Walking into the Future: How will walking fit into a city with smart technology, robots and AV’s?

By

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What are the urban design guidelines to cope with this...?

Need a little theory to understand how a city needs people to walk.....

The theory of urban fabrics

doi:10.3828/tpr.2016.28
The Rise and Fall of an Empire – a Trilogy

The theory emerged.... 2015

1989

Global Cities Database on 100 cities....

SUSTAINABILITY AND CITIES

2009

Overcoming Automobile Dependence

PETER NEWMAN and JEFFREY KEENWORTHY

THE END OF AUTOMOBILE DEPENDENCE

How Cities are Moving Beyond Car-Based Planning
Fuel Use Decreases as Density Increases

Source: Kenworthy, J. R., 2010, Cities Data Base for 2005, CUSP
Different parts of the city have very different transport fuel use....
Melbourne...wealthy use cars less, use sustainable modes more...depends on which part of the city

<table>
<thead>
<tr>
<th></th>
<th>Core</th>
<th>Inner</th>
<th>Middle</th>
<th>Outer/Fringe</th>
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<td>% Household earning &gt;$70,000</td>
<td>12</td>
<td>11</td>
<td>10</td>
<td>6</td>
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<td>Car Use</td>
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<td>2.62</td>
<td>1.61</td>
<td>1.08</td>
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</table>
Sydney....three different cities

Outer suburbs residents, particularly those away from rail lines, drive much more than inner suburbs residents.
Why transportation priorities shape cities…

MARCHETTI CONSTANT
The average travel time budget is around one hour per person per day…. (i.e. half an hour average for the journey to work). Found to apply across the world and throughout urban history.

This means?
THE CITY IS ALWAYS ‘ONE HOUR WIDE’….
TRADITIONAL WALKING CITY
Up To 1850 In Europe

- High Density
- Mixed Use
- Organic Structure
TRANSIT CITY
1850 - 1940 dominant city form in industrial world

- Medium Density
- Mixed Use
- Grid Based
- Centralised

Tram Suburbs

Rail Based Suburbs
Tram city fabric
Train City Fabric
Tokyo
38 million
Best transit, Best walking city.
AUTOMOBILE CITY
1940 - Present, US + Australian Cities Mostly
• Low Density
• Separated uses
• Arterial Grid and cul de sac Based
• Decentralised
The Theory of Urban Fabrics

• All cities have a combination of Walking City, Transit City and Automobile City fabrics.

• The elements of the fabric consist of differences in density, mix, road widths, set backs and infrastructure that supports the modes (parking levels, stations, pedestrian and cycling spaces....)

• Understanding the city helps us manage it...
The Theory of Urban Fabrics

- *Recognise* the three city types,
- *Respect* the functionality of the three types, and
- *Repair/Regenerate* each type in its own way...with priorities defined by the outcomes each can give.

- There is not one city but three. It depends on the M and the P combinations!
1. Recognise.....

• *Recognise* the urban fabrics by careful mapping and especially where the overlaps and transitions occur.
Travel to work by main mode of transport – LONDON Car use in decline

drawingrings.blogspot.com

Source: 2011 Census
Data and boundaries are from ONS, and are crown copyright
Outer suburbs residents, particularly those away from rail lines, drive much more than inner suburbs residents.
2. Respect....

• *Respect* the urban fabrics as the basis of understanding how the city works and thus how it needs to be planned.
Walking city fabric needs...

- Dense, mixed land use zonings
- Zero setbacks and narrow streets
- Pedestrian priority and infrastructure (plus cycling), eg zero or minimal parking.

- *Increasingly the walking city is for knowledge economy jobs and residents who need and want dense urbanism and high quality walkability.* High P Low motor vehicle M.
Transit city fabric needs...

• Medium densities and some mix in a string or corridor of centres.
• Minimal setbacks and walking city fabric in centres.
• Transit priority and infrastructure. Eg minimal parking.

• Increasingly transit city is needed for location of education, health, professional activity as well as other services. Small but important walking centres inside transit stop precincts are the attractor. **High P** Low M in station centres....
Automobile infrastructure needs...

• Low density and low mix - but saving space where possible.
• Large setbacks and space for car/truck storage and management – but minimise.
• Car and truck priority eg truck routes and freeways – but only here.

• Increasingly wanting to get transit corridors and transit fabric into their shopping centres. Low P and high M, increasing the amount of high P and low M....
ONE LANE - people per hr:
Freeway 2,500
Busway 5000
LRT 10-20,000
Train 50,000

Why cars do not enable high P....
3. Repair and Regenerate....

- *Regenerate* the urban fabrics to work more effectively in their walking, transit and car-based functions within a sustainability framework.
The attractions of dense urbanism in walkable TOD’s....
Rejuvenating Copenhagen...by reducing demand for cars. 30 year campaign to create people-oriented streets. Reduced car parking 2%/year
Economic and social attractions of walkable urban design...
Melbourne.
Places for People
1994
Report by Jan Gehl

Places for People
2004
Report Gehl Architects

www.gehlarchitects.dk
Pedestrian traffic weekdays daytime: +40%
Pedestrian traffic evening: +100%
Stationary activities +200-300%
Perth’s transformation

1992 to 2015

Could not have happened without new rail system
New York City transformation
The top 6 most walkable cities in the US have 38% higher GDP.

70% of knowledge economy workers in Boston live in walkable areas.

Ed Glaiser and Richard Florida were right...
This is where the wealth is produced, in dense, walkable centres.

EJD and Labour productivity

\[ y = 4.1585x - 59417 \]

\[ R^2 = 0.3983 \]
What is next?
Walking City needs:

• Dense, mixed use buildings with a primary focus on walking infrastructure to enable the most number of white collar people to meet and create projects...efficiently.

• Place making in the streets....

• Can build in multiple centres across the city...
Rejuvenating the Transit City

**TRANSIT CITY**
1850 - 1940 dominant city form in industrial world

- Medium Density
- Mixed Use
- Grid Based
- Centralised

- Tram Suburbs
- Rail Based Suburbs
Public transport – especially rail – is now booming everywhere.
America goes for rail… esp LRT not buses

% Change in Patronage, 1993-2011

- Total Ridership (000s): 23%
- Heavy Rail (000s): 68%
- Light Rail (000s): 190%
- Commuter Rail (000s): 41%
- Trolleybus (000s): -20%
- Bus (000s): 109%
- Demand Response (000s):
Tysons Corner – four TODs replacing an Edge City car-based development, one heavy rail line and two light rail lines...
Rail outstripping traffic speeds...

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<tr>
<td>Ratio of overall public transport system speed to road speed</td>
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<td>American cities</td>
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<td>0.48</td>
<td>0.55</td>
<td>0.50</td>
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<td>Canadian cities</td>
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<td>0.52</td>
<td>0.58</td>
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<td>Australian cities</td>
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<td>0.63</td>
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<td>European cities</td>
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<td>0.70</td>
<td>0.82</td>
<td>0.91</td>
<td>0.81</td>
<td>0.90</td>
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<td>Asian cities</td>
<td>-</td>
<td>0.77</td>
<td>0.84</td>
<td>0.79</td>
<td>0.86</td>
<td>0.86</td>
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<tr>
<td><strong>Global average for all cities</strong></td>
<td>0.55</td>
<td>0.58</td>
<td>0.66</td>
<td>0.66</td>
<td>0.71</td>
<td>0.70</td>
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</table>

| Ratio of metro/suburban rail speed to road speed |      |      |      |      |      |      |
| American cities                        | -    | 0.93 | 0.99 | 0.89 | 0.96 | 0.95 |
| Canadian cities                        | -    | -    | 0.73 | 0.92 | 0.85 | 0.89 |
| Australian cities                      | 0.72 | 0.68 | 0.89 | 0.81 | 1.06 | 1.08 |
| European cities                        | 1.07 | 0.80 | 1.22 | 1.25 | 1.15 | 1.28 |
| Asian cities                           | -    | 1.40 | 1.53 | 1.60 | 1.54 | 1.52 |
| **Global average for all cities**      | 0.88 | 1.05 | 1.07 | 1.11 | 1.12 | 1.13 |
Global growth now in rail ...

• 82 Chinese cities building metros and high speed rail between cities
  Shanghai 8m passengers/day
• 51 Indian cities building metros Any city over 1m.
• Middle east cities building rail for first time
The 2\textsuperscript{nd} rail revolution – in the place that first built them in the 19\textsuperscript{th} century....UK
Figure 2.4: Rail patronage growth per annum in major international cities (2004–08)

<table>
<thead>
<tr>
<th>City</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melbourne (Com)</td>
<td>10.5</td>
</tr>
<tr>
<td>Perth (Transp)</td>
<td>8.2</td>
</tr>
<tr>
<td>Brisbane (Citytrain)</td>
<td>6.4</td>
</tr>
<tr>
<td>Singapore (SMRT)</td>
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<tr>
<td>Vienna (Wiener Linien)</td>
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</tr>
<tr>
<td>San Francisco (BART)</td>
<td>4.2</td>
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<td>New York City (NYCD)</td>
<td>3.3</td>
</tr>
<tr>
<td>Washington (WMATA)</td>
<td>3.2</td>
</tr>
<tr>
<td>London (TfL/LL)</td>
<td>3.1</td>
</tr>
<tr>
<td>Madrid (Metro de Madrid)</td>
<td>2.6</td>
</tr>
<tr>
<td>Chicago (CTA)</td>
<td>2.6</td>
</tr>
<tr>
<td>Hong Kong (MTR)</td>
<td>2.1</td>
</tr>
<tr>
<td>Sydney (CityRail)</td>
<td>2.1</td>
</tr>
<tr>
<td>Adelaide (TransAdelaide)</td>
<td>0.9</td>
</tr>
</tbody>
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Note: *Domestic lines including JR East & West lines, excluding airport and cross-boundary.

Source: Rail operator annual reports and statistics; Government statistics; L.E.K. Analysis
The revival of the transit city, 1979...
National and global model...
$17-22$ mill per km. Carrying $8$ lanes of traffic.
How do you change a city’s transport and planning priorities? The Perth Freight Link, including Roe 8
Mark McGowan stops Perth Freight Link in first move as WA premier

Labor leader who won Saturday's Western Australian election in a landslide announces work has ceased on controversial Roe 8 highway extension
Metronet and City Deals

- Extend the Joondalup Line to Yanchep
- Remove dangerous Level Crossings on the Armadale, Midland and Fremantle Lines
- Build the new Morley-Ellenbrook Line
- Complete the Forrestfield-Airport Line
- Commence building the Circle Line
- New Station at Karnup
- Extend the Armadale Line to Byford
Reinstating a biodiversity corridor and creating a community-based, ped/cycle biophilic link....
The Ring Rail, LRT and BRT plus development sites for the next 30 years growth in Perth
Rejuvenating the automobile city....?

• Don’t need any more...just fix what is there.
Car dominance began to wane....

Passenger-kilometres by private car and light trucks, 1990 – 2009, DESPITE WEALTH INCREASING!

Index (1990 = 100)
21st century...THE USA IS DRIVING LESS

Population adjusted using the BLS Civilian Noninstitutional Population Age 16 and Over [FRED CNP160V]
Australian city car use peaked the same year...and keeps going down.
What traffic modelers are saying….stuck in the old paradigm of inevitable growth in car use as GDP grows.
22 cities have removed freeways...
Cheonggyecheon River in Seoul,
buried under freeway
Not only has the greenway become a well-loved part of the city, it has proven to benefit the city in many different ways. The temperature of the inner city has dropped several degrees, and birds, fish and other wildlife have returned to the urban core. Also, since the freeways were removed, fewer people are driving into the city, choosing to take public transit or other options.
‘Cheonggyecheon – symbol of the green economy’

President Lee

The traffic just disappeared...
Calcutta rather more forced to remove this one...
What about the emerging cities?
Case study - Beijing and Shanghai

Shanghai 1990 and 2010
1990’s - Flirting with the American model...
Rapidly filled...

So what can be done?
Shanghai Metro... 12 lines, 273 stations, 420km covering 80% of metro area...
Built mostly since 2000; carries 8 million per day
Shanghai – dramatic growth of rail
Beijing peak car use and transit growth

9 million passengers per day!
Peak in freeway building in big cities...
Beijing decouples economic growth from car use
The causes of 2nd rail revolution and peak car...
...the economics of cities is changing towards active, low carbon urbanism.....

1. Travel time benefits and costs are moving away from cars to rail....
2. Peak density decline...cities are coming back in for economic reasons.
3. Cultural change....especially with the Millenials
4. Urban space efficiencies in the knowledge economy....people need face-to-face after all.
5. More inclusive, resilient and sustainable cities...HEALTHY!
Car City needs

• Respect for freight-related activity and manufacturing areas, the consumption economy. BUT.....

• Fast rail in each corridor to go around the slow freeways and highways....efficiently.

• Shopping centres into city centres.

• Electric buses, bikes, EV’s and AV’s to enable the linkages....

• Polycentric city.
The future city is emerging....
Core issue is decoupling wealth from car use...mostly in the cities with rail investment and great centres, eg Washington DC and Portland.
Full electric fleet by ± 2040 – oil stranded.
Autonomous Vehicles?
The phasing out of private vehicles...
Local Shared Mobility Services

Figure 12: Projected Light-Duty Vehicle Demand

Rocky Mountains Institute, 2016
Smart transport is shared transport....

On-demand shuttle buses to move NSW commuters between home and train stations

By Michelle Brown
Updated 24 minutes ago

PHOTO: Citymapper uses smartscreens to tell passengers their location and what's coming next. (Facebook: Citymapper)

A private rideshare-style service to move people between their doorstep and the train station will be trialled in Sydney and the Central West.

RELATED STORY: Could Sydney's inner-west soon see Uber-style buses?

PHOTO: Chariot in the US has sought to reinvent mass transit through crowdsourcing routes. (Facebook: Chariot)
The auto-rickshaw ‘last mile’...maybe this is the main role for AV’s in the future?
Electric Transit too...
and cheap as no tracks. 70 kph 300-500 people per carriage

New trackless train in ZhuZhou
ART – Autonomous Rail Transit
FUNDING?
TRANSIT ACTIVATED CORRIDOR.... paying for train from land development.
In an age of AV hype.....

1. Don’t believe the idea that AV’s can replace transit, especially mass transit. *Just use the new smart technology to make transit better!*
2. Don’t believe the idea that AV’s are going to make cities better everywhere, especially in the critical walking centres. *Just ensure pedestrian priority in centres.*
3. Don’t believe the idea that AV’s will make us safer and thus healthier, when we don’t have to even walk to them. *AV’s should be directed to special pick-up points at the edge of city centres and at the edge of stations.*

4. *Cars make good servants but bad masters....even AV’s. Cities need walkability most of all.*