An overview for the development of an industrial design centre for South Africa:

Global:

Initially the establishment of industrial design schools in South Africa will have a relatively small impact on global economy. An idea that is being investigated at the CSIR is minimising the export of raw materials and increasing production of finished goods in South Africa. This would mean that the country saves costs on certain products that are presently being manufactured in other countries. The result would be that South Africans design and manufacture goods using local materials.

The impact of such a strategy would diminish the import market and improve the export of South African designed products. Presently, South Africa exports raw materials very cheaply but buys back manufactured products, from countries those importing the raw materials, at a hundred times the price of the raw material.

Another impact is the exporting of South African designed goods to international buyers. With the training of design professionals and the upgrading of manufacture, South Africa could become a strong export country of high quality designed and manufactured goods.

Local (South Africa):

The above argument defines the vision of product development and industrial design in South Africa over the next 15-20years. The government has shown great interest and strong investment in the education of design, from a scholarly level right through to industry – CSIR DesignNation initiative.

DesignNation (CSIR):

- *The upgrading of industrial design schools from 2 to 14*
- *Educating people in design understanding*
- *Introducing CAD education at school level*
- *The integration between Technikons and schools*
- *The full backing of the government*
- *Cooperation between industrial design education and industry*

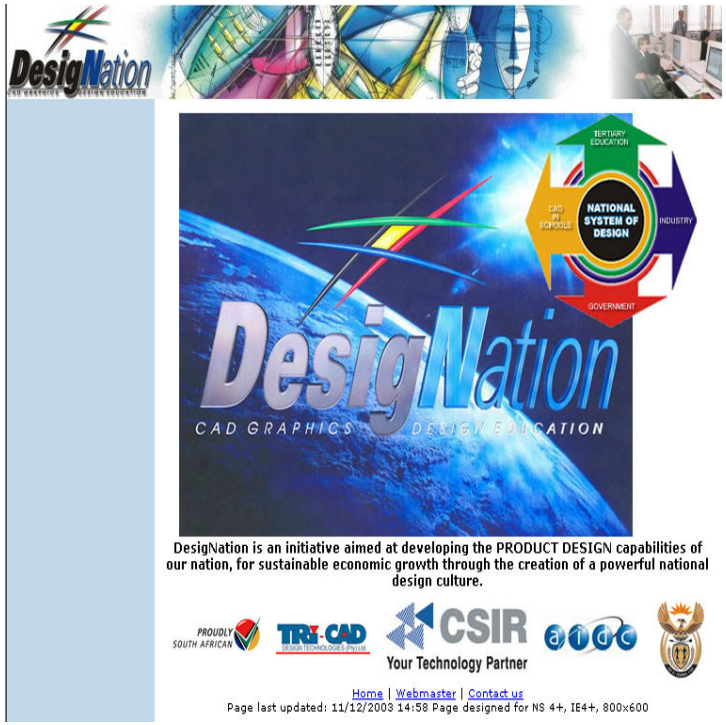

Fig 1. DesignNation website page

The intention of the "DesignNation" initiative from the CSIR is to eliminate the necessity of importing products from abroad; these cost a lot more than if the same products were designed and manufactured in South Africa. Beginning at school level, students are made aware of product design. They are sensitised to the concept of 'quality design and manufacture'. This empowers them as consumers.

Ultimately the goal is to minimise imports and to exploit local talent and industry to its full extent. Benefits to the country are plentiful. With design comes manufacture; the industrial sector will be boosted, along with industry comes job

creation and more specialist requirements. This is more sustainable as there will be competition locally and greater collaboration between the public and private sectors.

Government is currently funding industrial design; the Wits Technikon receives sponsorship from government for machinery and development. Fortunately, government is aware of the fact that design is underdeveloped in the country. The CSIR is in constant discussion with government and have their approval to proceed with the development of design education.

Benefits for schools [CSIR Manufacturing and Materials Technology]:

- *School CAD centres can be run as a business or as a revenue-generating establishment*
- *Members of the corporate sector or local industry can be trained at school computer centres*
- *Teachers from the school who qualifies as Certified CAD Instructors can teach at other venues anywhere in the country*
- *The CAD centre can process contract drawing work from the Engineering or Architectural industry and have the senior CAD learners produce their first "Industry Standard drawings" whilst still at school*

This excerpt from the CSIR "CAD in schools initiative," illustrates some advantages for schools to implement CAD training. CAD is an important tool for the design field today as many products are finalised and built with the aid of computer models before production. The advantages to schools are similar to the advantages to the design school project. Many courses offered at the design school can be used in other industries.

Currently the success of CAD in schools is very positive. According to the CSIR, 24 schools in Gauteng have been introduced to two-dimensional and three-dimensional CAD training with phenomenal results.

Local Economy:

This section focuses on the building and the direct influence it has on the local economy. To design a building that performs well at a regional level means that the building respects the local economy.

To be relatively economical the building process and the later use of the building must be within environmental restrictions and suitable to the success and use of the building and its programme. Locality of materials, passive climate control, emissions and waste production, for instance, must be clearly defined through limitations. Resources and materials are local and accessible within reasonable environmental limitations. Construction contractors are local and labourers in the area benefit from being employed close to their homes.

How the facility benefits the local economy:

- Local people have access to the facility, as there is training available for people off the street
- Training offered to people off the street will improve the quality of their products and so strengthen informal trade in the area
- If the products of local craftspeople are improved, these people can be offered courses in operating small businesses, at the institution
- The school offers courses in entrepreneurial studies to help craftspeople to get their own operations up and running
- The success of the school is not only promoted and determined by formal advertising and invitation, but also through word of mouth by people who have attended a few short courses.
- Local contractors are used to build the building
- Materials and components are of a local source

- Furniture and fittings are preferably manufactured locally
- Maintenance and repairs are carried out by local contractors

Another component of local economy is the fact that training for a design career starts at school level, as mentioned in the previous section, local schools do benefit from the implementation of CAD in schools.

Industrial collaboration:

The local industry is influenced through the development of product and industrial design. Certain key industries and companies within the area may sponsor tuition at the institution in exchange for new design solutions. In this way, industry benefits directly, capital is injected into the school and so furthers the development of design students.

Awareness in design is increased through partnerships created between the design school and industry. This opens a new market in industrial design and promotes the importance of design in industry.

The most important aspect is the fact that through successful partnerships created between industry and design is the realisation that South Africans can design and produce goods for local and international use. Where design and industry meet in local circumstances, the result can be an increase in the quality and design of products that meet international standards. This creates growth in the South African economy thus improving the import and export of raw and manufactured goods.

With proper interest generated through this school, the role of design increases the demand for quality in products and the improvement of standards. In turn, standards are maintained and raised by the interest and intervention of end users.

Economic benefit:

The impact at a later stage is that the import of internationally manufactured goods can be minimised and local design and manufacture could be fully exploited. The design and building of products in South Africa requires a strong industry and readily available materials, whether raw or fabricated.

Raw materials need to be fabricated and processed in close proximity to factories and product development industries. In order for this to happen, new facilities for fabrication, storage space and manufacture are required.

The requirement for facilities of this nature needs labour and skilled personnel to operate efficiently. Employment is created and an exceptionally high standard of workmanship is maintained in order to stay competitive at an international level.

The building makes use of a structural system designed for variation in envelope conditions. This means that the building can adapt and change the façade and envelope skin of the building during its life. Benefits arising from this system are that new materials can be regularly fitted and old materials can be replaced and recycled, thus empowering local contractors and manufacturers and ultimately pushes for new innovative designs.

Social impact:

As mentioned earlier, the social impact of a design school of this kind influences people from many different backgrounds and disciplines.

The intention of the school is to reach out to every person who is affected by industrial design. This means that everybody can be influenced and educated through design. From people who are directly involved with or at the institution right through to people who may own South African designed products. This is not to say that all products are directly related to the proposed institution, but rather that

products designed by people who have been trained by such a facility in South Africa, display the qualities of production and design that the institution teaches.

Benefits:
Creates an environment where formal and informal training is offered to people who seek training in pure industrial design or simple courses in improving their own product and craft business. Corporate companies aid the institution with funding; hereby learners are afforded an opportunity to work with real problems and the funding companies benefit by receiving new ideas and prototype products in order to improve their brands and image. In this win-win situation, students are introduced to real-world problems and challenges and the companies are strengthened through local talent and ideas. This naturally beneficial association improves the trust in companies by the consumers through using locally trained design professionals.

Local economies can improve and businesses may save money and time through the employing of locally trained designers. Companies strengthen local contractors and manufacturers due to increased demand on locally designed and manufactured objects; consequently, labour demand will increase in the manufacturing sector.

Community involvement and upliftment:
Education through design enables people at street level to become involved in product design and development. In educating certain individuals others can be informed and educated, thus informally, people are made aware of design and the potential it has to improve their trade and financial lifestyles.

Environmental impact:

"Shibui" derives from the specifically Zen-Buddhist concept of expressing spirituality through minimal aesthetic means. A good example of this is the highly rigorous Zen approach to garden design where two stones placed strategically can stand for the whole universe.
Sparke 1987, p13

The building provides the opportunity to enhance and uplift the lives and circumstances of all who are involved either directly or indirectly with the design school. Not only can the people themselves benefit, but the precinct itself can also be uplifted. By educating the participators within the precinct, environmental awareness and responsibility is achieved. The building is designed in order to become an example for users and participators to understand how an urban building addresses environmental concerns.

The following are a few examples of how the building responds to environmental concerns and constraints:

Water:

Water consumption
- Consumption of water is designed for at all levels by introducing components that are specified to minimise water usage and the use from a primary source of water supply. Some components are:
- Dual flush water closets that are connected to a grey water supply and aerated showerheads.
- Automatically controlled taps in basins for all toilets and bathrooms from where this water is reintroduced into the grey water system for usage in irrigation or the like.

Plants and Landscape design
- Planting plants with relatively low maintenance that are found indigenous to the area.
- The design of the landscape adheres to the requirements of water saving, soil utilisation and definition of space.

The site slopes down to the north. This means that there is potential for a large loss of water off the site during storms. Utilising appropriate design techniques, the retention and use of this water is

important for the functioning of the building.

Energy:

Consumption

The requirement for a saving in energy is important. The building has a responsibility in that the saving in energy usage comes from systems used in the building and components.

Sources

Energy primarily sourced from Eskom and the building makes use of alternative sources as listed below:

- Solar heated water panels.
- Solar activated light switches and meters
- Windows are fitted in every space to maximise daylighting and thus minimise the need for artificial lighting

Passive heating systems allow the building to use natural heating and solar gain from the sun. This is maximised because the building is north orientated. The use of mass materials, such as concrete, allows heat gain during the day; the building radiates stored heat during nighttime, especially during winter. A louvre system is employed to minimise solar glare and allow heat into the building. The louvres allow the winter sun into the building to warm the building during the day and minimises radiation from the sun during hot summer days. This system is important in the functioning of the building in terms of alternative energies; solar energy is renewable and important for the heating and lighting of the building spaces.

The massing and insulation of the building "shell" determines the use of solar heating and lighting. In order to save light energy, spaces that require maximum lighting are found on the southern side, like the studios, offices and training spaces, and those requiring maximum solar heat gain are on the northern façade of the building. Spaces benefiting are the design studios, offices, training spaces and residential units

Ventilation systems

Passive ventilation systems minimise the need for mechanical ventilation. Users can access windows to adjust them according to the comfort of the space. Each space is specifically designed to offer an average temperature of between 20-22 degrees Celsius during occupation. A combination of mechanical ventilation and passive ventilation reduces the consumption of energy.

Specific spaces are designed primarily for mechanical ventilation for example: the design studios, auditorium spaces and the computer laboratories. A fan-coil mechanical system is used for the building and runs on an 'economic cycle' to minimise the waste of energy. The entire building is supplied with chilled water from the air-conditioner chiller-plant placed on the roof of the building.

Appliances and fittings

Appliances are of energy saving type and fittings are similar, thus reducing energy consumption and ensuring the longevity of components such as light fittings. Fittings for the building are predominantly polymer materials such as composite polymers and advanced composites, these materials offer great resistance to wear, they are flexible in design and can be well recycled. Appliances and fittings are also sourced locally and are manufactured from recycled materials or can be recycled after use.

Site:

The site is discussed in "Site Context"; however, the developed site is not defined.

Being a brown-field site the design follows an urban design framework and communicates with neighbouring buildings, spaces and language. To improve the urban environment means that the design addresses problems and challenges related to the precinct and the spaces that exist in isolation from the design school.

Landscape design reflects the desire to conserve water usage and the ongoing costs of maintenance. Plants used should require virtually no spraying of insecticides or any other artificial inputs.

Economic Factors:

Not only does the design centre offer educational facilities for students and crafts people, the building informs the precinct and surrounding urban spaces about product design. The building educates participators and passers by about how building design and product design can minimise the use of energy and improve the environment wherein it is found. This building benefits local talent and local contractors right through from design and construction to the education of design; this implies that local contractors are educated in building design, systems and construction.

Local people are employed and trained in building construction and building systems. These people are then skilled in order to improve their knowledge in building and construction. Contractors who have been trained during the construction of the design school can thus train other contractors in their fields thereby strengthening the profession and economy.

The design school trains professionals as well as people on the street such as local crafts people. When crafts people learn to apply what is learned at the design centre their crafts will improve in terms of quality and design.

Local economy:

A design centre in Pretoria is geared to creating wealth in the design and product sphere. Even though the design centre does not make a direct impression on local economies, the greater impact is distributed amongst professionals and products.

The building process and design is aimed at educating and upgrading local contractors. As mentioned earlier, the process of construction trains locally employed contractors in the processes of the building. In the process of educating these people, they are upgraded in the services that they may offer later in their careers.

Materials and suppliers are sourced locally within a 100km radius. Components are assembled on site and where specific components are difficult to assemble on site due to circumstances, the components are completed at the local workshops of contractors or suppliers.

The manufacture and supply of furniture and fittings is also sourced locally and made of locally supplied materials. These items are sourced with local raw materials and built by local contractors or specialists.

Repair and maintenance of the building and its systems is performed by locally trained specialists and professionals. The initiative to train local people in the construction phases of the building lends itself to the later maintenance and management of the building during the operational phases of the building. This strategy enables people to have understanding and knowledge in the building's systems and therefore afford them employment opportunities after completion of construction.

Efficiency of use:

Spaces in and around the building are designed to allow maximum usage and minimum wastage. This means that spaces are not monofunctional, but that they are multifunctional. Studio spaces are dedicated for the use of full-time students in the interest of safety. Lecture spaces are used for other functions during the evenings when there is no requirement for lectures for part-time students.

Design firms can utilise the facility during specific times for conferences and meetings with clients. By doing this companies are able to display their input into the school by products designed for them by the students. Clients are given the opportunity to

explore the school and its facilities as well as the process of design by the students.

A catering facility is incorporated into the school for meals and refreshments; this company can cater for functions that take place after hours. The catering company can offer business outside of the school, but their primary business is to offer a service to the school and all of the participants.