The Changing Urban Landscape

Antony Wood
CTBUH Executive Director
FPRF / NFPA
Washington DC, November 2013
Tall Trends in Cities
Tall Building Trend One: An Increase in Height

Incremental height changes in the World’s Tallest Buildings (as of April 2013)
Tall Building Trend Two: An Increase in Number

Notes:
1. We can predict 2012–2014 building completions with some accuracy due to projects now in advanced construction.
2. Totals after 2001 take into account the destruction of the World Trade Center Towers 1 and 2.
Tall Building Trend Three: A Change in Location

100 tallest buildings by location

Supertall buildings (300m+) by location

Tallest Buildings by Location (as of January 2013)
Tall Building Trend Four: A Change in Function

Tallest Buildings by Function (as of January 2013)
Tall Building Trend Five: A Change in Material

Tallest Buildings by Structural Material (as of January 2013)
Tall Building Trend Six: A Change in Title / Motivation

Pre-2000

- Chrysler
- Sears

Post-2000

- Taipei 101
- Chicago Spire

- Transamerica
- Petronas
- Burj Dubai
- Shanghai Tower
Tall Building Trend Seven: A Change in Aesthetics

4 Times Square
Bahrain World Trade Center
Al Bahar Towers
Pearl River Tower
Drivers /
Influencing factors
Tall Building Driver One: Land Prices & Return on Investment
Tall Building Driver Two: Global Icons
<table>
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<tr>
<th>Old Stone Age</th>
<th>New Stone Age Commences</th>
<th>New Stone Age</th>
<th>Bronze Age</th>
<th>Iron Age</th>
<th>Middle Ages</th>
<th>Modern Times</th>
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1900 ≈ 1.7 Billion
2013 ≈ 7.0 Billion
2025 ≈ 8.0 Billion

Source: UN Population Fund
Tall Building Driver Four: Urbanization

Transport and Urban Density

The U.K.

Factors:
- longer life expectancy
- smaller household size
  (single person households, divorce rate, children outside marriage, etc)

Results:
- a government demand of 2.6 million new homes by 2020
- An annual requirement of 189,000 new homes
USA Pop. Growth / Immigration

- 0.9% per annum (world average = 1.09%)
- 0.9% x 3.2 million people = 280,000 urban growth annually
- Not equal across cities. Rust belt to Sun-belt, etc.

Source: Brookings Institution
Tall Building Driver Seven: Energy, Sustainability & Climate Change
Tall Buildings and Place: 
The Shortfall of Tall?
Shortfall 1: The Commercial Design Approach

1958. Seagram Building, New York, Mies van der Rohe & Philip Johnson
Tall building-scape, Jakarta

Tall building-scape, Seoul
Shortfall 2: The Iconic - Sculptural Design Approach

2007. RAK Financial City, Ras Al Khaimah, UAE, Rakeen
The Extreme Iconic-Sculptural Design Approach: A Tall Building Menagerie?
New Paradigms in High Rise Design:
A New Vernacular for the Skyscraper?

10 Design Principles
Design Principle 1: Tall Buildings should relate to the **physical** characteristics of place.
2004. “Building As Frame”
Annette Ward
University of Nottingham
Design Principle 2: Tall Buildings should relate to the **environmental** characteristics of place (Light, Wind, Air, Sun, Rain)
Light
Thomas Pickford
University of Nottingham
Wind
2007. “Wind Farm”
Adam Chambers & Alex Dale-Jones
University of Nottingham
Harnessing Wind in Tall Buildings?

\[ P = 0.5 \rho V^3 T \]

where \( P \) = Turbine Wind Power, \( \rho \) = air density, \( V \) = Wind Velocity, \( T \) = Time.

Bahrain World Trade Center, 2008

Strata, London, 2010

Pearl River Tower, Guangzhou, 2013
Water
Steve Henry & Hannah Cho, Illinois Institute of Technology
Maximum Facade for Wind Driven Rain Collection

Water is captured on the facade

Predominant Wind Direction

The remainder is collected at the bottom canopy
Design Principle 3: Tall Buildings should relate to the **cultural** characteristics of place.
2009. “Swadeshi Tower (Textile Tower),” Mumbai
Nishant Modi & Hiren Patel
Illinois Institute of Technology
1) Integrate a dhobi ghat system within the high-rise to wash and dry the clothes of surrounding towers and neighborhood.

2) Revive an existing textile market culture at the base of the site.

3) Integrate a clothes drying system within the skin of the tower.

4) Incorporate the terrace as not only an outdoor balcony, but a semi-outdoor space with tubs for clothes washing.

5) Provide an open space at top of tower for kite flying.
Design Principle 4: Tall Buildings should **Vary with height** – in form, texture, scale (and program) – not be just vertical extrusions of an efficient floor plan
2003. “SkyBox version 1”
Eva Young, University of Nottingham
Burj Khalifa, Dubai, 2010
SOM

+6 degrees in external air temperature at top of tower, compared to bottom

The environment changes with height too!
Design Principle 5: Accommodate new and multiple functions – bringing all aspects of the city into the sky
2006. “Vertical Farm”
Paul Foster & Darran Oxley
University of Nottingham

Conceptual Diagram
Tall Building as “City in the Sky”
The last few years have shown increasing dissatisfaction with food quality, safety, cost, choice and inequality in food distribution. Questions have been raised concerning food being transported unnecessarily miles within, to and out of the UK. The UK is a net importer of food, the trade gap rising from £5.6 billion in 1994 to £27.3 billion in 1998 and is becoming more reliant on overseas producers.

Between 1978 and 1998 the amount of food transported on UK roads increased by 30% and the distance travelled increased by 57%. Some of food travelled an average distance of 723 km compared to 82 km in 1978. Road transport is the largest amount of freight above any other single commodity and 34% per cent of the increase in goods travelled is made up of food.

Transport is a major consumer of energy. In 1994, some 34% of all UK energy consumption was used by transport, contributing significantly to urban pollution. Food travelling longer distances requires more packaging to retain quality and nutritional values drop during greater storage and transportation. In addition, long distance transportation can result in greater use of agrochemicals to protect crops in storage and transit, which may add to the product.

A reduction in Food Miles will not only provide an environmental benefit, but will shorten the link between producer and consumer and increase the level of understanding between buyer and seller. Farmers markets are examples of this, where only locally produced food of high quality and freshness are sold.
Design Principle 6: Tall Buildings should provide significant communal, open, recreational space
Commerzbank Frankfurt, Germany

View of high-level sky garden

Inward facing office
Design Principle 8: Tall Buildings should introduce more **facade opacity** (and variation / texture) in skin/envelope
1984. National Commercial Bank, Jeddah. SOM Architects
O14, Dubai, 2009
Reiser + Umemoto
Design Principle 9: Embrace **organic vegetation** as an essential part of the material palette
Design Principle 10: Introduce physical, circulatory and programmatic connections – skybridges
1908 - *The Cosmopolis of the Future*. Harry Petit. From *King’s Views of New York*

1927 - *Metropolis*. Erich Kettelhut. Still from Fritz Lang’s film

2009. Linked Hybrid, Beijing, China. Steven Holl Architects
2010. Marina Bay Sands
Singapore
Moshe Safdie Architects
2009. The Pinnacle @ Duxton
Singapore
ARC Studio
1998 - Petronas Towers,
Kuala Lumpur.
Cesar Pelli
Cross Cultures
Differing Cultural Attitudes towards Fire Safety
Urban Enrichment – Hong Kong
What is needed?........ A new regulatory, political & financial model for urban development........
The horizontal 2-dimensional planning model flipped vertical into 3- Dimensions........

A new Vernacular for the Skyscraper, for Cities?

Future Tall Buildings should........

1. Relate to the **physical** characteristics of place
2. Relate to the **environmental** characteristics of place
3. Relate to the **cultural** characteristics of place
4. **Vary with height** – in form, texture, scale (and program) – not be just vertical extrusions of an efficient floor plan
5. Accommodate **new and multiple functions** – bringing all aspects of the city into the sky
6. Provide significant **communal, open, recreational space**
7. Maximize **layers of usage** on all systems and materials
8. Introduce more **facade opacity** (and variation / texture) in skin/envelope
9. Embrace **organic vegetation** as an essential part of the material palette
10. Introduce physical, circulatory and programmatic connections – **skybridges**

What is needed?........ A new regulatory, political / financial model for developing vertical cities
The Future of Sustainable Cities?
www.ctbuh.org

awood@ctbuh.org