised medicine, and it could have a major impact on both diagnostics and the therapies offered to treat very large groups of disease. This underlines the need to have a flexible hospital that can be adapted to new healthcare approaches.

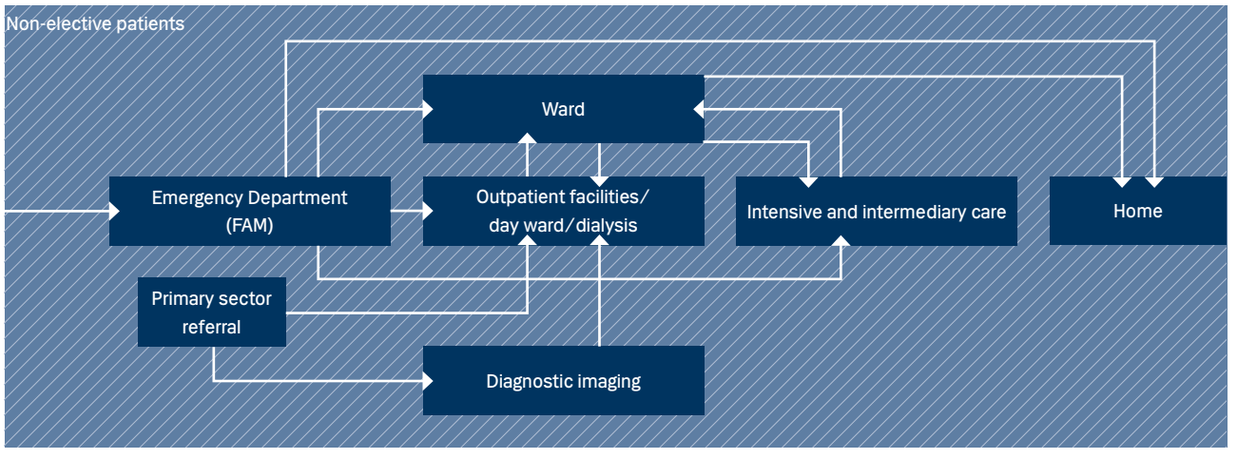
Patient involvement and increased collaboration with other stakeholders

Two other trends should be mentioned in this context: increased involvement of patients and collaboration with other stakeholders.

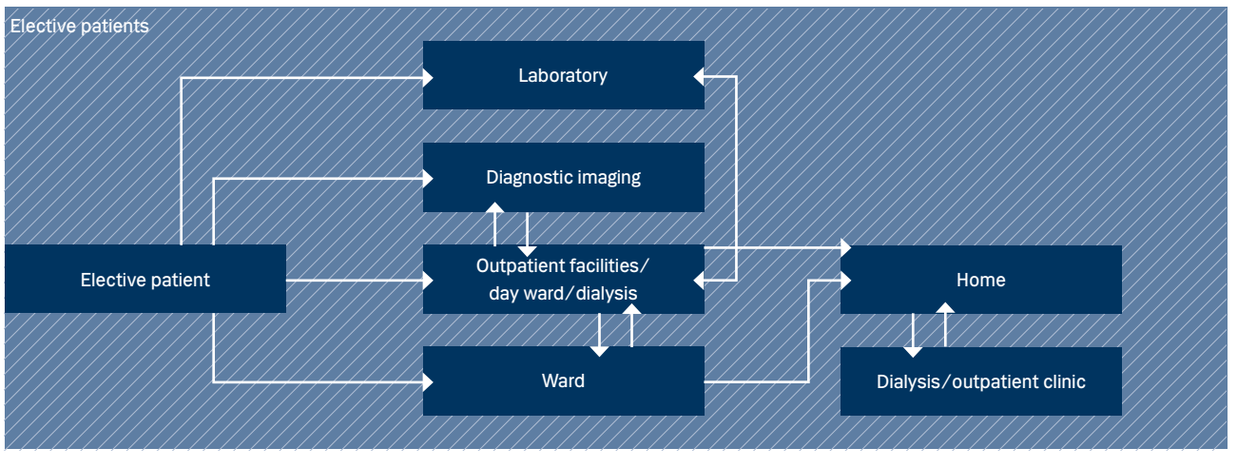
It is considered a fact that the elderly internal medicine patients of the future will be more resourceful than the patients typically seen in internal medicine wards today. In future, such patients are likely to make much greater demands and expect to be involved in their care and treatment to a much greater extent than is the case today. An obvious way of catering to such demands would be to set up patient schools, and the use of such schools is expected to grow. The schools make it possible to provide systematic information to patients, and patients can benefit from the support of other patients, just as they can learn to live a good life with their disease.

Collaboration with other stakeholders, including general practitioners, local authorities and non-governmental organisations, has been a focus area for many years. Still,

FACTS: General patient flow in the field of internal medicine



FACTS: General patient flow in the field of internal medicine



it is regarded as a growth area. Better patient pathways for internal medicine patients will depend completely on improved collaboration between the hospital and various external stakeholders. Technological development and more use of information technology will likely accelerate this trend, but the physical design of the hospital should promote it as well. A hospital that remains flexible in the future will allow openness towards the outside world and facilitate a greater degree of collaboration with external actors. ■

INTERDISCIPLINARY CLINICAL DEPARTMENTS

A characteristic feature of the interdisciplinary clinical departments is that their core function is part of the patient pathway and that they collaborate with the individual specialist clinical departments, but usually have no patients of their own.

As appears from the concepts defined for the new hospital (see Chapter 8), the general rule with respect to the interdisciplinary departments is that they should physically be gathered together in central units. There are a few exceptions to this rule, all of which will be specifically mentioned below.

ANAESTHESIOLOGY DEPARTMENT AND INTENSIVE-CARE UNIT

Together with the surgical units, the Anaesthesiology Department will form the core of surgical activities at the hospital. The Anaesthesiology Department will manage all operating rooms at the hospital as well as all associated recovery facilities.

The core function of the department will be to sedate patients before surgery, monitor patients, provide assistance to surgeons during surgical procedures, and monitor patients coming out of anaesthesia after their operation.

In popular terms, it could be said that the Anaesthesiology Department is in charge of the operating tables, whereas the surgeons come from the various surgical specialties. A well-functioning anaesthesiology department is crucial in ensuring efficient surgical procedures at the hospital.

The Anaesthesiology Department will run both the central surgical unit and the day surgery facilities. In addition, the department will assist in sedation in the labour ward, diagnostic imaging and other hospital units.

The department will also run the intensive-care unit and its intensive-care and intermediate-care beds, and it is involved in the activities of the emergency response cars and pre-hospital care.

Net floor area allocated to the department

ANAESTHESIOLOGY DEPARTMENT	NUMBER	M2	TOTAL FLOOR AREA
Operating rooms, including recovery rooms	23	160	3,680
Intensive-care unit (beds), including intermediate care	24	50	1,200
Outpatient clinics, special rooms (pain)	1	30	30
Office facilities			465
Sterile items			222
Total			**5,597**

There will be a total of 23 operating rooms plus the same type of operating room to use for emergency C-section procedures in the Obstetrics and Gynaecology Department. At present, no final breakdown into stationary operating rooms and operating rooms for day surgery has been made: this will be done at a later stage of the project. It should, however, be noted that the new hospital will have a great deal of day surgery activity.

There must be 24 intensive-care beds. This number includes both specific intensive-care beds and intermediate-care beds. At present, the final distribution between intensive-care and intermediate-care beds remains undecided, but each of the two categories should be allocated the same number of square metres.

Proximity requirements

The surgical unit is a key element in an efficient hospital. It should be located where it will ensure an optimal flow, as such a flow is a prerequisite for a well-functioning hospital and crucial in terms of optimising hospital operations.

As the surgical unit is directly linked to the surgical departments at the functional level, the flows for elective and non-elective patients that apply to those departments are reflected in the activities of the surgical unit.

The areas in the surgical unit that are used for non-elective patients should be located close to the Emergency Department, where patients urgently in need of surgical procedures are received at the hospital. In the Labour Ward, which is part of the Obstetrics-Gynaecology Department, it is regularly necessary to perform emergency C-sections and, as mentioned above, it is crucial that this ward is located close to the Anaesthesiology Department. Finally, for efficiency reasons because these departments

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1. ICU at Royal Free Hospital, London. An example of an open bay model supporting infection control. **2.** Study visit to Groningen UMC, April 2012. Newly fitted out ward with joint monitoring of four patients in one room. **3.** Acuity adaptable rooms (intermediary-care beds). Such rooms are popular in the United States, as they cut in-house patient transport to a minimum, but the flexibility obtained is costly if staff are unable to use them without additional training. Sliding glass doors have been installed at El Camino Hospital in Silicon Valley to allow maximum monitoring.

have staff on call at all hours, the Emergency Department, the Intensive Care Unit and the part of the Anaesthesiology Department that deals with non-elective patients should be located within the same physical structure.

The part of the surgical unit used for elective activities will have a different life. The objective here is to ensure a high level of productivity, which can be done by planning surgical production in advance. In this area, it is possible to give patients a different experience of service than in the non-elective area.

The elective area comprises both day surgery and elective surgery. In the latter case, patients are admitted to a ward. This area should be located close to the endoscopy unit to allow sharing of a number of storeroom and service facilities.

It should be noted that the surgical unit must be laid out as a physically coherent area, as is also stated in the concept for surgery and other invasive procedures (see Chapter 8). The reason for this requirement is flexibility, ie the possibility of using shared facilities and, at some future date, being able at to easily implement a shift from stationary surgery to day surgery.

To optimise operations, the elective part of the surgical unit should be screened off from the rest of the unit, which means that it should have its own patient flow and its own entrance.

Outlook

The outlook for the surgical unit is similar to the outlook for surgery in general. However, it should also be seen in the context of the current trend towards increasing optimisation of patient pathways in both the elective and non-elective fields in their entirety.

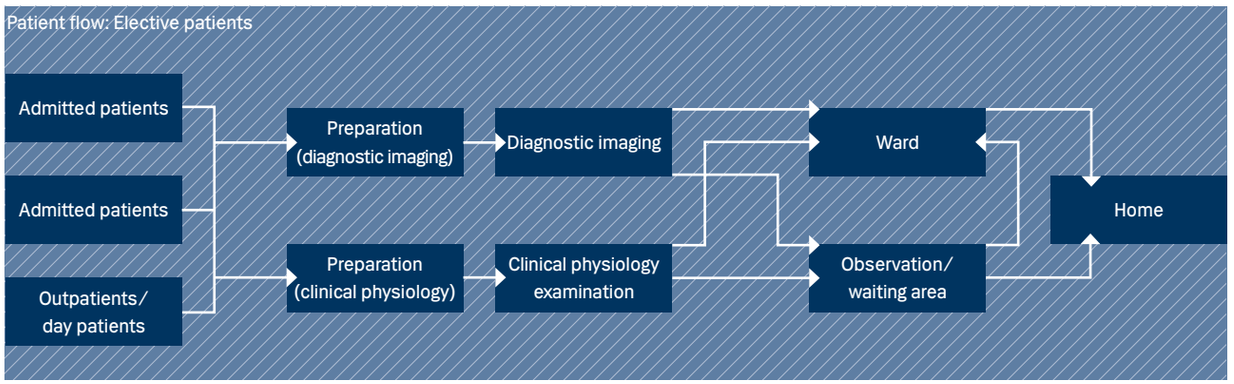
The future situation for non-elective surgery will be closely related to that of the Emergency Department. The objective is to ensure that unscheduled patients who are received by the Emergency Department will be operated on and discharged as quickly as possible and with a minimum of transfers. It is believed that considerable resources can be saved by streamlining these processes and reducing waiting times and delays for non-medical reasons.

The future for elective surgery is to ensure that it remains completely undisturbed by non-elective activities, which lays the foundation for highly efficient and well-organised 'production'. In future, there will also be an increase in day surgery production, and the service experience relating to elective surgery will improve considerably. Elective patients of the future will be expected to come directly to a reception area in the surgical unit, change into hospital clothing and receive treatment. Many of them will be able to return to their home on the same day, and those who need to be admitted will be taken from the surgical unit to a relevant ward.

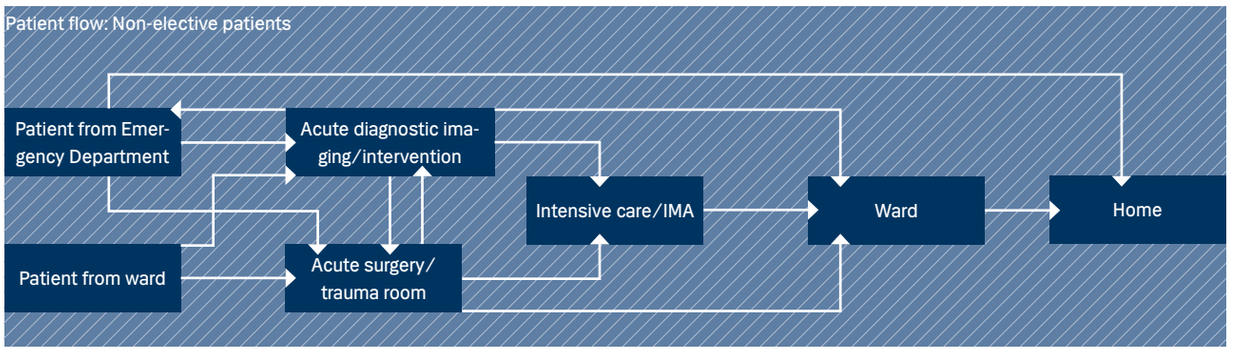
Elective surgery is planned surgery, which means that much of the process is predictable. As a result, the hospital is in a very good position to plan a process that will be perceived as being very service-oriented and comfortable by the patient. It should be simple, obvious and reassuring, and it should take place in an atmosphere characterised by professionalism. The professional core service should of course always take priority, but everything else around the patient should be optimised and will of course play a role in the patient's overall subjective experience of the hospital.

Intensive care unit, Hillerød

FACTS: General patient flow, Diagnostic Imaging Department: Elective



FACTS: General patient flow, Diagnostic Imaging Department: Non-elective



DIAGNOSTIC IMAGING DEPARTMENT

The Diagnostic Imaging Department provides diagnostic imaging services to the clinical departments and patients referred to it from the primary care sector. Typical services are X-rays, ultrasound scans, CT/MR scans, clinical physiological examinations and nuclear medicine examinations.

Net floor area allocated to the department

DIAGNOSTIC IMAGING DEPARTMENT.	NUMBER	M2	TOTAL FLOOR AREA
Radiology, modalities	25	90	2,250
Clinic, physiology and nuclear medicine, large room (PET/CT)	1	160	160
5 medium-sized rooms (diagnostics)	5	90	450
3 rooms (radiopharmacy and radiochemistry, renal function)	3	50	150
6 small rooms (examination and therapy)	6	30	180
Office facilities			377
Total			**3,567**

Proximity requirements

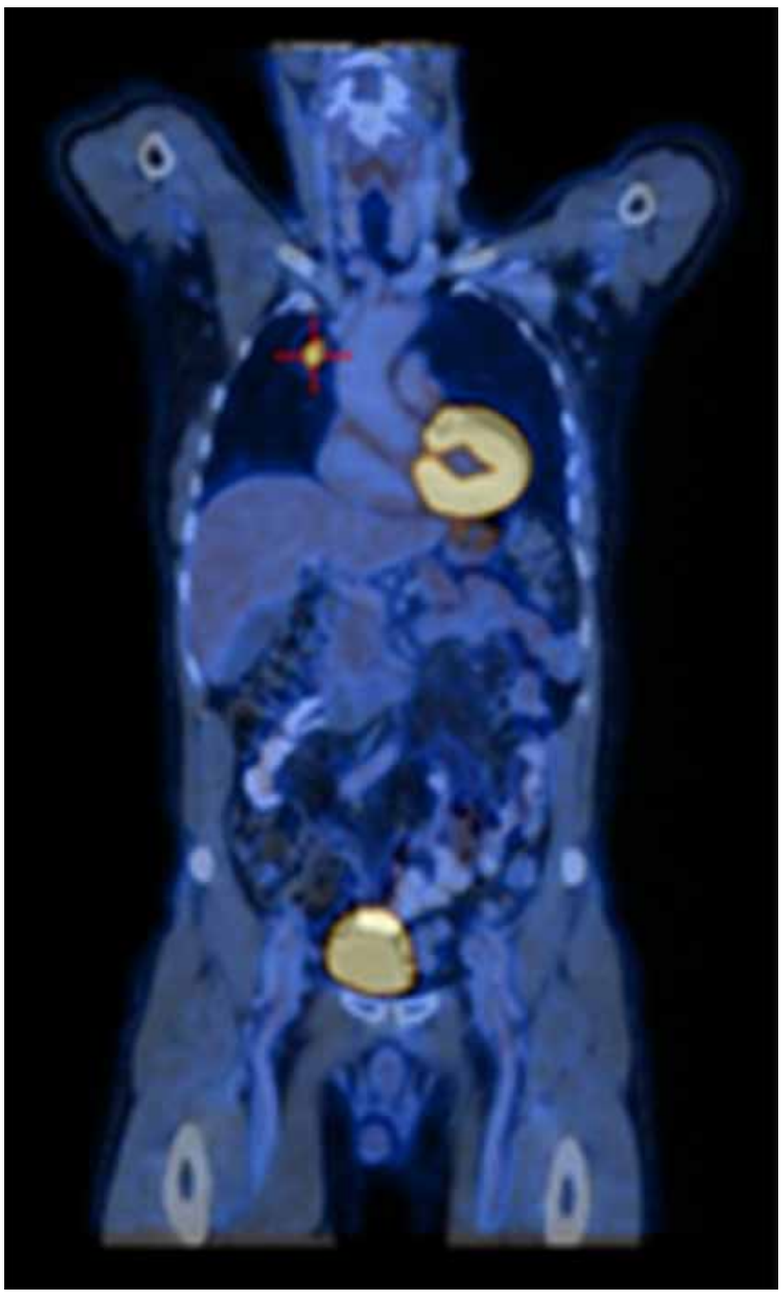
The Diagnostic Imaging Department will be important in diagnosing patients quickly, so it should be located close to the non-elective flow through the Emergency Department and to the elective area with the outpatient clinics. A characteristic feature of the Diagnostic Imaging Department is that patients need to be physically present, which calls for a central location within the building facility. Entrants should coordinate the layout of floor areas in these two departments so that there will be immediate access for the Emergency Department to one of the Diagnostic Imaging Department's CT scanners and two of its conventional X-ray machines.

Furthermore, it must be easy to replace equipment such as scanners in the Diagnostic Imaging Department, as such equipment generally has a relatively short product lifetime of typically six to ten years.

Outlook

Developments in the field of medical technology are rapid, and there is no doubt that the diagnostic modalities of the Diagnostic Imaging Department will continue to change and that the equipment will be continually improved. As regards non-elective patients, it is particularly important to ensure that some of the scanning capacity is located where it can be accessed directly by the Emergency Department. It is believed that, in future, CT scans will become increasingly important in terms of diagnosing patients quickly, for example in connection with suspected haemorrhage or a blood clot in the heart or brain.

Another trend that is expected to manifest itself is an increased use of diagnostic imaging in connection with invasive procedures.



PET/CT image

LABORATORIES
CLINICAL BIOCHEMISTRY DEPARTMENT

The Clinical Biochemistry Department analyses blood and other bodily fluids. Samples are taken from most patients at the hospital and used in diagnosis and in monitoring their condition.

There should be an area where blood samples can be taken in the Emergency Department, which should also contain a small point-of-care laboratory that can perform the most common tests on the spot.

Study visit to Åhuset in Oslo, 2009. Robot that opens and sorts pneumatic post in the laboratory.

The Emergency Department should be connected with the Clinical Biochemistry Department via an automated transport system. This system will be used to send blood samples to the latter department's laboratory. Lab results will be sent electronically to the Emergency Department.

Wards and outpatient clinics should also be directly connected with the central laboratory of the Clinical Biochemistry Department via an automated transport system

Proximity
The Clinical Biochemistry Department is an important department at the hospital because blood samples are taken from a very large proportion of patients. On a very general level, the department's function can be said to comprise two main procedures. The first is taking the actual blood sample; the second is to analyse the sample and provide test results electronically.

As regards non-elective patients, these functions are carried out in a small area in the Emergency Department, where bioanalysts take the samples and analyse them on the spot, as mentioned above.

There should also be a centrally located area for taking samples from all elective outpatients. Samples should be sent by pneumatic post from this area to the laboratory in the Clinical Biochemistry Department. Alternatively, the laboratory could be located close to the sample-taking area.

As regards admitted patients, blood samples are taken in the patient room and sent to the laboratory in an automated transport system that can be accessed from central workstations.

Outlook
Technological advances in this field are rapid, which means that the large machines typically found in a central laboratory are able to do more and more while growing smaller and smaller. In parallel with this trend, small point-of-care equipment is being continuously improved and thus becoming more and more useful, which means that it will become available in more decentralised locations, wherever there is sufficient volume.

Other laboratory functions: Microbiology Department, Pathology Department, Clinical Immunology Department

The Microbiology Department, the Pathology Department and the Clinical Immunology Department will be satellite functions at New North Zealand Hospital. This means that the actual core service of analysing samples will take place at another hospital. Although such analyses will be crucial in diagnosing and treating patients at New North Zealand Hospital, only a limited floor area should be set aside for these functions.

The following paragraphs give a brief outline of these specialties and their work procedures.

In brief, microbiology is used to make diagnoses if there is a suspicion that a disease may be caused by parasites, bacteria or a virus. The typical work procedure in this department is that a secretion or some other kind of sample is taken manually from the patient and subsequently cultivated: the pathogen is then identified, which makes it possible to diagnose and treat the infection.

Harvesting samples from patients will take place at New North Zealand Hospital, whereas cultivation and identification will take place at Herlev Hospital. Test results will be sent to the relevant department at New North Zealand Hospital, most likely electronically. In the special cases that may sometimes occur in the field of infection medicine, there will also be additional guidance and dialogue between the clinical staff at New North Zealand Hospital and the staff in the Microbiology Department at Herlev Hospital concerning the treatment to be provided. Correct handling of the samples until they are transferred to Herlev Hospital is therefore necessary, which means that the samples should be kept cold or stored in a heating cupboard. Elective patient samples will wait for routine transport, but non-elective patient samples will be sent to Herlev Hospital by taxi.

The pathology specialty is, in brief, the microscopic examination and typing of tissue, mainly in connection with cancer therapy. This specialty works closely with the surgical departments dealing with cancer patients and also contributes to the assessment of disease by taking and analysing tissue samples. At New North Zealand Hospital, the departments in question will mainly be the Surgical Department and the Ear, Nose, Throat Department.

In a typical process, the Surgical Department will take a tissue sample for analysis. As all other types of samples, tissue samples will be placed in an automated transport system and sent directly from the surgical unit to a central collection area at New North Zealand Hospital, probably in the service village. From the collection area, there will be daily routine transports of tissue samples to the Pathology Department at Herlev Hospital. Samples taken during surgical procedures will be transported immediately. Once the tissue has been analysed at Herlev Hospital, the results will be sent electronically to the clinical department at New North Zealand Hospital.

The job of the Immunology Department is to determine blood types and produce blood products. The core services are to draw blood, take samples for correct blood transfusion and store prepared blood and blood products correctly. The department will typically work closely with the Surgical Unit and the Emergency Department. It will be crucial for New North Zealand Hospital to always have a sufficient quantity of relevant blood products available close to the areas where such products are needed. Blood products must be stored under special conditions, but will not take up much space from a floor area point of view.

Net floor area allocated to the laboratory function

CLINICAL BIOCHEMISTRY DEPARTMENT AND LABORATORY FUNCTION	TOTAL FLOOR AREA
Clinical Biochemistry Department	1,080
Clinical Immunology	120
Clinical Microbiology	90
Pathology Department	700
Office facilities	378
Total	**2,368**

PATIENT HOTEL

There must be a patient hotel at New North Zealand Hospital. For reasons of flexibility, the beds at the patient hotel should be standard beds, which means that – out of the total number of stationary beds – there will be about 32 hotel beds operated on the basis of the principles applying to patient hotels. The floor area allocated to patient hotel beds will thus be included in the floor area for patient beds of the wards, but the area standard will be lower. ■

SERVICE VILLAGE

Services and logistics are a very special area in the building of a new hospital. Some important principles for logistics and services at the new hospital were set out in the twenty concepts explained in Chapter 8.

To ensure efficient and effective logistics and supply, there should only be one physical location for the reception of goods at New North Zealand Hospital. It will be called a service village.

With such a service village, the flows of goods to and from individual areas at the hospital can be organised and coordinated so as to ensure optimal efficiency.

There must be a production kitchen with a net floor area of up to 2,500 m2. It should not be integrated with other buildings for other functions, as the funding of the kitchen is uncertain at the time of launching this competition. Because of this uncertainty, it must be possible to realise the clinical facilities independent of the realisation of the production kitchen.

Entrants are also requested to illustrate the location of a kitchen with a net floor area of 500 m2 where deliveries of food from external suppliers can be received. This kitchen should be part of the service village. It will be realised if it proves impossible to establish the production kitchen. ■

Net floor area allocated to the service village

SERVICE VILLAGE	M2
Storage facility/goods reception/post	750
Waste handling area	560
Production kitchen	2500
Storage room for technical aids	490
Technical Department	1.405
Outdoor services	150
Staff and office workstations	321
Total	**6.176**

ADMINISTRATION, RESEARCH, EDUCATION, TRAINING, ETC

The preceding text briefly described the various clinical departments, the interdisciplinary departments and the service village.
The following paragraphs will describe the other areas which, together with the facilities just mentioned, will make up New North Zealand Hospital

OTHER LARGE FACILITIES	NUMBER	M2	TOTAL FLOOR AREA
Outpatient nutrition clinic	1	30	30
Administration			1,402
Office facilities, unallocated, temp services, etc			540
Mammography			163
Duty rooms			300
Research, education, classroom facilities			1,998
Pharmacy			410
Housekeeping			185
Locker rooms/changing rooms			2,784
Canteen			741
Lobby facilities			890
Bed handling			766
Mortuary, chapel and reflection room			500
Staff clothing/linen			446
Total			**11,155**

DESCRIPTION OF THE LARGE AREAS LISTED ABOVE

Administration

The administration at New North Zealand Hospital will comprise the management board and associated staff functions. The area for the administration will comprise office areas generally laid out as open-plan offices.

The administration will collaborate with the clinical departments on a daily basis, but there is no specific requirement of proximity to the rest of the hospital.

Study visit to Klagenfurt, December 2010. Separate service village with a focus on robust surfaces, functionality and installations based on the on-stage/off-stage principle.

Research and education

A considerable area has been set aside for research and education. These functions have high priority and are essential in an efficient modern hospital. Good conditions in this respect will help attract and develop the right manpower, ensure optimal treatment and therapy, and ensure efficiency in the operation of the healthcare sector. The research and education area should be laid out in accordance with the concept set out in Chapter 8.

Locker and changing rooms

There should be about 2,800 locker and changing rooms for staff. The layout of the locker and changing room area is important in relation to the staff flow as a whole. Staff's route from the car park to the changing room and shower facilities inside the hospital should be naturally connected with their routes to the clinical work areas and back.

Duty rooms

There should be four duty rooms for a total of 20 people on duty: the rooms should be directly connected to the Emergency Department. The standard for a duty room is a net floor area of 15 m2, including shower and toilet, which means that a total area of 300 m2 should be set aside for this purpose.

The duty rooms should be located close to the hospital's acute functions, ie the Emergency Department, the Surgical Unit, the Labour Ward and the Intensive Care Unit. Secondly, there should be fast access to the wards from the duty rooms, as inpatients can also suddenly fall ill during duty periods. (Duty periods are periods outside normal working hours, ie from around 4 pm to 7 am, and in weekends, on public holidays, etc).

Summary

All the functions that together will make up the new hospital have been described in this chapter. As stressed initially, the descriptions of the individual departments and the spaces they need – wards, offices, outpatient clinics, etc – do not necessarily mean that all their rooms have to be in the same location in the new hospital. That is why there is a summary of the above descriptions in the two tables below.

One of the tables shows the net floor area allocated to each area described above, and at the end the total net floor area is multiplied by a factor of 2.0, which gives a total gross floor area to be built of 128,000 m2.

New North Zealand Hospital comprises the following departments:

AREA	DEPARTMENT	NET FLOOR AREA
Acute care	Emergency Department	4,415
Surgery	Surgical Department	3,628
	Orthopaedic Department	3,552
	Ear, Nose, Throat Department	1,398
	Ophthalmological Department	341
Internal medicine	Oncology and Palliative Care Department	1,625
	Cardiology, Nephrology, Endocrinology and Internal Medicine Department	7,441
	Pulmonary Medicine and Infection Disease Department	2,529
	Neurological Department, including physiotherapy and occupational therapy	4,776
	Rheumatology Department	333
Woman and child specialties	Obstetrics and Gynaecology Department	3,198
	Paediatric Department	1,901
Interdisciplinary clinical	Anaesthesiology Department	5,597
	Diagnostic Imaging Department	3,567
	Clinical Biochemistry Department and laboratory area	2,368
Service village	Service village	6,176
Other areas	Other areas	11,155

Total net floor area required (m2)	**64,000**
Total gross floor area required (m2)	**128,000**

The second table shows the floor areas of some of the overall functions such as wards, outpatient clinics, offices, interdisciplinary clinical departments and service functions. This serves to illustrate that the puzzle pieces that make up the new hospital can be put together in several different ways. The guiding principles set out in Chapters 1 and 8 and the various interrelationships and outlooks set out in this chapter should govern the design of the hospital as a whole.

Capacity and floor areas

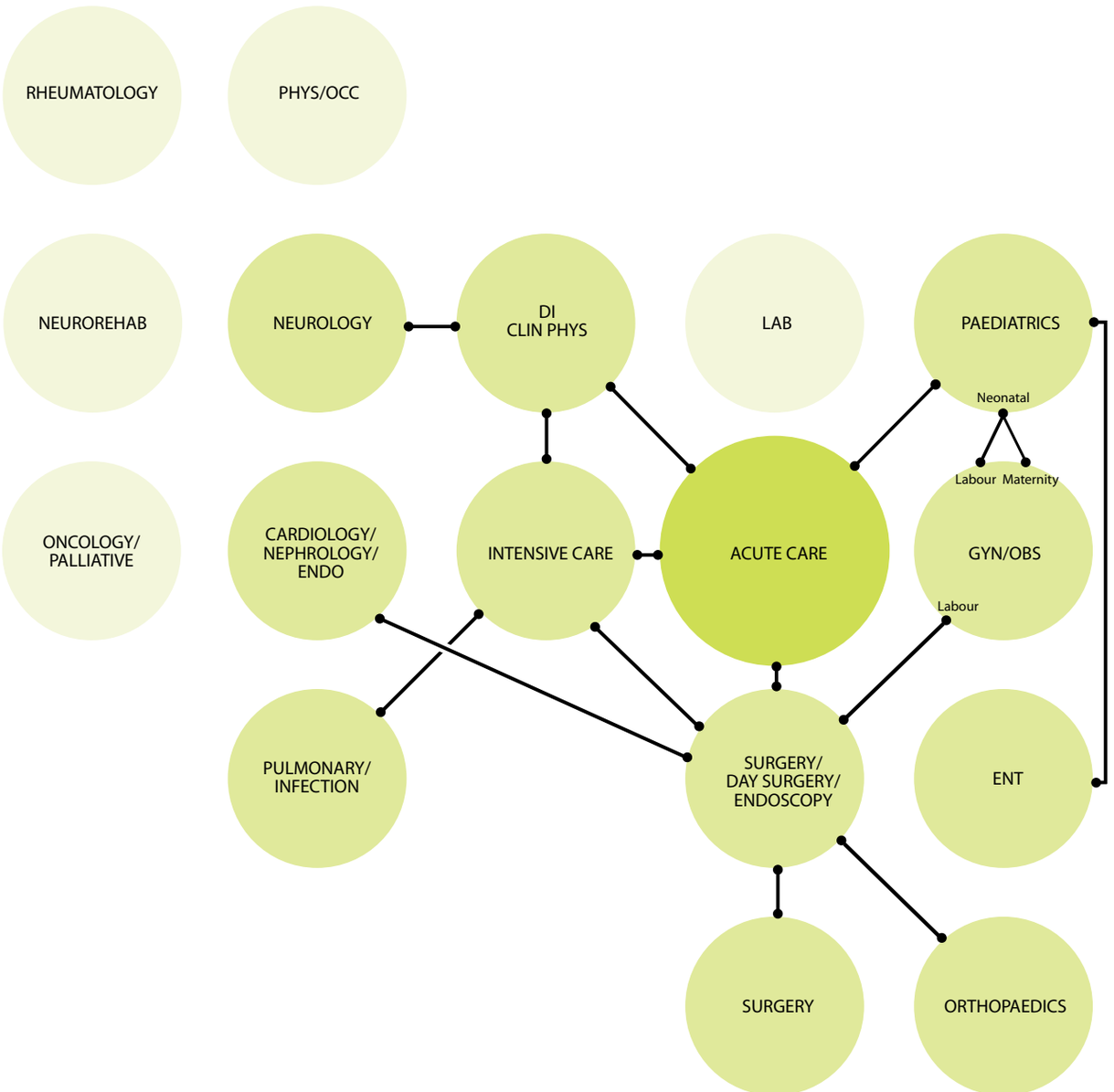
FUNCTION AREA	NUMBER	NET FLOOR AREA
Beds	**662**	**23,220**
- In clinical departments	548	19,320
- Intensive Care Unit	24	1,200
- Emergency Department	90	2,700
Outpatient clinics and day case units	190	5,593
Endoscopy units	6	300
Surgery	23	3,680
Other interdisciplinary functions		8,850
Research and education		1,998
Offices and administration		7,560
Logistics, supply and service area		12,799
Total net floor area required (m2)		**64,000**
Total gross floor area required (m2)		**128,000**

Remarks on the table:
The line setting out the required number of beds for outpatient clinics comprises all outpatient clinics and day case units including areas used for dialysis and chemotherapy. ■

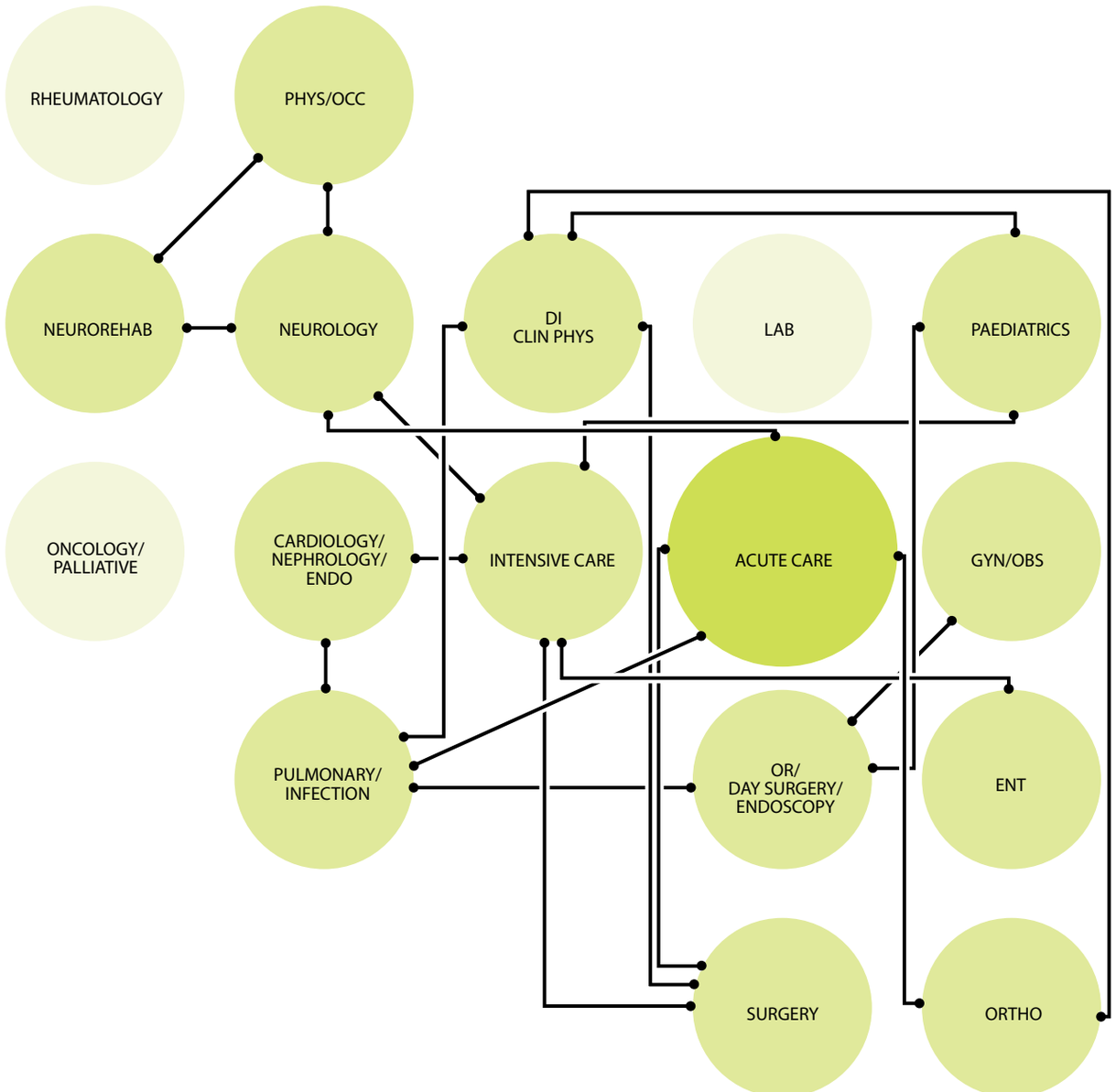
PROXIMITY MATRIX: GENERAL OVERVIEW

Three diagrams:

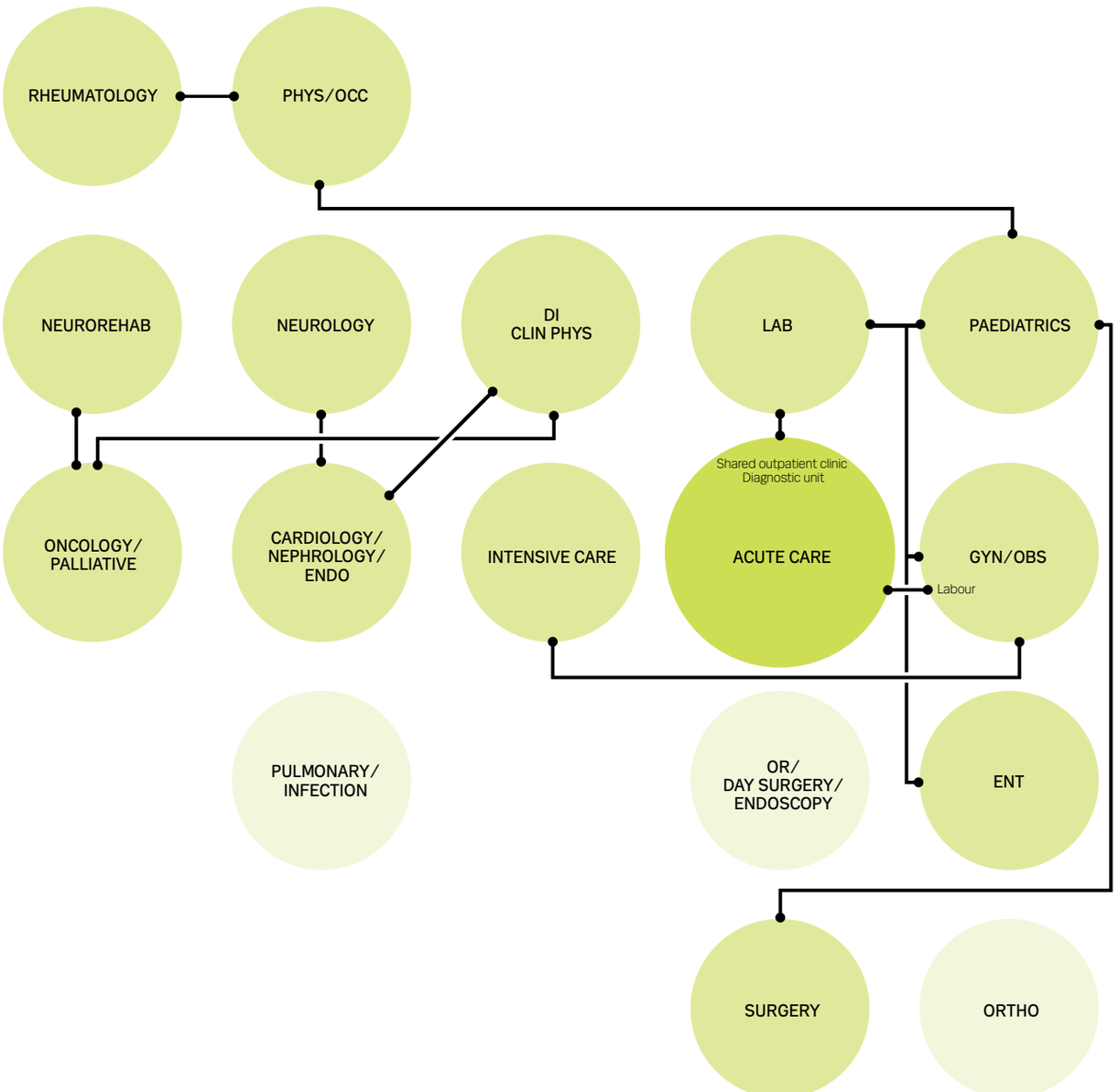
High priority



Medium priority



Low priority

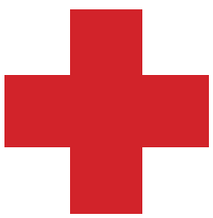


Abbreviations:

- CLIN PHYS: Clinical physiology
- DI: Diagnostic imaging
- ENDO: Endocrinology
- ENT: Ear, nose, throat
- GYN/OBS: Gynaecology and obstetrics
- NEUROREHAB: Neurorehabilitation
- OR: Operating room
- ORTHO: Orthopaedic Department
- PHYS/OCC: Physiotherapy and occupational therapy

“In der Beschränkung zeigt sich erst der Meister”

Goethe



The Capital Region of Denmark

New North Zealand Hospital
Hillerød Hospital
Dyrehavevej 29
3400 Hillerød

Phone: +45 48 29 48 29
E-mail: nythn@regionh.dk
www.regionh.dk/nhn

The Capital Region of Denmark
New North Zealand Hospital

REGION

VOLUME III
COMPETITION REGULATIONS
PROJECT BASIS

YOUR BLANK CANVAS


COMPE
REGULA

10

CHAPTER

COMPETITION PROMOTER, COMPETITION TYPE AND COMPETITION LANGUAGE

This competition was launched by New North Zealand Hospital on behalf of the Capital Region. It is a restricted design competition with a limited number of participants, organised in accordance with Council Directive 2004/18/EC (the Public Procurement Directive) following a prior prequalification round as set out in Tender Notice S 188-309367-2012 published in the Official Journal of the European Union on 29 September 2012. The notice is attached as an annex to this brief.

The assessment panel reserves the right to select one to three winners of the competition. If more than one winner of the design competition are selected, they will be considered equal winners. The winning entrant(s) will subsequently be invited to participate in a negotiated procedure as set out in Article 31(3) of the Directive. The subject of the tender will be the lead consultancy contract for New North Zealand Hospital.

This Stage 1 is thus the design competition, while Stage 2 is the negotiated procedure.

The competition language is Danish, which means that all parts of entries must be in Danish. In order to facilitate the understanding of the brief for non-Danish participants, New North Zealand Hospital has decided to issue an English version of the competition brief and selected annexes (see the list of annexes), and questions and answers will be issued in both a Danish and an English version. In case of discrepancies between the two versions, the Danish version will apply.

PARTICIPANTS

The following teams participate in the design competition:

- Lundgaard & Tranberg Arkitekter A/S (lead consultant)
  Subconsultants:
  EKJ A/S
  WSP UK Ltd
  Schønherr A/S
  Via Trafik
  Arkitektfirmaet Jens Clementsen
  Hospitalitet A/S

- BIG A/S – Bjarke Ingels Group, WHR Architects Inc, Ove Arup & Partners International Ltd (joint venture)
  Subconsultants:
  ArchiMed
  Davis Langdon

- Herzog & de Meuron, Basel Ltd, Vilhelm Lauritzen Arkitekter A/S (joint venture)
  Subconsultants:
  Ramboll UK Ltd
  Vogt Landscape Architects Ltd
  Davis Langdon
  IBG – Institut für Beratungen im Gesundheitswesen

- schmidt hammer lassen architects (lead consultant)
  Subconsultants:
  Eliassen & Lambertz-Nilssen Arkitekter A/S
  JJW Arkitekter A/S
  Kragh & Berglund
  HASKONING Nederland B.V.
  Midtconsult A/S

- SCAU (totalrådgiver)
  Subconsultants:
  CEBRA A/S
  EGIS
  Møller & Grønborg A/S

- C.F. Møller A/S, Alectia A/S, Rambøll A/S (joint venture)
  Subconsultants:
  Søren Jensen Rådgivende Ingeniørfirma A/S
  Cubo Arkitekter A/S
  Tredje Natur ApS

- Henning Larsen Architects A/S, NNE Pharmaplan A/S, Friis & Moltke A/S (joint venture)
  Subconsultants
  COBE ApS
  Norconsult Danmark A/S
  SLA A/S
  SINTEF Teknologi & Samfunn, Healthcare Department

Competition secretary
Anne-Mette Bølling
The Competition Unit
Architects Association of Denmark
Strandgade 27 A
DK-1401 Copenhagen K
E-mail: amb@arkitektforeningen.dk
Tel: +45 3085 9016

COMPETITION MATERIAL

The competition material comprises the following documents:

- **Volume I,** *Vision and fundamental principles*
- **Volume II,** *Programmatic requirements*
- **Volume III,** *Competition regulations and project basis*

Annexes as set out in the list of annexes.

In addition to this printed version of the competition brief, the competition material includes a DVD with the annexes and the competition brief in e-paper format. There are no printed versions of the annexes, but all annexes can be downloaded at www.regionh.dk/nythospitalnordsjaelland.

It is up to the competition entrants to check that they have received a complete set of the competition materials including all annexes. Entrants are asked to acknowledge receipt of the material by e-mail to the competition secretary, Anne-Mette Bølling, by 4 pm on **12 February 2013.**

Questions and answers relating to the competition and any corrigenda and other notices that may be issued to the competition entrants will also be considered annexes to the competition brief.

SITE VISIT, INFORMATION AND QUERIES

Entrants are invited to participate in a site visit at Overdrevsvejen on **22 February 2012** and a subsequent information meeting at Hillerød Hospital, where they will have an opportunity to ask questions.

If possible, the questions will be answered at the meeting. After the meeting, minutes containing the answers to the questions asked during the meeting will be distributed to entrants. Questions that cannot be answered before the minutes of the meeting are distributed will be included in the query round.

Any subsequent questions concerning the competition may be sent to the competition secretary, Anne-Mette Bølling, by e-mail.

The competition secretary will then submit the questions, which must be in Danish or English, in anonymised form to the competition promoter. They will be answered by e-mail as quickly as possible after receipt and not later than **12 April 2013**. Answers to questions will be provided in both Danish and English.

The formal deadline for submission of questions is **4 April 2013**. All questions received by that date will be answered by **18 April 2013.** Questions received after **4 April 2013** will only be answered if answering them imposes no unreasonable burden on New North Zealand Hospital. Such answers will be issued by **25 April 2013.**

Concurrently with sending these answers, a copy will be e-mailed to all competition entrants. In the case of joint ventures, the answers will be sent to the joint venture partner designated as the official representative of the joint venture.

Entrants are requested to submit a digital building model of their proposed scheme in accordance with the guidelines set out in Annex 2. As stated in the section entitled 'Compliance with space constraints', compliance with space constraints is crucial to New North Zealand Hospital. To help entrants ensure that their digital building models meet the requirements, the competition promoter is making a checking tool available: a BIM checker developed by Dalux. A special information meeting about the BIM checker will be held at 1.00 pm on **26 February 2013** at the BIM LAB in Building 118 at the Technical University of Denmark (DTU), where Dalux will be present.

Questions as to how space and floor area requirements are to be understood can be sent to the competition secretary in Danish or English. Questions and answers will be sent regularly to all competition entrants in both Danish and English. On or before 2.00 pm on **6 May 2013,** entrants may call Dalux on +45 3110 0386 if they have technical questions concerning the BIM checker.

Link to contract notice

http://www.regionh.dk/NR/rdonlyres/C126421F-AEBC-4562-9CC9-B5314A373175/0/Bekendtgoerelseomprojektkonkurrence.pdf

SCOPE OF COMPETITION ENTRIES

In brief, entrants are asked to present proposals for the on-site placement and design of New North Zealand Hospital. The total floor area of the facility will be approximately 128,000 m2, including a shared emergency department, approximately 662 beds in single-patient rooms, and 24 specialities that offer contemporary and effective services to patients, patient families and staff in settings that promote best practices in treatment as well as in research and education.

Competition entries should include the facilities and themes listed below, and the explanatory texts submitted will be included in the assessment of the entries. In this connection, entrants are referred to the assessment criteria set out in the section headed 'Assessment criteria'. New North Zealand Hospital would like to stress that any failure to submit explanatory text may adversely affect assessment of the entry in question.

After each theme, New North Zealand Hospital states its specific wishes and provides examples of submission formats, but it is otherwise up to the entrants to determine how these wishes, eg a diagram, should specifically be included in the proposed scheme.

Masterplan
The masterplan should illustrate the main concept and visions proposed, and the drawings and other material submitted should illustrate the location of the building facilities in the urban context and landscape structure, including the overall infrastructure in the form of roads, access routes, paths, parking areas, hard surfacing, hospital entrances, wastewater treatment plant, helipad, service village, etc.

The masterplan should also illustrate how the existing landscape qualities are used in the design and how the views of Frederiksborg Castle have been taken into account.

Furthermore, the masterplan must feature proposals for extension and reduction of the proposed building structure. It must generally be possible to extend the gross floor area of the various functions by 20% – in the case of diagnostic imaging and the service village, however, by up to 50%. As regards reduction of floor areas, the masterplan should include proposals for the reduction of wards by entire ward entities (32 beds) for a total of up to four wards. The purpose of this is to be able to adjust individual elements of the masterplan in the event of changes to the hospital structure, changed needs and unforeseen trends in the individual areas.

Entrants are also requested to outline how the production kitchen can be reduced to a kitchen with a total gross floor area of 1,000 m2 that only receives meals from an external supplier and washes dishes.

Finally, entrants are requested to submit proposals for a 40,000 m2 extension of the facility as a whole, contained in a detached building complex that can be used for mental health services.

For the sake of completeness it should be noted that such potential extensions and reductions will have no impact on the assessment of the competition entries' compliance with the floor areas set out in the competition brief (see the section entitled 'Compliance with floor area requirements').

The masterplan should explain and substantiate the logistical, functional and architectural choices made. In this connection, reference is made to the assessment criteria set out under the heading of 'Assessment criteria'.

- Plan (scale 1:1000), diagrams, explanatory text and illustrations.

Floor plans
All floor plans must serve to illustrate the main concept proposed in the entry. They should show all main functions described in Chapter 9 in Volume II. Entrants are also requested to illustrate and explain the organisation of the function areas and their interrelationship and to show compliance with the proximity requirements.

The floor plans must illustrate the layout of spaces and the relationship between indoor and outdoor areas.

Tunnel and corridor connections, the principles governing the layout of technical areas, and the use of natural light should be part of the entry.

The plans should illustrate and explain the logistic, functional and architectural choices made

- Plans of all floors (scale 1:500), diagrams, explanatory text and illustrations
- The plans may be illustrated as diagrammatic floor plans with no details

Selected areas
Entrants are requested to explain the main idea behind the design of the following three function areas. In this connection they should describe internal flows and operations:

- Shared emergency department
- Wards: at least two wards with a total of 64 beds
- Outpatient clinic area with at least 20 rooms

For the areas selected, entrants are asked to describe and explain the logical, functional and architectural choices made.

- Plan details (scale 1:200), plus diagrams, explanatory text and illustrations

Selected facades
The illustrations should communicate the overall architectural concept, including the selection of materials.

- Elevations and sections, scale 1:500

Selected sections and plans
The illustrations should show the main principles governing the design of load-bearing structures, ducts and pipes for technical installations, and other installations, along with the sustainability principles applied.

- Sections and plans, scale 1:500 and 1:200

Flows and logistics
The illustrations must show the overall flows for external traffic, including ambulance access, and internal logistics for staff, patient families, bed-confined patients, supplies, waste, etc.

- Diagrams

Robustness
Entries should explain the robustness of the scheme proposed in terms of flexibility, elasticity, generality and buildability.

- Diagrams and description

Four key experiences
Entries should highlight four key experiences in the new hospital:

- Life in a patient's room seen in the context of the multidisciplinary approach to room use
- Patients' experience of the highly technical areas in the hospital, mainly the Surgery Department and the Diagnostic Imaging Department
- Admission and discharge: transitions between hospital and home
- Staff breaks and staff shift handover

Entrants must submit an account of how they suggest the individual areas should be laid out so that the fundamental elements of a healing architecture are incorporated into the building design, while at the same time ensuring that the building structure is conducive to good patient pathways and staff working procedures with a focus on optimising future operations.

- The case for the design choices relative to the different scenarios must be given in the form of diagrams, explanatory text and possibly also visualisations.

Description of the proposed scheme
Entries must include a description of the proposed scheme that supplements the drawings and other illustrations by providing the following information:

- The main concept, priorities and space organisation
- An explanation of the functional and technical robustness of the scheme proposed
- An explanation of how the execution phase of the scheme can be divided into smaller, manageable entities
- A statement on the buildability of the scheme. If the entry is based on system deliveries of characteristic elements, or if a special modular approach is applied to the overall building structure, the entry must include a specific description of this
- The fundamental principles governing the incorporation or anticipated incorporation of the following focus points into the proposed scheme: control and minimisation of greenhouse emissions and energy consumption; control and minimisation of the use of substances that are harmful to human health and the environment; control and minimisation of the use of water in the construction and operational phases; the choice of environmentally sound materials for the buildings; and the use of products, services and methods in the construction and operation of the new buildings.

- Explanatory text and possibly visualisations.

Visualisations
Entrants are requested to submit 3D visualisations that illustrate the main concept and the spatial qualities of the exteriors and interiors proposed.

One visualisation should show how the sight lines towards Frederiksborg Castle have been taken into consideration in the proposed design.

- Visualisations

List of floor areas
The floor area form enclosed as Annex 1 must be filled in and submitted together with the entry.

- Completed floor area form

Digital building model (IFC model)
Entrants are requested to submit a digital building model in IFC format and in the original file format in accordance with the requirements set out in Annex 2.

The building model submitted must show the following:

- The building geometry with a low level of detailing, but showing distinctive features
- Modified terrain geometry
- Gross and net floor area coded in accordance with the floor area form

3D video
The video should present the overall architectural and functional ideas in the proposed scheme, both for exteriors and interiors.

- Suggested duration: about 4 minutes. May include commentary and background music.

Physical model
Physical models will not be accepted, but entrants may submit photos of a physical building model.

COLOUR CODES

Colour codes must be used in the entry to indicate the various functions in the building facility. The colours should be as set out in the list below

Functions and RGB colours

Outpatient clinics	165/180/35
Diagnostic imaging	230/200/45
Surgery	234/101/21
Intensive care	195/20/30
Dialysis	165/20/130
Beds	70/125/190
Secondary areas	133/133/133
Offices	145/190/210
Education and training	185/180/130
Other functions	200/200/200
Research	180/155/200
Laboratories	72/101/109
Staff facilities	128/128/128
Service village	196/198/182

The purpose of the colours is to enable the assessment panel to visually identify the various function areas and their interconnections. As a minimum, the colour codes must be used in connection with the floor plans, but they should also be used in diagrams, drawings, etc.

SUBMISSION OF ENTRIES

Only one entry from each team invited to participate in the competition will be accepted.

Panels
One set of A0 format panels (840 mm x 1200 mm) must be submitted. Each entrant is expected to submit about ten portrait format panels.

Only a (legible) summary of the explanatory text may be mounted on the panels. The graphic methods used for the panel illustrations must be such that the illustrations are easy to see and read.

A3 booklets
One A3-sized booklet must be submitted in 25 copies containing a maximum of 35 sheets of paper each (printing on both sides is permitted). The scale of all drawings must be clearly indicated.

All drawings mounted on the panels must be included in the booklet, and no drawings over and above those listed in the section entitled 'Scope of competition entries' may be included.

PDF files of the panels must be submitted either on a CD-ROM or a USB memory stick. It is fine if the A3 booklet contains text that is not included on the panels.

The A3 booklet must also contain the scheme description, diagrams, spatial illustrations, etc.

DVD
Entrants must submit a DVD that must be clearly marked with the identification number chosen. The DVD must contain all illustrations included in the entry, marked with the identification number, for possible inclusion in the assessment panel's report. Each illustration must be a separate file. The DVD must also contain the following:

- The entire A3 booklet in PDF format using e-paper technology
- A PowerPoint presentation of the scheme, containing only text and illustrations from the entry
- List of floor areas
- Digital building model
- 3D video
- PDF images of all panels

GENERAL REQUIREMENTS

Entries must be anonymous, and all parts of an entry must be clearly marked with a five-digit identification number chosen at random.

The panels must include the identification number and a schematic illustration of the order in which the panels are to be displayed. Illustrations must be made using a technique that facilitates a clear understanding of the proposed scheme.

Drawings and other illustrations must be provided with the identification number and of a quality suitable for reproduction in the assessment panel's report.

Identification sheet
An opaque, sealed A4 envelope with the entrant's identification number and the text 'Navneseddel' ('identification sheet') on the front must be submitted together with the entry. The envelope must contain an A4 identification sheet with the following information about the entrant:

Company name
Name of contact person
Mobile phone number
Telephone number
E-mail address
Postal address
The identification number used for the entry

Furthermore, the names of the consultant team members must be listed, and it must also be stated who has the copyright to the entry and who was on the entrant's team as an employee, consultant or adviser without any share in the copyright.

SUBMISSION OF ENTRIES

Entries must be handed in at the following address by **2.00 pm on 6 May 2013,** clearly marked 'Nyt Hospital Nordsjælland':

Arkitektforeningens Konkurrencerådgivning
Strandgade 27A
DK-1401 Copenhagen K
Attention: Anne-Mette Bølling

Entries must be handed in anonymously. A receipt will be issued once the entry has been handed in.

Immediately after the entry has been handed in to the Architects Association of Denmark, a scanned copy or a photocopy of the date-stamped receipt must be sent to the competition secretary. The five-digit identification number chosen must be stated as sender, together with a telephone number that can be used if something is missing, eg the envelope containing the identification sheet, or if the contracting authority sees that two identical identification numbers have been used. The telephone number and e-mail address used may not compromise the anonymity of the entrant..

ASSESSMENT PANEL

Entries will be assessed by a panel composed of six members of the Regional Council appointed by the Regional Council and three design professionals:

- Kirsten Lee, chair of the panel (B)
- Per Seerup Knudsen (A)
- Peter Kay Mortensen (A)
- Per Tærsbøl (C)
- Per Roswall (V)
- Steen Olesen (F)

- Kim Herforth Nielsen, architect
- Jan Christiansen, architect
- Søren Harde Larsen, engineer

The following advisers have been appointed to assist the assessment panel:

- Morten Rand Jensen, chief operations officer, Capital Region
- Kasper Jacoby, portfolio director, Capital Region
- Suzanne Aaholm, hospital CEO
- Henrik Schødts, project director
- Claus Roikjer, project manager
- Mette Stokholm, project manager

- Ann-Pia Puggaard, client adviser, Cowi A/S
- Mette Dan-Weibel, architect, Aarhus Arkitekterne
- Representatives of the hospitals

In addition, the following person has been appointed to represent the local authority vis-à-vis the assessment panel:

- Kirsten Jensen, mayor of Hillerød

The secretary to the assessment panel is:

- Anne-Mette Bølling, competition secretary

The panel may call in additional advisers for assistance.

COMPLIANCE WITH FLOOR AREA CONSTRAINTS

Crucial conditions: Rejection of entries before assessment

In Chapter 9 and Chapter 13 of the competition brief and in Annex 1, New North Zealand Hospital has set out the floor area constraints and financial constraints that apply to the project, including information about the required government undertaking to fund the project and the budgeted construction costs for the project. In connection with this design competition, both the floor area constraints and the financial constraints are of crucial importance to New North Zealand Hospital.

After the final deadline for submission of competition entries, but prior to the involvement of the assessment panel, the project organisation will verify whether the entries submitted comply with the requirement of a gross floor area of 128,000 m2.

If this verification process shows that the gross floor area proposed in an entry exceeds 128,000 m2, New North Zealand Hospital will consider such a deviation as a reservation relating to a fundamental element, which means that New North Zealand Hospital will have both a right and an obligation to reject the entry. A rejected entry will not be presented to the assessment panel for assessment.

It is stressed that the anonymity of all entrants will be maintained until the publication of the assessment panel's report, in which one to three winners will be selected, but the contents of rejected entries will not be included in the publication.

Method for verification of compliance with the floor area requirements

In Stage 1 (the design competition), entrants are requested to submit a digital building model (IFC model) as stated in Annex 2. The model should indicate the floor areas of the proposed scheme as set out in the guidelines included in the annex.

Based on the building model and using the BIM checker, New North Zealand Hospital will assess whether the entries comply with the floor area requirements specified. If that is not the case, New North Zealand Hospital will have both a right and an obligation to reject non-compliant entries before the assessment panel sees them. If an entry is rejected as non-conformant, the entrant will not be entitled to the fee for participating in the competition, as stated in the section about fees.

ASSESSMENT CRITERIA

The winner or winners of the design competition (Phase 1) will be selected on the basis of the following assessment criteria, which reflect New North Zealand Hospital's intentions and wishes as set out in the full competition brief, including the introductory and general descriptions in Chapter 2:

Function
There will be an emphasis on functionality, ie how the physical framework realises the brief's intention of creating optimal, efficient and integrated logistic connections in a hospital context, as well as appropriate work procedures based on the four key experiences described.

The emphasis will also be on whether the physical and functional solutions proposed, including the building structure and the infrastructure, are conducive to optimised patient pathways and sufficiently robust to accommodate new developments and new activities in the field of healthcare. Moreover, importance will be attached to the entry's responses to the five guiding principles and its use of the ten space management principles.

As regards technical robustness, emphasis will be placed on the possibilities of adapting and developing technology as functions change and new technology is introduced in the future.

With regard to the robustness of the building facilities, the focus will be on whether they are future-proof in terms of their ability to accommodate changes in use and functions and new possible uses. In addition, importance will be attached to the possibilities of converting the facilities in a flexible way and of extending or reducing the individual function areas.

Another point of interest will be the degree to which buildability has been taken into account in the proposed scheme.

Architecture
Emphasis will be attached to architecture and design, which will be assessed on the basis of the buildings' appearance and design, including their interaction with the surrounding landscape. It will also be assessed on the basis of the overall concept illustrated in the masterplan, and in this connection it will be considered how the individual areas of the proposed scheme are laid out and whether the fundamental elements of healing architecture are implemented, particularly with regard to the five guiding principles and the four key experiences.

Sustainability
Importance will be attached to sustainability, with a special focus on the entry's potential for controlling and minimising the emission of greenhouse gases and reducing energy consumption, controlling and minimising substances that are harmful to human health and the environment, and controlling and minimising the use of water in the construction and operational phases. Another point of interest will be how the proposed design supports the use of environmentally-friendly materials in the buildings and the use of environmentally-friendly products, services and methods in the construction and operation of the new building facilities.

RESERVATIONS

New North Zealand Hospital is entitled to reject competition entries that contain reservations regarding the competition material, as the hospital intends to adhere to the principle of equal treatment.

If an entrant includes a reservation concerning fundamental elements of the competition material, New North Zealand Hospital will be obliged to reject the entry in question in its entirety. The entry will not be accepted for assessment by the assessment panel, and no fee for participation will be paid.

If an entrant identifies elements in the competition material that make it impossible for the entrant to prepare a proposal without reservations, then the entrant should contact New North Zealand Hospital and ask relevant questions (see the procedure above for asking questions). New North Zealand Hospital will then decide on the matters presented.

FEE

All competition entrants who submit a compliant and thoroughly prepared proposal in accordance with the competition brief (Phase 1) will receive a fee of DKK 500,000 and an additional amount of DKK 100,000 for the making of the required 3D video. Competition entrants who conclude the negotiations in Phase 2 by submitting a compliant tender will receive an additional fee of DKK 400,000.

In Phase 2, entrants may also have their travel expenses reimbursed up to an amount of DKK 75,000 per team.

If the project is discontinued before a contract has been signed with the final winner of the competition, or if the final winner has not been commissioned with the assignment tendered within two years after the conclusion of the competition, the winner will receive a compensation amount of DKK 500,000. If the winning entrant is later entrusted with the design assignment, the compensation amount will be considered part payment of the consultant's fee. The amounts mentioned are exclusive of VAT.

In Phase 1, the amounts will be paid out two weeks after the announcement of the winners of Phase 1. In Phase 2, the amounts will be paid out immediately after a decision has been made concerning the award of the contract.

RIGHTS

The competition promoter will acquire ownership of the entries submitted. However, the copyright to an entry will always remain with the entrant.

Third parties will be entitled to publish the entries submitted, for example in newspapers and electronic media, but only if the names of the entrants are mentioned.

When commissioned with the assignment, the winning entrant will be entitled to use ideas from the other entries.

ANNOUNCEMENT OF RESULT

The result of the design competition is scheduled for publication on **17 September 2013.** The entries will then be displayed at Hillerød Hospital.

INSURANCE

Entries will not be insured.

RETURN OF ENTRIES

Entries will not be returned.

STAGE 2: NEGOTIATED PROCEDURE

Once the winner(s) of the design competition have been selected, they will be invited to participate in a negotiated procedure as set out in Article 31(3) of the Public Procurement Directive. In this connection, the winner(s) will receive the tender documents, including a copy of the lead consultancy contract to be signed later on. The tender documents will include information about practical matters relating to the negotiations, and the documents will also elaborate on the subcriteria formulated.

The winner or winners will thus be informed of the final negotiation procedure in connection with distribution of the tender documents.

Before the first negotiation meeting, tenderers will be requested to submit a tender. The negotiation procedure will be based on this tender. The tender must include a fee tender and a proposal for the organisation of the assignment based on the scheme submitted in the design competition.

In connection with the transition to Stage 2 (the negotiated procedure) it will be possible to add new subconsultants to the project organisation composed for Stage 1 if this is deemed relevant and provided that such addition is included in the tenderer's proposal for organisation of the assignment.

After the conclusion of the negotiated procedure, the tenderers must submit their final tender for the assignment. The tenders will be assessed on the basis of the award criterion 'the economically most advantageous tender' in accordance with the following general subcriteria:

• Project (function, architecture, sustainability, financials)	Weight: 65%
• Organisation and method	Weight: 20%
• Fee	Weight: 15%

BRIEF INFORMATION ABOUT THE LEAD CONSULTANCY CONTRACT

The lead consultancy contract will be distributed together with the other tender documents in **Stage** 2 (the negotiated procedure). It will in all essentials be based on ABR 89 ('General Conditions for Consulting Services'). However, because of the complexity of New North Zealand Hospital project, the contract is expected to include a number of special conditions, as outlined below.

Regulation of the scope of services
Since the winning project is yet unknown, and since the various construction contracts or tender documents that will form the basis for the execution of the project are consequently also unknown, New North Zealand Hospital would like the lead consultancy contract to be entered into with the final winner after **Stage** 2 (the negotiated procedure) to be flexible in contents and structure.

It must therefore be expected that it will be part of the lead consultancy contract and the services to be provided that certain parts of the project may only have to be designed up to the level of conceptual or preliminary design, as was stated previously in the contest notice.

To reflect the possible regulation of the services to be provided, the contract will also contain a similar regulation of the fee.

The winning entrant must also be willing to accept that the 4,000 m2 production kitchen may be eliminated from the project, as the competition promoter at the time when this competition was launched had not obtained a financial guarantee for the realisation of a production kitchen. The competition entrants will be informed as soon as possible of the likeliness of a decision to include the production kitchen, but it should be anticipated that such a decision may not be available until the time of the signing of the contract.

Addition and replacement of participants
The assignment will be carried out over a number of years and will be characterised by considerable variations in intensity and complexity. It is therefore expected that the final lead consultancy contract will include stipulations concerning the possibility of adding to and/or replacing members of the design organisation and/or key staff.

Addition of further subconsultants or replacement of subconsultants and/or key members of staff will only be allowed after prior approval by New North Zealand Hospital. The contract will most likely set out conditions for such approval, for example regarding competencies, qualifications, etc.

Insurance
The Capital Region attaches great importance to risk management and has decided to take out joint insurance for all the Region's hospital projects with the same insurance coverage and the same terms and conditions of insurance for all consultants, contractors and the Capital Region itself. The Region has thus taken out combined contractor's all-risk insurance and professional liability insurance.

The insurance covers the services of the winning tenderer and any subconsultants in relation to the project. The insurance premiums are paid by the contracting authority.

Redesign
Finally, the contract will contain the usual clauses concerning situations in which the lead consultant must redesign, either as a consequence of changed conditions at New North Zealand Hospital's end, which will entitle the design team to an additional fee, or as a consequence of matters pertaining to the lead consultant, in which case no additional fee will be paid for the redesign. ■

IMPORTANT DATES

12 February 2013 by 4 pm
E-mail acknowledgement of receipt of complete set of material, including all annexes.

22 February 2013
Visit to the competition site followed by information meeting.

26 February 2013
Information meeting about the BIM Checker.

4 April 2013
Deadline for submission of queries.

18 April 2013
Deadline for answers to queries.

25 April 2013
Deadline for answers to questions submitted after 4 April 2013 if the provision of the answers does not impose a disproportionately heavy burden on New North Zealand Hospital.

6 May 2013 at 2 pm
Final deadline for submission of technical questions concerning the BIM Checker.

6 May 2013 at 2 pm
Final deadline for submission of competition entries.

17 September 2013
Anticipated announcement of the result of the design competition.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LINING RAINTS

CHAPTER 11

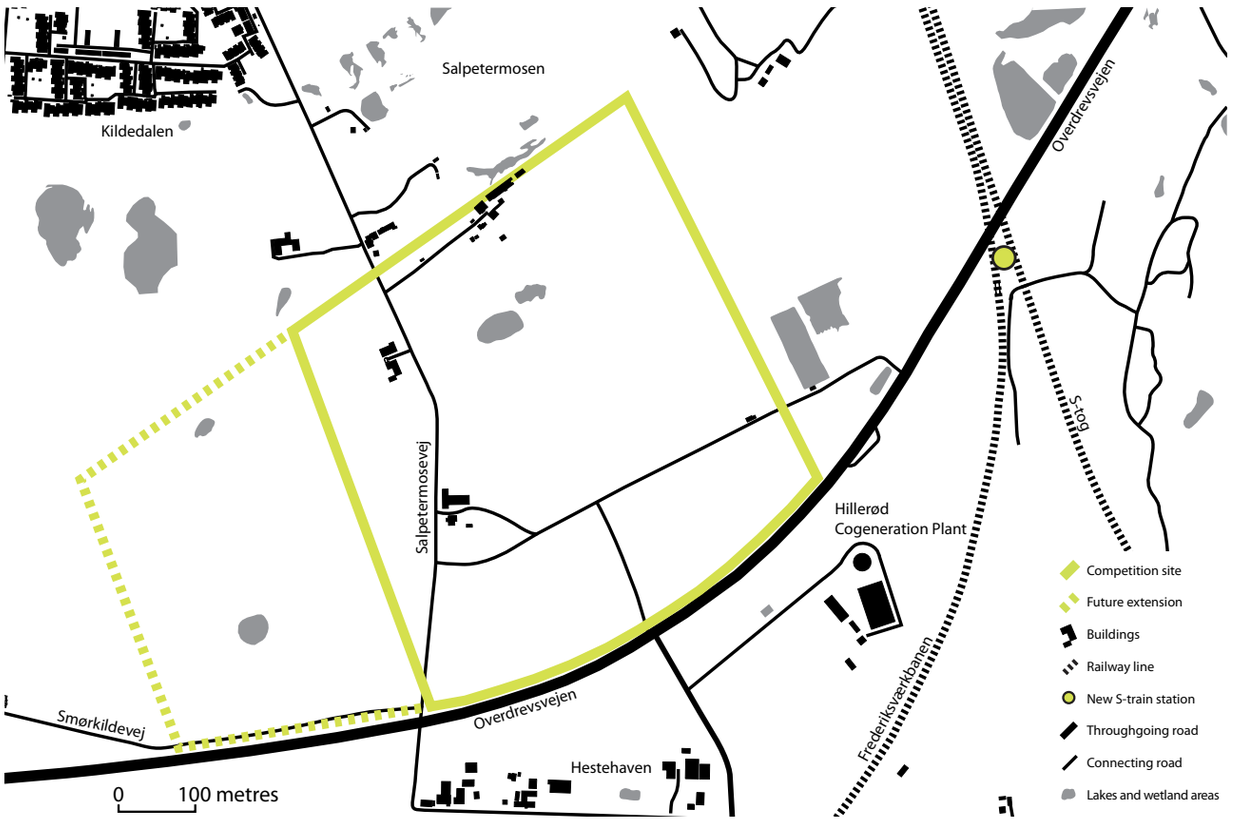
New North Zealand Hospital will be built in an area for which only very general planning exists. The following text describes current planning constraints.

FINGER PLAN 2012 (NATIONAL PLANNING DIRECTIVE)

The Finger Plan is expected to be submitted for public consultation in early 2013. It includes a decision to locate a new train station where the S-train line, the local railway line and the Overdrevsvejen road cross each other (see the illustration below). It has also been decided that the tracks for the local line at Hillerød Station will be relaid in order to create greater cohesion between all local train lines in North Zealand.

MUNICIPAL PLAN, LOCAL PLAN, EIA, ETC

In late 2012, Hillerød Council submitted a draft version of the 2013 Municipal Plan for public consultation. The plan delimits the competition site and zones it for public purposes, in this case the hospital. The plan contains no other detailed framework provisions concerning the competition site. The plan will thus be of a general nature and simply indicate areas where buildings should be located close to the station and other areas.
Once the competition is over and a winning entrant has been selected, a local plan will be prepared for the hospital, as will an Environmental Impact Assessment report and a schedule to the 2013 Municipal Plan.



Map of competition site and future extension area

Finger Plan 2012

Link will be uploaded on NHN website when available

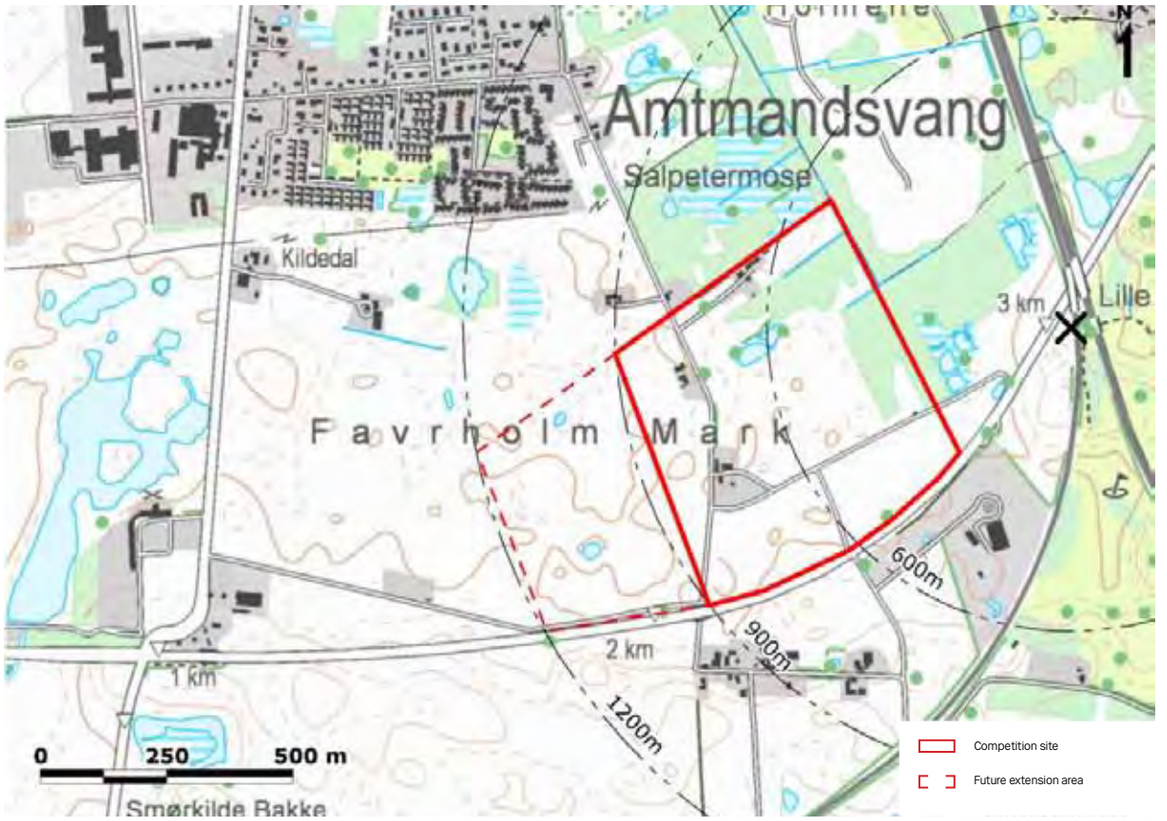
2013 Municipal Plan, Hillerød

http://www.hillerod.dk/da/Nyheder/2012/December/Kommuneplan2013.aspx

ENVIRONMENTAL IMPACT ASSESSMENT

The Capital Region has performed an environmental impact assessment of the location chosen for New North Zealand Hospital (see link). The work relating to the assessment was concluded in September 2012 and resulted in the delimitation of the hospital site shown below (competition site) as well as the indicated extension area.

The environmental impact assessment led to the formulation of a number of guidelines for the design of the hospital and associated facilities located inside the competition area. The guidelines (see factbox on page 186) are indicative only and should not be seen as mandatory requirements in the competition. After conclusion of the competition, the guidelines will be discussed in greater detail with relevant public authorities. It should be noted that the size of the hospital and the number of parking spaces were adjusted after adoption of the environmental impact assessment.



This map was used in connection with the environmental impact assessment.

Link to strategic environmental impact assessment

http://www.regionh.dk/NR/rdonlyres/56C79D66-382C-4E52-AE93-927D364DA05A/0/Program_og_miljoevurdering_for_placering_NHN.pdf

South-east view

FACTS: Thirteen guidelines

01 The new hospital will replace the current hospitals in Hillerød, Frederikssund and Helsingør and provide services to a catchment area of about 312,000 people.

02 An area should be set aside so that it will be possible to accommodate new facilities at the site in connection with a potential future amalgamation of the somatic and psychiatric facilities in Planning Area North. Furthermore, the site must be open to further development. The area set aside must cover about 50 hectares (including the extension area already defined), whereas the acquired area is likely to be in the region of 30 hectares, which will have a plot ratio of about 50 once it is fully developed.

03 The hospital will have a floor area of about 136,000 m2, up to 3,500 parking spaces and a helipad.

04 The hospital should preferably be located close to the Overdrevsvejen road in Area West 1.

05 Buildings should be located inside a 600-metre zone from the future S-train station and the local railway line station. This requirement does not apply to service facilities.

06 The main entrance should be oriented towards the S-train station.

07 The helipad and a large proportion of the parking spaces should be located outside the 600-metre zone.

08 The location and design and the buildings should fit into the local landscape so that the current qualities of the landscape will interplay with the new building facilities. In this connection, clear sight lines to Frederiksborg Castle should be ensured.

09 The design of the building facilities should take the water cycle into account, ie water consumption, discharge of wastewater and drainage of water from areas with hard surfacing, and this should be done in accordance with general practice in the Hillerød area.

10 When determining the location of the helipad, the local bird life at Favrholm should be taken into account insofar as possible.

11 When determining the layout of the programme site, natural environment areas should only be incorporated or replaced after discussion with the Ministry of Environment or Hillerød Council, who must also approve any such incorporation or replacement.

12 When determining the layout of the programme site, it should include wildlife passages between the natural environment areas that are retained within the programme site and other nature areas outside the site.

13 There must be path connections to the new S-train station and to the town of Hillerød, and a north-south main recreational path must be established.

WASTEWATER PLAN AND WATER ACTION PLAN

Hillerød Council has adopted a wastewater plan (see link) that sets out general rules for the handling of rainwater in new urban areas.

In collaboration with local councils in adjacent municipalities, Hillerød Council has prepared a proposal for a water action plan (see link) that outlines how the governmental action programmes will be realised.

INFORMATION!

Hillerød Council has prepared a landscape character analysis. The competition site is located in Landscape Character Area 8: Uvelse/Hillerød farmland landscape.

HILLERØD SOUTH: A NEW URBAN DISTRICT

New North Zealand Hospital will be part of a new urban district: Hillerød South. Hillerød Council has launched the first part of an open ideas competition based on a vision for the new district. The competition is scheduled for completion in the autumn of 2013.

Hillerød Council would like the new district to be sustainable and carbon neutral. It is located in an area where only limited rainwater percolation is possible, so handling of rainwater on the individual plots would be meaningful.

There will be a focus on retaining views from the surrounding landscape towards the town centre and especially Frederiksborg Castle. Given this, Hillerød Council suggests an area with a plot ratio of 70 and buildings that are generally three or four storeys high, although a few buildings or building elements may be higher.

With its location close to a train station, the hospital will have a central position in the new urban district in Hillerød. It would therefore be an obvious solution to locate the building complex so that it opens up towards the rest of the district and perhaps in particular towards the densely built urban core areas close to the station. These areas will also serve as connectors between the hospital and the new stations for the many people – patients and staff – who will use public transport to travel to and from the hospital.

Hillerød Council would like unbuilt areas at the site to be landscaped into park-like areas that create an urban connection with the surrounding urban district and form a suitable transition between the urban facilities and the nature areas in Salpetermosen to the north of the competition site. ■

Link to wastewater plan

http://www.hillerod.dk/ForBorgere/Natur_Miljoe_og_Klima/Miljoe/Spildevand/Spildevandsplan.aspx

Link to water action plan

http://www.hillerod.dk/ForBorgere/Natur_Miljoe_og_Klima/Vand_og_Naturplaner/Vandhandleplan.aspx

Link to Hillerød South

http://www.hillerod.dk/OmHilleroed/Byplanlaegning/Byudviklingsprojekter/Hillerod_Syd.aspx

Landscape character analysis

http://www.hillerod.dk/da/ForBorgere/Natur_Miljoe_og_Klima/Natur_vandloeb/Landskabskarakteranalyse.aspx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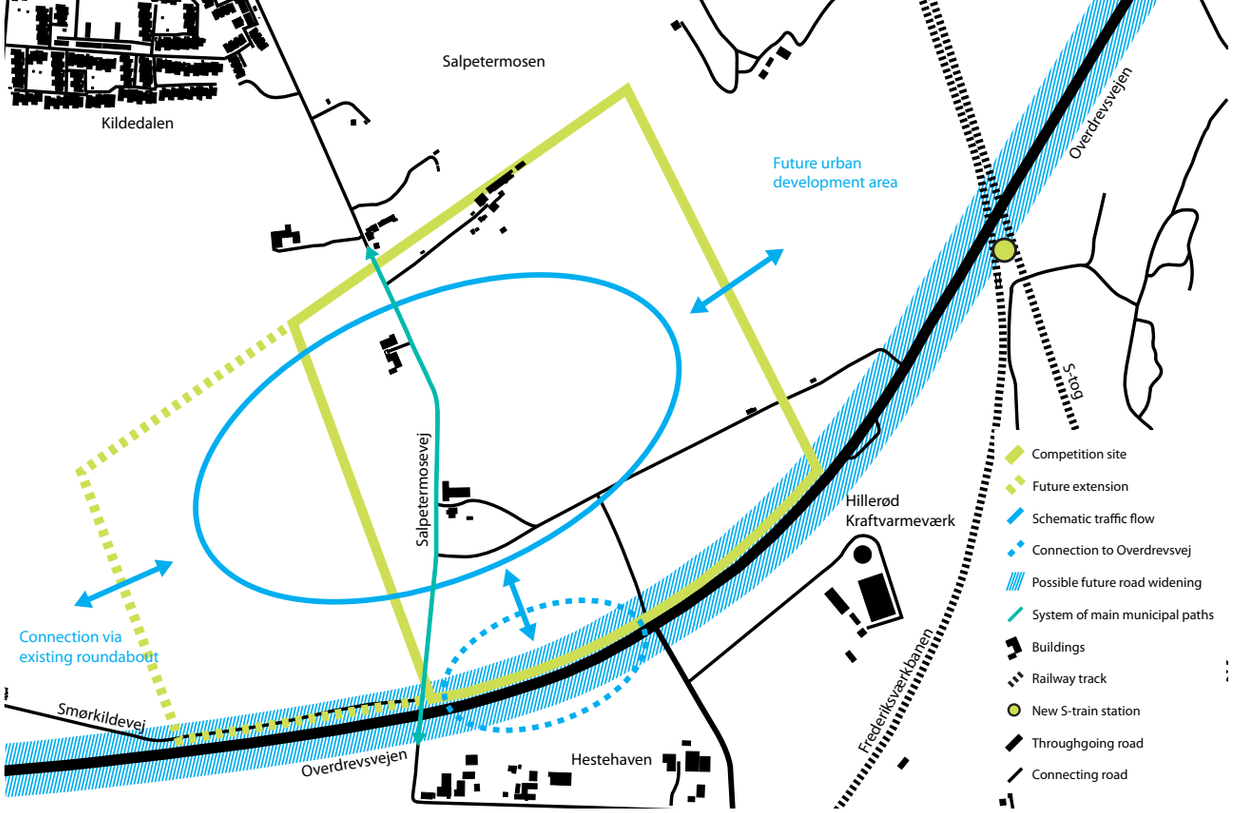
CHAPTER



Map of planned roads and paths

SITE

Salpetermosen was a large lake with several islands in prehistoric times. The lake was rich in plant- and wildlife, which was what attracted the first settlers. Today, the area is a large overgrown bog and marshland area where people used to cut peat. The area features both natural and cultural amenities.

TRAFFIC

Initial discussions have been conducted between Hillerød Council and the Danish Road Directorate concerning future roads leading to the hospital and the new urban district, Hillerød South.

The primary access route to the hospital will be via Overdrevsvejen, which is currently used by 9,000 cars a day on an annual basis. The traffic load is expected to almost double in the future. The Road Directorate, the public authority in charge of Overdrevsvejen, can theoretically only allow one direct access to the urban development area. It could be located as shown on the map below, for example.

It is also expected that it will become necessary to widen Overdrevsvejen at some future point in time. The new building facility's footprint must therefore respect the road widening zone shown. The current roundabout in Roskildevej will continue to serve as the road connection point to the urban development area and the hospital.

The network of roads on the hospital site must be laid out so that there will be roads leading to the area to the east of the competition site, ie the part of the urban development area located between the hospital and the future S-train station. The total number of trips to and from the hospital is estimated to be about 9,100 a day, with an equal distribution of arriving and departing vehicles. In the morning peak hour, 900 cars are expected to drive in the direction towards the hospital, and a similar number of cars are expected to go in the opposite direction in the afternoon peak hour.

Salpetermosevej will form part of one of the main paths in the municipal grid of paths. This path will run from Hillerød Station and Hillerød town centre along Salpetermosevej, under Overdrevsvejen, through Hestehaven, across the tracks of the local railway line and further on towards Hammersholt and Allerød to the south. This path between the new urban district and the rest of Hillerød is intended as a safe and easy connection for pedestrians and cyclists, and other pathways may be added.

SOIL CONDITIONS

Feasibility studies have been carried out to determine the geotechnical and hydrogeological conditions at the site. Entrants are generally referred to the Data and Evaluation Report (see the link below), in which details of the studies and results are given, including information on the possibilities and constraints identified relative to the building project.

In terms of the possibility of using direct foundations, the site can roughly be divided into three categories: suitable, conditionally suitable and less suitable/unsuitable. In the figure below, the areas falling under the three categories are hatched in red, blue and yellow respectively, and the distance to the future S-train station is stated as well.

The suitable area (sea green in the figure) is located on a northwest-southeast ridge. This area is characterised by firm glacial sediments from about 0.5 m below the current ground level. In this area, it will generally be possible to use direct foundations down to a normal foundation depth, also for buildings without a basement.

The conditionally suitable area (green in the figure) is located at the centre of the site and along its western boundary. Here, firm sediments were found at a greater depth, typically 2-4 m below the current ground level. It is estimated that direct foundations can be used for buildings without basements, although deeper foundations or foundations resting on gravel cushions may be necessary in some places. This area is thus considered to be most suitable for buildings with a basement and less suitable for buildings without a basement.

The less suitable/unsuitable part of the site (yellow in the figure) is located at the northern and eastern ends of the site and is characterised by a thicker layer of soft soil sediments that are not suitable for foundations. This means that, for technical reasons, building in this area should be avoided.

The majority of the site is waterlogged, as the groundwater table in the layers close to ground level are very close to – and in some places even above – ground level for many months of the year. Suitable measures to handle the high groundwater table level should therefore be incorporated into the planning of the project to make it possible to construct buildings (with or without basements), roads and parking areas at the site. A clear focus on these constraints is necessary both in the construction phase and in relation to the finished buildings. Permanent buildings can be protected against the high groundwater table through permanent drainage or, alternatively, by using structures that are able to withstand uplift pressure. Permanent drainage will generally be less expensive than structures able to withstand uplift pressure. However, for safety reasons, such a solution requires ongoing maintenance of the systems.

Plan of subareas

Geohydrological feasibility study

http://www.regionh.dk/NR/rdonlyres/D1565390-264A-4909-B1ED-9A7F1575D468/0/NHN_forundersoegelser_geo_hydro_fase_2.pdf

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One of the possible technical solutions that can be applied to counter the effects of the high groundwater table would thus be general permanent drainage of the site. Given the soil and groundwater conditions detected, such drainage would be technically and practically feasible. However, draining off the groundwater may affect nearby wetland areas, and it would be necessary to assess the possible impact of the individual building elements in consultation with relevant environmental and nature conservation authorities in order to determine requirements and conditions.

Temporary or permanent drainage of the site is not estimated to have any significant impact on the formation of groundwater for the primary aquifer.

Given the current terrain and drainage conditions, it is believed that, in times of extreme precipitation and failing drainage systems, surface water might rise up to a level of about 22 m above the datum level and thus cause flooding of the lowest parts of the site and also affect the upper aquifers. Proposals for the use of the site should include precautions against this extreme risk of actual flooding so that there would be no risk of damage to hospital buildings, installations, etc. The risk should also be taken into consideration in the design of any uplift-preventing systems.

ARCHAEOLOGY

Preliminary archaeological studies were initiated in the autumn of 2012. Actual archaeological digging is scheduled to begin some time in 2013 and to be completed in 2016. ■


1


2

1 & 2. Archaeological studies suggest that there are many historically interesting items in the ground. A building from the Iron Age (750 AD) and a processed bone that can probably be dated back to the Early Stone Age (4000 BC) are among the finds made here.


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CHAPTER

COSTS

BUDGET

It is essential for realisation of the project that costs do not exceed the budget.

In November 2010, New North Zealand Hospital had a tentative commitment from the governmental expert committee for an amount of DKK 3.8 billion (Index 2009-PL). The final application will be submitted in the first half of 2013, and the outcome is expected to be known before a lead consultancy contract is signed with the final winner of the design competition.

As lead consultant, the final winner will be required to manage and be responsible for all construction costs in the budget that are related to the lead consultancy services. The total budgeted costs (Index 2009-PL) are broken down as follows:

• Contractor costs, buildings	DKK 2,055 million
• Earthworks	DKK 120 million
• Art	DKK 35 million
Total	DKK 2,210 million

Contractor costs include building and construction work relating to buildings (including possible additional costs for foundations and excavation pits), built-in furniture, site costs (exclusive of power, water and heating), winter measures and contingencies. The contractor costs do not include any costs involved in the potential incorporation of mental health services.

The following square-metre prices (Index 2009), broken down into the four building categories set out below, were used to calculate contractor costs. The prices include site costs, winter measures and preliminaries.

• Category A, secondary areas (technical rooms, basement, corridors, archives, etc)	DKK 11,150/m2
• Category B, non-clinical areas, (offices, conference rooms, etc)	DKK 13,600/m2
• Category C, clinical areas, low installation level (wards, outpatient clinics, etc)	DKK 16,650/m2
• Category C, clinical areas, high installation level (operating rooms, laboratories, etc)	DKK 19,350/m2

Earthworks includes all costs relating to works at the site connected with parking, roads, paths, open areas, site development , site operations costs (exclusive of power, water and heating), winter measures and contingencies. The cost of the helipad and a possible water treatment plant should not be included.

The lead consultant's budget should include items relating to site costs, winter measures and preliminaries.

The amount set aside for art is 1% of the total amount granted by the governmental expert committee (exclusive of parking areas) and should be handled separately in the various project phases. See also the information about the concept for architecture and art in Chapter 8.

In addition to the above-mentioned total construction costs, the client's budget includes amounts set aside for the purchase of the site, main utility connection costs, design and planning, IT/medico costs, interior furnishings and client's own expenses.

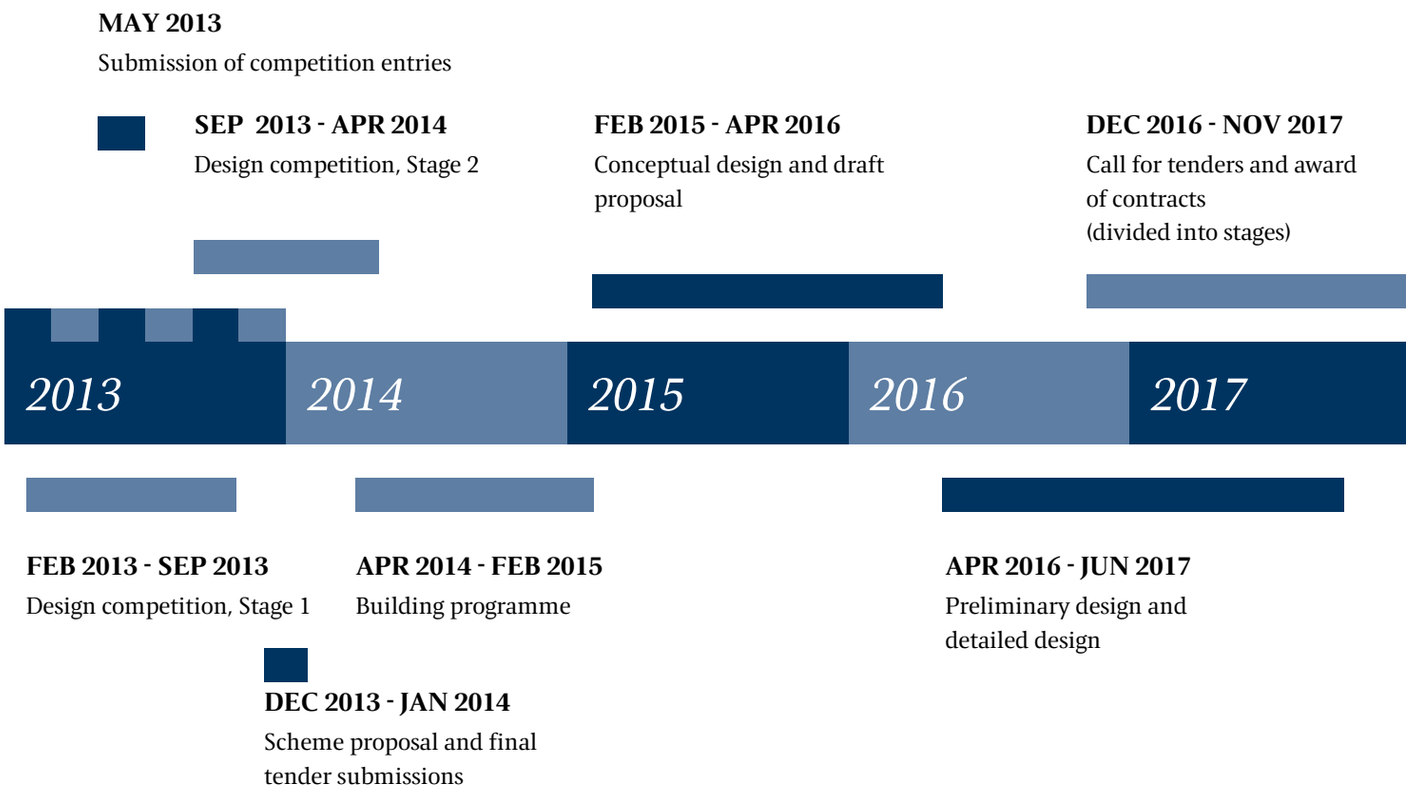
FACTS

The PL Index is the regional price and pay index for construction work, calculated as part of the financial agreement between the Danish government and Danish Regions. The appropriation for New North Zealand Hospital will be adjusted on the basis of this index.

Doctors on the way in front of Hillerød Hospital's Emergency Department.

TIME SCHEDULE

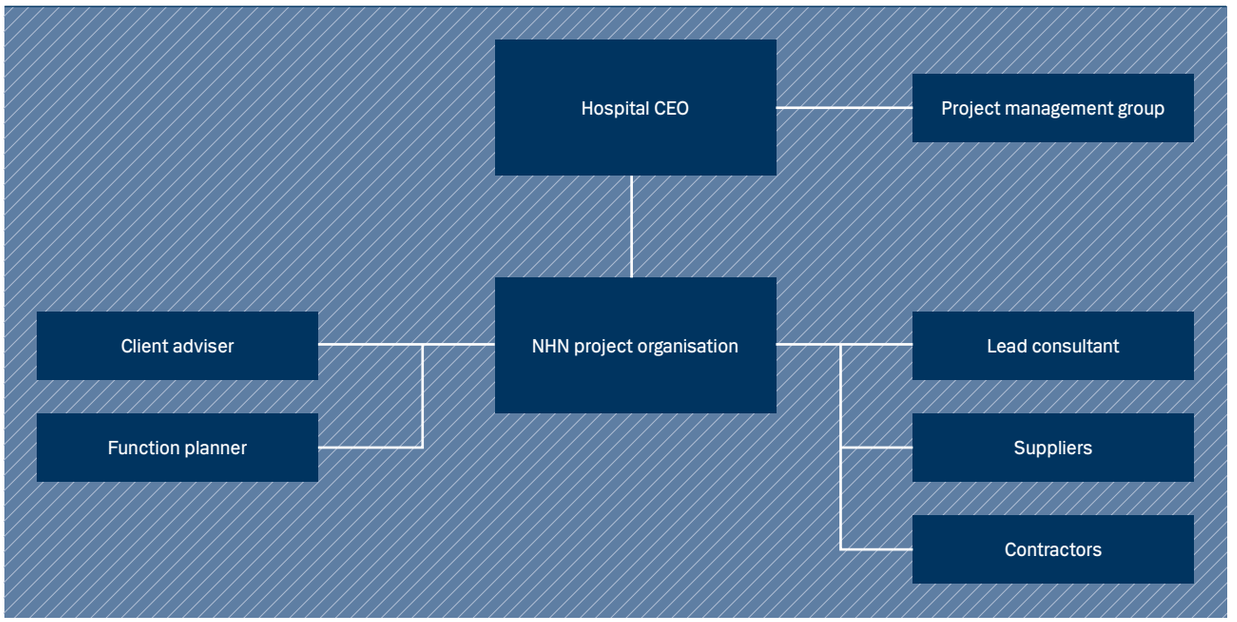
New North Zealand Hospital is planned to be realised in accordance with the following time schedule:



DEC 2020 - MAY 2021
Commissioning

AUG 2017 - DEC 2020
Execution (in stages)

FACTS: The client's project organisation – Capital Region: Project organisation



ORGANISATION

Organisationally, the client function for New North Zealand Hospital is under the CEO of the hospitals in North Zealand. The CEO is responsible for the projects, and the client function is in charge of the overall development and management of the project within the framework of a project organisation.

The day-to-day management of the project is anchored in the project organisation, which is headed by the project director.

A greenfield project is a complex assignment that requires a great deal of management, and it is the responsibility of the project organisation to ensure its systematic, well-documented and value-adding execution.

The North Zealand Hospital project organisation is active in a number of networks and engaged in collaboration across the Capital Region's quality fund projects, across Denmark and in the context of Danish Regions.

Such collaboration enables the organisation to benefit from lessons learned and experience gained in relation to projects in other project phases, just as participation in development work and joint sharing of knowledge help optimise project development

There are three administrative decision-making levels in relation to New North Zealand Hospital project (see the paradigm for management manual for the Capital Region's building projects in Chapter 2).

01 The hospital construction management group chaired by a group executive.
02 The project management group chaired by the hospital CEO.
03 The daily project management/project organisation, for which the project director is responsible.

The project organisation communicates with Group Construction Management (KBS) in the Capital Region about ongoing activities in the Capital Region and their coordination.

The organisation of the client function under the joint management of the hospitals in North Zealand is illustrated in the chart at the top of this page. ■

The competition site in the low winter sun. View towards the southwest.

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The competition brief was prepared by New North Zealand Hospital with the assistance of Cowi and Aarhusarkitekterne.

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The Capital Region of Denmark

New North Zealand Hospital
Hillerød Hospital
Dyrehavevej 29
3400 Hillerød

Phone: +45 48 29 48 29
E-mail: nythn@regionh.dk
www.regionh.dk/nhn