

THE IN-TIME(S)

Inspired by the future,
rooted in the past, acting in
the present

Extracts based on the book "Inventing for the Sustainable Planet" - the inner and outer journey to sustainability.
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RADIALITY REPORT

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Introduction

Background & Purpose

Radiality, a city planning methodology, was discovered during creativity exercises to identify sustainable technology. This report summarises the details of the idea in order to provide a basis for communicating and verifying the principles.

Creative exercises like these often produce conflicting information. The reader may wonder if this report does not contain such conflicts. Experience has shown however that the solutions produced by this type of exercise contain deep intuitive insights which a) are valuable despite conflicts and b) looking into the conflicting information often reveals further insights.

What is Radiality?

Radiality is a discipline of urban planning. It works to minimise the ecological footprint of the city whilst ensuring a sustainable, health promoting urban environment.

Radiality Principles

- Everything is close to everything else
- Minimise dependence on non-renewable source transport
- Walking is natural transport medium
- To minimise the impact of the city on the environment, transport driven by non-renewable energy sources needs to be kept to a minimum.

Therefore, the guiding principle is 'everything is close to everything else'. Defining close, the dimensions are based on what is a natural daily walking distance for the human 18-65.

We already know that inactivity is not good for health. And walking is both a natural form of exercise and transport. Therefore, radiality utilises walking as the main form of transport.

The design of the 'everything close to everything

ABOUT THE IN-TIME(S)

We are living at the peak of human achievement, but also at the peak of our resources. Sustainable development means handing over to future generations the possibility to create for themselves a standard of living at least equivalent to that we enjoy. This requires fundamentally re-thinking how we use resources, indeed all of the social arrangements we take for granted. And we need to start now. Ideation, imagining, even fantasizing are tools we can all use in this re-thinking process. The technique used to provide the basis of these extracts, Imagestreaming, opens up endless possibilities to explore our ideal future.

else' means also that transport associated with goods and services is reduced. The largest transport need to human society is food and water. Therefore radiality calls for urban environments to be as self-sufficient as possible in food and water. Food production is carried out throughout the city, and especially a separate area in the centre produces both food and clean water.

Radiality solutions

Multi-functionality Firstly, to make the city as efficient as possible, population density is kept high. For the area to provide comfort and convenience requires the multiple use of land: multi-functionality.

This is manifested in several ways, for example all green areas are available both for recreation and growing food. Wetland areas are used for water treatment as well.

Separation There is also the separation of technology and the natural environment. The central part of the city is separated from the effects of technology, thereby allowing the natural environment to, in an uncontaminated way, produce food and cleanse water.

For natural water circulation, run-off and cleansing to function with minimum contamination and obstruction, automobiles and trucks are removed and paved, asphalted roads and paths are replaced with gravel.

For walking to be facilitated as far as possible, buildings are stilted so people can walk under them.

Outer circular canal Water-borne transport is effective for heavy loads, one solution to bringing goods to residential areas is to use barges sailing around a peripheral canal.

Circular and Cross-town train A system of trains both circular and cross-town provide fast transport to all

urban areas from all urban areas. Again, supporting 'everything close to everything else'.

Biogas, nutrient recycling the central area receives all bio-waste and turns it into biogas and horticultural fibre. Gardeners and farmers place rolls of the fibre over the soil, and plant seedlings through it. The fibre keeps weeds away, and as it decomposes, nutrients recycle back into the soil. All other fertilisation is unnecessary.

Revolving circular building complex In our exercise, we encountered a solution where a circular building complex runs on rails. Work is carried out partly from the home, again following the multi functionality principle. The central building complex functions as a communal meeting and work area.

Example PORENA

In our creative exercise we encountered a population of nearly one million. The radius is 9 kms.

This gives an area of:

$$\pi R^2 = 254 \text{ km}^2 \quad (22/7 \times 9 \times 9)$$

The residential area is a band 2kms broad. The total area of this band is the total area of Porena minus the inner circle

The area of the inner circle is

$$\pi R^2 = 154 \text{ km}^2 \quad (22/7 \times 7 \times 7)$$

So total area in residential band is $254 - 154 \text{ km}^2 = 100 \text{ km}^2$

Now, the population of the densest part of a city is 14,000 per square km. If we took say 10,000 per square kilometer the total population for the residential band would be

$$10,000 \times 100 \text{ km}^2 = 1,000,000$$

This would give an overall density of:

$$1,000,000 \text{ people} / 254 \text{ km}^2 = 3937 \text{ people per km}^2$$

The farthest from a train line is 2kms in residential areas. See the diagram below.

Note: By removing roads and other areas needed for cars, up to 40% of city space is saved. The radial solution with the simple train system puts everything close to everything else, defined as being accessible within 20 -30 minutes.

The maximum travel time would be from the outskirts, 2 km from a station, to another dwelling.

Walking time, maximum 30 minutes plus 30 minutes Train time.

$$\text{Circumference } (2\pi R) = 22 \text{ kms } (2 \times 22/7 \times 7)$$

At an average speed of 50 kms/hr,

$$\text{Half of the circle } (11 \text{ km} / 50 \text{ km/hr})$$

$$= 0,22/\text{hr}$$

$$= 13 \text{ minutes roughly}$$

Add ten minutes for waiting

Maximum journey time is 1 hr 23 minutes.

At faster walking times and no wait, journey time is $20 \text{ mins} + 20 \text{ mins} + 13 = 53 \text{ minutes}$

Savings in travel time are afforded by the revolving section of the administration complex.

The Circular rotating building complex has a radius of 5km.

$$\text{Circumference} = 2\pi R,$$

$$= 31.4 \text{ kms. } (2 \times 22/7 \times 5)$$

Speed of rotation, 6kms/hr.

One full revolution takes 5.2 hrs at 6km/h.

$$(31.4/6)$$

If you walk in the same direction as rotation you travel at 12kms/hr... by walking!

Summary:

A city like Porena designed radially, with a circular train line and two cross lines, allows a million people to live in a radius of ten kilometres. The design utilises walking at the frequency considered healthy.

Reference: Key numbers and terms

Population density

- London inner city 14,000 per km²
- London outer city 5,000 per km²

Walking

Speeds

- Brisk 5-6 km/hr
- Normal 4 km/hr

Minutes per day spent walking = 60

Distance: Good distance is 10,000 steps, equivalent to 8-10 km. Very healthy is 18,000 steps, equivalent to 14-18km

Mathematical formulae

$$\text{Circumference} = 2\pi R$$

$$\text{Area} = \pi R^2$$

$$\text{Speed} = \text{distance}/\text{time} \quad \pi = 22/7$$

Kms

