> both are changed by the interaction ... the second law of thermodynamics (states that) energy tends to dissipate towards entropy, or chaos. In seeming violation of that law, biological systems tend to become increasingly more complex and efficient.

The aim of urban design is the development of the city and its parts as open systems, constantly building up more complex forms of energies from the energy absorbed. This view of the city is in contrast to the city visualized as a mechanism with its parts functioning like clockwork. The result of working to this philosophy of the city as machine is the parasitic metropolis feeding off its host, giving little in return and leading ultimately, if not checked, to the demise of itself and its host.

A design concept strongly associated with sustainable development is the idea of mixed land uses. As a concept it has its origin in the rejection of rigid and inhuman land-use zoning associated with the mechanistic model of city planning as practised earlier in this century. For those espousing sustainable development, localities of mixed land use present the prospect of self-sufficient communities, while at the same time reducing the need to commute great distances from home to work, from home to school or from home to shopping centre. As a concept it is a tentative step towards an 'open systems' view of settlement. Such a systemic analysis of settlement concentrates on the relationship and linkages between design components. Any design for a human settlement involves concepts or ideas about the problem and its solution, techniques for performing essential design tasks, strategies for achieving a future goal and the materials of construction. Urban design is the method used to assemble the components of city design, whether they are concepts, ethical propositions, social imperatives or the physical structures of design such as buildings, infrastructure, land and vegetation: the purpose of the process being sustainable development and security of man and all living beings. Central, therefore, to urban design is an analysis of the linkages between the various components, even if that analysis is no more than the simple listing of each component's characteristics. The ultimate aim of the analysis is the location at close proximity of those activities which are mutually supportive. Design policies which support mixed land uses at the local level of the quarter or residential neighbourhood are compatible with this aim. While the use of a regime of mixed land uses is not an alternative to a more detailed analysis of major linkages, it is a sound basis for such a more definitive study.

Each urban activity has outputs, yields or products which become resources only when they are used productively. They become pollutants if they are not used constructively by the system being designed. Each activity also has inputs, needs or demands on resources. If these inputs are not being supplied by the design system, then energy has to be found to satisfy those demands from without the system. In terms of permaculture theory, 'A POLLUTANT is an output of any system component that is not being used productively by any other component of the system. EXTRA WORK is the result of an input not automatically provided by another component of the system'.[15] The aim, therefore, of urban design is to develop systems where the outputs from activities become the inputs for adjacent activities. In the sustainable city the location of activities is not only or necessarily a function of economics, but more importantly it is location strategies which attempt to minimize the export of pollution and the importation of additional inputs of resources, or EXTRA WORK, from beyond the boundary of the system.

The concept of the self-sufficient, neighbourhood, quarter or urban village is a useful tool for structuring the sustainable city region.[16] The early new towns built in Britain after the Second World War, to some extent, achieved this aim. In many ways the early post-war new towns in Britain adopted an organic structure with components organized like living cells. New towns such as Harlow by Gibberd are structured on an hierarchical basis: the city comprising four main districts, each with its own

district centre. Districts are sub-divided into neighbourhoods with a neighbourhood centre. The neighbourhoods further divide into distinct housing areas, which in turn sub-divide into housing clusters, each composed of the basic unit or cell - the home of the nuclear family (Figure 5.7).

McKie's concept for 'cellular renewal' is a particularly good example of organic planning.[17] He devised a model for restructuring streets and run-down neighbourhoods in inner-city areas. His suggestion was to replace comprehensive redevelopment, then the favoured tool for city restructuring, with a more sympathetic small-scale process of rehabilitation and regeneration. There was evidence, at the time McKie was working, to show that comprehensive redevelopment destroyed many vital communities in the process of renewing the physical structure. Cellular renewal depends for its success on a detailed survey of individual properties

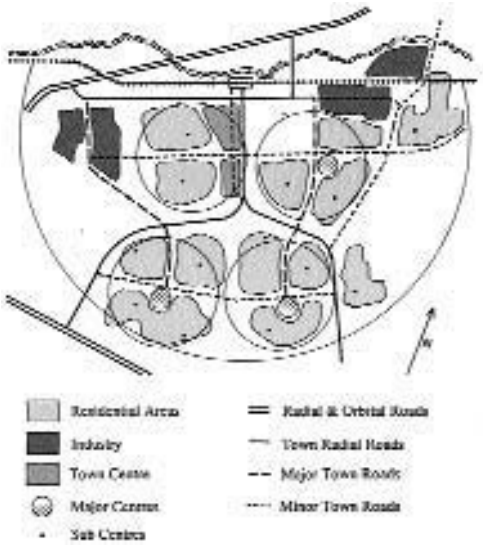

Figure 5.7 Harlow new town, structure diagram.

Figure 5.8 Cellular renewal.

Cells	1	2	3	4	5	6	7	8	9	10	11	12		Special notes
	Standard of amenities	Structural deficiency	Internal arrangement	Internal maintenance	Externalities/ social costs	Tenure	Household type/mobility	Household's perception of environmental deficiency	Social/kinship ties	Workplace ties	External amenity	Deficiency of effective demand for improved housing	Rating	
1	d	d	c	c	c	b	c	c	c	b	b	b	c	Small families in private lets
2	a	b	a	b	b	a	c	c	b	c	b	b	b	Small adult families, first time owner occupiers
3	c	c	c	d	c	d	d	c	d	a	b	c	c d	Mainly students
4	b	b	b	c	b	c	a	a	a	d	a	a	a b	Old people renting from local authority, improve?
5	a	a	a	b	b	c	c	d	c	c	b	b	a/c	Families anxious to move. Possible source of houses for internal relocation
6	c	b	b	c	c	b	a	a/b	a	d	a	a	a b	Older people in private lets. Improvement potential?
7														