

From Visions To Plans And Physical Environments; Designing Hospitals From A Patient Perspective

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Ragnbild Aslaksen is the chief architect in Helsebygg Midt-Norge, and in charge of the architecture and aesthetic guidelines of the new University Clinic in Trondheim, St Olavs Hospital. She is also in charge of the art-program of the new hospital, and has worked in the project organization since 1997. Ragnbild Aslaksen has during her work in the university hospital project tried to include theory from environmental psychology, and develop an “ethics of space”, as a pedagogic tool in the process of changing the different design levels of the hospital from “staff focus” to “patient focus”. These thoughts, models and experiences are expressed in the summary of the design guidelines for the new hospital “Space for Health”.

BRIEF PRESENTATION OF THE UNIVERSITY HOSPITAL PROJECT

St. Olav's Hospital and the Faculty of Medicine comprise the University Hospital in Trondheim. St. Olavs Hospital is the main hospital for Central Norway and functions as a general and local hospital for Sør-Trøndelag County. The project replaces the current hospital with a new one on the same site, providing the 630,000 inhabitants of the counties of Trøndelag and Møre og Romsdal with a hospital for the future, designed with the provision of patient centered care as its guiding principle.

The Hospital Development Project Central Norway manages the construction project. It is a division of the Central Norway Regional Health Authority¹, which is responsible for all public hospitals (8) in the region.

The Center Model

The most important innovation of Trondheim's new university hospital is that - unlike other hospitals in Norway - it is structured into several clinical centers. This choice involves major organizational changes, making this a development project just as much as an expansion project. Improved resource utilization and shorter hospital stays are the goals of the center model.

Integrating Research And Teaching With Hospital Care

Both the organization and the layout of the new hospital are focused on integrating its key activities - patient treatment, research, and teaching. The university function is closely integrated within the clinic buildings. Trondheim has had a complete medical school since 1993. The Faculty of Medicine at the university, and Sør-Trøndelag College (HIST) total about 500 employees and 1250 students, with 120 medical students being admitted each year.

Dimensions And Project Costs

The new university hospital is to a great extent financed by the Norwegian state. Total project costs are not finalized, but the first phase of building is estimated at NOK 4 750 million (US\$ 650 million). Phase 1, consisting of three centers totaling about 90 000m² (nearly 1 mill sq.ft.) will be complete on Aug 6th 2006, while phase 2 may be completed in 2011/12. The hospital including the Psychiatric center will have a total area of 220 000 m² (2.36 mill sq.ft). About 50 000 m² is allocated to university and college purposes, and about 40 000 m² of the total area is refurbished current hospital buildings.

PLAN OF DEVELOPMENT

Phase 1

The new university hospital is being built in phases. The new hospital structure will gradually replace the existing, which will remain in full operation at all times. The centers built in phase 1 are the

- Neuro Center,
- Women's and Children's Center,
- Laboratory Center,
- Patient Hotel and the
- Supplies Center (technical section).

About 700 construction workers will be involved at the peak of this building phase, which commenced in November 2002.

Phase 2

The current plans for Phase 2 of the building program include the following clinical centers:

- Cardio-thoracic Center
- Psychiatric Center,
- Mobility Center,
- Environmental Center (including cancer treatment),
- Abdominal Center and
- Emergency Center.

There will also be administrative areas and a further extension of the Supplies Center. Plans are being made for Phase 2 of the building program while Phase 1 is under construction. The original estimates of population and patient base are reviewed and the planning horizon extended till 2020. A reassessment of the location and content of the remaining centers based on updated hospital production data is made.

The overall objective of the project is to provide the best possible solution with regard to patient focused care, flexibility, integration with the urban planning scheme and economic operation.

Development of the hospital project as seen in three stages;



Fig. 1a: Phase 1 shown completed next to existing hospital

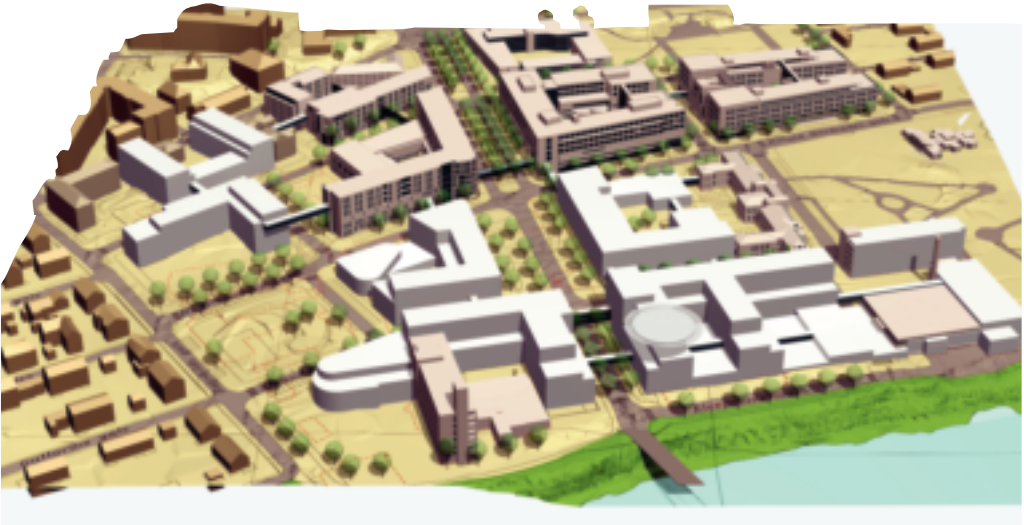


Fig 1b: Phase 1 and 2, the complete hospital program

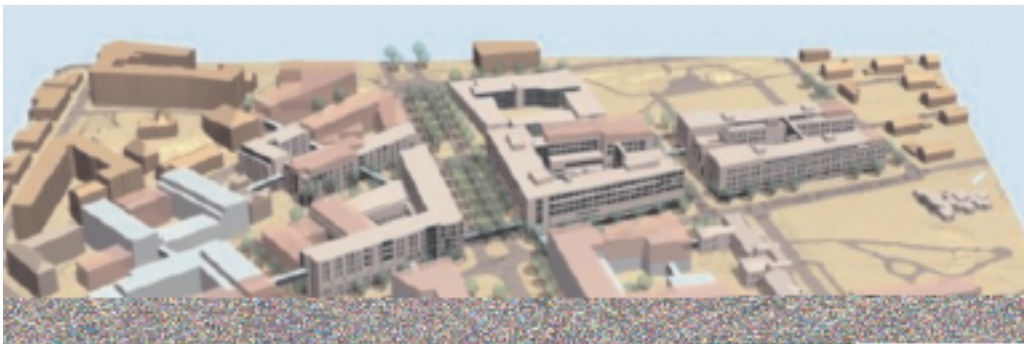


Fig. 1a: Phase 1 shown completed next to existing hospital

¹Until 2002, Norwegian public hospitals were owned, funded and operated by one of Norway's 20 counties. To improve regional coordination, the government formed 5 regional health care foundations, which each has full regional responsibility. These non-profit foundations receive remuneration from the government according to the number and type of patients treated, and have a semi-autonomous status with regards to development and operations.

HOSPITALS, BUILDINGS AND PERSPECTIVES ON PEOPLE

Patient-focused care is a concept that may be difficult to put into operation. The aim of this presentation is to convey some of the issues raised by this and other processes in the development of design models for St. Olav's Hospital, pointing out relationships between ethical and aesthetic issues: how physical surroundings reflect a perspective on humanity. (The pedagogy developed in the project relating to these issues is structured in "Space for Health", an extract of the project's design guide for hospital interiors. The guide will be available at the conference).

The planning and design of hospitals reflect a view of society and humanity at all levels from the location, overall concept and urban plan; down to the architecture of the immediate surroundings of the patients and staff. At St Olav's Hospital, part of the challenge in planning and design is to transform an existing physical and organizational structure into a modern hospital according to the objectives for efficient operation and the provision of patient-focused care.

A "Medical Part Of Town" - Integrating The Clinical Centers In A Urban Block Structure

The century old present and future hospital is located close to the Technical University and the historic center of Trondheim. The historic center of Trondheim is a 15th century urban block structure, with particularly wide streets to prevent city-wide fires spreading among the wooden buildings.

The master plan of the new University Hospital is made by Frisk architects (Niels Torp, Naarud Stokke Wiig and Pål Kavli architects) based on the winning concept of a 1995 international idea competition. The seven clinical centers,

each of 20- 30 000 m² with approximately 700 employees, divides the large hospital into a smaller scale, both with regards to buildings and organization. This offers the possibility of creating clearer and more intimate structures and environments. A basic idea of the plan is to integrate the new hospital in an urban block structure, to give the impression of the hospital area as a "medical part of town". This idea contradicts the tradition of constructing an "institutional" hospital building complex in vast environments in the suburbs².

For patients and staff, the "Medical Part of Town" strengthens the image of the hospital as part of "normality" and everyday life. The location offers the best public transportation accessibility for patients and staff, an important issue in this region with long distances, limited road systems and poor public transportation in suburbs and countryside. The urban block structure separates out-door space into center-private gardens and public streets and parks. The public space opens and connects the hospital to surrounding landscape and neighborhood, and a large central space gives access to all the clinical centers.

The urban block structure has demonstrated great flexibility to adapt changes in organization and building program, without compromising the basic architectural and functional qualities. The organization of a center is not fixed to a specific block, but can be divided between different blocks according to actual patient and staff logistics. The idea of a fixed pattern for future hospital buildings also allows for wide architectural variations within the hospital plan, without creating a situation that often occur in hospitals, chaotic and contradicting physical environments.

"nature alone cures"
Florence Nightingale

²Interestingly, the last hurdle for the project was an extensive and at times acrimonious public debate over the location of the new hospital. Arguments were launched in favor of placing the hospital at Dragvoll, the present University campus in the suburbs. After a project delay of about 18 months, public hearings concluded that that the savings realized building on an open site were marginal, and that an overwhelming majority of public authorities and patient and employee organizations were in favor of the central city location.



Fig. 4: Art and nature; illuminated stones at the entrance boulevard, established before the first centers were constructed.

Nature

The healing effect of visual and physical contact with nature is proven both through science and experience. The Hospital Project has placed great emphasis on adapting elements of nature and living life into the various levels of the hospital design. The Hospital itself is situated overlooking the beautifully curved river enclosing the historical center of Trondheim, emptying in the Trondheim fjord. The riverside is a nature reserve, and you can fish salmon and trout in the clear water. The hospital public spaces are furnished with mainly green elements, trees, wild stones and bushes, enclosing the buildings. Every block has interior gardens and roof gardens that cover about 25% of the ground area.

The urban block structure allows sun and daylight into all parts of the buildings. Large entrance halls open from the public, tree-lined

streets to the center's private gardens, making orientation easy within the building. It is planned that all patients have a view to green elements from their beds. The exterior and interior of the buildings use natural materials to a great extent. Wood is a material with strong tradition in Norway, and due to the intention of creating "normality" it is the chosen material for most furniture in patient areas.

The Generic Center - Urban Block

A goal for the organ-centered organization is to concentrate medical service in smaller blocks around the patient, and thereby reduce patient movement and number of staff involved with a patient, to a minimum. The concentration of different medical services within a center has to be related to interdisciplinary functions and services in other centers in an efficient way. To secure overall connections and future flexibility,

general principles are created for building blocks and various functional areas. This model of guiding principles is termed the Generic Center. All somatic medical centers are variations over the structure of the Generic Center, which will be described in more detail in the following.

All centers are connected with underground passages on the basement level, and bridges crossing the streets one level above the ground floor. Each urban block is made of different volumes that are joined but in such a way that there are one or two openings between streets and gardens in each block.

ration of offices, research labs and university functions in one corner of the block, connected to all the levels by bridges. The university is also integrated within most clinical areas.

DESIGN FROM THE PATIENT'S PERSPECTIVE

Patient And Staff Participation

The hospital project combines development of organization and buildings. According to traditions of Scandinavian organizational democracy, the hospital planning process involves extensive staff participation, in Trondheim more than 300 staff members have participated in the develop-

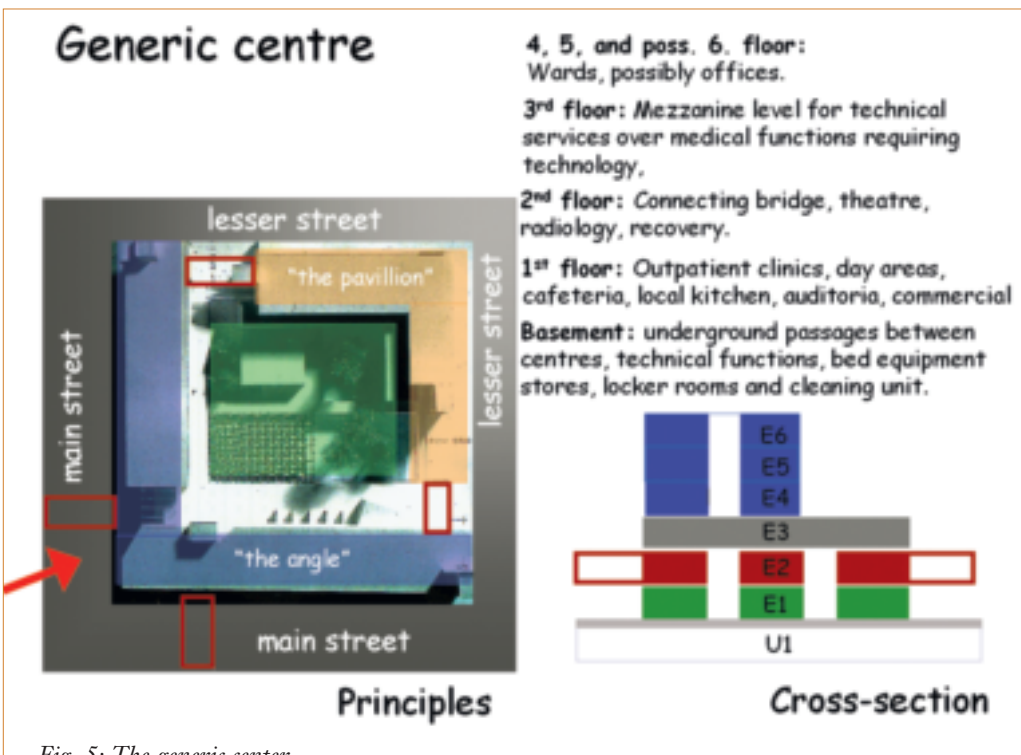


Fig. 5: The generic center

The main disposition of functions throughout the entire hospital is then that technical and supply functions are located in the basement, out-patient areas on the first floor; operation theatres, x-ray etc on 2nd floor, 3rd floor is technical, while 4th floor and above holds in-patient areas. In each block there is a concent-

ment of the new hospital. A first for the Trondheim project is the extensive use of patient participation. About 141 patient organizations have joined in a common organization, and the members have, according to relevant experience and qualifications, participated in structuring and design on most levels of the process.

Involving patients in hospital planning has yielded some important benefits for the new hospital, both in the design of patient areas and for prioritizing issues that are important for patients and may not be perceived either by staff or planners. One result of patient participation is the demand for the principle of single bed patient rooms³ throughout the hospital. Patient perspective is included early in the planning process, in programming and during the construction period.



Fig. 6: Interaction between main groups of hospital users

Roles And Interaction, How To Make Supporting Space

The figure depicts the principal groups of users who set requirements for the design of the hospital. In its own design guide (Space For Health), the Hospital Project has defined various areas in the hospital where the requirements from the various groups can be given more or less emphasis. In the wards, the emphasis must be on the needs of patients and their families. In all parts of the hospital where treatment of patients takes place, a primary concern is to create a good framework for the important interaction between patient and health practitioner/ staff.

Contribution from environmental psychologists has outlined that the potential for mutual contact between groups and individuals, is affected by the possibilities for setting relevant boundaries. This

has a deterrent influence on the actual design of the different areas in the hospital. Existing hospital has many examples of spatial boundaries made to enclose staff territories and private spaces, which thereby serve as barriers for the patient. At the same time the patient has a need for relevant boundaries (privacy) to feel safe and open for contact. The combination of “sengetun”⁴ and single rooms provides a good starting point for covering patient needs at these levels.

SENGETUN – PRINCIPLES OF DEVELOPMENT

The building layout gives a perspective on people and the possible interaction between them. The “sengetun” (“bed-courtyards” for step-down care), is on one hand motivated by the desire to minimize walking distances and number of movements for the nursing staff. The solution also creates opportunities for designing the architectural surroundings to better suit the patient while improving patient and staff contact.

Different building layouts influence nursing staff logistics and the resulting staffing requirements. Long distances between patient and supplies generate traffic and increase the need for staff (existing wards). At the same time, the staff is less accessible to the patient. Multiple occupancy rooms provide little protection of the patient’s private sphere. The layout of the duty room functions poorly as a meeting point and place for contact between patients, their families and the staff. Compact building layouts (circular, “cluster”) minimize the distances but lack flexibility with regard to changes, both building-related and organizational, such as variations in patient numbers and staff.

³Single occupancy, while initially a ‘patient rights’ issue, also has important economic benefits. Less space is required for treatment/consultation, there is less movement of beds, and hospital infections can be reduced by 10% (estimated).
⁴“sengetun, lit. bed-courtyard. The Old Norse and Saxon word ‘tun’ (meaning (fortified) farm or enclosure, is found in English place names as –ton and –ten endings, and in the modern word ‘town’. In Norwegian the word has come to mean the protected interior space in the middle of a circle of farm buildings, a design which allows both protection and easy access to all buildings with the least amount of walking.



Fig. 7: The starting point, existing wards at St. Olav's Hospital Organization and design

Organizing the wards in courtyards or Sengetun, like “pearls on a string”, combines the advantages of the compact and the linear building lay out. The patient rooms are grouped around stores for supplies and workstations for the staff caring for these patients; at St. Olav there are 6-8 patient rooms per sengetun. The sengetun are positioned in series with common supporting rooms between them. A sengetun is not an organizational unit. To ensure flexible and effective operation, each ward should have at least 3 sengetun (24 beds) in series, with visual contact between workstations. Staff can be reduced to serve only from one unit at night.

Each sengetun has one isolation room. There is visual contact from most beds to the workstation,

direct contact to two patient rooms from windows behind workstation. In the future, more patients in the ward will be monitored patients. The building layout of the sengetun is made to allow some degree of monitoring, with medication room in the sengetun, direct access to “immediate-help lift” and two workstations with visual contact from the staff to all beds.

The building lay out creates a widening of the corridor around workstation and patient rooms, called a “tun”. The workstation is made like an open accessible space for contact between staff, patients and relatives. A mock-up model has been made as a part of the project as an arena for staff and patient participation in the design of workstation and sengetun.

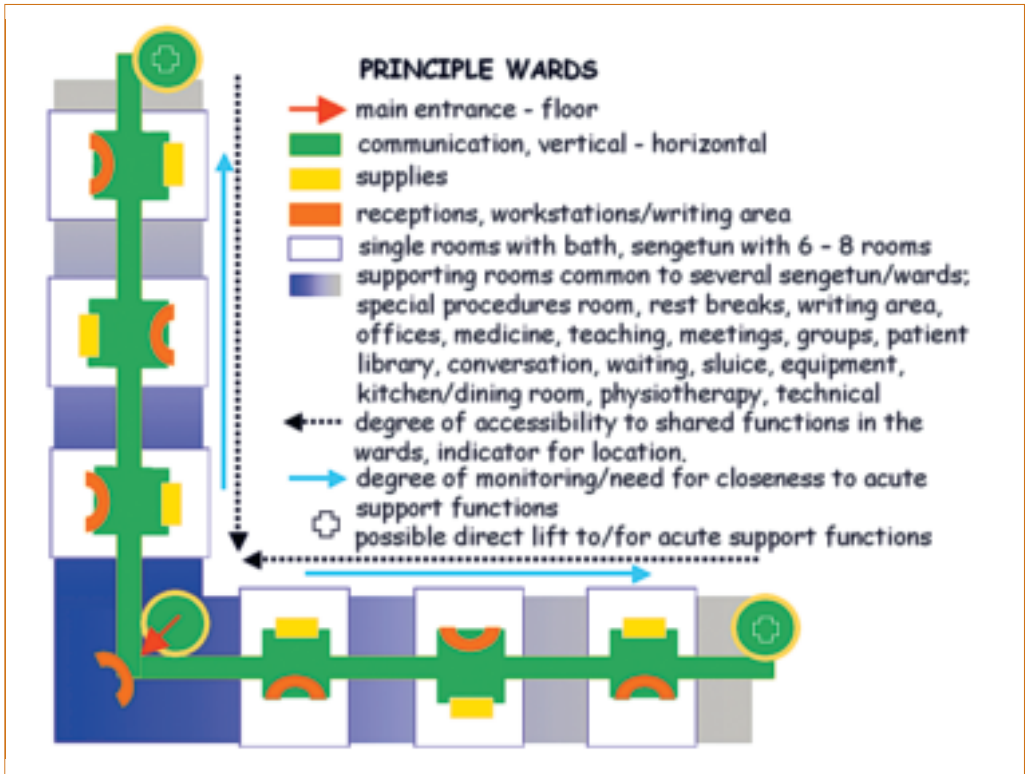


fig.8: Organization principle for the wards in the Generic center



Fig. 9: Sengetun in the Neuro Center

THE HOLISTIC RESOURCE-MODEL

Staff and patient involvement in the design and the development process of the hospital has launched a debate beyond the specific solutions. One result is the idea of a holistic resource model for hospital development as a tool for developing a hospital from the patient perspective. The holistic model seeks to describe various aspects of a single phenomenon, the hospital organism, and to show how the various aspects affect, strengthen or weaken each other in a development process. The holistic model allows the different participants and interests to understand the value of their own contribution towards achieving the aim of the project, and even more so to understand the value of other aspects and contributions. The model separates the resources (input) in two main sectors, the human (people) and the material (buildings and equipments), and the values (output) in quantity (measurable) and quality (experiential). The different aspects of the process are found in the intersections of resources and values.

The nature of a holistic model is, like the development process, that all the aspects of the model are included, whether they are taken into account or not. For example, one may well choose not to work consciously with the aesthetics of the hospital, but all building-related measures will still have an aesthetic consequence. The aesthetics in turn affect the human being's experience of care and thoughtfulness in their surroundings (ethics) In the same way; an organizational initiative will have a direct ethical consequence. Directly and indirectly, all aspects will affect each other and the planners depend on an adequate understanding of the whole and of shared objectives for developing good, sustainable solutions.

The vision/objectives for the Hospital Project in Trondheim have been defined as patient focus meaning both "production focus" and "customer orientation", understood as taking care of the human being entire. This involves awareness of both quantitative and qualitative values, and the whole model is activated.

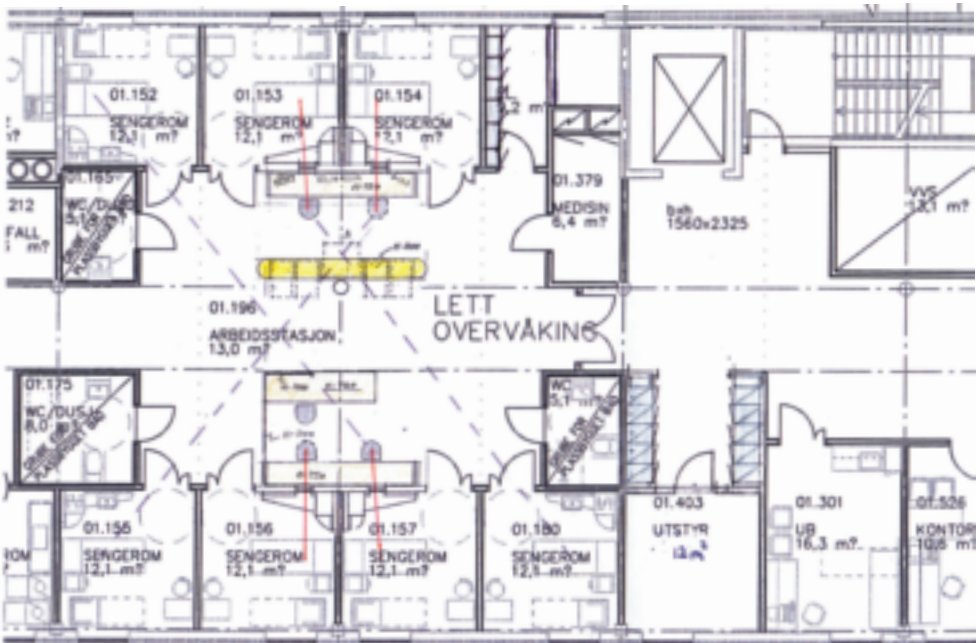


Fig. 10: Sengetun designed for light monitoring – 5th floor Neuro Center



Fig. 11: Holistic Model, human and material resources