Creating Sustainable and Smart Cities

Graham Hill, City Executive, Arcadis
Arcadis in the **leading global natural and built asset design consultancy** firm.

We differentiate through our talented and passionate people and unique combination of capabilities covering the **whole asset life cycle**, our deep sector insights and ability to integrate health & safety and sustainability into the design and delivery of **solutions across the globe**.

**28,000 PEOPLE**

**€3 billion REVENUE**

**#6 rated WORLDWIDE**

With global expertise spanning across six continents, we are positioned to work with our clients across multiple sectors to deliver exceptional outcomes.
Creating Sustainable Cities
The evolution of The City

- Technological change
- Rapid urbanisation
- Resilience
- Connectivity
- Fairness
Arcadis’ strong track record in influencing city evolution

2015
- **Sustainable Cities Index**
  City leaders need to find ways to balance the demands of People, Planet and Profit.

2016
- **Sustainable Cities Water Index**
  Resiliency is key to water sustainability.

2017
- **Sustainable Cities Index**
  People-related elements have the greatest influence on city sustainability.

2018
- **Sustainable Cities Mobility Index**
  Money, mass or maturity do not equal sustainable mobility.
- **Connected Autonomous Vehicles**
  The CAV revolution will disrupt transport infrastructure and urban living.
- **Sustainable Cities Index**
  Citizen-centric cities are the cities of the future.
Sustainable Cities Index

• The SCI assesses the sustainability of 100 global cities across
  • People (social)
  • Planet (environmental)
  • Profit (economic)

• This Index takes a deeper dive into citizen experience and all 100 cities are not only ranked, but also in a cluster that typifies a citizen experience.

• London, Stockholm and Edinburgh rank in the top three
What do we measure?

- **Education**
  - Primary school enrollment | university rankings | share of population with tertiary education

- **Health**
  - Life expectancy | infant mortality

- **Demographics**
  - Dependency ratio

- **Income Inequality**
  - Gini coefficient

- **Affordability**
  - Consumer price index | property prices

- **Work-life Balance**
  - Average annual hours worked

- **Crime**
  - Homicide rate

- **Access to Transport**
  - Cultural Offerings
    - Number of attractions

- **Cost of Broadband**
  - Access to Digital Public Services
    - Online property tax payment availability
What do we measure?

- Environmental Exposure
  Natural catastrophe exposure

- GREEN SPACES
  Green space as % of city space

- Demographics
  Dependency ratio

- Energy
  Energy use | renewables share | energy consumption

- Air Pollution
  mean level of pollutants

- Greenhouse Gas Emissions
  emissions in metric tons (per capita)

- Waste Management
  Percent of solid waste recycled | share of wastewater treated

- Water & Sanitation
  Access to drinking water and improved sanitation | % of houses with inside toilet | risk to water supply

- Bicycle Infrastructure
  Bicycles per capita | bicycle sharing schemes

- Negative Emissions Technologies
  Carbon capture and storage

- Natural Disaster Monitoring
  Number of early warning systems | digital alerts
What do we measure?

- **Transport Infrastructure**
  - Congestion
  - Rail infrastructure
  - Airport satisfaction
  - Transport economic opportunity
  - Transport public finance

- **Economic Development**
  - GDP per capita

- **Connectivity**
  - Mobile connectivity
  - Broadband connectivity
  - Importance in global networks
  - Internet speeds

- **Employment**
  - Number of people employed as share of city population

- **Ease Of Doing Business**
  - Ease of doing business index

- **Technology Research**
  - Ranking of city’s top performing university in field of technology & engineering
  - Number of top 200 ranked universities in the fields of technology & engineering

- **Tourism**
  - International visitors per year, absolute and per capita
Global Trends 2018

- The top 20 sustainable cities are mostly European but among them are three Asian cities and three US cities.

- London is one of few highly ranked, balanced cities in the Index – most other top-ranked cities score well in one or two pillars.

- Edinburgh ranks top for quality of life – most liveable city

- On current trajectories, are new technologies going far enough or fast enough to mitigate many of the negative impacts of city living?
Overall Results

1. London
2. Stockholm
3. Edinburgh
4. Singapore
5. Vienna
6. Zurich
7. Munich
8. Oslo
9. Hong Kong
10. Frankfurt
11. Copenhagen
12. Amsterdam
13. Seoul
14. New York
15. Paris
16. San Francisco
17. Hamburg
18. Berlin
19. Seattle
20. Dublin
21. Madrid
22. Boston
23. Prague
24. Taipei
25. Ottawa

26. Vancouver
27. Rotterdam
28. Barcelona
29. Manchester
30. Toronto
31. Montreal
32. Glasgow
33. Tokyo
34. Sydney
35. Canberra
36. Geneva
37. Calgary
38. Birmingham
39. Washington
40. Rome
41. Macau
42. Milan
43. Antwerp
44. Brisbane
45. Los Angeles
46. Lyon
47. Brussels
48. Chicago
49. Wellington
50. Leeds

51. Houston
52. Philadelphia
53. Denver
54. Warsaw
55. Honolulu
56. Melbourne
57. Budapest
58. Moscow
59. Dallas
60. Pittsburgh
61. New Orleans
62. Lisbon
63. Miami
64. Indianapolis
65. Jacksonville
66. Shenzhen
67. Kuala Lumpur
68. Baltimore
69. Phoenix
70. Atlanta
71. Detroit
72. Tampa
73. Beijing
74. Guangzhou
75. Athens

76. Shanghai
77. Santiago
78. Sao Paulo
79. Mexico City
80. Bangkok
81. Buenos Aires
82. Istanbul
83. Tianjin
84. Rio de Janeiro
85. Lima
86. Salvador
87. Wuhan
88. Chennai
89. New Delhi
90. Chengdu
91. Bengaluru
92. Johannesburg
93. Mumbai
94. Jakarta
95. Manila
96. Nairobi
97. Cape Town
98. Hanol
99. Cairo
100. Kolkata

Colors: Green = People, Blue = Planet, Yellow = Profit

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The Citizen Experience

- To provide greater insight into the factors that influence city evolution we have developed a deeper understanding of how citizens and cities relate.

- The research features work on city archetypes and clusters aimed at explaining the citizen experience and close correlation to the SCI rankings.

- This insight is derived from city archetypes based on research into how cities are evolving and the experience of citizens.

- The results are presented as a set of four city clusters - the clusters are based on an analysis of the citizen experiences of city living.
Edinburgh shares a citizen experience similar to cities such as Ottawa, Wellington, San Francisco, Boston and Lisbon.

Ranks as the **most liveable city in the world**, with an enviable position as a centre for tourism, low crime rate and status as an attractive place to live and work all contributing to its success.

Citizens in all 'Balance Innovator' cities experience a comfortable and technology-driven life (automated) and a service-driven economy that is highly monitored (sensing).

Edinburgh is a top 3 in the 2018 sustainable cities index.
Embracing smart solutions for Cities

Two solutions…
Citizens in Motion 2018

• The emerging **Connected and Autonomous Vehicles revolution** opens a new frontier of disruption in transport, infrastructure and urban living.

• For cities, this presents a huge opportunity to radically transform urban mobility and be prepared

• 14 cities studied - what are the factors that may - or may not - support the development of CAV to help cities achieve mobility objectives.

• Research show cities like **Dubai and Singapore** are leading the pack e.g. autonomous buses

• Cities like **Amsterdam and Edinburgh** are laying the foundations through initiatives like MaaS and electric charging respectively.
City Analytics

“Urban Development Engine”... an Arcadis solution developed in collaboration with GMCA:

• Forward looking and predictive, based on fact, driven by data

• Investment-focused approach to optimising site plans and delivery

• Flexible, responsive, more collaborative approach to housing planning

• Evidenced planning decisions and their implications for policy compliance.
1st London
Balanced innovator
View UK insights

3rd Edinburgh
Balanced innovator
View UK insights

32nd Glasgow
Post-industrial opportunist
View UK insights

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**Graph:**
- **People:**
  - London: 74%
  - Edinburgh: 78%
  - Glasgow: 66%

- **Planet:**
  - London: 68%
  - Edinburgh: 65%
  - Glasgow: 65%

- **Profit:**
  - London: 48%
  - Edinburgh: 67%
  - Glasgow: 79%
<table>
<thead>
<tr>
<th>Rank</th>
<th>City</th>
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<tr>
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<td></td>
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</tr>
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<td>32nd</td>
<td>Glasgow</td>
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<td></td>
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<td>View Europe insights</td>
</tr>
</tbody>
</table>

The chart shows the percentage distribution of values for People, Planet, and Profit for Edinburgh, Glasgow, and Copenhagen. The values are as follows:

- **People**
  - Edinburgh: 78%
  - Glasgow: 66%
  - Copenhagen: 62%

- **Planet**
  - Edinburgh: 65%
  - Glasgow: 65%
  - Copenhagen: 65%

- **Profit**
  - Edinburgh: 48%
  - Glasgow: 67%
  - Copenhagen: 61%