UP!

University of Waterloo
arch346: Competitions Elective
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Fig 1. Exterior Perspective

Burj Khalifa   Cloud Gate   Pyramids
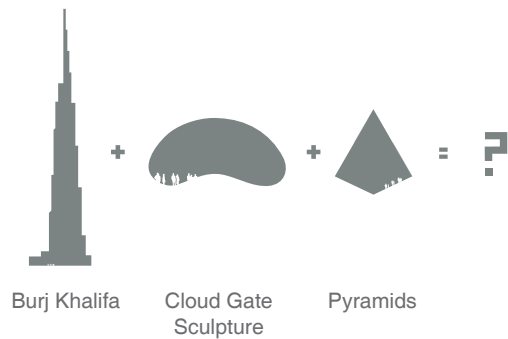   Sculpture

Fig 2. Icon Concept

Introduction and Objectives

UP! is a future model for a new sustainable building typology that reinterprets the notion of architectural iconicism. It often appears that there is a preconceived idea that sustainability and iconic architecture does not go hand in hand. Perhaps this is a result of society's aspirations to stand out and leave a mark on the world; by excessively constructing massive iconic buildings and monuments, we are able represent our power and wealth to the rest of the world. However the obvious consequence of this is that, leaving a mark on the planet also typically results in disregarding the landscape and sustainability of the environment around it. Unfortunately, this type of behavior has been evident throughout history. From Egyptian Pyramids and Obelisks, to the Colossus of Nero in Rome, there has always been an incredible fascination with the sculptural form of a built object and its height. With the vast technological advancements of skyscraper construction over the last century, the desire for built structures to be visible from a great distance has never been greater, as evident with the Burj Khalifa in Dubai.

However, all of these megatall structures offer very little practicality at such alarming heights. Not only are many of these thin tapering structures not even occupiable at the peaks[1], but it is also a headache to resolve the vertical transportation efficiently and effectively. Moreover, it completely desensitizes the intimacy of the architecture that we encounter at the human scale. To us, the strategy to designing spaces at such ridiculous heights is simply counter intuitive, especially within the context of sustainability. Therefore, our challenge is to design a new typology that looks to combine the two opposing ideas of "iconicism" and "sustainability", and the goal is to do so in the most unintimidating and playful manner possible.

The competition site itself is suitably located in Dubai, and it is to serve as a fixed venue for the Dubai Global Energy Forum (DGEF), an annual event that takes place to discuss the progress and development of mitigating the environmental impact on our planet.

Site Context and Development

The site is located in a prominent area directly across from the current Dubai World Trade Center, between the major routes of Sheik Zayad and 2nd Za Abeel highway. Due to its proximity to the major highway intersection and the fact that it is situated between the airport and the heart of the city, it becomes a compulsory passing by everyone visiting Dubai.
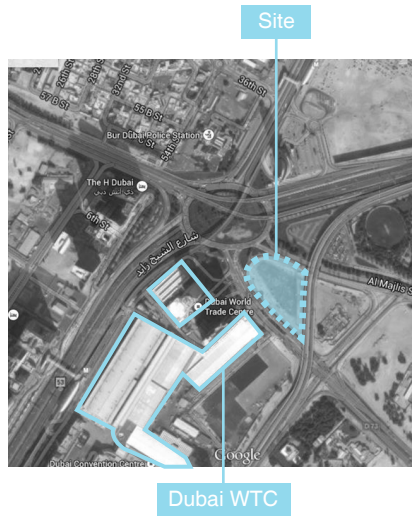

Fig 3. Dubai Context

Fig 4. Site Context

The massing strategy of the project was to propose a sunken ellipsoid structure that would alleviate the irregularity of the site boundary, as well as create a relatively simple and deliberate geometry. The elliptical nuances were introduced to gently respond to the three primary components adjacent to the site: the major intersection on the northwest, the elevated subway tracks on the east and Dubai World Trade Center complex to the west.

By using an open sunken structure and then modestly covering all required interior program with a large public park space, we are able to take advantage of simple passive systems to shade all the conference rooms and function spaces while maintaining lots of ventilation. As a result, the body of the building essentially becomes submerged and

hidden away from the rest of the urban fabric. We also integrated three different conditions at the boundary between the existing and sunken ground plane, utilizing a cliff condition, a stepped staircase condition and shallow slope to further articulate the edges and circulation as you approach the building.

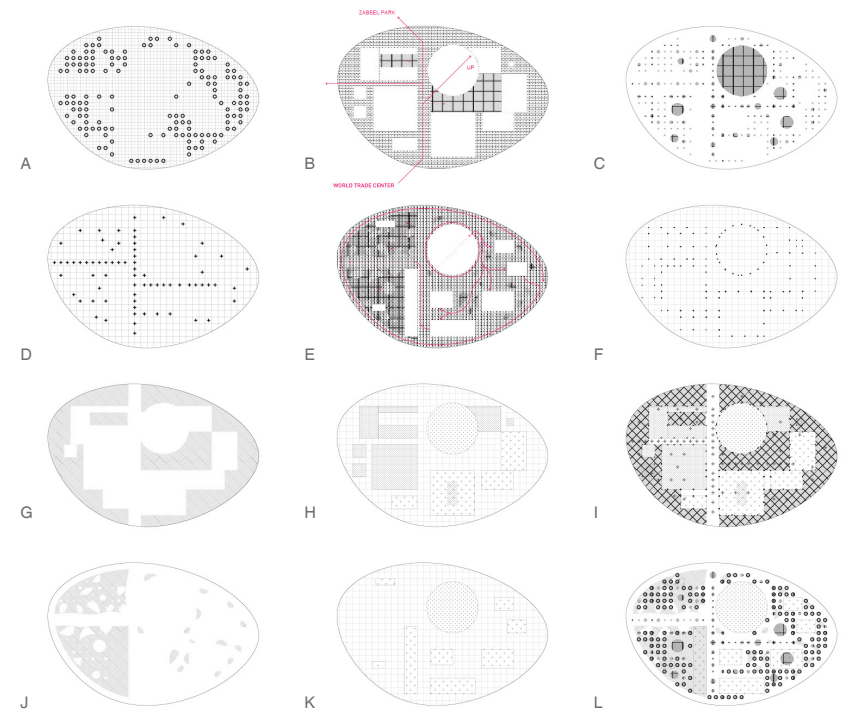Fig 5. Plan Matrix Diagrams
A. Balloons
B. Trees
C. Green Space (Below)
D. Green Space (Above)
E. Openings
F. Circulation (Above)
G. Circulation (Below)
H. Program (Above)

I. Program (Below)
J. Structure
K. Superimposed (Above)
L. Superimposed (Below)

Precedents and Programmatic Development

A

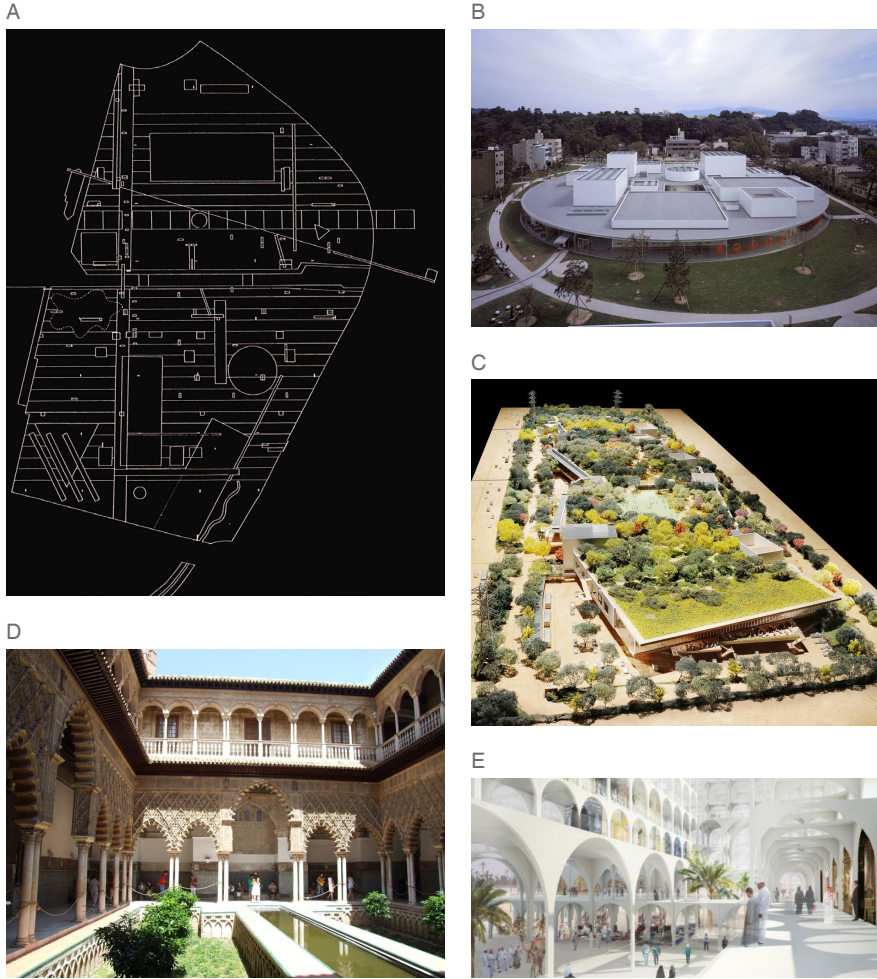
B

C

D

E

Fig 6. Precedent Images
A. Parc de la Villette by OMA[2]
B. 21st Century Museum of Contemporary
Art by SANAA[3]

C. Facebook Campus by Frank Gehry[4]
D. Alcázar of Seville[5]
E. Doha Masterplan by Sou Fujimoto[6]

To further develop our scheme, we looked towards several precedents that aligned with the themes of creating a large urban park filled with a variety of different types of program. OMA's competition proposal for Parc de la Villette in Paris interested us because of the use of "programmatic bands" to help create systematic areas for where public activity can be facilitated. Rem Koolhaas' use of a formal grid helps to bring rigor and modularity to an otherwise irregular site geometry. Similarly, SANAA's 21st century museum of contemporary art in Kanazawa also uses a series of rectilinear pavilions within the building footprint to rationalize the pure circular geometry. The walls of the pavilions also extend out through the roof to create a very interesting exterior form, but unfortunately appear to be inaccessible and therefore, felt underutilized. On the contrary, Frank Gehry's Facebook Campus project shows an extensive use of the building's roof as a large outdoor parkscape in addition to the building being placed underneath it. We aimed to create a new typology that combines the different aspects of the precedents, by incorporating the required program from the brief as well as introducing new program to articulate our urban park, such as: a tour center, kid's playground, marketplace, café, museum of sustainability, bike shop and cycling loop. By adding new public program, we are able to give life to the site over the course of the entire year, so that it becomes a vibrant social gathering for both tourists and locals, as well as individuals and families. Additionally, we introduced a large amphitheater to help serve as the primary public space that helps to anchor the navigation within the entire building, in addition to creating a main path to access the roof level. Lastly, we had wanted to integrate the use of arches and archways from local Moorish vernacular architecture to emphasize the structure and use of passive systems within the project.

Typical Typology
Building sits over site and
surrounding park space

Submerge
Building is shifted underground
to maximize public space

Go green or go home!
Sustainable elements: wind turbines
and solar panels are placed on a
now continuous park space

UP!
Ecological systems are raised up!
Eco-Balloons soar upward and collect
energy from all layers of strata
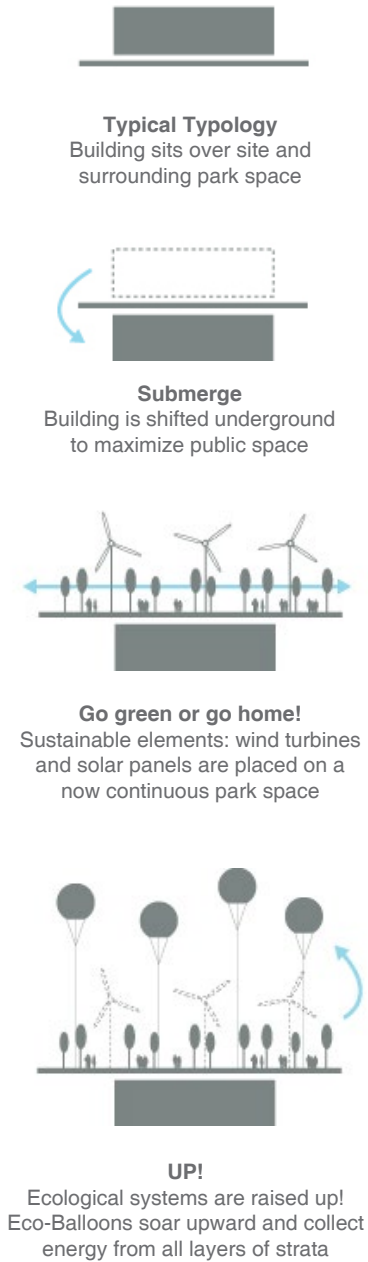
Fig 7. Building Concept Strategy

Fig 8. Amphitheater Perspective

Fig 9. Interior Perspective

Eco-Balloon

secondary rm

translation rm

toilets

office and admin.

amphitheater

conference rm

toilets

translation rm

cafeteria

rest. and kitchen

gallery

parking / storage (below grade)

pergola roof

playground

kids park

social park

amphitheater

toilets

tour center

marketplace

picnic area

cafe

bike shop

gallery

museum of sustainability

cycling loop

Fig 10. Axonometric
Left: Ground Level
Right: Roof Level

Eco-Balloon Technology

At the beginning of the competition, we looked at three main precedents: the Burj Khalifa by Adrian Smith in Dubai, the Cloud Gate sculpture by Anish Kapoor and the Great Pyramids in Giza. We asked ourselves, how could we create a building that had comparable height to the Burj Khalifa, the playfulness and interactiveness of the Cloud Gate sculpture, and the iconic presence of the Pyramids? Our answer to this was to create a system of "Eco-Balloons" that would be hoisted up into the sky, soaring as an iconic reference to the city, as well as serving a function purpose to harness energy.

LED lighting

photo voltaic skin

H_2 pockets
wind turbine
turbine generator

battery
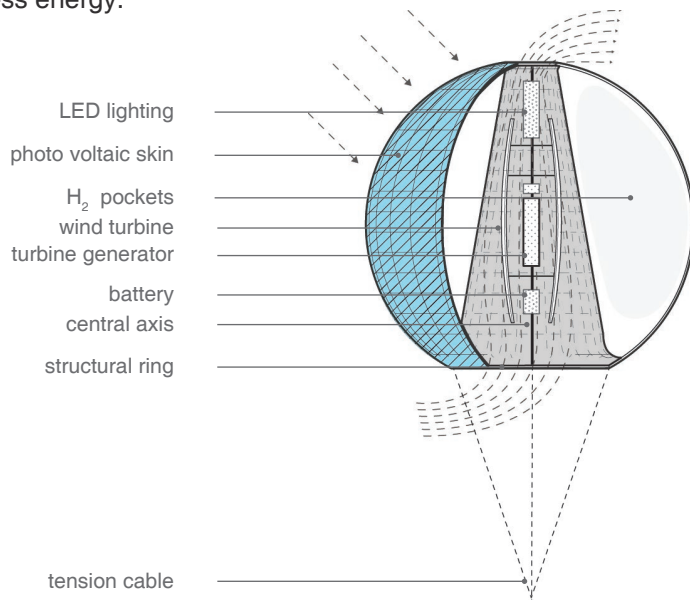central axis

structural ring

tension cable

Fig 11. Eco-Balloon Detailed Section

The Eco-Balloons are designed to operate at multiple strata within the site to provide different effects on the building, park and city. The primary function on the building is to harness both solar and wind energy at high levels. The balloon's themselves are constructed with a photovoltaic skin, and features an internal wind turbine to generate electricity. Not only does this help to offer renewable power to fuel the building, but the simple icon of a balloon that can soar to limitless heights helps to empower the rest of Dubai with a sense of vibrancy and playfulness that the vision

of a sustainable future should offer. The energy that is collected in the sky is then stored in a battery until it gets extracted back at the ground level. Once at a lower level, the balloons help to form a semi-canopy condition. This has the ability to offer shade and cover, while creating a more intimate architectural environment to the park users. Alternatively, the balloons can be brought down to the park surface and activated as a lantern, to create localized interaction with ambient lighting.

High Condition
Eco-Balloons soar above the site to collect wind and solar energy

Low Condition
Eco-Balloons are pulled closer to the park, creating intimate architectural environments

Lantern Condition
Using embedded LEDs, the Eco-Balloons are pulled towards the park to create beacons of light and a localized interactive moments

Energy Collection
The internal batteries are collected below the park and harness into energy for the site

Fig 12. Diagrammatic Sections

Conclusion

When the Eco-Balloons are soaring over the skyline of Dubai and collecting renewable energy, it becomes a true icon of sustainability and growth. It creates a reference point to a new type of public space that operates at a multitude of scales and promotes a social conscience for the future of urbanism. Over the last turn of the century, sustainability has been a vital and undeniable part of the discussion regarding future designs. UP! is a new concept that embodies the "icon" in the most playful, intimate and human way possible. An experience that inspired our architectural vision was to imagine ourselves as children running freely in the park, with balloons in our hands and high up in the sky; we think that this can lead to a new type of architecture that provokes a friendly future to the new direction of Dubai.

Bibliography

[1:] Taylor-Foster, James. "Vanity Height: How Much of a Skyscraper Is Usable Space?" Vanity Height: How Much of a Skyscraper Is Usable Space? ArchDaily, 06 Sept. 2013. Web. 24 Apr. 2015.

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[5:] Alcázar of Seville. Digital image. 68-sevilla-alcazar.jpg. N.p., n.d. Web. <http://www.tuin-thijs.com/images/vakantie_spanje/68-sevilla-alcazar.jpg>.

[6:] Fujimoto's Doha Masterplan. Digital image. Shop_130411.jpg?1385424481. N.p., n.d. Web. <http://img5.adsttc.com/media/images/5293/e694/e8e4/4eba/3c00/0076/large_jpg/Shop_130411.jpg?1385424481>.