

# design

# proposal



In an era when visual communication plays an enormous role, architecture is becoming a powerful medium for the transmission of knowledge on green sustainable design within the built environment. The need to encourage awareness is becoming increasingly evident, locally and internationally. To rethink some of the principles of a 'good design' such as functionality, symbolism, cultural belief systems and industrial technologies. Design must be redirected towards an ethical attention on quality, leading towards a rooted awareness with a relation between human artefacts and nature - one that is lived in partnership, not domination. A point of reference for the new production model, increasing the output and lower the consumption of natural resources.

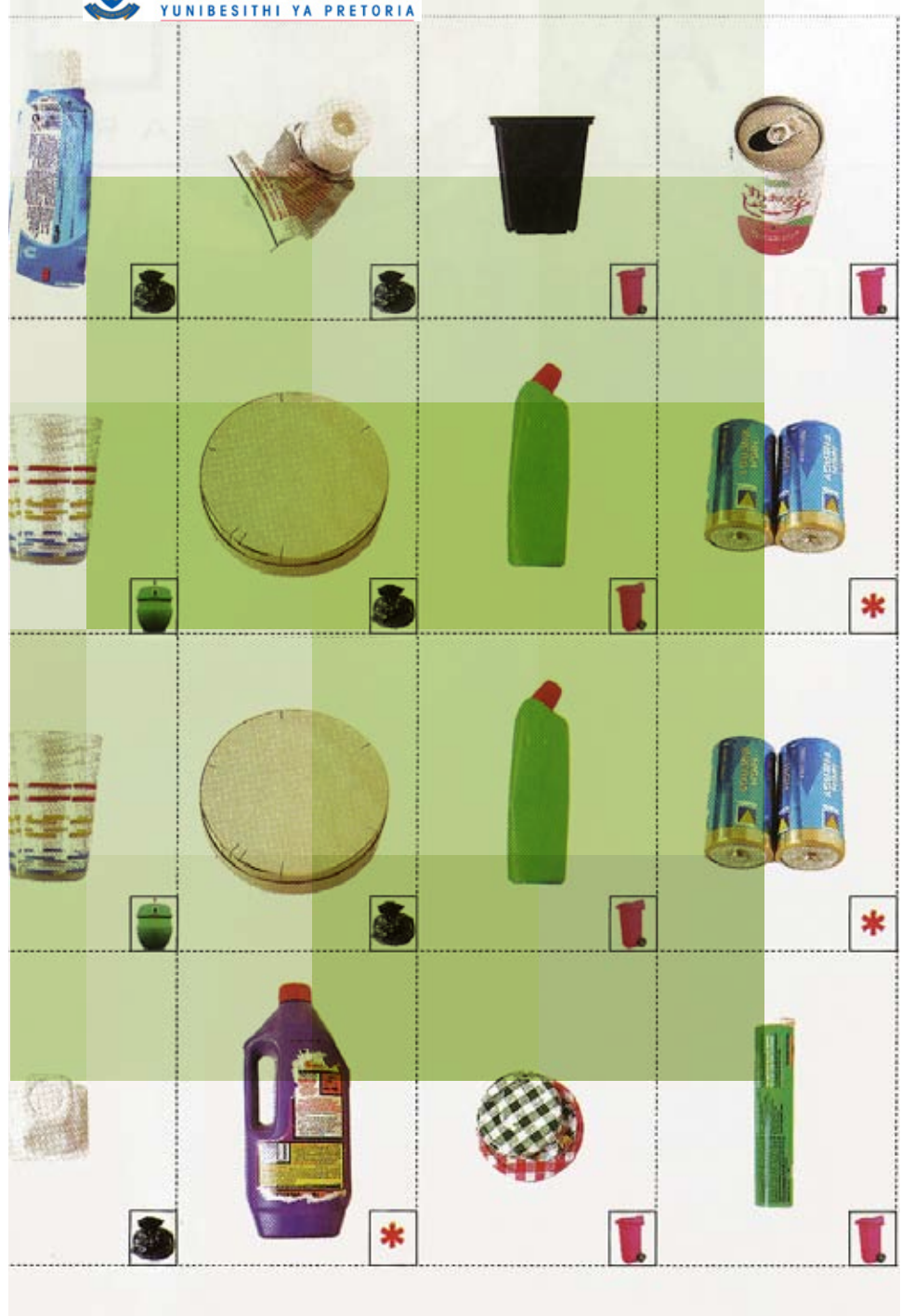
This requires a mind shift, from a linear model [design - production process - distribution and use to end of life - recycling/re-use], a systemic model, where recycling is only dealt with at the end of the process. Superseded by emissions reduced to zero.



The proposed facility aims to achieve a carbon minus footprint, consuming less energy than produced by the facility itself. Focusing on replacing, re-use and recycling of natural resources and in the process explore, interact and communicate the profession of architecture through the medium of green technology, Conveying the message via digital information systems, offering entertainment value to students. Creating a platform for discussion among built-environment professionals to-be, contributing to inform the public and future clientele. Addressing the issues at an educational facility, ensuring skill empowerment within the profession.

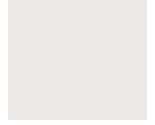
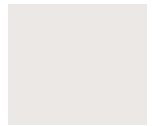
**George Burgmans, producer of Caracas: The Informal City:** *"I find architecture very interesting - it has a real relationship with what is happening in the world...it forces you to think about different perspectives at the same time."*

At student-level, thorough learning experiences and information systems should guide them to validate their choices, closing the divide between the obvious 'problem solver' and the innovative solution. Exposing the weak links, reshape them into opportunities for progress, enriching the quality of the designed product. It's too comfortable to get sucked into the familiarity of our everyday lives, losing grip on reality. To prevent this scenario, we have to ensure the students have adequate tools to tackle design problems, ensuring immediate confrontation with diverse realities both sides of the fence. Embarking on programmes where students can start to become part and parcel of resource efficient living and enable them to design accordingly. To consider





\_fig. 112: the physical building component





how appropriate their technological interventions are and how well it fits within the environment they are creating.

Therefore, the facility displays a physical component [physical reality], built into the structure; a meta-physical [virtual reality] component, offering opportunities to connect via digital interaction systems. This could be incorporated through a campus network system, as well as a virtual global system; [i.e. *Design Indaba*, a Japanese industrial designer designed a product named 'tangible earth', this product enables the user to connect to an information system, giving relevant information on any topic in real time, right there on that specific spot, at that specific moment.]

These systems, could become the instigators to connect the students with a virtual reality network world wide. To achieve this goal, a proper understanding is needed, enriched by reality as a frame of reference, on a regular basis through both the building structure and the function it hosts.





exhibition space, functioning as the physical awareness component of the facility



[e]



[f]



**Andrew Makin:** "...living in the 'real reality', as opposed to the media-projected reality, would be a great advantage for us all in understanding what is really going on and living in it as opposed to judging it and imagining that we, as architects and planners, are going to fix it."

**Rob Schroder, maker of documentary Caracas: The Informal City.** "For me, architecture can only survive in the future if architects try to understand how people actually live and build. Maybe when there's a switch to thinking more about the environment and about how people actually live, then architecture can do more for the future of cities."





A technique used as a problem solver, is linked to nature's solution to problems - Biomimicry [mimicking nature: 'What would nature do?']. Its a discipline that seeks an answer when it comes to an approach that wants to incorporate nature's mannerism to solve problems. Its a search for solutions, to manufacture safe, successful, efficient technologies. Copying nature isn't a new phenomena, its been a well-known strategy, to come up with workable solutions for a long time being.

*1851, London's Crystal Palace, where Sir Joseph Paxton took inspiration from the cellulose "ribs" of a variety of South American hyacinth plants. He found the leaves have enough strength to support the weight of a person weighing 130kg.*

*The morphology of birds, used to conceive aeroplanes.*

*The self cleaning varnishes, developed by a German company, using the repellent mechanism used by lotus leaves to keep clean.*

*Anti-reflective and anti-reverberating auto type film developed to collect as much light as possible without reflection, taking inspiration from the eye structure of moths, used to avoid being spotted at night by predators.*

*Plastic micro fibres, whose electrodynamic adhesiveness is similar to the hairs on the palm of a gecko's paw.*

Unfortunately, these extraordinary inventive technologies often remains hidden in laboratories, not reaching its full potential. Therefor, the proposed facility needs to reverse this action. Creating an opportunity to combine an awareness component to the function it hosts - the development of green

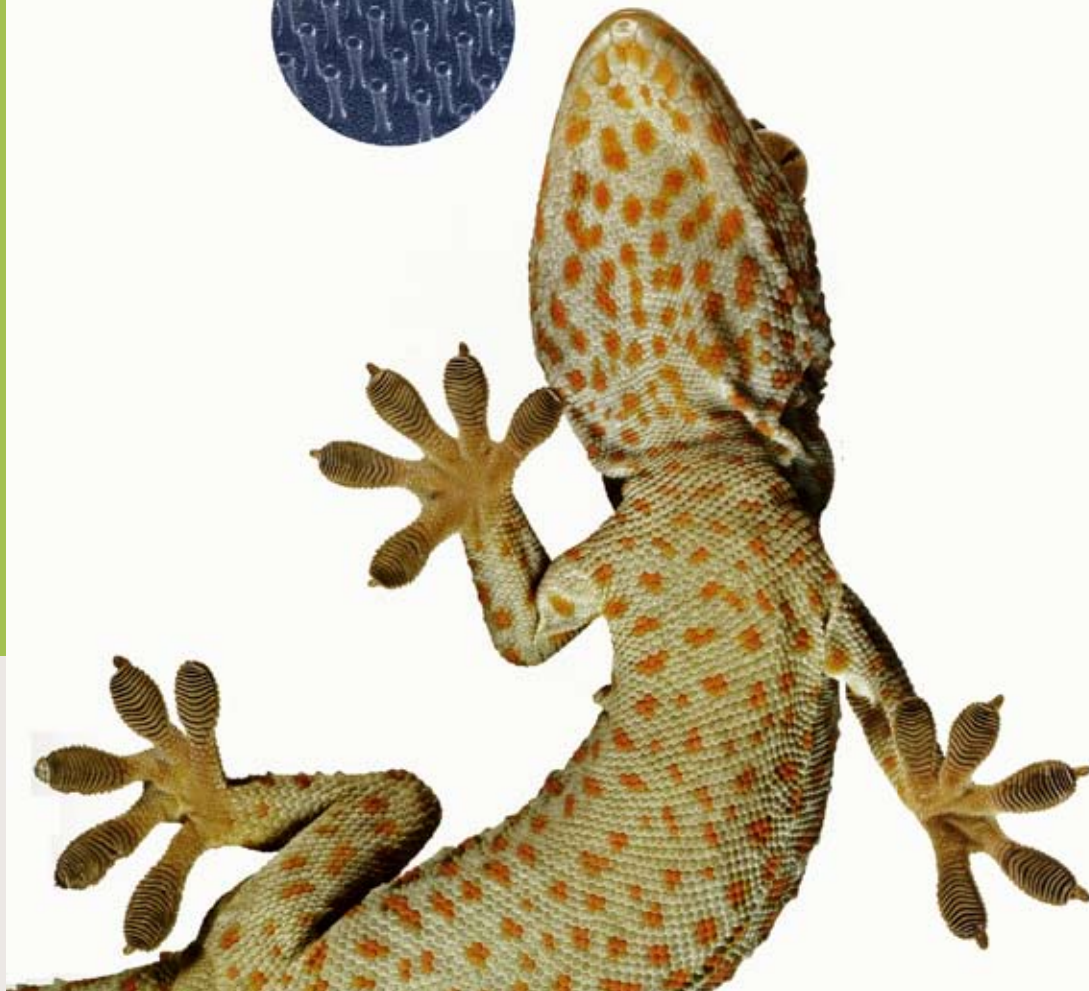




fig.112 [g]: biomimicry



technology, a structured system can be incorporate in ways, not only to view these technologies, but to experiment and test them in real life situations. To reach the prime audience and let the world outside these laboratories know how innovative human induced activities with nature's help can be. The facility would achieve this goal by creating opportunities to experiment, exhibit, allowing their economic and practical value to be evaluated and transformed into an actual manufactured product.

*With organisations already in place, such as the "Innovation for Conservation Fund", who finance the industrial launch of 100 biomimicry technologies, a decisive factor for the progress and an opportunity for mass change in a stage of critical change of culture, becomes more than just a possibility. The first product benefited from the fund, was launched in Australia, an antibacterial product, created by copying the capacity of a variety of algae. A decisive factor for the progress of infection.*





# concept



## **\_the vision:**

It is in Africa  
It is in South Africa  
It is in the heart of the city of Pretoria  
It is in the heart of the Hatfield precinct  
It is in the heart of the western precinct  
on campus

LIFE CYCLE - RHYTHM - ROUTINE -  
RECURRENT - PROCESS - ENERGY-  
FLOW - RENEW - RECYCLE - DY-  
NAMIC - CIRCULAE MOTION

It is a place of learning, a place of  
thinking, a place of discovery, a place of  
exploring, a place of integrating, a place  
of interaction

## **\_As it stands today**

- *an unknown parking area, an invisible place, an unacknowledged place*
- *an overlooked place*
- *a building site in waiting*
- *a place with immense potential to inform, stimulate, educate, move and change opinions*
- *a place with a significant attribution to make to the campus and its students*
- *a place for the people and the University to be proud of*

## **\_what it will be**

- *an internationally recognised symbol of innovative research of the University of Pretoria, born from the current shortage in resources to maintain our lifestyles;*
- *the home of advanced green technology integrated in everyday life;*
- *the home of innovation and education of users and visitors in Pretoria, and South Africa.*

## **\_place-making**

*an urban place a place of reflection, a place of innovation, a place of study, a place of learning, a place of creating, a place of entertainment, a place of reality, a 'green' place.*

Reviving the city, reviving the campus,  
reviving the site, reviving the user



**\_the building aim**

- eliminate the need for nonrenewables-based grid energy
- increase the efficient use of the site's and region's renewable resources
- improve overall energy efficiency
- improve the building envelope's longevity
- inform the design of the skin and envelope in order to be appropriate to the climate
- reduce maintenance cost
- improve quality of life
- are essential to the larger community
- improve the healthy environment of the users
- act as a steward to the environment and the community

**\_the programme**

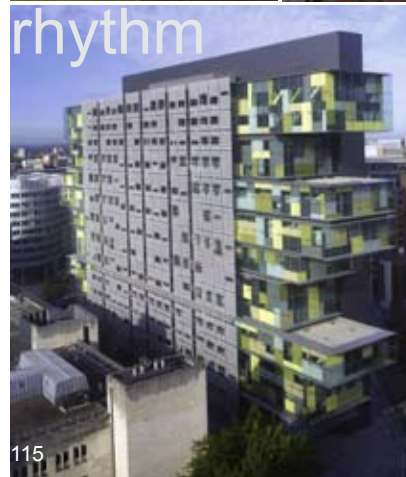
As a Research centre for Green Technology, this addition to the EBIT faculty will focus the attention on environmentally friendly innovative technology design, specifically applied to the built environment. The facility will focus courses applied to post-graduate students [classes not exceeding twenty students] in:

- \_green urban design;
  - \_green technology management;
  - \_green technology design;
  - \_green industrial design;
  - \_green engineering design;
  - \_green product design;
  - \_green architecture;
- and specific modules for extra credits for all pre-graduate students.

Since technology is a phenomena applied to all fields, the facility will incorporate a digital information system [metaphysical interaction] to include all the faculties, functioning as the social sustainability component. By establishing a green campus network, applied to all courses of the University of Pretoria, research and information



transparency





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activity



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interaction  
education



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energy flow



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exhibition

• can be exchanged, giving the centre  
• the 'voice' to act as a local instigator to  
• inform students of the innovative think-  
• ing methods needed for our survival  
• as a post-carbon society, giving every  
• student the opportunity to become a  
• participant.

• The facility itself [physical interaction],  
• becomes the physical experiment, to  
• use and replace, adapt and renew,  
• produce and recycle every day. At  
• the same time conveying the 'green  
• message' to awaken awareness on the  
• topic.

• **\_skin**  
• The building is mostly transparent with  
• specifically applied techniques to control  
• the micro-climate within the building.  
• These mechanisms allows the build-  
• ing to breath, to adapt according to a  
• climate change, a seasonal change, or  
• a day-time change.  
• This transparent logic allows the user  
• to relate to nature and activities outside  
• the building and allows the sporadic pe-  
• destrian to view the organs of activities  
• within the shell.

• The hierarchy of the building progresses  
• from a public- to a semi-public-, to  
• a private area. The ground level,  
• functioning as a public are, is slightly  
• lifted above street- and courtyard level,  
• Relating to the life of both: the entrance  
• from the courtyard, into the double  
• height exhibition space. The public area  
• consists of public facilities including;  
• an exhibition space, an event space, an  
• internet cafe, a print shop, a book shop,  
• a restaurant, green courtyards and  
• a coffee bar. [Ground- and first floor]  
• The library and auditorium functions as  
• semi-public area, accessible to private  
• or public users. [First- and second floor]  
• The private are will cater for specific  
• post-graduate students registered at the





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## green space



## circulation

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## activity hub



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## pause

facility. This zone include; laboratories, lecture rooms, workshops, digital labs, offices, and a library. All these facilities will be controlled by secure access. Students not affiliated at the facility can register for library access.

### **\_exhibition space:**

Organic shaped pockets, will provide exhibition space for students' innovative designs as well as the hottest new topics on the green technology. The space will symbolise the 'voice' of the building, personifying the users' experience through personal log-in systems, ensuring an interactive, responsive, experience. Reinforcing the physical interaction between the facility and its users.

### **\_event space:**

Functioning as an extension of the exhibition and lobby spaces, the area acts as a spill-out and circulate-through space to accommodate big crowds gathering after public or private functions. The area is ideal for interaction purposes, can be used as additional extra exhibition space and offer the opportunity to become the portal of communication within the building, fulfilling the social sustainability function of the centre.

### *Brooklyn Mall; Pretoria*

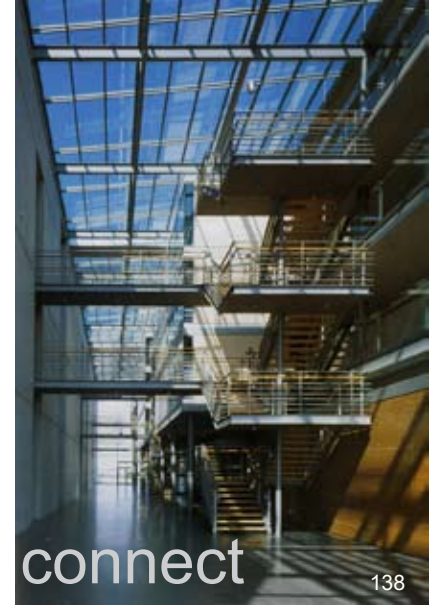
*An image of a school of fish swimming in a coral reef is displayed on the floor by a screen monitor fixed to the top concrete slab. Movement sensor detects a pedestrian passing, and the sound of water is displayed over a speaker next to the screen monitor. This technique example could be used to convey environmental messages to the pedestrian in a subtle but effective way.*



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visual



connect

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central spine

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interactive

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transparent



green roof

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### **\_green courtyards**

The building is centred around a courtyard, functioning as a semi-private space and relates with the green corridor in front of the Musaion. Two secondary circulation routes link the three building wings with the courtyard and offer an opportunity for the facilities on the ground floor to extend into the courtyard, to form a vibrant, energetic activity hub for student recreational activities. Trees, growing from the basement, offer shading for quiet sit-down sessions in-between classes. The planted courtyard also functions as a green barrier against radiated heat instead of the normal paved option.

### **\_library**

The library will focus on green technology information in all study fields. As the expert on the topic, this facility will offer students with top of the range information. The library is further divided into two floors with controlled access points on both. Most of the information will be in digital format, ensuring the waste percentage of the facility is limited to the bare minimum.

### **\_coffee bar**

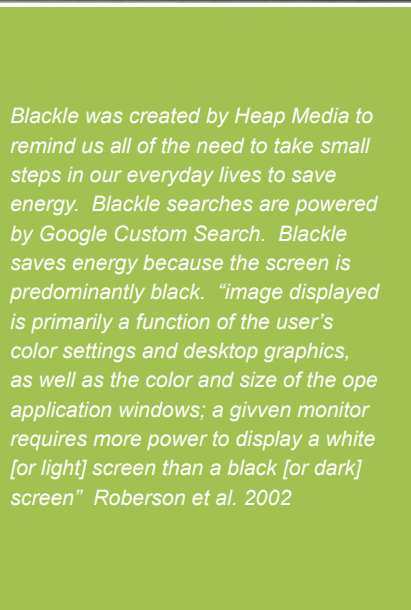
The coffee bar will function as an extension of the internet cafe as an end destination, allowing the user to visit the exhibition pockets while circulating through the building.

### **\_internet cafe**

The internet cafe will function as a fully digital cafe, to minimise any paper waste and will operate on Blackle screens from Google, saving approximately 750 Megawatt-hours a Year.

### **\_restaurant**

Situated on the first and second floor, it acts as the main link between exist-





ing and new. Using specific recycling procedures, solar water heaters for hot water and no plastic containers for take-aways. The roof of the restaurant is converted to a roof garden and utilised as outside-seating for guests.

### **\_lecture room**

There are two lecture rooms, seating sixty students each. These rooms will be facilitated with temperature sensors, monitoring the micro-climate. If the temperature rises above twenty-one degrees, or the comfort levels is too low, the cooling system kicks in as soon as the movement detectors detect occupants arriving. As soon as the occupants leave the room, the system switches off. The lecture rooms are provided with balconies on the southern side, living out into the courtyard.

### **\_workshop**

This facility will enable the student to build a product sample to test, evolve and eventually exhibit. The workshop is provided with sufficient day-light for this specific requirement.

### **\_laboratory**

The library will function as a wet lab and is situated next to the workshop. These two facilities can be use in cohesion if needed. The laboratory has twelve stations, accommodating three students. This room is also provided with sufficient day-light as required.

### **\_offices**

The offices are situated on the third floor. They will function as open-plan offices, allowing the ventilation system to accommodate all the offices at once. Meeting rooms and private discussion tables are centred at strategically placed areas and defined by temporary wall structures.







**\_energy**

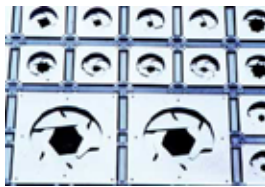
The building's energy revolves around the sun, depending on its path, changing every day, announcing the beginning and end of a day, a season, a year. To design systems which perform harmoniously relative to the functions contained within a structure, incorporating mostly passive systems to control the micro climate, minimising the use of mechanical alternatives. Enhancing its legibility and function. Ensuring an optimum microclimate and maximise occupant comfort. Developing a relationship between the building and its immediate environment, replacing what is used, harvesting and recycling of energy, ensuring the building respects its surrounding environment, transpiring in and around it all the time.

**\_recycling**

One of the principles of sustainable design is to replace what is used. Recycling derelict products, less products need to be manufactured from scratch, resulting in less energy consumption. Old materials are processed, reused as new products, relieving the necessity to supply new resources. The facility will accommodate for a fully equipped recycling centre on site. This responds to the purpose of the building, visibly reducing its energy consumption,

**\_light**

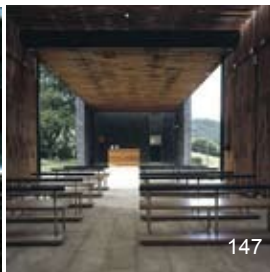
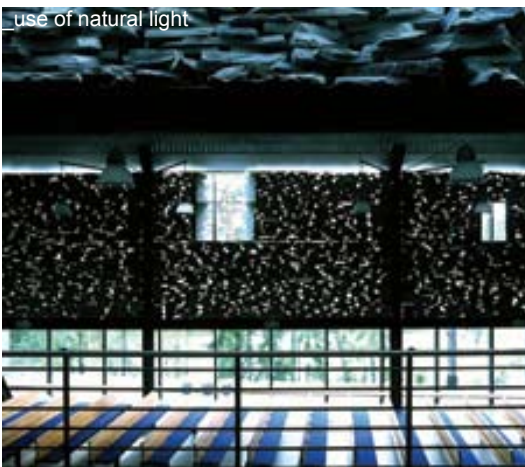
A phenomena with the potential to set the mood and character of a space, triggering an onlooker's attention, dragging a pedestrian passing by into the building to experience the journey and function within.



# energy saving



use of natural light



artificial lights requiring less energy demand 224



*"Architecture is the masterly, correct and magnificent play of masses brought together in light; light and shade reveal these forms; cubes, cones, spheres, cylinders or pyramids are the great primary forms which light reveals to advantage; the image of these is distinct and tangible within us and without ambiguity."* [Le Corbusier. 1923]

*"Modern architects are negligent. They have systematically ignored the massive transformation of everyday life caused by the twin forces of mechanization and population explosion. Their endless garden-city schemes desperately provide token fragments of 'pseudo nature' to pacify ruthlessly exploited citizens. The modern city is a thinly disguised mechanism for extracting productivity out of its inhabitants, a huge machine that destroys the very life it is meant to foster. Such exploitative machinery will continue to grow until a single vast urban structure occupies the whole surface of the earth. Nature has already been replaced."* [Constant Nieuwenhuys. 1960. December 10]



# circulate



## **\_circulation**

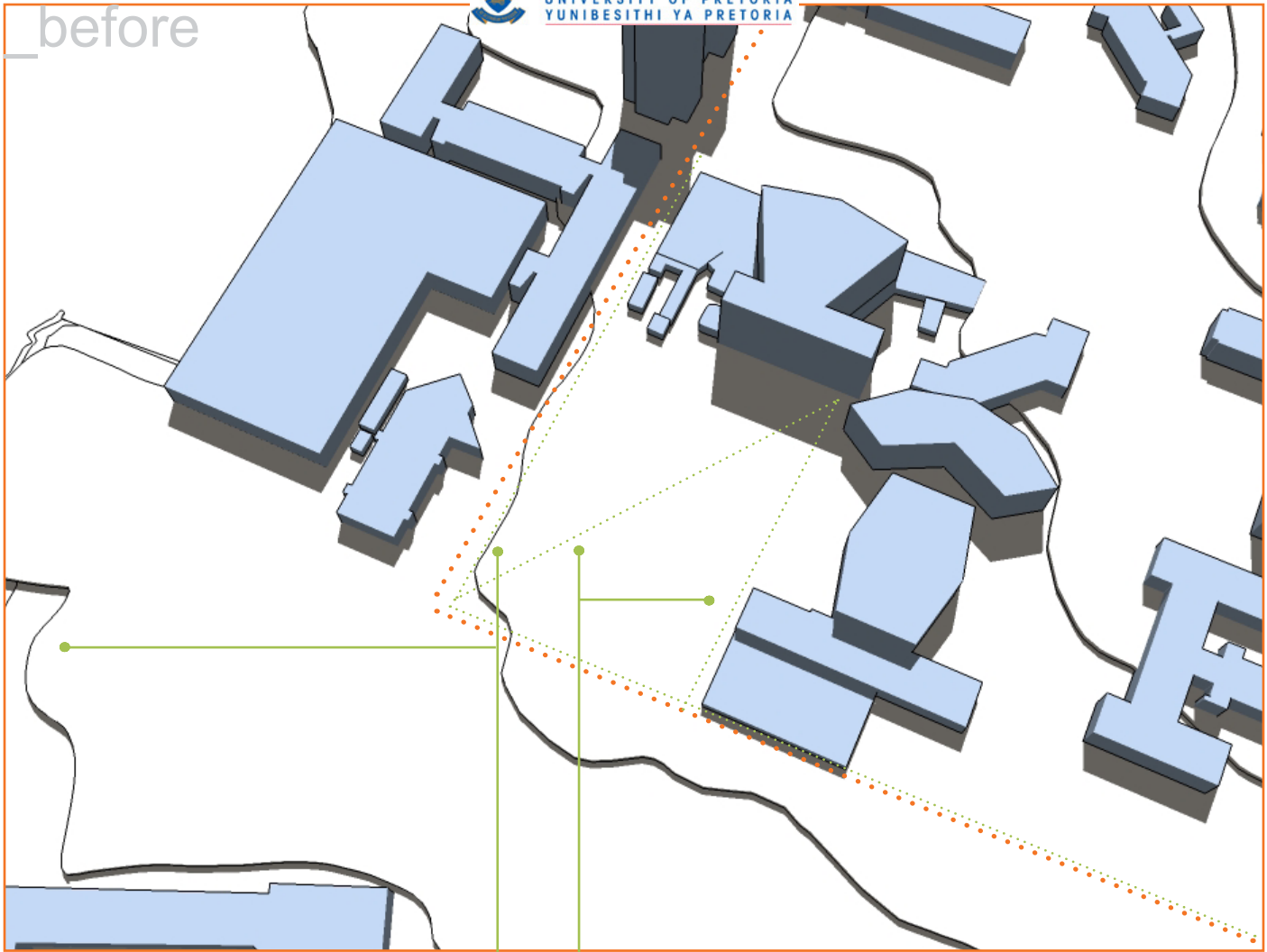
### **\_aim**

- to improve the existing circulation routes on site
- redirecting pedestrian circulation through building
- to ensure the building receives optimum exposure
- to function as an information distribution centre
- to generate energy within the building
- to ensure circulation spine becomes the nucleus of the facility
- to connect energy flows within and around the facility
- to ensure the linear circulation spine, is experienced as a visual journey
- to become a point of interaction
- to function as a pro-pedestrian circulation precinct
- to connect the site with the rest of campus
- to establish a link between existing and new
- to activate dead zones

### **\_problem identification**

- interference with pedestrian circulation - existing service delivery area
  - existing parking area
- insufficient circulation space
- no direct circulation routes
- pedestrian functioning as a secondary user
- no existing link between existing and new
- unused areas on site





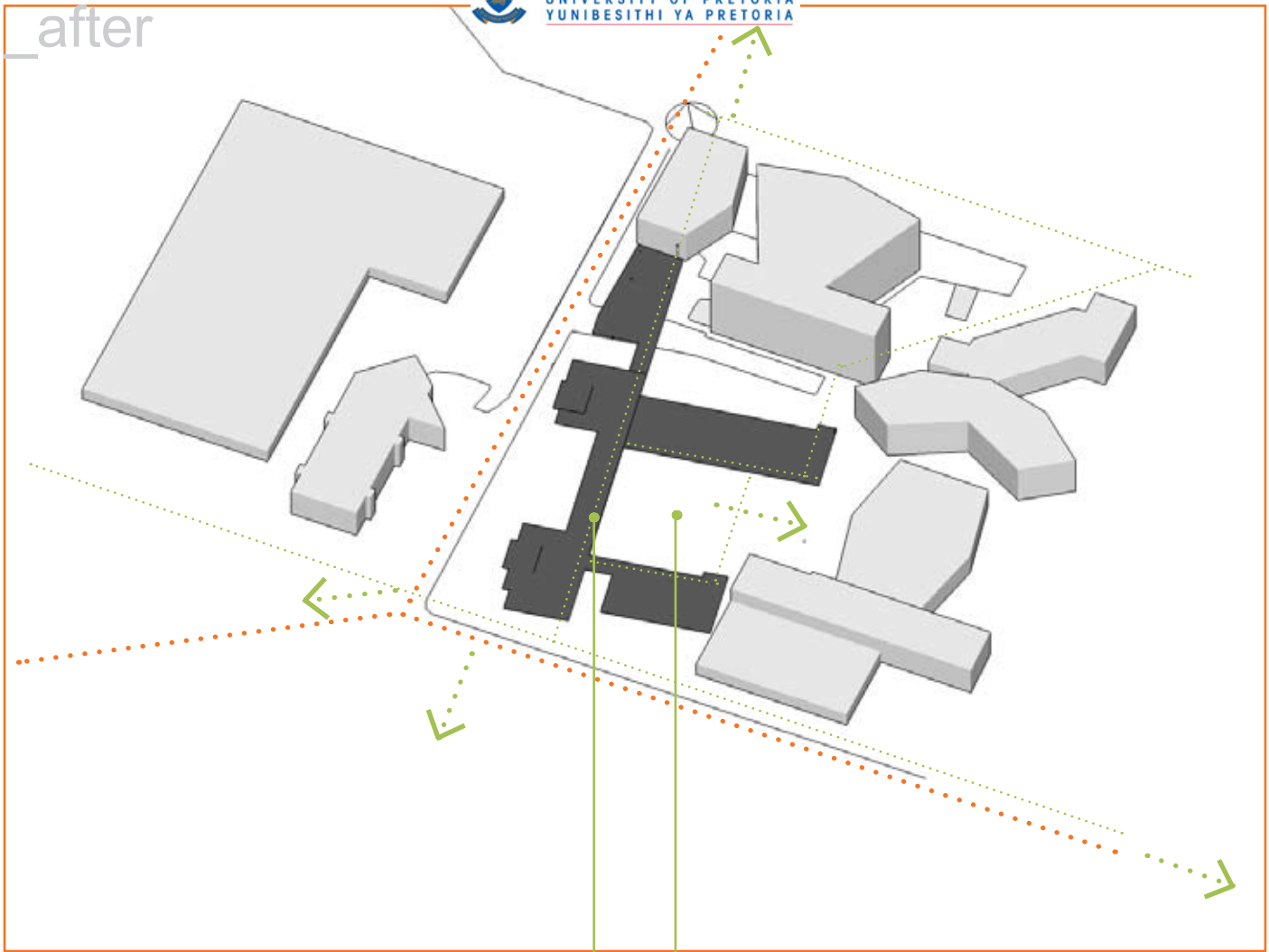
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- western pedestrian route too narrow
- need for alternative pedestrian routes
- interfere with existing service delivery area
- no existing western link
- underutilized area

- site used for open parking
- prohibit the activation of the area
- no established links with existing context
- existing diagonal pedestrian route
- existing pedestrian route [as a result of parking area]



\_after



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circulation spine replace western pedestrian route

link to alternative pedestrian routes

no interference with service delivery area

establish western entrance link

utilize parking area

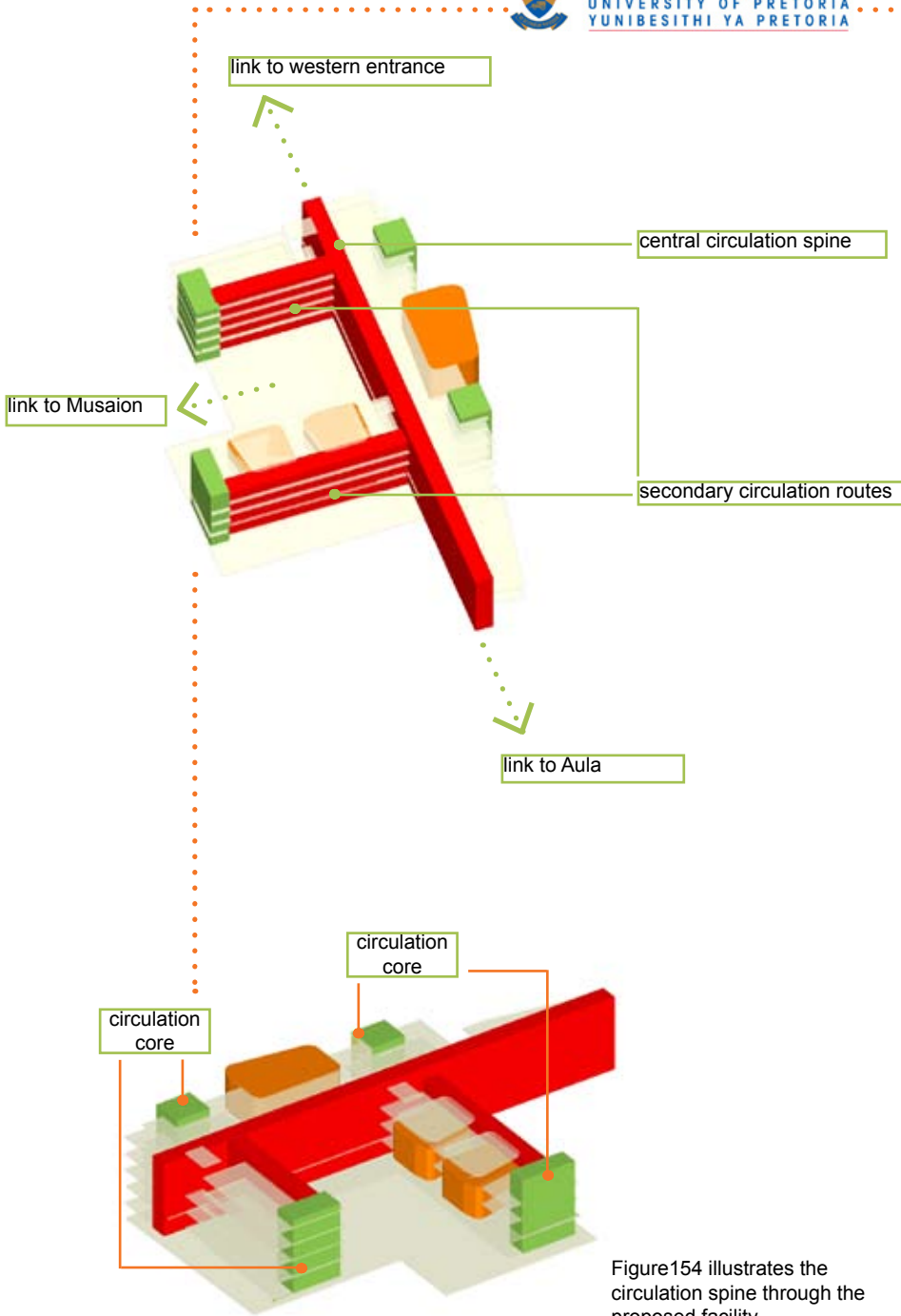
site becomes a host of a new faculty on the campus

generate activity within and around the facility

establish links with existing context [Aula; Musaion; Amfi-theatre]

replace existing pedestrian routes with safe, efficient options

site becomes a social activity hub, activating the site and its surrounding area



## \_circulation

Access to the building is provided by lifts and staircases attached to the west facade. Movement is a key theme of the building, with a central spine symbolising the energy flow of both the building circulation and its renewable energy sources. Its the main artery between two nodal points: the entrance and the users' end destination. This artery is emphasised by the external surface treatment, displaying the colours of life-giving forms; earth, water and nature. It becomes the obvious route to follow as it is well defined and therefor stimulates the direction of movement. Secondary circulation routes serves the two side wings, positioned at the northern end of the building wing, with fire stairs at each end. The east facade functions as the servicing zone, containing mechanical service ducts

Figure154 illustrates the circulation spine through the proposed facility

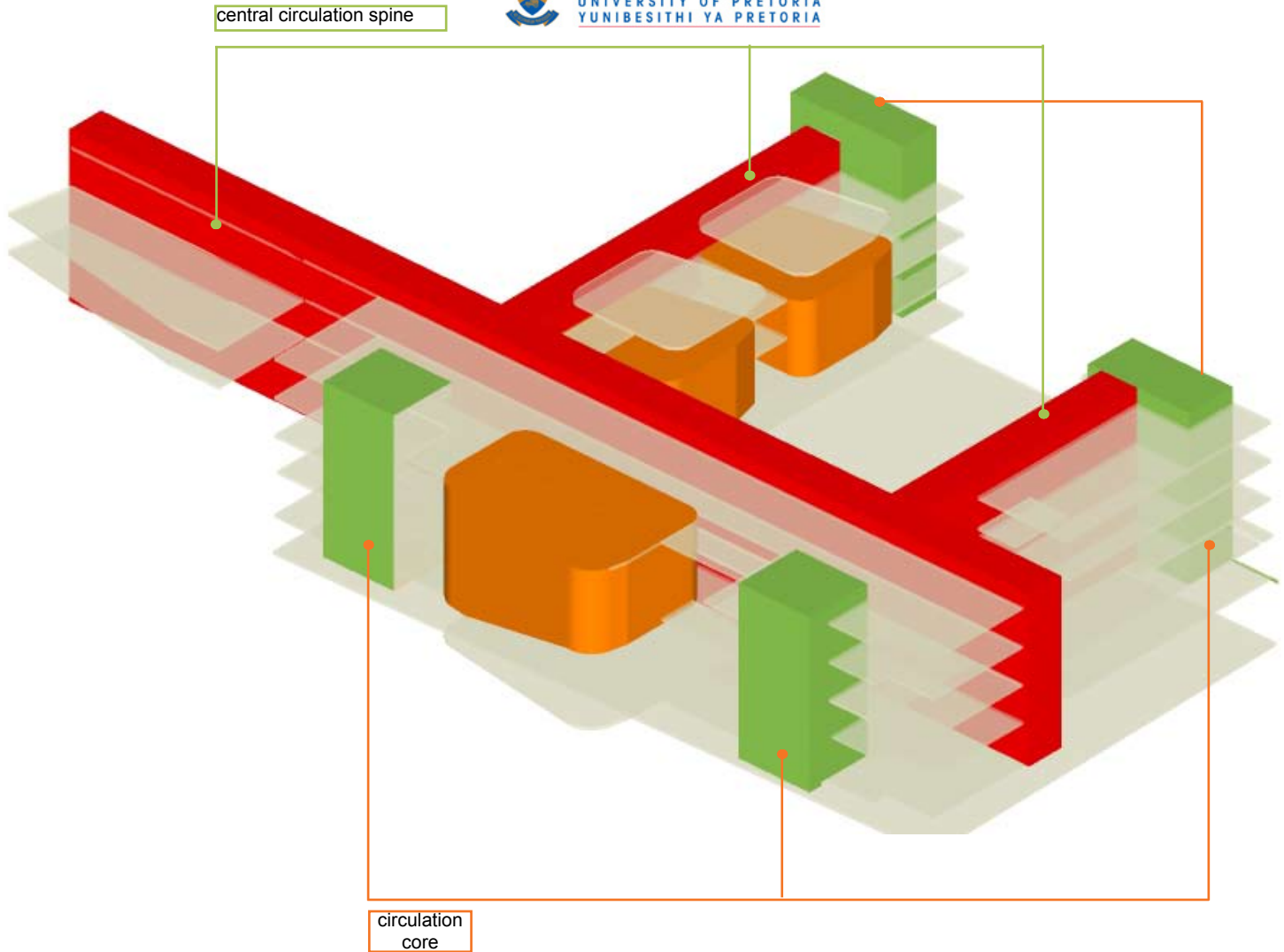
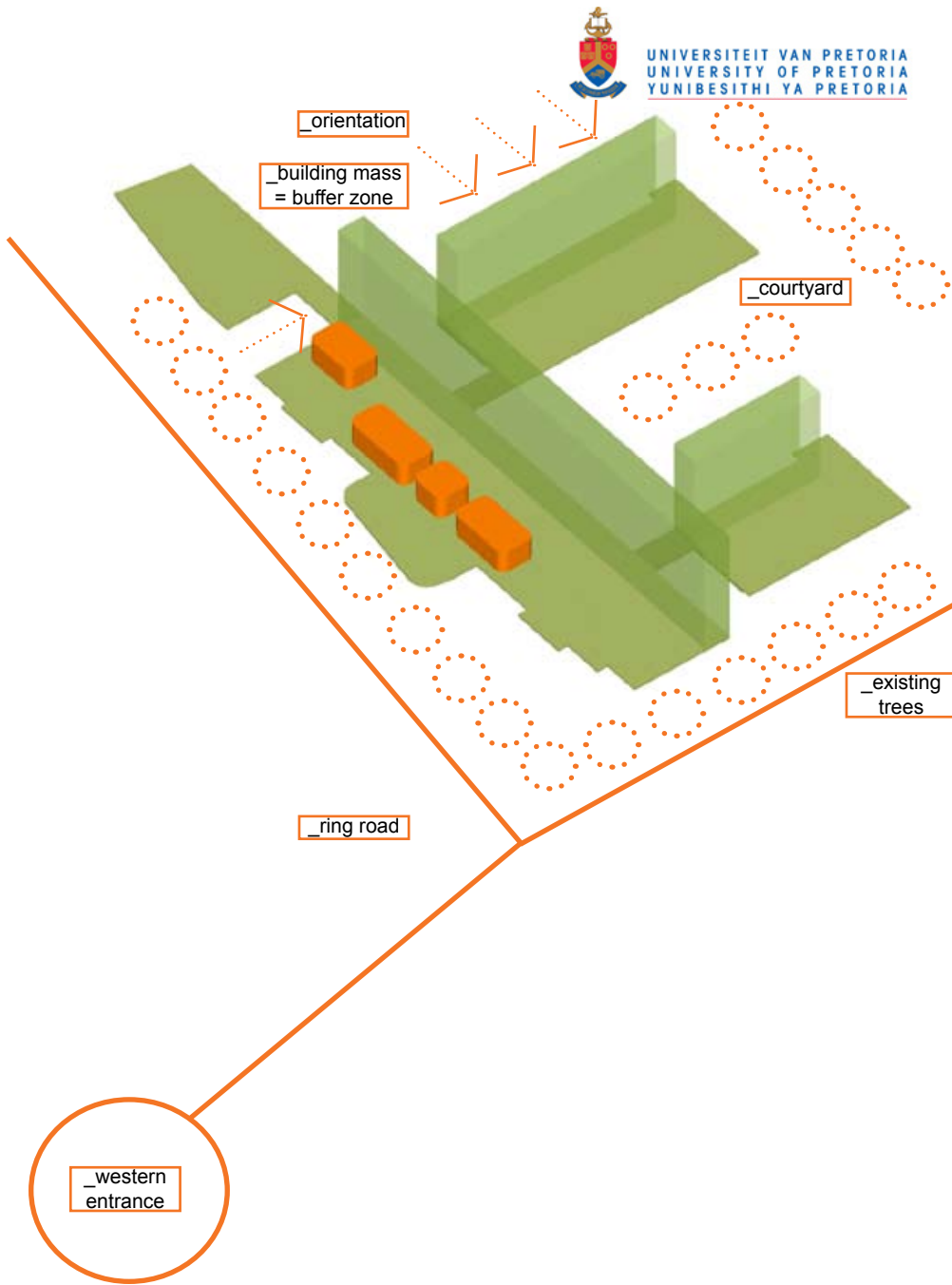


Figure 155 illustrates the circulation spine through the proposed facility in collaboration with the circulation cores



# form



\_western entrance

\_ring road

\_existing trees

\_orientation

\_building mass = buffer zone

\_courtyard

## \_form influences

\_form

*The building form is a result of a few factors:*

- \_the existing vegetation on site;
- \_the main circulation road serving campus [the ring road];
- \_the relocation of the western entrance;
- \_reacting to the site's existing context;
- \_existing pedestrian routes;
- \_existing service entrance;
- \_orientation [sun angle];
- \_creating an intimate semi-public space;

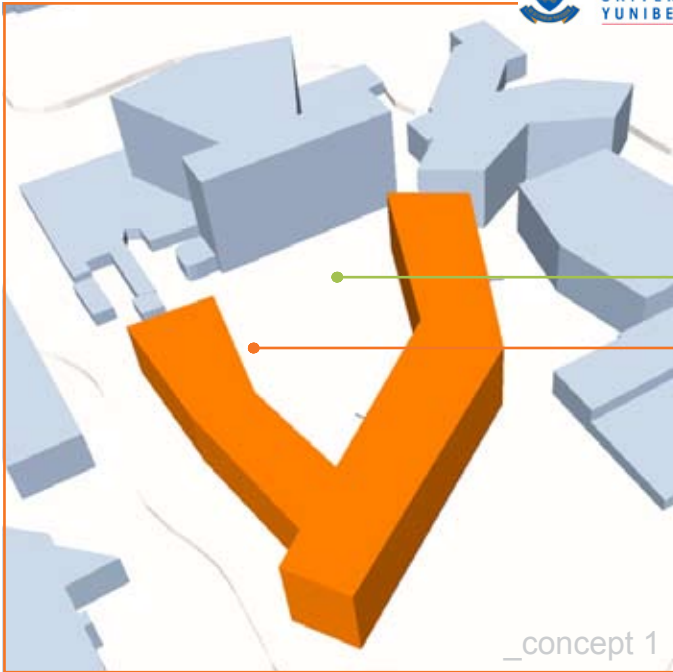
*These factors were considered and as a result, the building was designed consisting of:*

- \_a main wing - hosting the circulation cores and acts as a buffer to the street, connecting the two side wings;
- \_creating a central courtyard, functioning as a semi-public space for recreational activities and at the same time reacts to its existing context.
- \_the wing is positioned in a North-West-erly direction, focusing the attention on the exploration of different design techniques, to solve heat gain problems on the Western facade.
- \_the two side wings, [fifteen degrees north], have optimum passive heat gain opportunity, for ideal micro-climate conditions.

\_signage

Colours interplay with a display of cafe's, bookshops, and exhibition spaces. To define these functions, and ensure the use of the facility at an optimum level, vibrant, colourful signage will send the message through, celebrating the activity, inviting the students to participate.

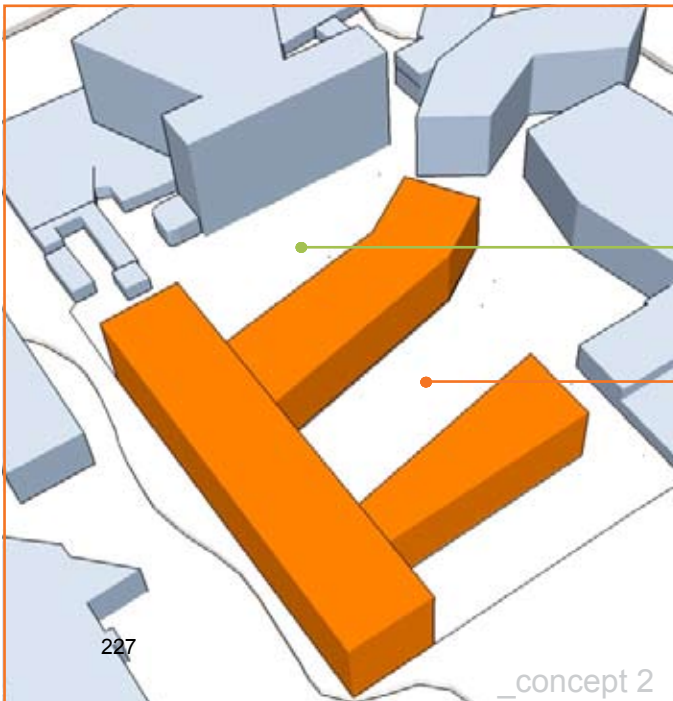




semi-public courtyard

The initial form was a result of the existing pedestrian circulation patterns. The building mass would integrate existing and new, creating a single entity. The orientation of the sub-wing was problematic and the focus of the semi-public courtyard would be towards the Aula's service yard. Physical and visual linkage between the existing context were not at an optimum level.

\_concept 1

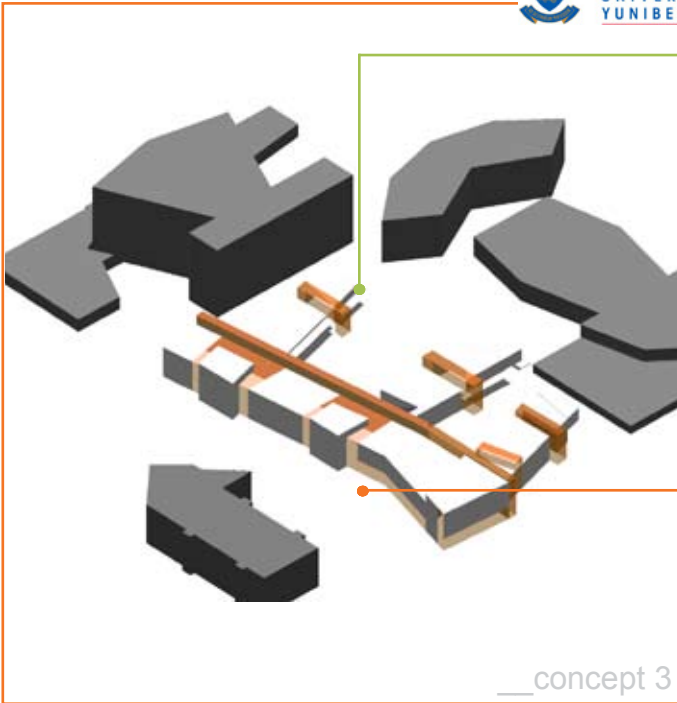


service yard

The second proposal was to use the building mass to create a buffer zone, optimizing the use of created space [private courtyard], forming a physical and visual link between the proposed facility and the musaion. The main wing's fixed form resulted in the removal of existing vegetation, which was needed as a natural shading device against the western facade.

\_concept 2

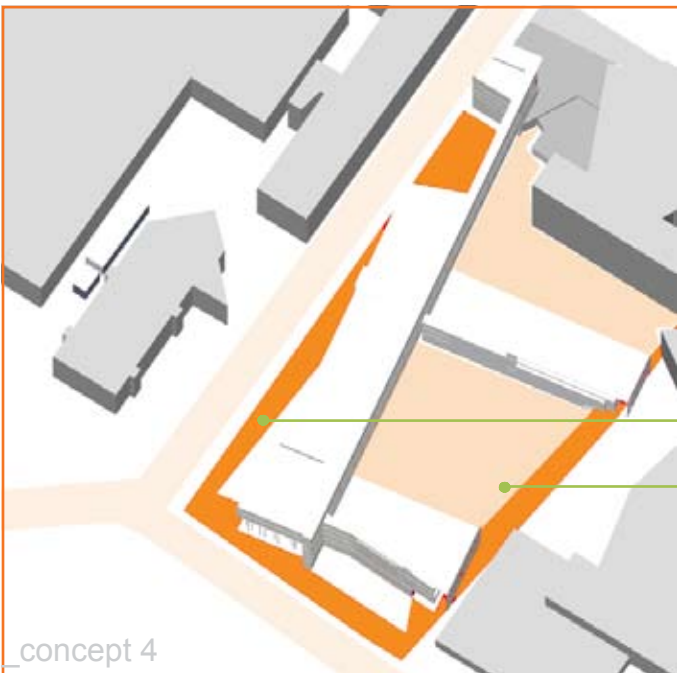
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third sub-wing

In the third proposal, another sub-wing was added, to divide the courtyard into two smaller spaces. Visual vistas were created to link the existing context with the new facility. These vistas were reinforced by specific placed pedestrian routes. The fixed building shape was changed to a more dynamic form, to accommodate the existing vegetation on site. The proposed facility became a circulation node, to redirect pedestrians from the western entrance towards their end-destination, offering a safe alternative to pedestrians. However, a sun-study determined the additional sub-wing added in this proposal, would be shaded most of the day during all seasons. Another problem was insufficient space for service deliveries. Hence, the third sub-wing was removed.

\_\_concept 3



In this proposal, the two sub-wings were reshuffled to ensure optimum solar orientation. This resulted into a semi-public courtyard, forming a physical and visual link between the proposed facility and its context. The diagonal shape of the main wing, ensures the existing vegetation remains in place and functions as a natural shading device, specifically for afternoon western sun. This green buffer zone minimize radiating heat from the ring road, ensuring latent heat from the road do not penetrate the building skin.

green buffer zone

semi-private courtyard

\_concept 4



# precedent



# \_convert to 'green' design

## PRECEDENTS: GREEN STAR CERTIFIED PROJECTS

### STUDY 1: 30 THE BOND, SYDNEY

A nine story building, with a design that ensures 30% lower greenhouse gas emissions than a typical office building.

Sustainable features include:

- rooftop garden
- natural ventilation
- passive-chilled beam cooling
- fully operable shading on the facade
- sophisticated building management system
- mix-mode winter garden space
- specification of low Volatile Organic Compound emission products and materials

Pre- and post occupancy evaluations: 84% of respondents felt that they were more comfortable.

Reasons for their increased comfort, the responses were:

- 64% new building
- 64% overall indoor environment conditions
- 55% indoor air quality
- 54% work space
- 43% lighting
- 40% air conditioning

The sustainable features incorporated into the building structure, within a city context, was one of the major attraction points of 30 The Bond, as a precedent study. This building is also one of the few with a fully post-occupancy report to monitor the success of the building. Highlighting specific areas which need to be included in the sustainable report to achieve a carbon zero footprint building.



### STUDY 2: COUNCIL HOUSE 2 [CH2], MELBOURNE

This building would act as a leader in sustainable development as the new office accommodation for the City of Melbourne.

The building's sustainable technologies are:

- a water-mining plant in the basement;
- phase-change materials for cooling;
- automatic night-purge windows;
- wavy concrete ceilings; and
- a facade of louvres [powered by photovoltaic cells] that track the sun.

A predicament of 4.9% improved air conditioning, led to reduced sick leave, and healthier, happier staff, representing a cost saving of \$1,12 million a year.

PREMIUM: it is estimated that sustainability features added 22% to the construction cost. One of the reasons cited for the high cost was the inclusion of risk management additions such as back up mechanical plant [chillers] and the co-generational plant.

PAYBACK: the city of Melbourne took a conservative estimate of an 11 year payback time for the sustainability features to pay for themselves. However, they believe the payback period will be more in the realm of 8 years.

INTERNAL RATE OF RETURN: optimistic saving return of 7.5% per annum after slightly more than 10 years, and a return of 13.67% per annum after 20 years. The return thereafter increases to 15.17% per annum for a 50 year investment.

ENVIRONMENTAL DRIVERS: emissions will be 64% less

- reducing electricity consumption by 85%
- reduce gas consumption by 87%
- produce only 13% EMISSIONS
- reduce water mains supply by 72%





# — strive towards an energy conscious design

## Other:

- new T5 light fittings consume 65% less energy
- solar panels provide 60% of the hot water supply
- photovoltaic cells will generate about 3.5kW of solar power
- gas fired co-generation plant that will provide 60kW of electricity, meeting about 40% of the building's electricity with much lower carbon dioxide emissions
- recycle waste heat from the cogeneration plant that will provide 40% of the building's supplementary air heating/cooling system.

*Mick Pearce, one of the forefront spokes persons on the topic, resolved the envelope of this building as separate entities. Each designed according to its specific orientation and the function it hosts. This strategy ensures the building has an optimum micro-climate and an ideal occupant comfort. Increasing the quality of work delivered by the occupants, ensuring the building and its occupants co-exist in harmony. The systems in place is designed as part of the building feature. With the cooling towers changing colors, the western facade following the sun pattern and the wind turbines, painted a bright yellow, the user is well aware of the dynamic response of the building towards its climate. Conveying the environmental message in a subtle but sure manner.*





GENZYME CENTRE, CAMBRIDGE, MASSACHUSETTS, BY BENISCH ARCHITECTS:

As the headquarters for a biotechnology company, the building sits on a former brownfield site. The building received a platinum LEED rating, incorporating all of the environmental-design strategies:

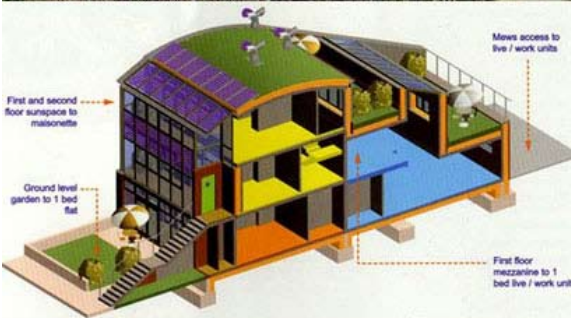
- \_energy efficiency;
- \_water conservation [using 32% less water than a comparable office building by waterless urinals, dual-flush toilets, automatic faucets and low-flow fixtures;
- \_material selection;
- \_urban-site selection;
- \_indoor environmental quality.

The high-performance curtain-wall system, has operable windows with automated control, providing for night cooling. A third of the exterior envelope is a ventilated double facade that tempers solar gains year-round. The central atrium functions as a return-air duct and a light shaft.

The sustainable features of this building is no add-on, its a vital part of the architecture.





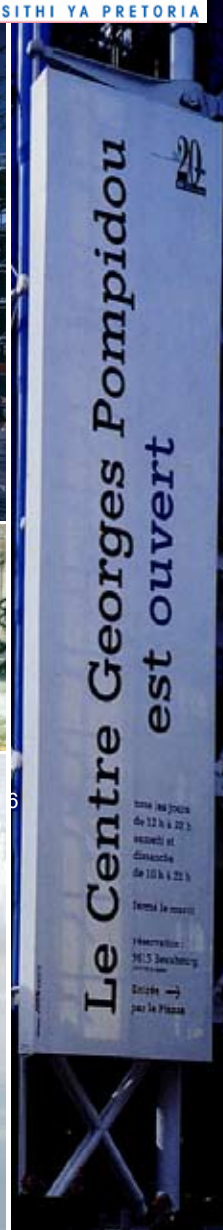


## BedZED SUSTAINABLE DEVELOPMENT, BILL DUNSTER, LONDON. UK:

This zero energy ground-breaking project proves sustainable living can be economically and technically viable but also comfortable and manageable by ordinary people. The project is based on a holistic design, embracing health, safety, water-use efficiency, recycling, waste minimization and green transport. The site is a former sewage works on the southern edge of London. The thermal performance of the building envelope is three times more efficient than the current UK regulations. Strategically placed facilities within an ideal building form enhance the passive solar heating and cooling conditions. The sustainable design aims of the facility includes:

- \_ reduction in energy demand and renewable sourcing;
- \_ land reuse, higher than normal urban density and biodiversity through landscape design;
- \_ integration with existing communities;
- \_ innovative home/work arrangements;
- \_ locally sourced materials;
- \_ material environmental impact embodied energy, durability and recycling;
- \_ reduced water consumption;
- \_ buildings as energy producers for transport.

The lessons from this precedent, was absorbed and relevant strategies applied to the proposed project.



POMPIDOU CENTRE, PARIS, FRANCE, RENZO PIANO & RICHARD ROGERS:

As one of the most spectacular monuments in Paris, this building marked a complex relationship between politics and culture. Launched as a whole new approach to public building, moving away from the typical stereotype public institutions. The essence of the facility was flexibility, responding to ever changing needs of its users, accommodating a variety of facilities, all the interior spaces would be moveable within the framework provided. The facility illustrates a close relationship between the building, the piazza and the piazza facade, illustrating the centre as 'an activity container'. The facade partly responding to service needs, illustrates clearly structural and architectonic clarity. The services boldly expressed, with the use of colour, coding the various services it supplies, functioning as servicing and movement zones respectively.

This centre's main concept, the idea of people enjoying the building, makes this facility a fantastic object in its own right: expressive, colourful, and complex. The realization of the Modern Movement, a vision of the building as a machine.



\_symbolising its function



## WOOLWORTHS DISTRIBUTION CENTRE, SOUTH AFRICA, GAUTENG

The Woolworth's Distribution Centre incorporated as many environmentally friendly and sustainable initiatives into the centre as was feasible, even if not all were economically viable within the short term. Of the 90 hectares site, approximately 50 hectares have been used for the new building site, while the other 40 hectares were set aside for future development and natural eco-systems.

A grey water system was installed to collect grey water in a separate waste water management system. This grey water was collected in water storage tanks, then circulated through a filtration plant and pumped into strategically placed storage tanks. The recycled water is utilised for flushing of toilets and urinals. Grey water from washing basins, showers and air conditioning plant rooms was also collected and re-used.

Solar energy is captured to generate warm water for showers- and washing basins use. There is a series of 30 solar panels, approximately 62m<sup>2</sup> in total, enough heated water for 40 shower units at a time.



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BP HEAD QUARTERS, SOUTH AFRICA, CAPE TOWN, KRUGER ROOS ARCHITECTS:

The BP's offices at the V&A Waterfront in Cape Town. Their initiative was to demonstrate their commitment to a more sustainable office operation and to develop that would reflect its brand values [green, progressive, innovation and performance-driven]. The project objectives included the reduction of energy consumption, optimising natural light and passive heat, and conserving water. The annual energy consumption target was set at 115kWh/m<sup>2</sup> - 40% less than similar buildings.

The building management system, maintaining the micro-climate, monitoring energy use and savings. The building used photovoltaic array of 68kW, used for solar water heaters and provided 10% of the building's energy requirements.

The building facades were carefully designed to maximise the thermal mass and exterior sun devices, designed as part of the building facade, ensured natural daylight penetrates the building at the right angle.

The insulation of the building, included double glazing, unusual for the African climate, but enhance the passive-energy design. Passive and natural ventilation was incorporated as part of the air-conditioning system

