Urban structure

the arrangement of land use, public and private space, connectivity and accessibility
Concentric zone model

1920’s: Urban Sociologist Ernest Burgess

1. Central business district
2. Zone of transition
3. Zone of independent workers’ homes
4. Zone of better residences
5. Commuter’s zone

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Concentric zone model 1920’s: Urban Sociologist Ernest Burgess

1. Central Business District (CBD)
Usually dense and with skyscrapers, government institutions, businesses, restaurants...

2. Zone of Transition
Industry and poor-quality apartments

3. Zone of the working class
Modest old houses of working class families

4. Zone of better residence
New and rich houses of middle-class families

5. Commuter’s Zone/Suburbs
Beyond the urban built area, mostly for rich residents

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Concentric zone model 1920’s: Urban Sociologist Ernest Burgess
Sector model

1939: land economist Homer Hoyt

Social groups around a series of sectors and radiating out from the CBD along major transportation lines. Low-income class near railroad lines; and commercial along business routes.
Sector model 1939: land economist Homer Hoyt
Multiple nuclei model 1945: Chauncy Harris and Edward Ullman

Cities grow from a number of points (ports, universities, airports, parks) - rather than only one central - that expand and merge in a single urban area.
The Garden City is a self-contained town, surrounded by rural areas, in which a small community works and lives in individual cottages. The town has its centre, which is at the same time geometrical, administrative and recreational. Residences, parks, services, shops, schools... are designed following a specific geometrical pattern.

“His idealised garden city would house **32.000 people** on a site of 6.000 acres (2,400 ha), planned on a concentric pattern with open spaces, public parks and six radial boulevards, 120 ft (37 m) wide, extending from the centre. The garden city would be self-sufficient and when it reached full population, another garden city would be developed nearby. Howard envisaged a cluster of several garden cities as satellites of a central city of 250.000 people, linked by road and rail”

Garden city 1898: Sir Ebenezer Howard
Garden city 1898: Sir Ebenezer Howard
Garden city 1898: Sir Ebenezer Howard
Garden city

1898: Sir Ebenezer Howard
In synthesis the Ville Radieuse is a 1.5 million inhabitants centralized city of high-rise multifunctional buildings spread in urban parks. These big buildings only occupy 12-15% of the city land to guarantee vast surface for parks and pedestrian movements, however they were not located close to each other in dense groups, but isolated among themselves.
Ville Radieuse  ~1924: Le Corbusier

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Ville Radieuse ~1924: Le Corbusier
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Broadacre city is a decentralized society in a rural ultra dispersed “city”. They were low-density buildings, individual family houses (each family would be given a one acre -4,000 m²- plot of land) and high-rise buildings, highly dispersed throughout farms and natural landscapes.

1932: Frank Lloyd Wright
Broadacre city 1932: Frank Lloyd Wright
Broadacre city 1932: Frank Lloyd Wright
Sufficiently autonomous urban cells compact enough to be walkable, providing resiliency, consistent functionality, and elegant urban design.

https://www.ted.com/talks/kent_larson_brilliant_designs_to_fit_more_people_in_every_city/transcript?language=en#t-355301

the first 6 minutes
Punctiform city 2013: Luca D'Acci

Parks and Nature
in which
Punctiform Cities are;
not vice versa

Habitats

The Humanity side of each Unit Point
Punctiform city  2013: Luca D'Acci

interconnected net of urban hyperdense ‘points’ throughout nature and lands
Punctiform city  2013: Luca D'Acci

www.urem.eu/isobenefit

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Isobenefit Urbanism 2013: Luca D’Acci

An urban genetic code to generate low carbon, adaptive, connected, compact, multifunctional settlements throughout nature, with unplanned forms and unlimitedly extendible, in which one does not need cars and can feel both urbanity and nature.

I. each citizen should be able to reach the ordinary daily points (shops, job, services…) within around maximum 20’- 30’ walking ($T^*$);

II. each citizen should be able to reach a centrality within $T^*$;

III. each citizen should be able to reach a natural area within $T^*$;

IV. buildings should be close to each other, in the same way natural areas (at least 1 continuous km2)
Isobenefit Urbanism 2013: Luca D'Acci
Isobenefit Urbanism 2013: Luca D'Acci
While Broadacre city is the antithesis of urbanity, it preserves nature and its contact with the “citizens” in their daily life.

The Garden City and Ville Radieuse offer a kind of soft nature but with lack of urbanity.

However the latter, due to speculation and contingency, lost the original meaning of their authors, respectively Howard and Le Corbusier, becoming garden suburbs and anonymous dormitory buildings without the multiuse land/buildings and, therefore, without the vibrant urbanity designed by the original authors.
A comparison

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A comparison

Ville Radieuse

Broadacre city

Garden City

Punctiform city

Isobenefit Urbanism

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Urban Structure and CO2


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“We've changed all our light bulbs to energy-savers, and you should do the same thing, but changing all your light bulbs to energy-savers saves as much energy in a year as moving to a walkable city does in a week”
CITY
Transportation: **28%** of GHG Emission. **Cars** account for **over half** of the emissions from the Transportation sector.


“**doubling** population-weighted **density** is associated with a **reduction in CO₂** emissions from household **travel** and **residential energy** consumption by **48%** and **35%**, respectively. Centralized population and polycentric structures have only a moderate impact in our analyses. Given that household travel and residential energy use account for **42% of total U.S. carbon dioxide emissions**, these findings highlight the importance of smart growth policies to build more compact and transit friendly cities as a crucial part of any strategic efforts to mitigate GHG emissions and to stabilize climate”.

Atlanta and Barcelona have similar populations but very different carbon productivity.

<table>
<thead>
<tr>
<th></th>
<th>Population</th>
<th>Urban area</th>
<th>Transport carbon emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlanta</td>
<td>2.5 million</td>
<td>4,280 km²</td>
<td>7.5 tonnes CO₂/person (public + private transport)</td>
</tr>
<tr>
<td>Barcelona</td>
<td>2.8 million</td>
<td>162 km²</td>
<td>0.7 tonnes CO₂/person (public + private transport)</td>
</tr>
</tbody>
</table>
COMPACTNESS: URBAN DENSITY

Transport-related energy consumption
Gigajoules per capita per year

Urban density and transport-related energy consumption
Large cities are less green

Erneson A. Oliveira, Jose’ S. Andrade, Jr. & Herna´n A. Makse (2014) Nature - SCIENTIFIC REPORTS | 4 : 4235 | DOI: 10.1038/srep04235
http://www.nature.com/srep/2014/140228/srep04235/pdf/srep04235.pdf

\[
A = -2.05 \pm 0.12 \\
\beta = 1.38 \pm 0.03 \\
\beta = 1
\]
MULTIFUNCTIONALITY
MULTICENTRALITY
COMPACTNESS + DIMENSION + MULTIFUNCTIONALITY + MULTICENTRALITY

Low carbon example from the past: GREEK, ROMAN, MEDIEVAL CITIES
And for the future: CELLULAR CITY, ISOBENEFIT URBANISM
GREEK CITY

1) **UNITY**: the city is an organic unit without closed separated microareas

2) **VARIETY**: mixed private-residential, religious, public, shopping, recreational, sportive areas

3) **NATURE**: the city is joined with nature

4) **LIMITED SIZE**: not a gradual expansion, but an additional (colonies)
ROMAN CITY

Strong urbanity and variety of public spaces
1) **CONTINUITY**: facade of buildings on the streets and squares create public spaces, urbanity. Hierarchy of streets interconnected. Squares softly connected with streets. No separation between private and public space as the ancient city, but a common complex public space.

2) **COMPLEXITY**: multicentral because of a religious centre (church and Episcopal palace), a civil centre (Town Hall), commercial centre (shops, market, merchant associations).

3) **COMPACTNESS**: the city grows inside the walls until it reaches maximum density.

4) **DYNAMIC AND UNIQUENESS**: both ex-novo (but no universal rules) and spontaneous cities.
MEDIEVAL CITY
Urban Planning

design and organization of urban space and activities
1983 European Conference of Ministers responsible for Regional Planning (CEMAT):

"Regional/spatial planning gives geographical expression to the economic, social, cultural and ecological policies of society. It is at the same time a scientific discipline, an administrative technique and a policy developed as an interdisciplinary and comprehensive approach directed towards a balanced regional development and the physical organisation of space according to an overall strategy."
What we can do with Planning
Controlling City size
Facilitate small-medium cities networked as a big “megacity”

• Superliner allometry between population and CO2 per capita

i.e. Randstad, Punctiform city
Green belts

- Compact city (prevention of urban sprawl)
- Preservation of nature
- Outdoor activities
- Clean air
- Water absorption
- Reduce urban temperature
Green and Built land locations

- Preservation of nature
- Outdoor activities
- Clean air
- Water absorption
- Reduce urban temperature
Through the innovative synthesis of topography, hydrology and vegetation, the Ningbo Eco-Corridor project transforms an uninhabitable brownfield into a 3.3km long “living filter” designed to restore a rich and diverse ecosystem, create synergy between human activity and wildlife habitat, and serve as valuable teaching tool and model for sustainable urban expansion and development in China's rapidly advancing economy.

https://www.asla.org/2013awards/253.html
Green and Built land locations

"La Coulee Verte" (The green corridor) is a 12 hectare park that will cut through the centre of Nice
Densification

- Compact city (prevention of urban sprawl)
- Preservation of nature
- Induce public transport investments and local services

http://www.bcva.dk/#!projects-restad-2/c1gwo
Multicentralities

- It **may** reduce daily commuting
The spatial distribution of jobs and population generate patterns of commuting trips

A. The classical monocentric model
B. The polycentric or dispersed model
C. The composite Model
D. The "Urban village" model (doesn't exist in real world)
Multifunctional neighbourhood

- It reduces daily commuting and depressive urban environment

You don’t need the car to buy 1 banana, or to enjoy a walk in a nice street, or to sit in a bench, or to accompany your children at school, etc.
Multifunctional neighbourhood
Multifunctional and pedestrian neighbourhood

Bjarke Ingels Group Proposes New Master Plan For Lower Hill District Of Pittsburgh
Multifunctional and pedestrian neighbourhood

!melk (in collaboration with Tom Leader Studio) - Nicollet Mall, Minneapolis
Re-shaping an underperforming downtown commercial corridor into a urban hybrid with a linear park, shopping corridor and market, as well as a hub for public transport
http://www.melk-nyc.com/work-portfolio/nicollet-mall/

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Public Transport

Jeddah’s Public Transport Master Plan

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Bangkok public transport network with the planned expansions after 2030
Public Transport

Cable car in Medellin
London SkyCycle

“SkyCycle is a 136-mile (219 km) route, with the first phase, proposed from east London to Liverpool Street Station, costing more than £200m.
If approved, the 10 routes would be built above existing rail lines and would take about 20 years to complete. The plans will be sent out to interested parties for feedback before a planning application is submitted.
Sir Norman Foster, the architect who designed London's Gherkin tower, has been working with Exterior Architecture and Space Syntax on the concept since 2012”

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flood risk – land regulation

The flood of 2011 of Bangkok
**GIS** (geographic information system)

i.e.:

- Check the ratio of residence/work places/green areas/shops/amenities per each neighbourhood [multifunctionality]

- GIS is multilayered mapping, where each layer has different information such as agricultural land, surface water, flood frequency, erodible land, crime levels, number of residences, density, public transports, green area, etc... This multilayered capability can help planning decisions thanks to the contemporary overlapping of specific layers

- Analysis of the vulnerable areas for flooding, or the best location for public transport, services, parks, residences, visualizing walking (or by car or public transport) distances from x to y, etc..
Space Syntax

Encourage movement of pedestrian, cyclists and public transport by connecting key routes for different transport modes at different scale; Understanding or designing geometrical potentiality for the location of amenities, shops and services.
Isobenefit Lines + Space Syntax + GIS + Multi Agent Model

Understanding people movement
“Optimal” location of urban objects (amenities, parks, shops, centralities...)
Understanding value of places (land value, property value)
Urban Design

‘the design of the spaces between buildings’ - ‘the art of making places’

http://www.udg.org.uk/about/what-is-urban-design
What we can do with Urban Design
Make places attractive for inducing people into walking, biking, living, going and passing through.
a reminder:
Planning is important....
... but don’t do it too much