



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA





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## 1.1 Introduction

The year 2008 could be the beginning of a defining epoch in the University of Pretoria's history. The university is celebrating its centenary, this year (1908-2008). To build upon the universities standing and history as a leader in the tertiary education and research fields in South Africa it has developed and implemented a strategic development framework, Innovation Generation: Creating the Future, 2007–2011 (<http://web.up.ac.za, 05/03/2008>).

The Innovation Generation framework has a number of key objectives to propel its advance towards achieving its main objective:

“Our University is about the future. And how we view the future is directly influenced by the concepts of `quality` and `academic excellence` embedded in our vision. Our University must view itself as the trustee of a quality future. The future is not a predetermined place. We must – as our mission mandates – contribute actively towards shaping that future. This is the essence of our new strategic plan. Its central theme is that of positioning the University of Pretoria as an internationally recognized research university in South Africa.” (<http://web.up.ac.za, 05/03/2008>).

The above statement as taken from the strategic framework clearly shows that the driving core of the “Innovation Generation” is to position the university as an internationally recognized research university. To strengthen this objective, the university aims to develop this field within four guiding principles:

- Research will make a positive contribution to local, national and international needs aligned with the National R&D strategy as well as International trends (<http://web.up.ac.za, 05/03/2008>);
- Research will be based on the proven capacity that exists within the University and will be built on work of excellent researchers and research leaders (<http://web.up.ac.za, 05/03/2008>);
- Research themes will not only be defined on

short-term needs, but also be visionary in that they will identify areas of future potential that will require the University to build competencies in order to remain a premier research institution (<http://web.up.ac.za, 05/03/2008>).

- The University research agenda should also take cognisance of unique competencies that exist within the University (<http://web.up.ac.za, 05/03/2008>).

The Universities Strategic development framework has not been developed in isolation; it has been developed to tie into the greater SA R&D context. “SOUTH AFRICA'S NATIONAL RESEARCH AND DEVELOPMENT STRATEGY” as published in August 2008 by the Government of South Africa, defines the greater context into which the universities development framework fits.

The national R&D strategy identified certain detrimental trends in the national R&D sectors, including; private, governmental and academic that are impeding the growth of the countries R&D sectors.

The most worrying of these issues include:

- The fragmentation of government Science and Technology Sectors. (This is seen as a key weakness, and encompasses all of the National R&D sectors).
- The innovation Chasm that persists in the country; the lack of connection of human capital to the appropriate markets.
- The lack of interest in R&D(S&T) from baseline sectors, school children are not interested in studying sciences.

As stated in the UP's strategic development framework, the university strives to become an internationally recognized academic research institution. Thus to bridge the national and universities contextual barriers in R&D development barriers in order to achieve its central goal, the university requires a research facility that:





1. Unites the fragmented, isolated nature of research on the campus.
2. Implements industry leading methodologies, technological applications and innovative techniques.
3. Builds upon the current capacity of the university, exploiting current fields of expertise as well as providing opportunities for the development of future innovative research areas.
4. Provides for and fosters a climate of networking nationally and internationally with special cognisance being given to “Human Capital” connection, and collaborations. Both with private sector and academic institutions.
5. Generates a Knowledge Base for the Institution.

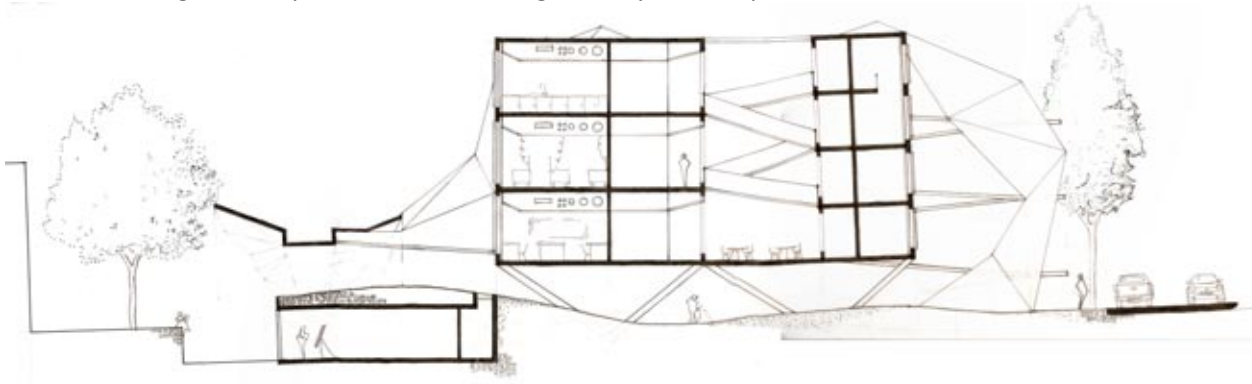
## 1.2 Goal Statement

To design a world class research facility that supports the University of Pretoria’s strategic objective of becoming an internationally recognized research institution, a collaborative research environment that promotes networked interaction between researchers, students, the public and private sectors.

A technologically enabled research facility that promotes and facilitates collaborative and innovative, interdisciplinary research, in a building that is flexible and adaptable.

Concurrently the development of an architectural surface that serves to enhance the research environment and all of its complex requirements.

Figure 1.1: Design development section through facility, landscape and circulation



## 1.3 Sub Problems

1.3.1 How can this building be designed to promote flexible, innovative and collaborative research between students, academics, public and private sectors on a local, national and international level?

1.3.2 How can this building be designed to be flexible and adaptable to fully satisfy the research requirements at the university now and in the future?

1.3.3 Can architectural surface act as; become a representation for “network” that is an inherent part of contemporary architecture. In fact can surface become a point of “network” interaction, connection and communication?

1.3.4 Can architectural surface as a sensory tool be used to define and establish an identity of a building or field of study?

1.3.5 How can this architectural surface be developed to lend its self to an enhanced research environment , with greater sustainable functioning ?

## 1.4 Project Objectives

A multidisciplinary research facility that promotes interaction and collaborative research, that unites the fragmented nature of research on the University of Pretoria’s main campus and opens possibilities of new explorations by facilitating new inter-faculty collaborations. A research facility that is highly technologically enabled, flexible and adaptable to all research opportunities and requirements of the university both now and in the future. A research building with a sensorial architectural surface, a surface that embodies and gives identity to the research faculties on campus. A building with surfaces that delight the senses and stimulate creativity.

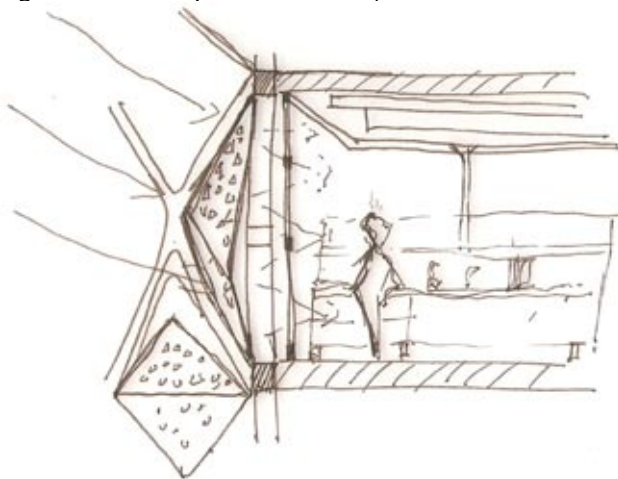
### 1.4.1 Unification

One of the Universities greatest obstacles in becoming an internationally recognized research institute is that its various research units function as isolated fragments units, which inescapably leads to what is commonly referred to as the “innovation redundancy loop”, this is defined as: “Many organizations are grappling with the problem of repeatedly generating the same ideas, solving the same problems, and creating the same knowledge over and over again, This tends to happen when those doing the knowledge creating, or what we call the pattern creating work are unconnected to the organization’s knowledge base, when the knowledge base is unconnected to the real world outside the organization or when there is no detectable knowledge base in the organization” ( VanPatter,2004:11)s.

The proposed new research facility should propagate intelligent research and collaboration. This process should lead to the creation of a Knowledge Base for the university, avoiding the dreaded loop as well as opening up new areas of interest.

“In research, crucial ‘aha!’ moments are often the result of chance meetings between scientists outside the laboratory space, wherever they encounter each other in the course of their movement between the lab, shared equipment rooms, and common areas.

Figure 1.2: Concept sketch of lab, surface interface





Over the past four decades, laboratory design has seen incremental improvements. In reviewing these developments, one can see that a common theme has begun to emerge: Lab design must facilitate interaction, both within a research group and between research groups. Architects who design research labs know from observation and experience that successful research facilities offer environments that combine rigorous technical sophistication and flexibility with comfort, visual delight, and inspiration—`high tech plus high touch`—thereby setting the stage for constructive interactions”

This objective can be achieved by applying the following strategies:

- Providing an appropriate research facility that caters for team based research,
- That encourages and fosters a climate of interdisciplinary research and collaboration,
- And changes the focus from “Knowledge Production” (Research Volume) to Innovation (Reach Value).

#### 1.4.2 Future LAB Design

The proposed new research facility should be a living Lab that advertises, enables, excites and informs everyone within range.

“A new model of laboratory design is emerging, one that creates lab environments that are responsive to present needs and capable of accommodating future demands. Several key needs are driving the Development of this model: (Watch, 2007)”

- The need to create “*social buildings*” that foster interaction and *team-based research*;
- The need to achieve an *appropriate balance between “open” and “closed” labs*;
- The need for *flexibility* to accommodate change;
- The need to *design for technology* to provide

access to electronic communications systems throughout the building, this has immense implications on lab design;

- The need for *environmental sustainability* (Watch, 2007).

#### 1.4.3 Research Capacity Development

“The modern organization must be competent across the total innovation landscape. This demands an understanding of the different innovation vectors and how the science of innovation intersects with the art of innovation. It is the intersection of these competencies that will provide the appropriate methodological response given a specific need.” (Michael S. Slocum)

By focusing on the universities key strengths as set out in the development framework: “In the South African higher education sector it is distinguished by its internationally recognized strengths in natural and agricultural sciences, engineering and technology, fields...” as well as providing opportunities for new collaboration by integrating the fields of art and design that are traditionally seen as being at variance with R&D/S&T, the universities capacity for developing new and innovative fields of research would be greatly enhanced. This trend can be seen in most of the world’s top research universities.

There is another possibility for investigative research to take place, taking into account the fragmented nature of the universities research units. When the integration of the various research fields take place the exposed fragments (edges) of each of them will come in to contact with raw edges of the others, thus creating the opportunity of interconnection of exposed edges and the discovery of unexpected fields to investigate.

## 1.5 The Client

The University of Pretoria's Research Support Department is the principle client.

### 1.5.1 The Client Needs

The university requires additional academic and teaching research facilities for its three foremost research units, including the departments of Natural Sciences, Engineering and Agriculture.

The University has been mandated by government to expand the above fields of study by 50 students per specialty per faculty at undergraduate level. The university thus estimates required research space for an additional 150 post graduate researchers for a period of two years per researcher. The university also requires spaces for interdisciplinary research, and visiting national and international researchers.

## 1.6 Delimitations

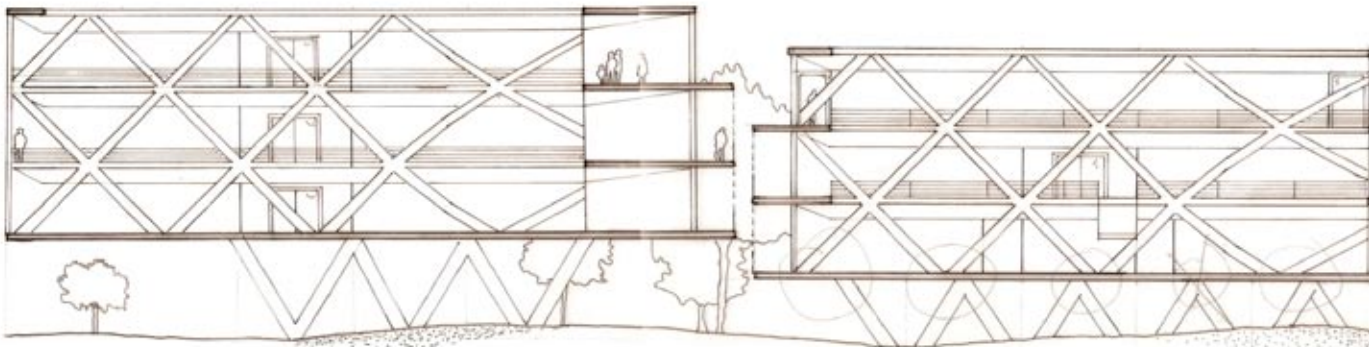
1.6.1. The research facility will be designed to accommodate various types of research; it will thus be a flexible and multi use facility that will not cater for any specific research field or faculty.

1.6.2. The study into architectural surface as a sensory tool will focus on visual perception and the translation of the findings into an appropriate surface for a research facility within the contextual response.

1.6.3. Research facilities are very high energy users because of the energy intensive functions as well as strict environmental regulations for laboratories in terms of air quality and other prerequisites for accurate research. Thus the research in to an energy efficient facility will focus on the study of Daylighting systems, appropriate efficient services and passive climate control.



Figure 1.3: Design development section through central connective atrium



## 1.7 Assumptions

1.6.1. The University vehicle access and parking is to be Universiteids Weg closed, and a new entrance to the proposed basement parking structure moved to the parking area adjacent to the Nano Electronics building.

1.6.2. The University of Pretoria will (according to the strategic development framework as set out in the campus "Vision") be integrated in to the Hatfield precinct of Tshwane sometime in the foreseeable future.

