Chapter 1 Systems analysis of the urban planning processes

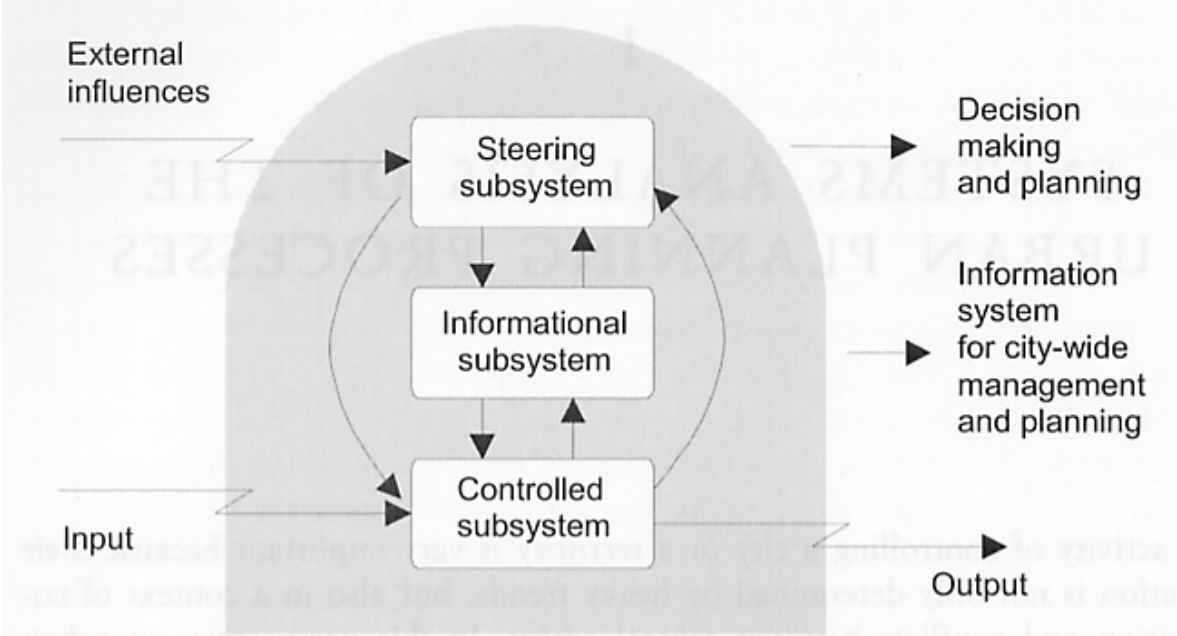

Figure 1.1 A city as a general system

1.1 Modeling cities as a general systems

City = General system including

a steering subsystem

an informational subsystem

a controlled subsystem

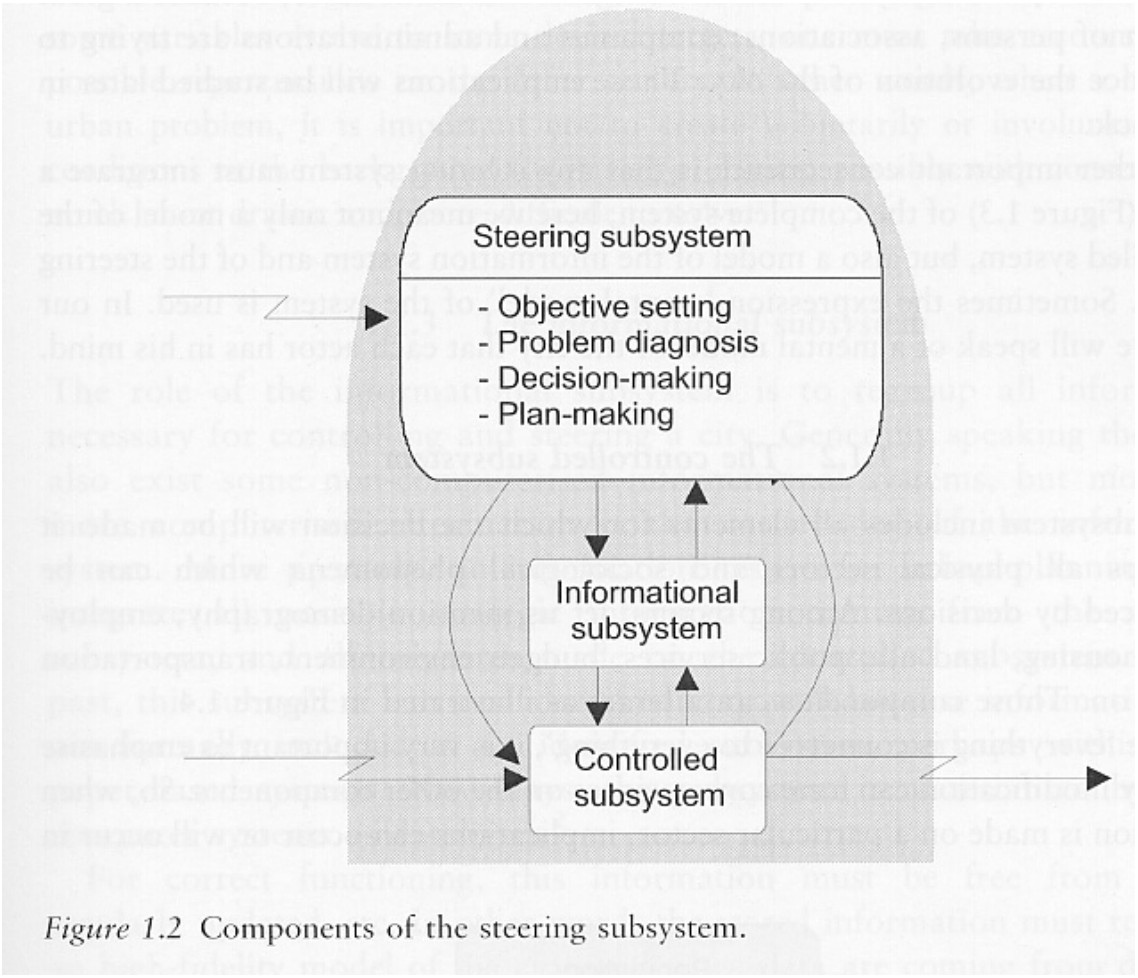

Figure 1.2 Components of the steering subsystem.

1.1.1 Steering subsystem

- Steering subsystem's main objective :

  determination of objectives

  diagnosis of the problems

  design & selection of decision alternatives

  planning

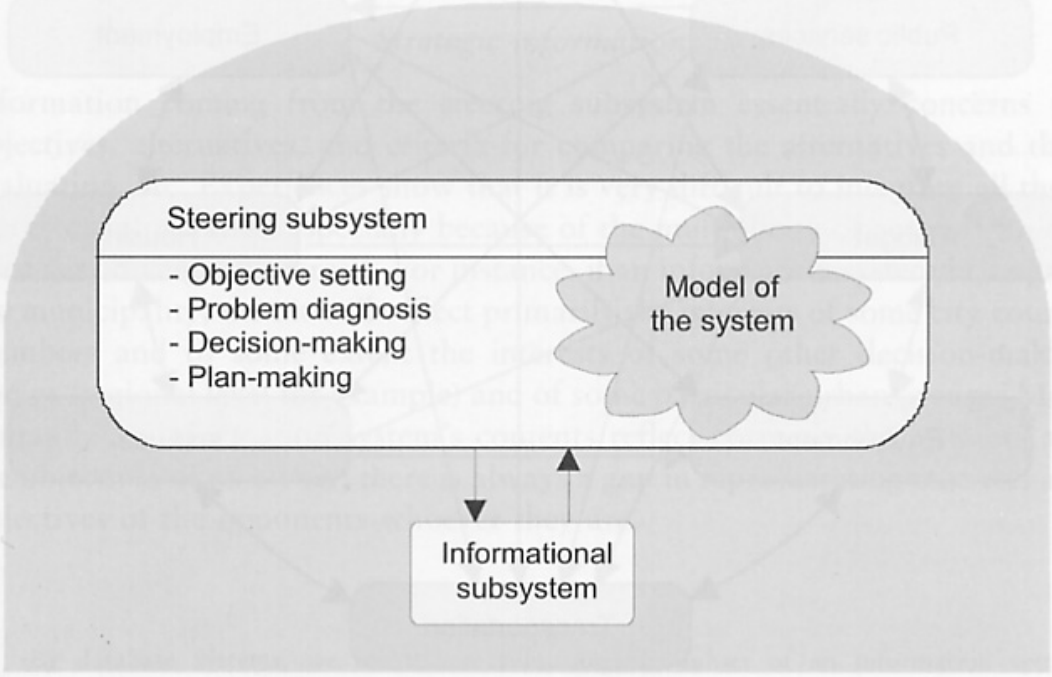

Figure 1.3 Any steering subsystem has a model of the complete system.

1.1.1 Steering subsystem

- Steering subsystem should have a ‘mental model’

  -> Must integrate

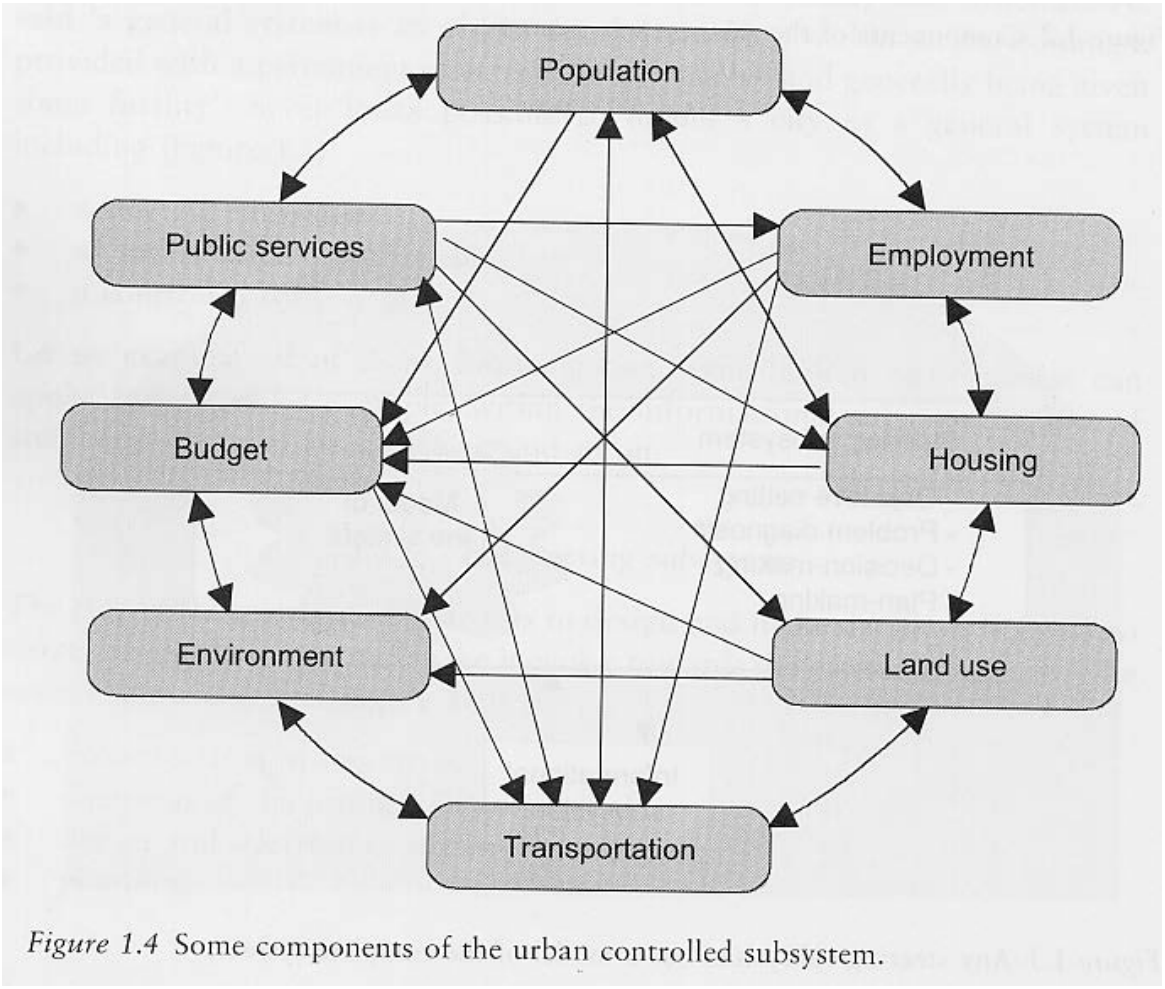

Figure 1.4 Some components of the urban controlled subsystem.

1.1.2 Controlled subsystem

- Controlled subsystem includes

  all elements for which the decision will be made

  (ex. demographic, employment, housing, landuse ..)

- Everything (all elements) is connected

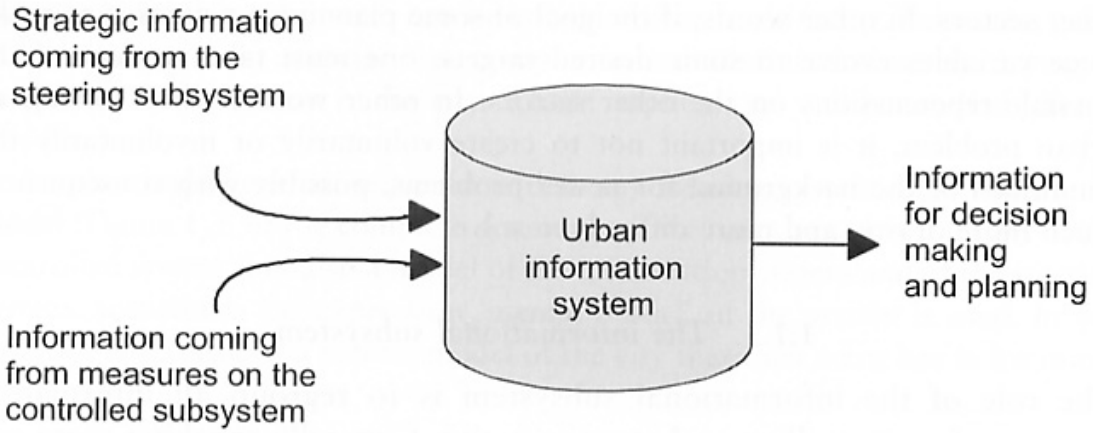

Figure 1.5 Main sources of an urban information system.

1.1.3 Informational subsystem

- Role of informational subsystem :

  regroup all info necessary for controlling & steering a city

  : integrate strategic info from the steering subsystem &

  all measures made on the controlled subsystem

  Strategic info concerns

  objectives, alternatives, criteria for comparing

  All measures from controlled subsystem

  easy to collect but huge

  (ex. data of parcels, persons, buildings, pipes, trees, ..)

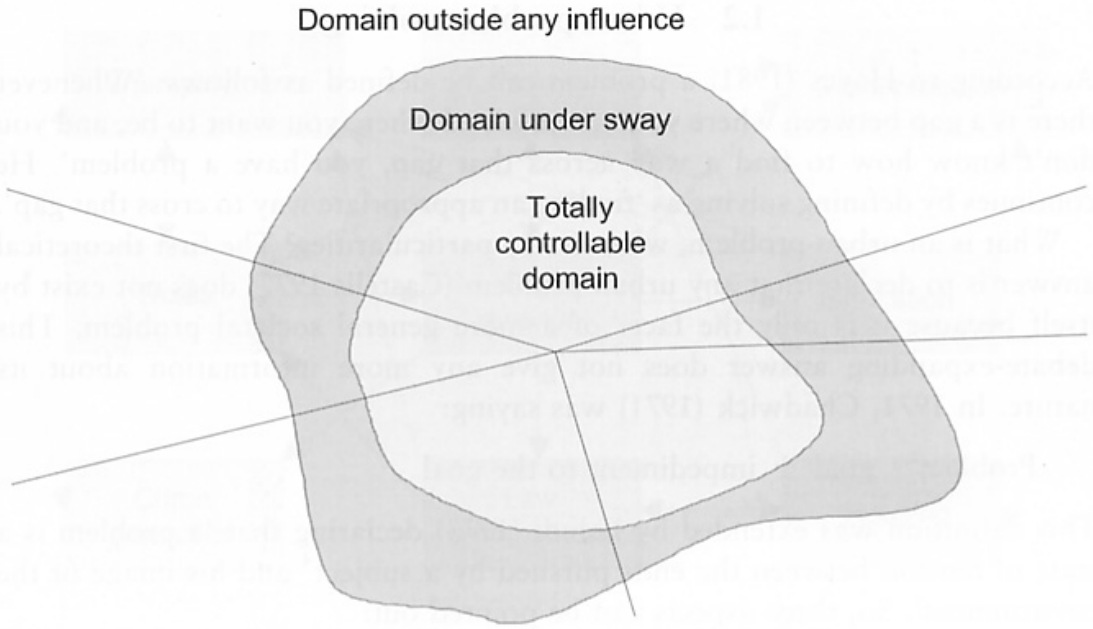

Figure 1.6 The totally controllable domain, the domain under sway and the domain outside any influence.

1.1.4 On the controlled domain

- In a city, there are 3 domains
  a. totally under control of the steering subsystems
  b. partially controllable, some influences from it
  c. totally outside any influence

  ex) open a new industrial zone to increase employment within a city
  -> fail due to people from outside to be hired

  NO sector is TOTALLY CONTROLLABLE !

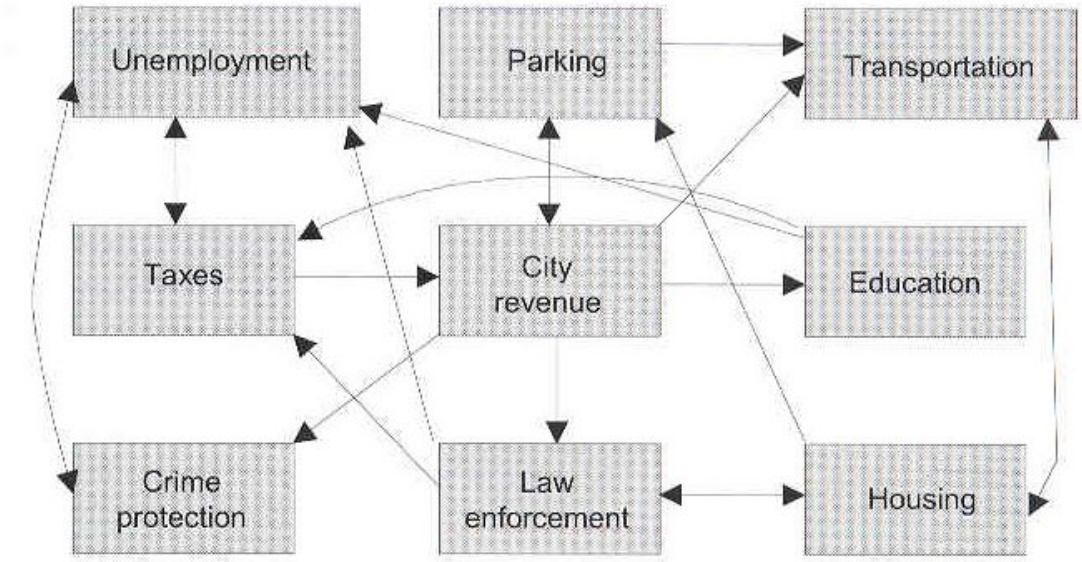

Figure 1.7 A mess of urban problems.

1.2 Urban problem solving

- What is "urban problem" ?

  = goal + impediment to the goal (Chadwick, 1971)

  Characteristics

  a. very complex & linked together to form a "mess"

  b. ridiculous

  ex) noise complaints from quite residential area not vicinity of noisy motorways

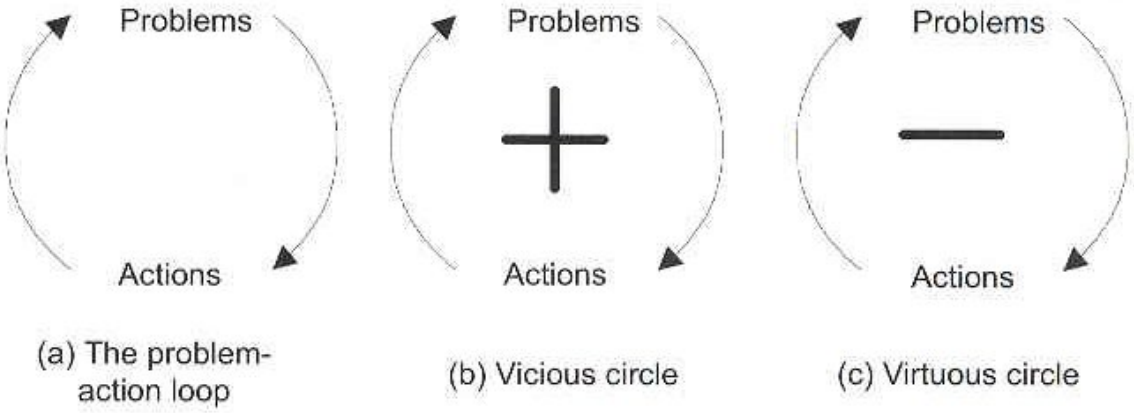

Figure 1.8 The problem-action loop and different cases. (a) the general loop. (b) the vicious circle. (c) the virtuous circle.

1.2 Urban problem solving

- Three types of problem-action loop

  a. general loop : problem – action cycle

  b. vicious circle : more action more problem (snowball effect)

  c. virtuous circle : more action less problem

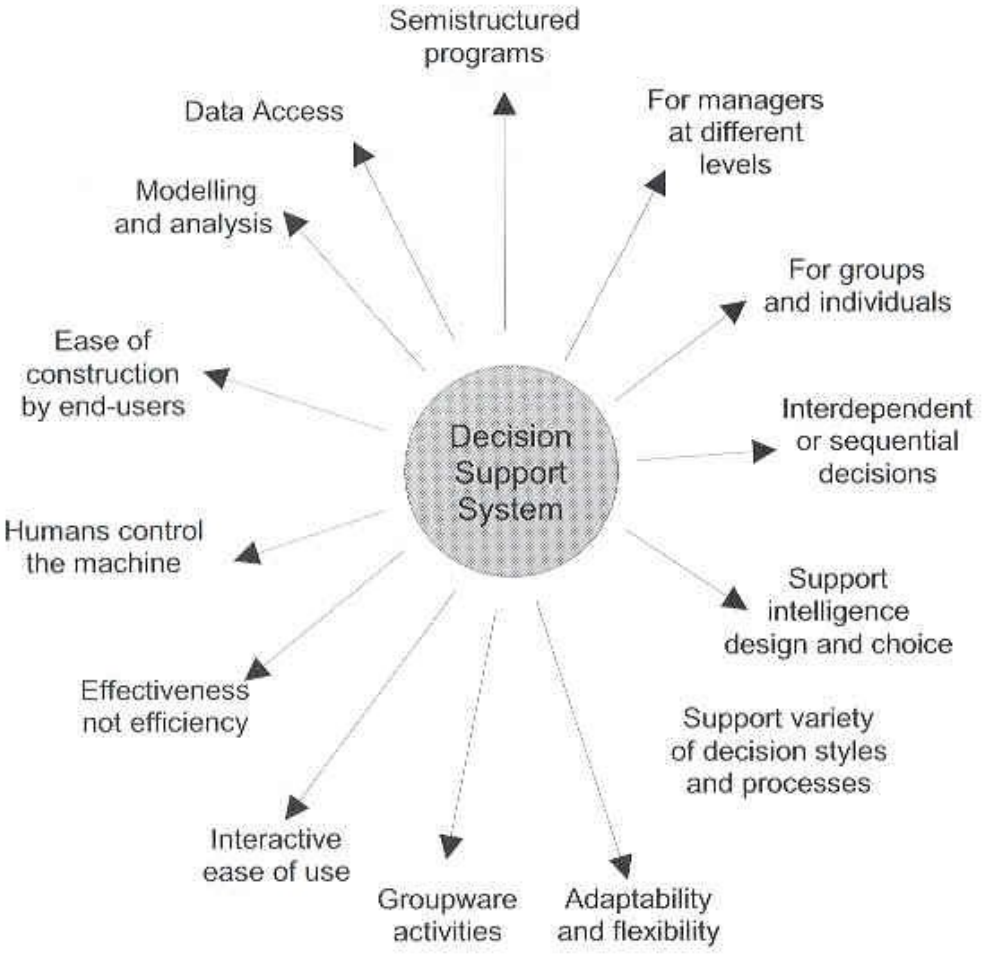

Figure 1.9 The ideal characteristics and capabilities of a decision-support system. According to Turban and Aronson 1998.

1.3 Decision support systems

- Ideal DSS (decision support systems) must support the above

- Should simulate the future by what-if models of

  a. transportation & traffic model b. pollution models

  c. service & commercial premises location

  d. energy & water consumption e. water production etc..

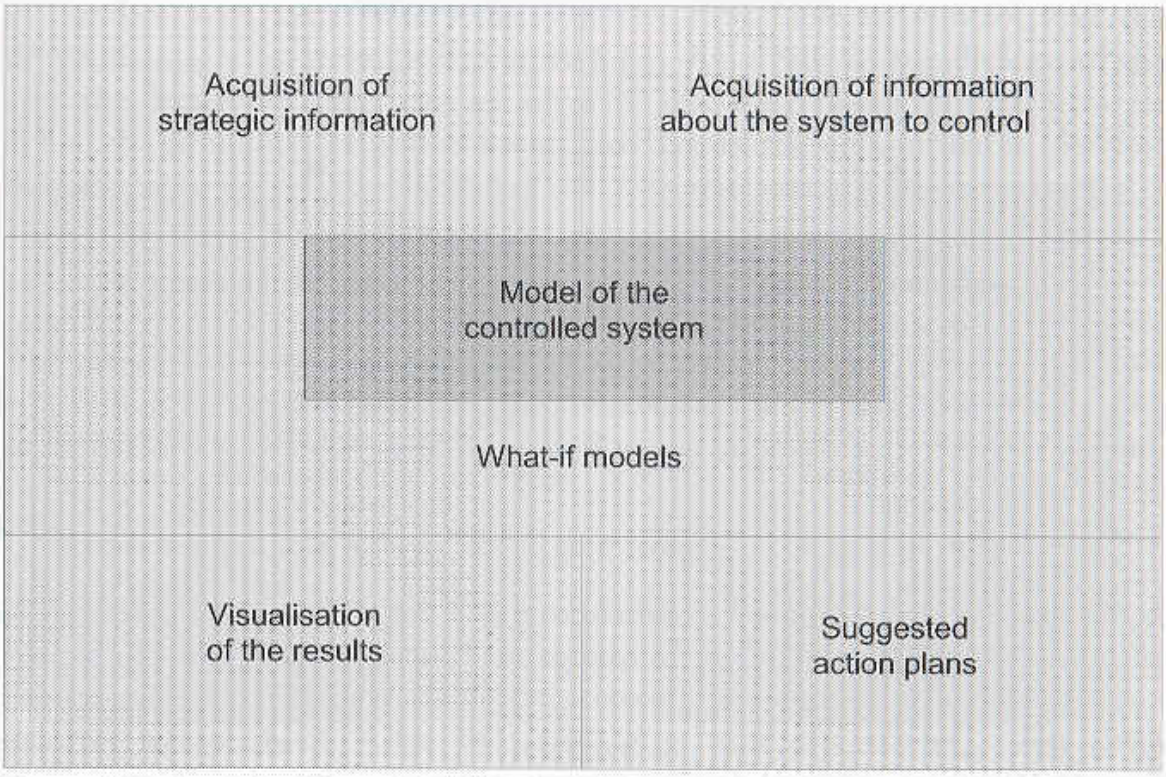

Figure 1.10 Structure of a spatial decision-support system.

1.3 Decision support systems

- Component of the "what-if" model

a. acquisition of strategic info

: info from steering subsys & info about territory

b. acquisition of info about the system to control

c. model of the controlled system

d. modules of what-if models for data analysis & sys simulation

e. visualization of the results

f. action plans

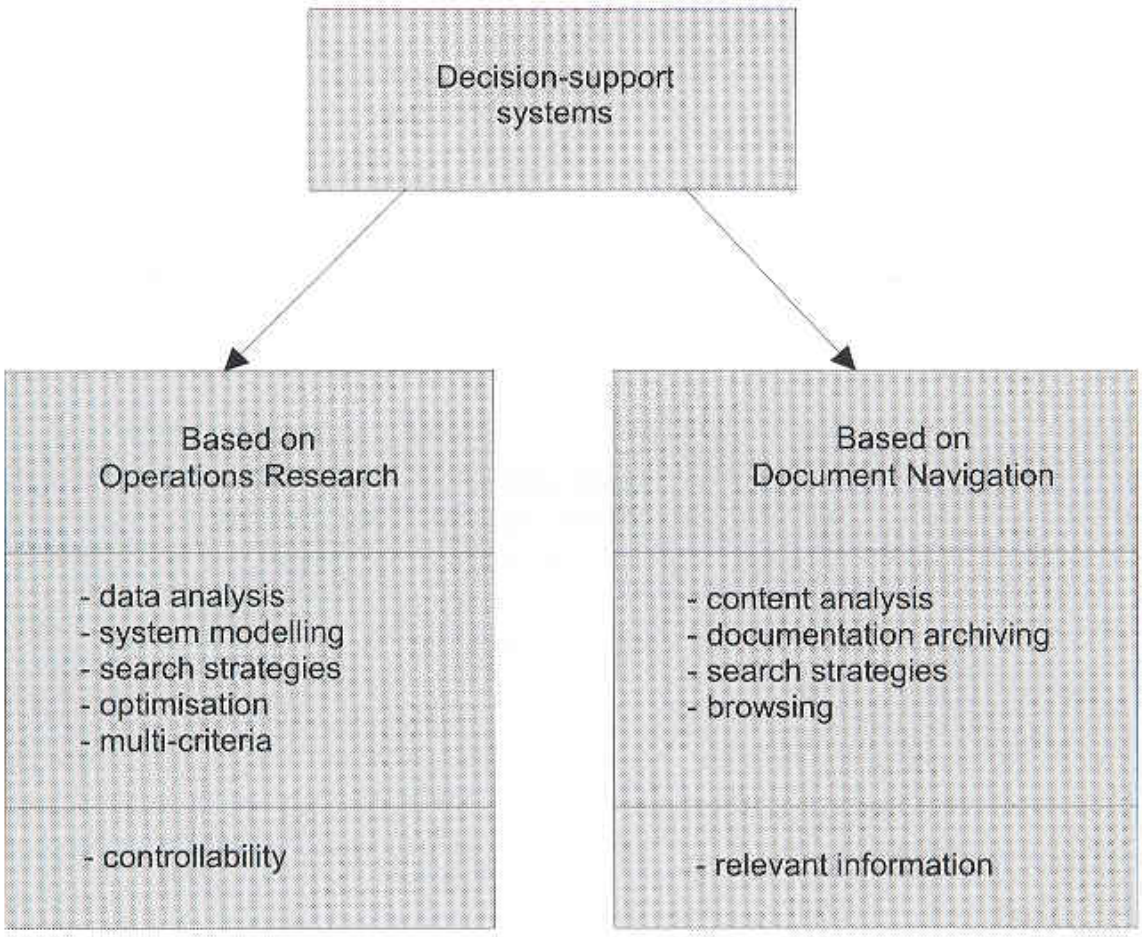

Figure 1.11 Different kinds of decision-support systems.

1.3 Decision support systems

Two kinds of DSS

a. based on OR : from operational urban modeling

b. based on document navigation : hypertext & hypermap

(-> Chapter 5)

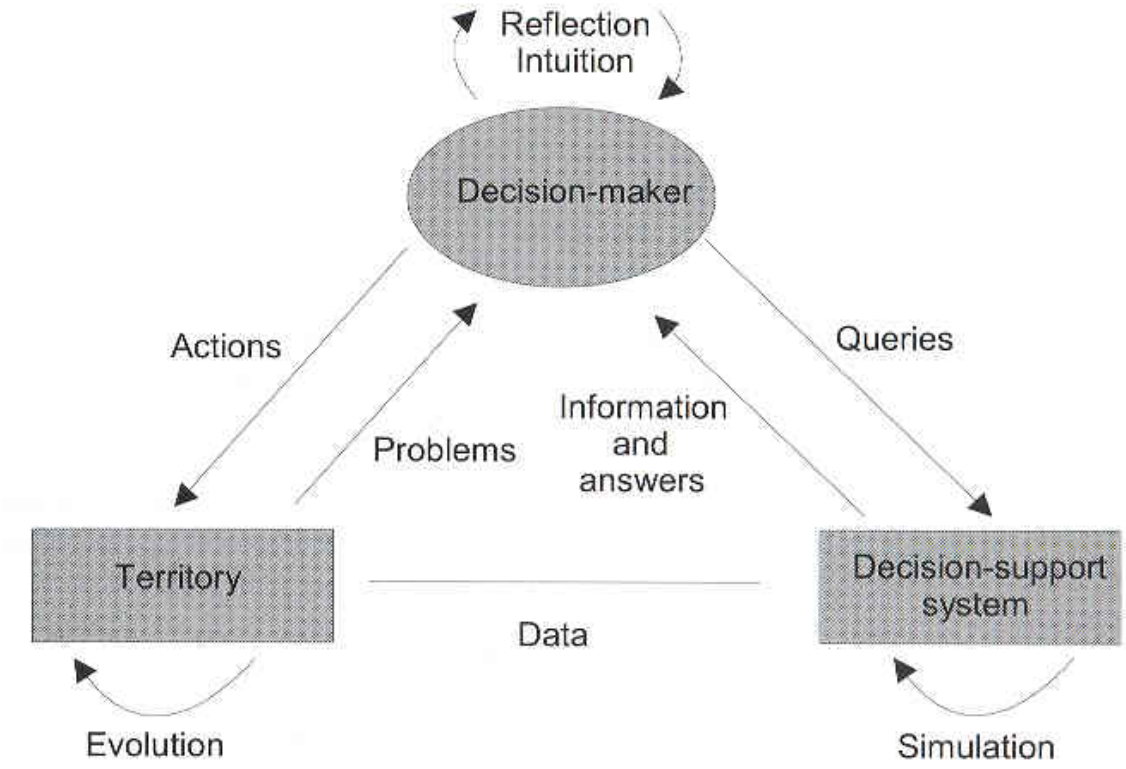

Figure 1.12 Relationships between decision-makers, the territory they have to control and the DSS.

1.3 Decision support systems

- Three elements in simulation

  a. decision maker

  b. territory

  c. DSS itself

1.4 Urban plan-making

1.4.1 Definition of urban planning

- What is urban plan-making ?

a. planning is future oriented

b. concerned w/ defining & evaluating alternative solutions

c. planning is political

d. planning has a special responsibility
ex) minority, disabled, poor

➔ planning is a process that uses a variety of tools to achieve envisioned & desired goals within the natural & build environment (Henderson, 1997)

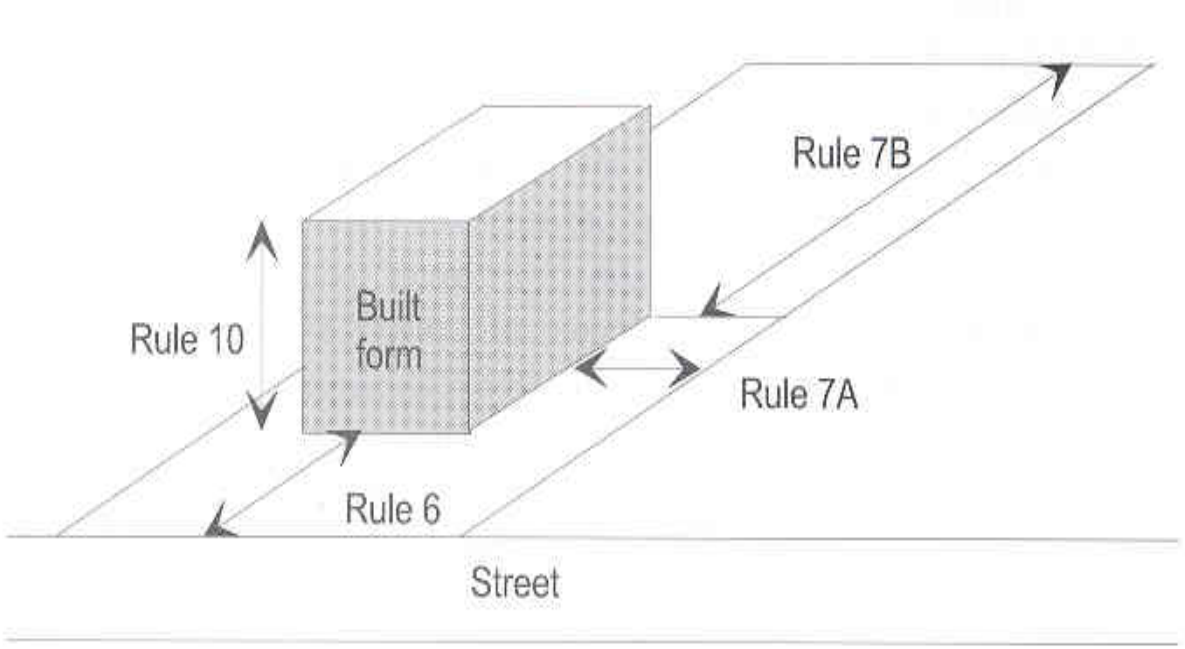

Figure 1.13 Applying building rules to define a building envelope.

1.4.2 Legislative framework

Planning should meets legislative framework

: many rules of zoning, floorspace ratio, road and access etc..

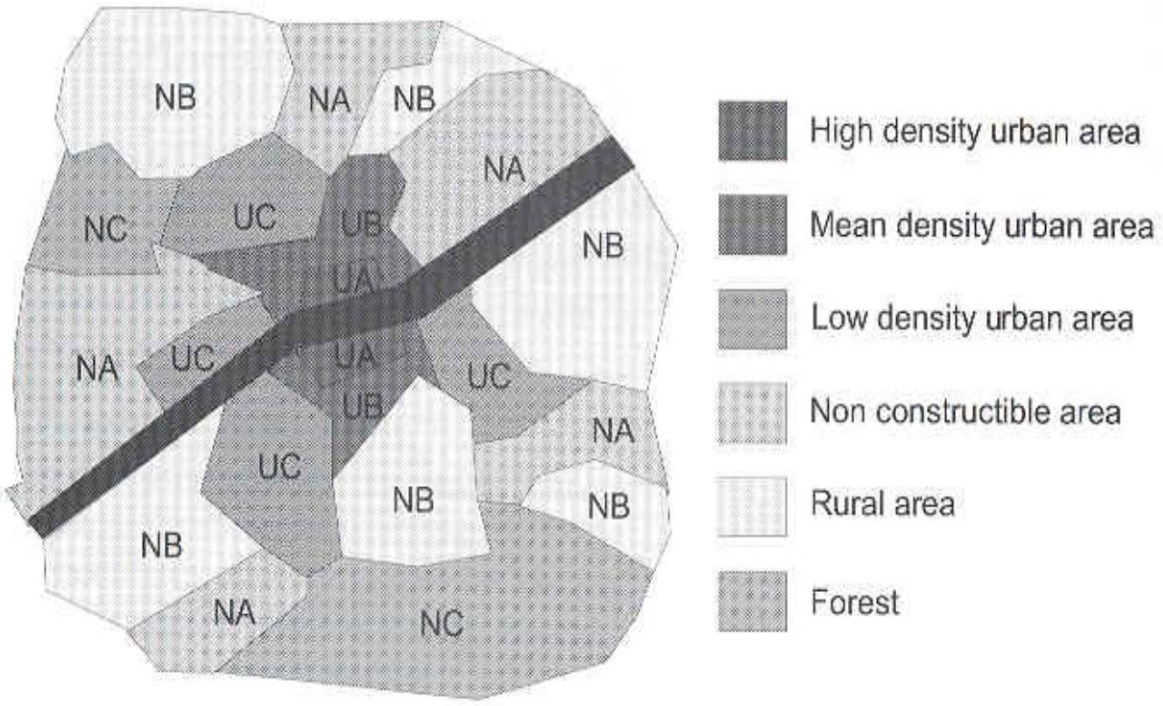

Figure 1.14 Example of French land-use map (POS).

1.4.2 Legislative framework

* POS : existing land use planning (main French regulations)

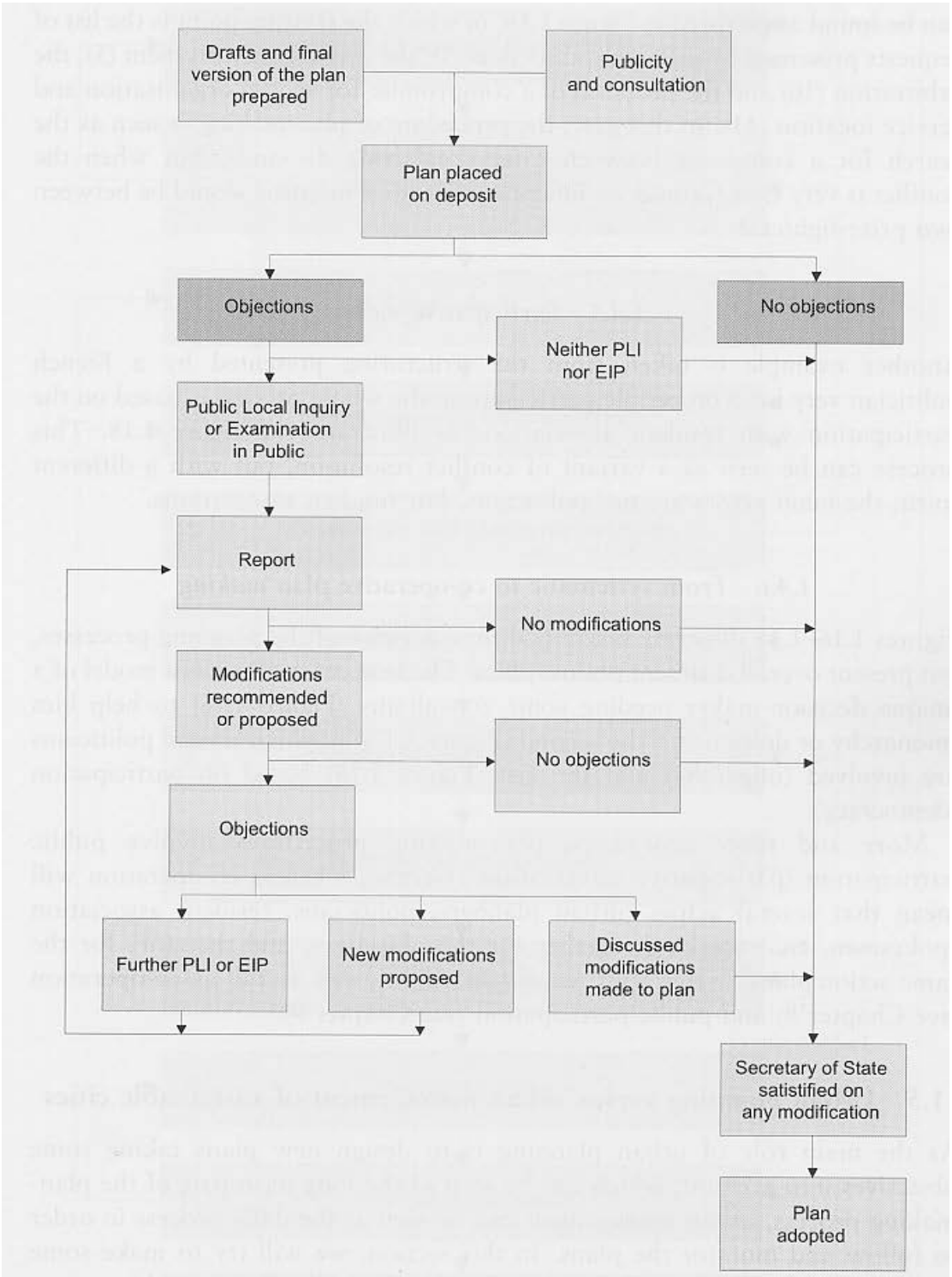

Figure 1.15 The development plan process in the UK, according to Rydin (1998). Adapted from Planning Policy Guidance note 12 section 4. PLI means Public Local Inquiry and EIP Examination in Public.

UK Case : legislative steps of a plan

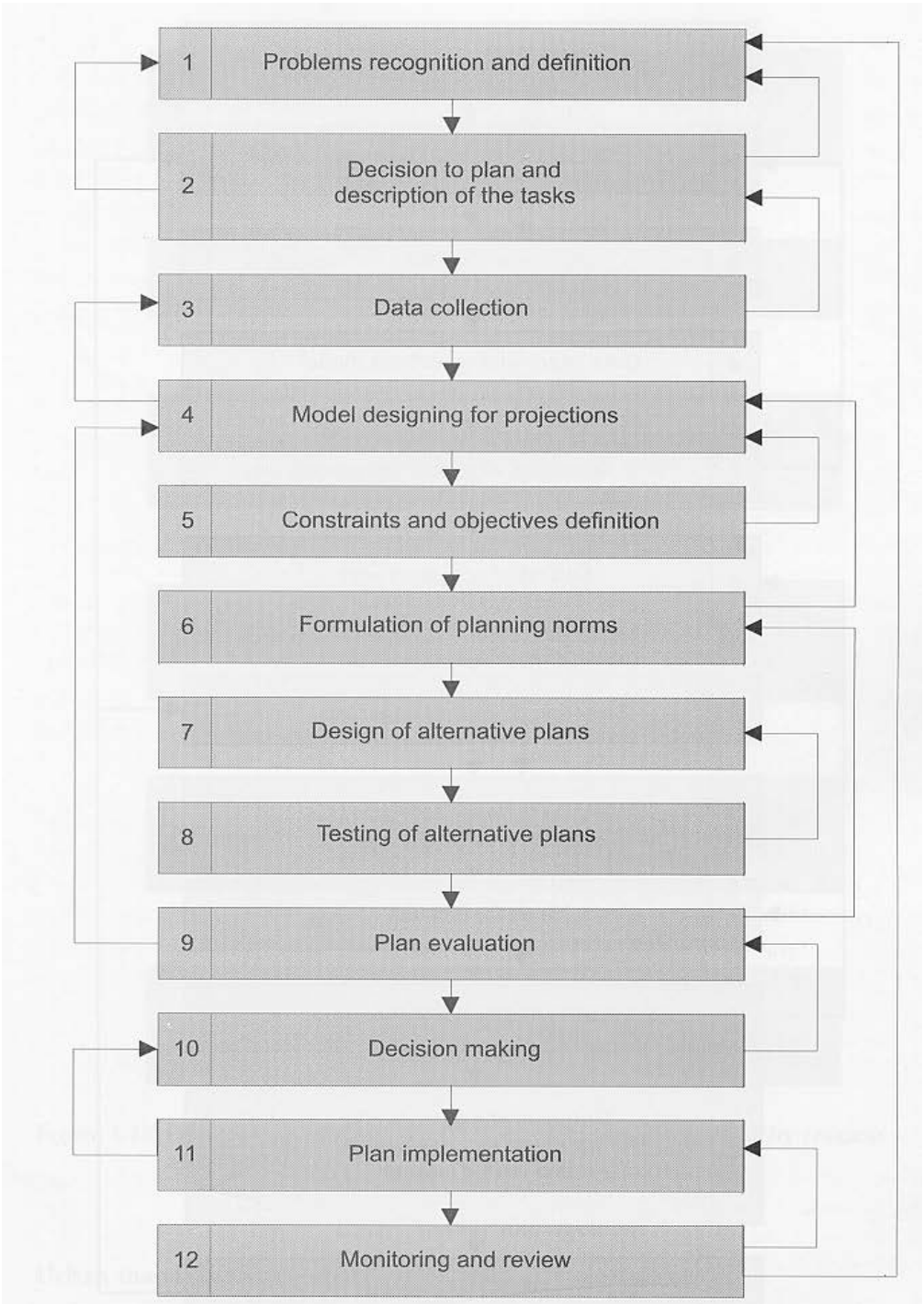

Figure 1.16 A systematic view of the urban planning process. Simplified, according to Sarly 1972.

1.4.3 Systematic view

- Different view of planning : Systematic view

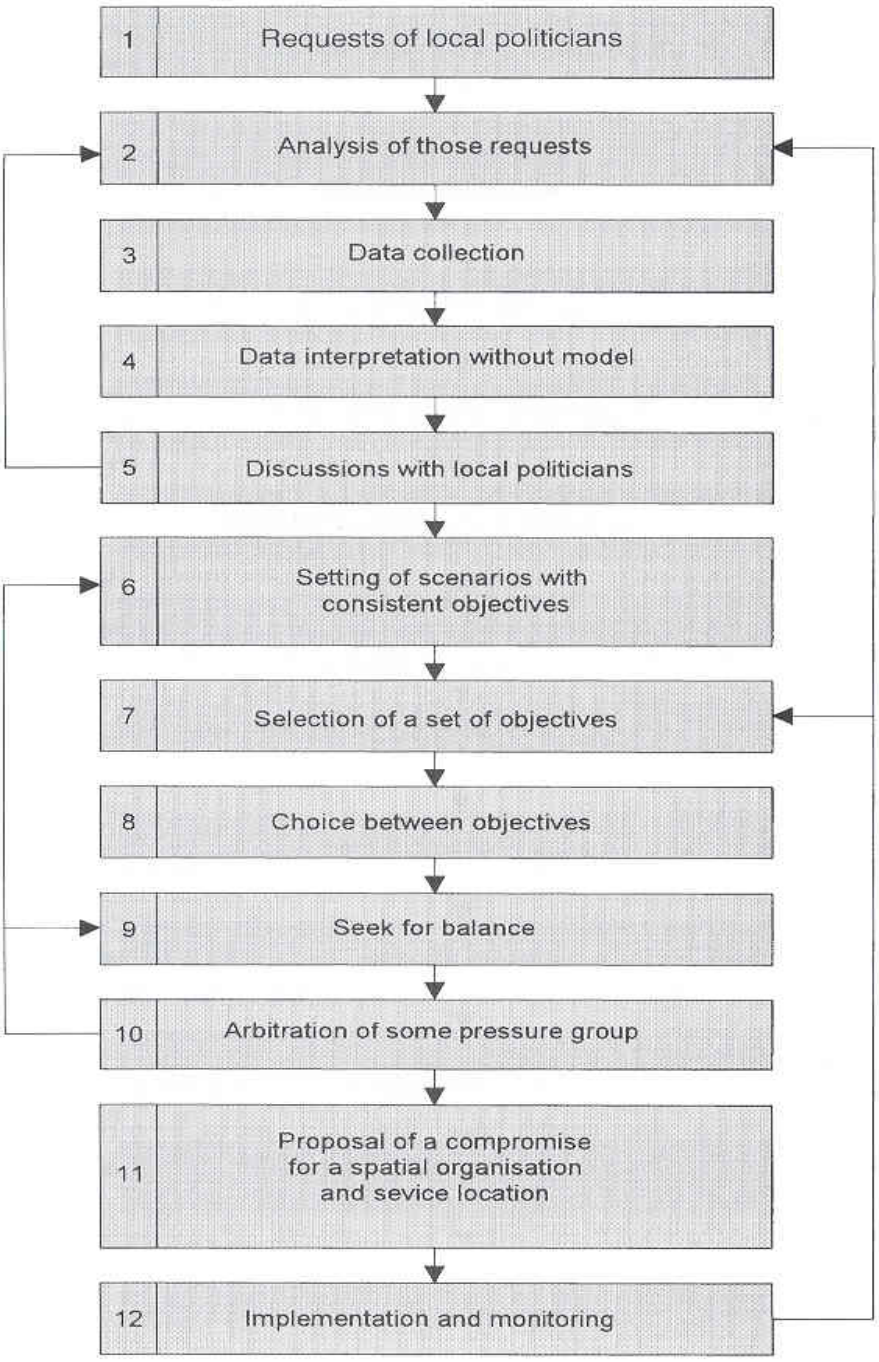

Figure 1.17 Plan-making process based on conflict resolution.

1.4.4 Conflict tackling view

- Different view of planning : Conflict tackling view

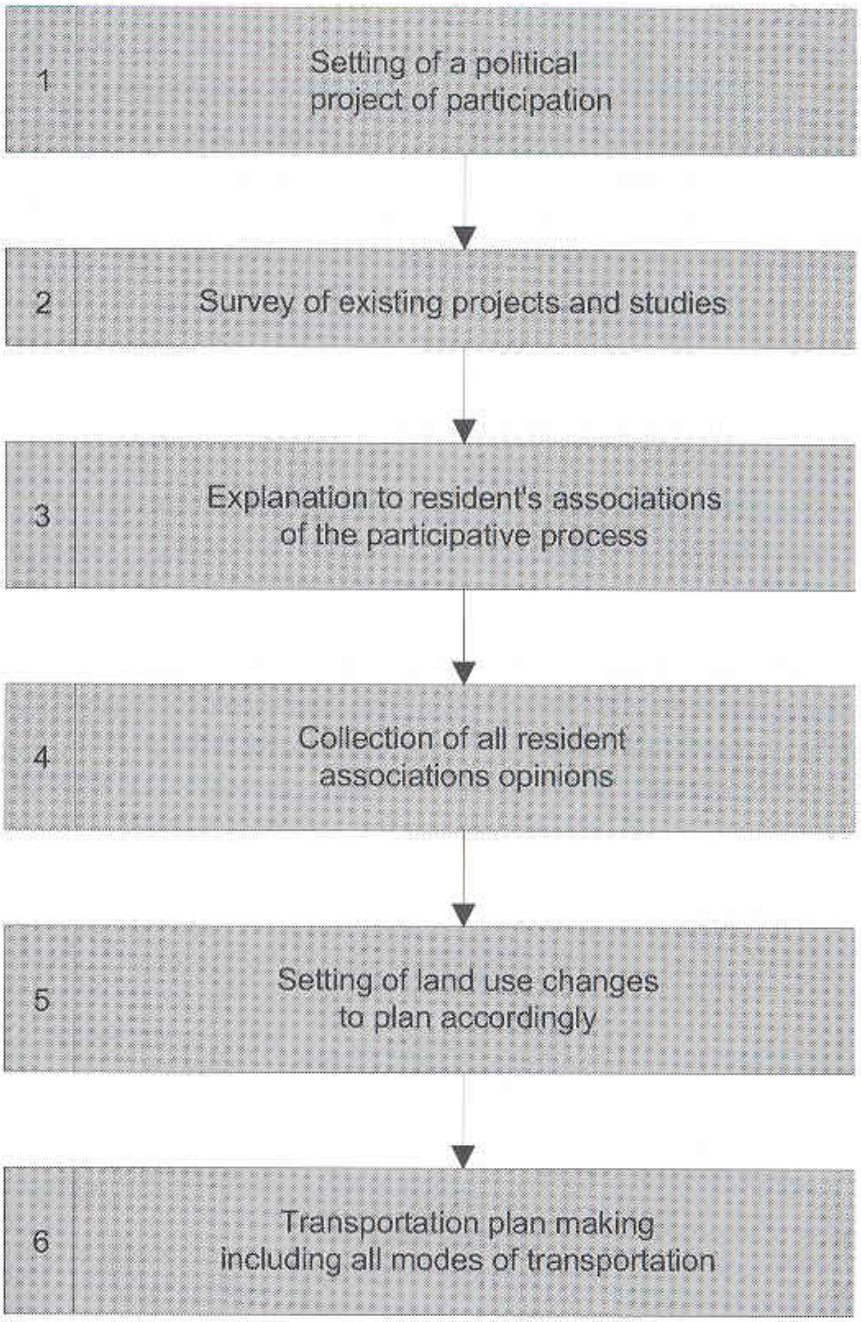

Figure 1.18 Plan-making process of a local French politician backed by resident associations.

1.4.5 Participative view

- Different view of planning : Participative view

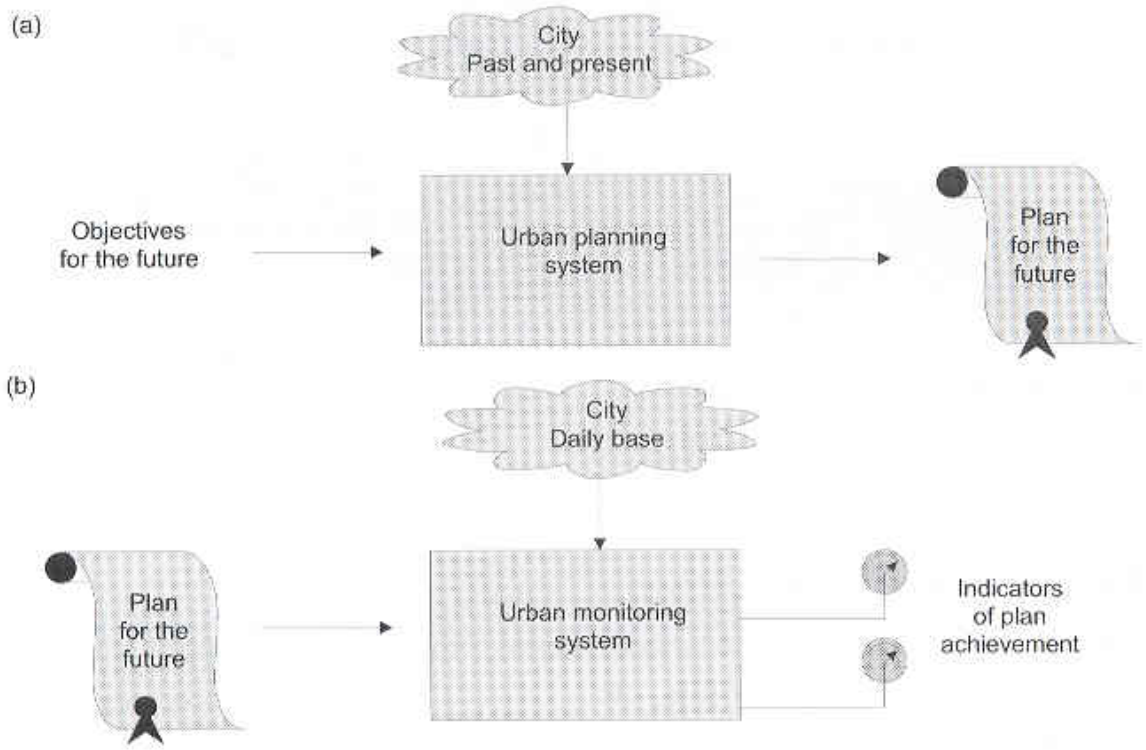

Figure 1.19 Comparing systems for (a) urban planning, (b) urban monitoring.

1.5 Urban planning & Urban management of sustainable cities

1.5.1 Urban management

- Urban planning : long-term

- Urban management : daily process to follow / monitor the plans

  a. data collected on a daily basis
  (ex. accounting, building permits, etc..)

  b. different kinds of administrative authorizations

  c. maintenance of the city infrastructure

  d. social services, etc..

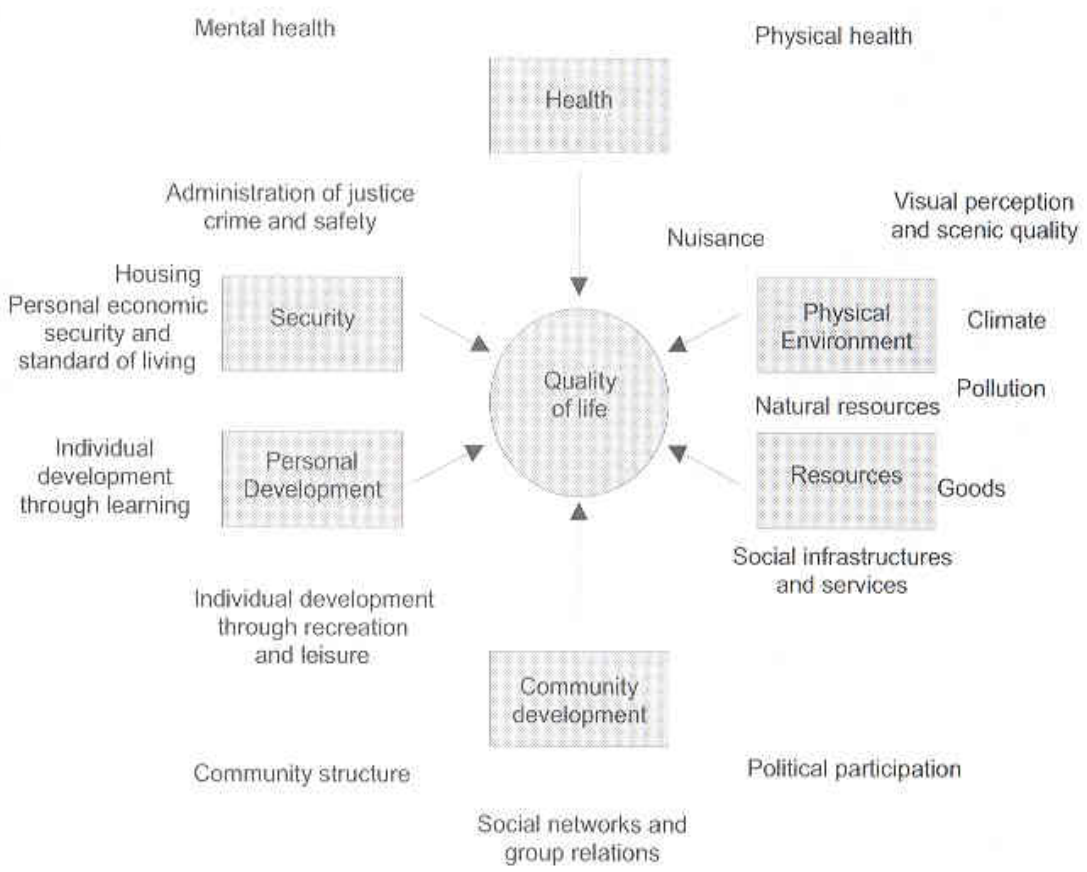

Figure 1.20 Classification of issues concerning quality of life in cities. From May *et al.* 1996.

1.5.2 Planning for sustainable cities

- Quality of life <- Meets by planning for sustainable cities

  * sustainable development meets

    futurity, social equity, public participation, environment
    (World Commission on Environment & Development, 1987)

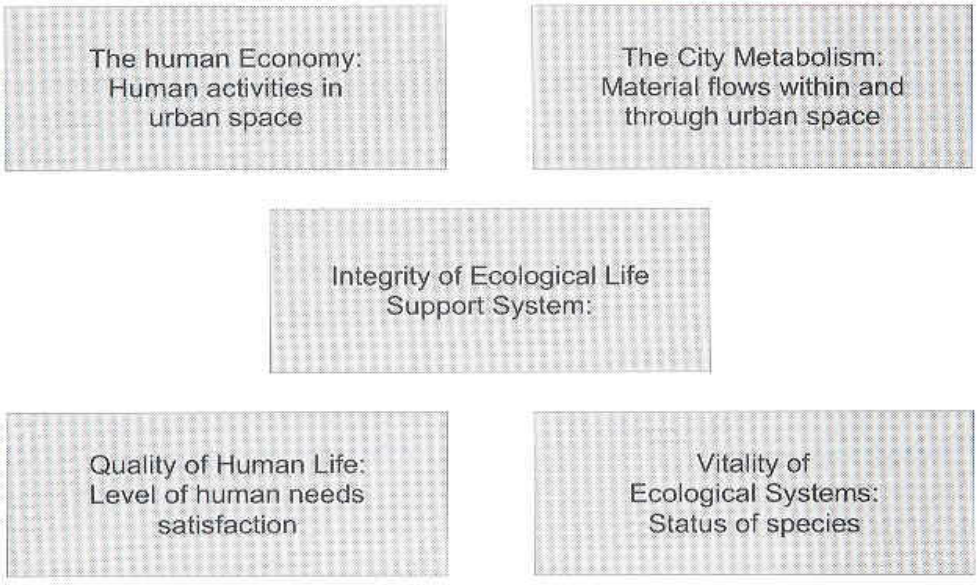

Figure 1.21 Components of a conceptual framework for a sustainable city model. From May *et al.* 1996.

1.5.2 Planning for sustainable cities

- Components of a conceptual framework for a sustainable city model
  a. human economy : human activities in urban space
  b. city metabolism : material flows within & thru urban space
  c. quality of human life : level of human needs satisfaction
  d. vitality of ecological systems : status of species

Table 1.1 Indicators of sustainability (according to May *et al.* 1996)

Theme	*Proposed indicators*
Resource depletion	Fraction of energy use generated from non-fossil fuel resources. Annual water use as a percentage of the stock in a 50 year return period drought. Percentage of households by key demographic group spending more than 10% of their income on domestic energy supply. Area by regional habitat type.
Residual emission	Respiratory illness in children under 16 years. Greenhouse gas emission. Exceeding critical acid load for sensitive agricultural soil. Remaining capacity at existing landfill sites.
Social sustainability	Life expectancy in years at birth. Number of people in temporary local accommodation. Staff student ratio per year. Total number of violent and non-violent crimes. Number of households at or below the official poverty line
Ecological integrity	Abundance of keystone and flagship species in key regional habitat.

1.5.2 Planning for sustainable cities

- Steps of a strategy

a. develop performance indicators
b. develop a conceptual model of city sustainability
c. develop a system architecture
d. assess the sustainability of existing models for use
e. mount & link existing models on the model system
f. develop operational sub-models
g. assess data availability & quality, implement data collection scheme
h. test model predictions against observed data
i. repeat step d-h until model successes

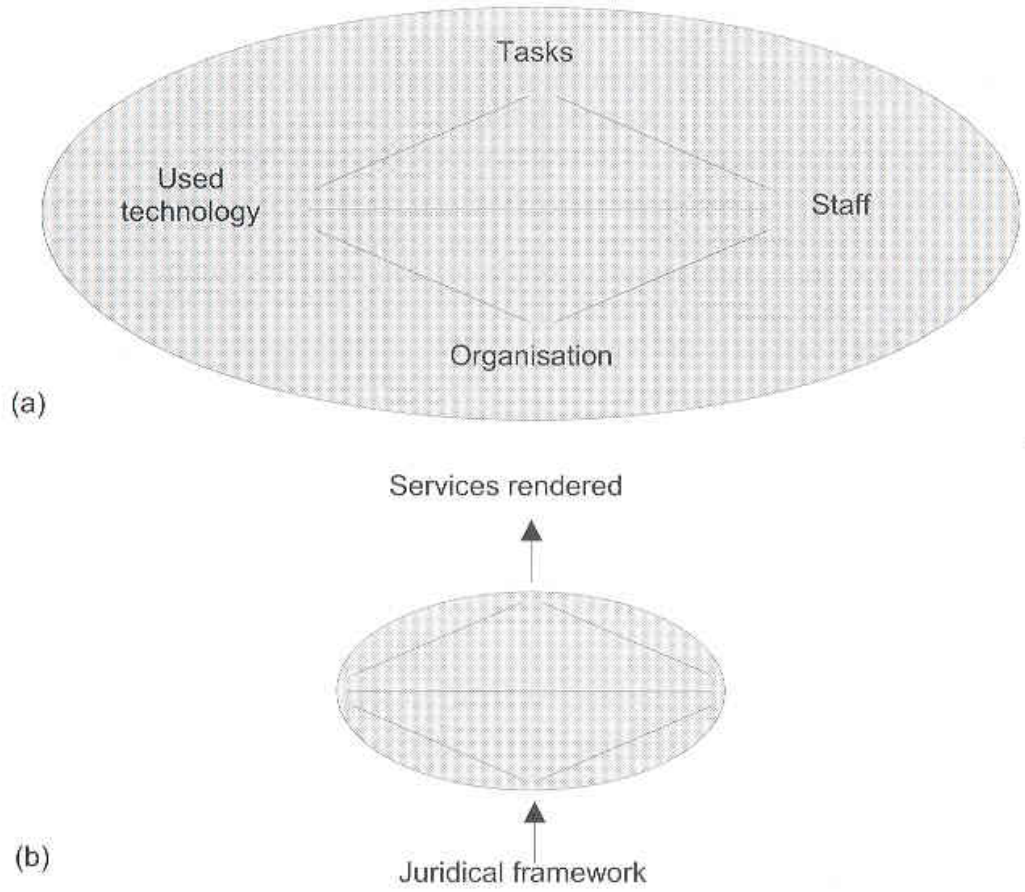

Figure 1.22 The Leavitt diamond. (a) the original. (b) revisited.

1.6 Role of information systems

1.6.1 Technology & information systems

- Relationship between technology & info systems

  -> Leavitt diamond, Strategic triangle, Government pyramid

  A. Leavitt diamond

  stresses the relationship – organization structure, staff, used technology, tasks to be performed

  juridical framework shapes the diamond & service rendered

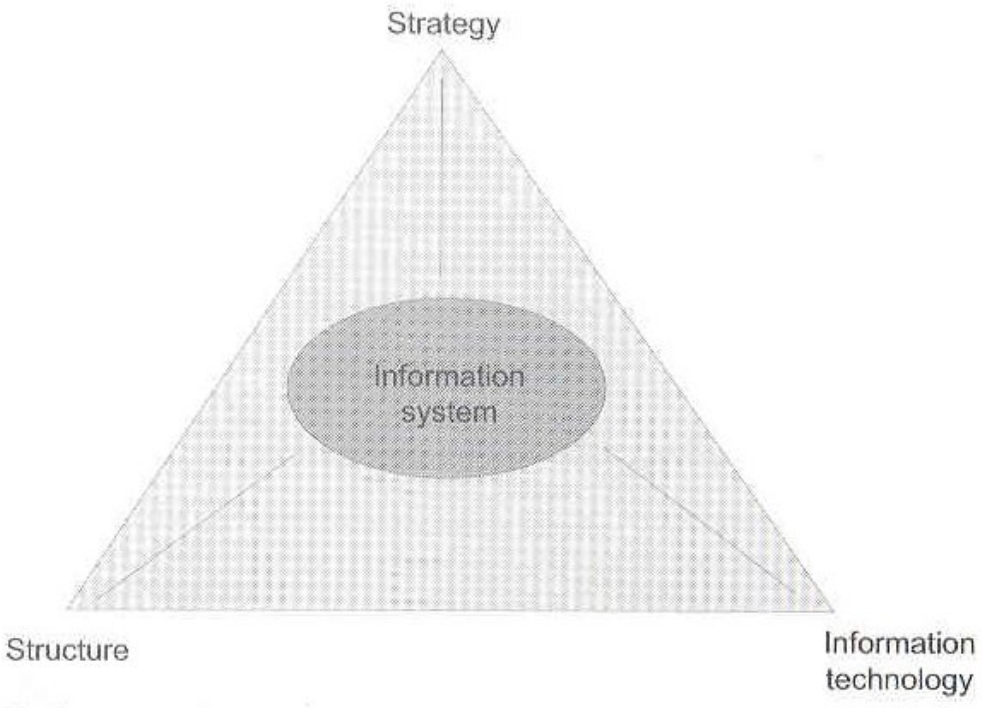

Figure 1.23 The strategic triangle.
According to Tardieu and Guthmann 1991.

1.6.1 Technology & information systems

B. Strategic triangle

illustrates the relationship – organization structure, its global strategy, level of info technology

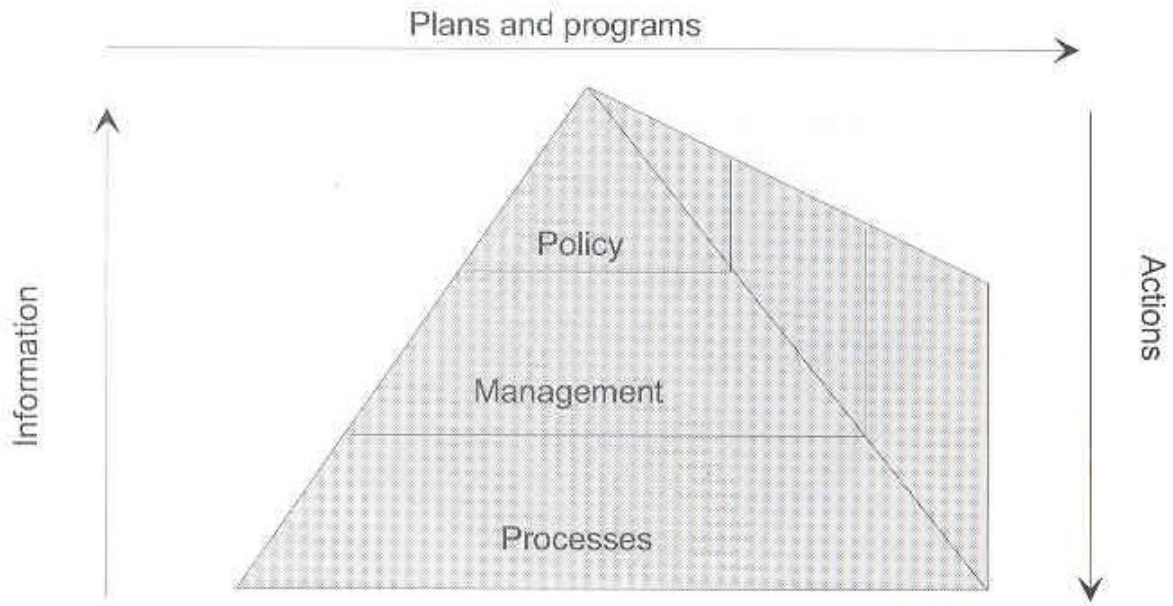

Figure 1.24 The government pyramid.
From Huxhold 1991.

1.6.1 Technology & information systems

C. Government pyramid

relationship – processes, manage, policy within organization

info : comes up from processes

actions : go down from policy

one passes from info to actions by means of **plans and programs**

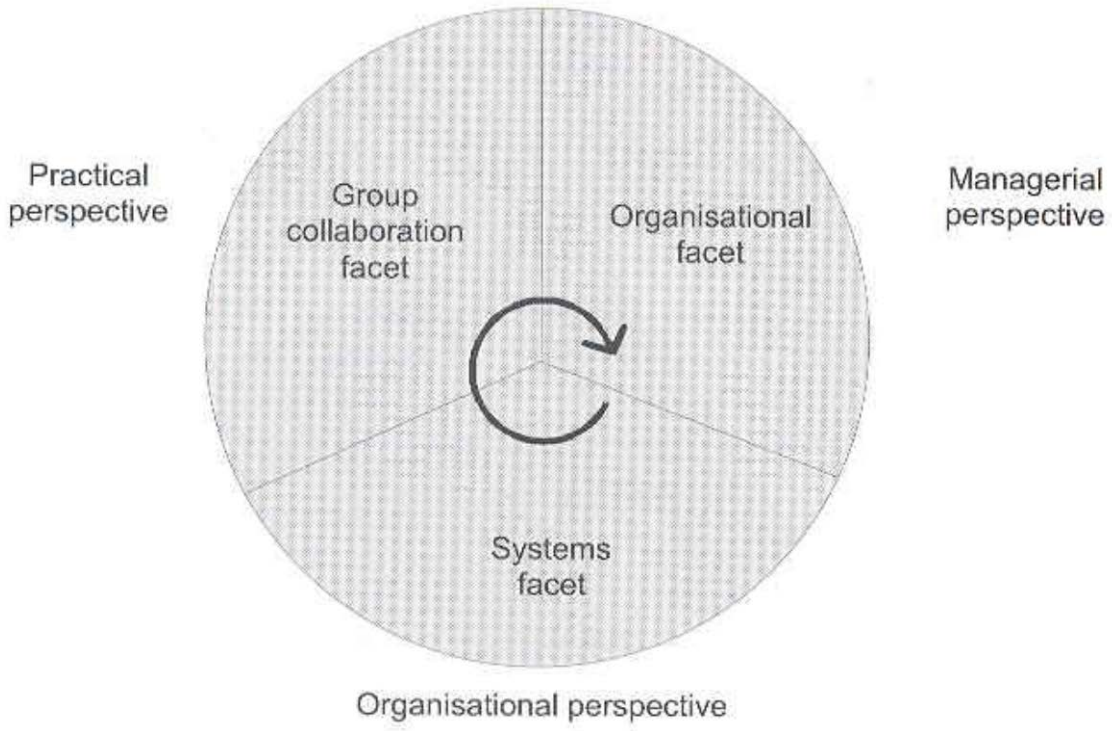

Figure 1.25 The three facets of information systems.
Source: De Michelis *et al.* 1998.

1.6.2 Group collaboration and info systems

- Dealing w/ changes is the one most fundamental challenge

- Changes come from 3 facets

  a. way of group collaboration

  b. organizational model

  c. computer systems

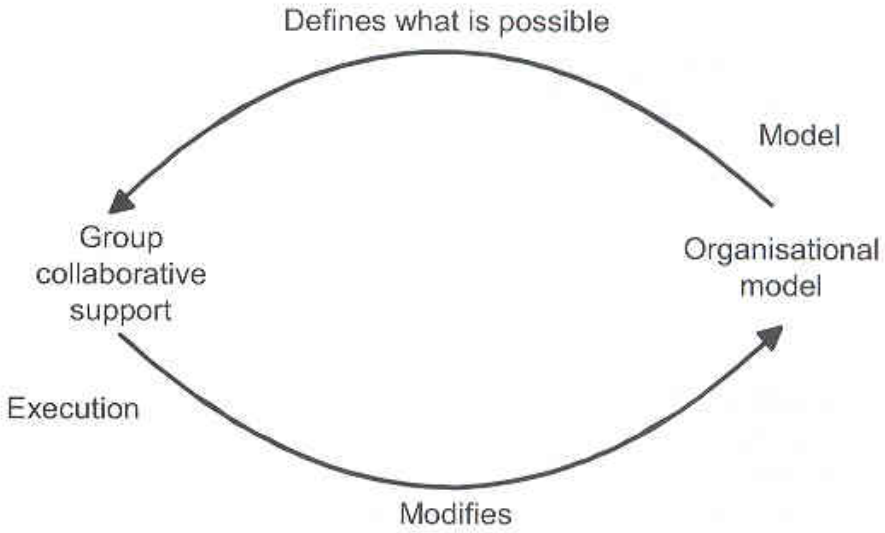

Figure 1.26 Interdependencies between group collaboration and organisational facets. Source: De Michelis *et al.* 1998.

1.6.2 Group collaboration and info systems

- Group collaboration vs. Organizational model

  -> they interact !

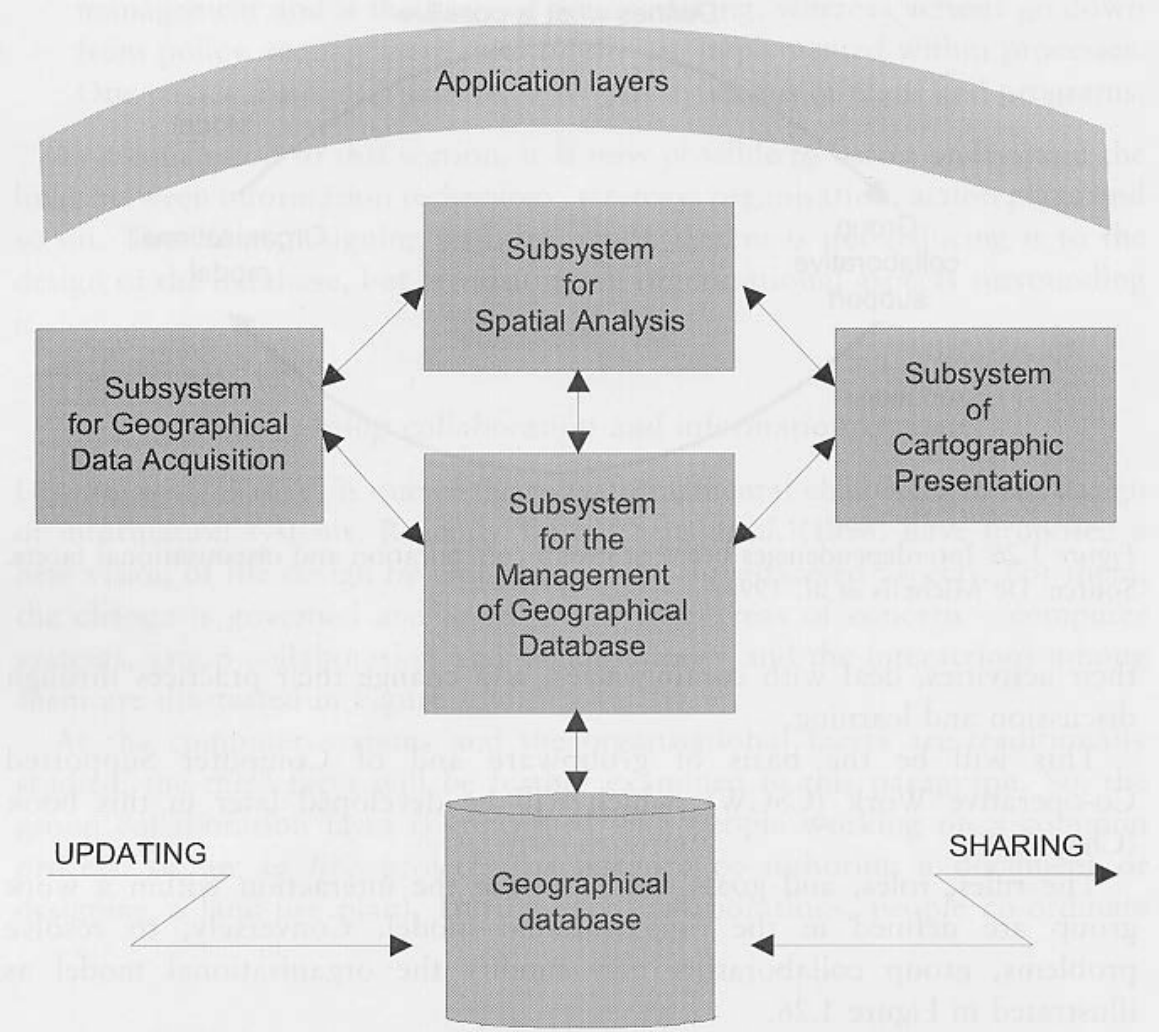

Figure 1.27 Structure of a GIS.

1.6.3 GIS as a building block of an urban planning info sys

- Four groups of functionalities
  a. Subsystem for geographical data acquisition
  b. Subsystem for spatial analysis
  c. Subsystem for cartographical representation
  d. Subsystem for data management

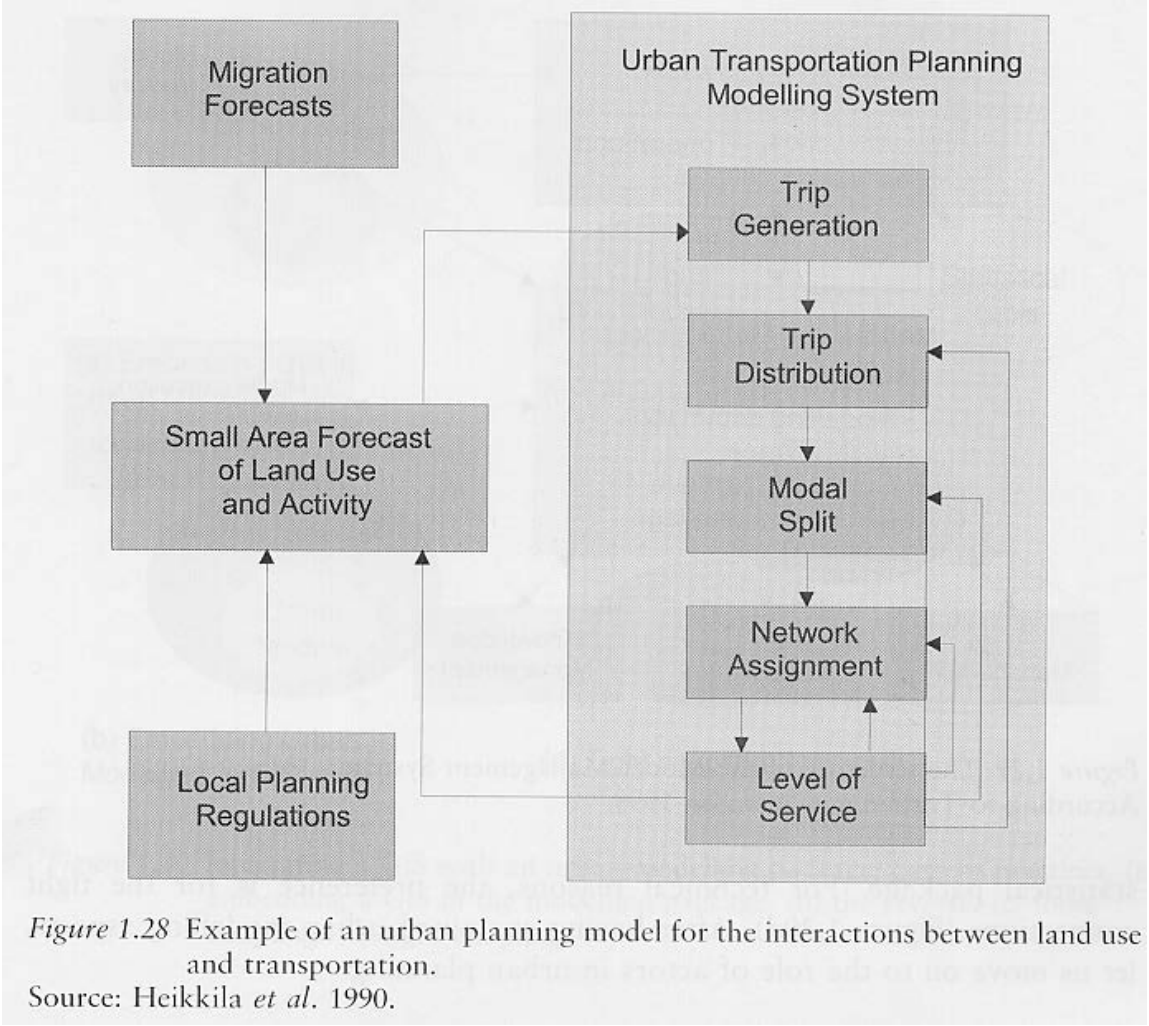

Figure 1.28 Example of an urban planning model for the interactions between land use and transportation.
Source: Heikkila *et al.* 1990.

1.6.4 Urban modeling and GIS

- Urban modeling : understand past / simulate future
- Connection is necessary (fig above)

- Different kinds of models
  a. strategic model : support top management strategy
  b. tactical model : for middle management
  c. operational model : for daily management

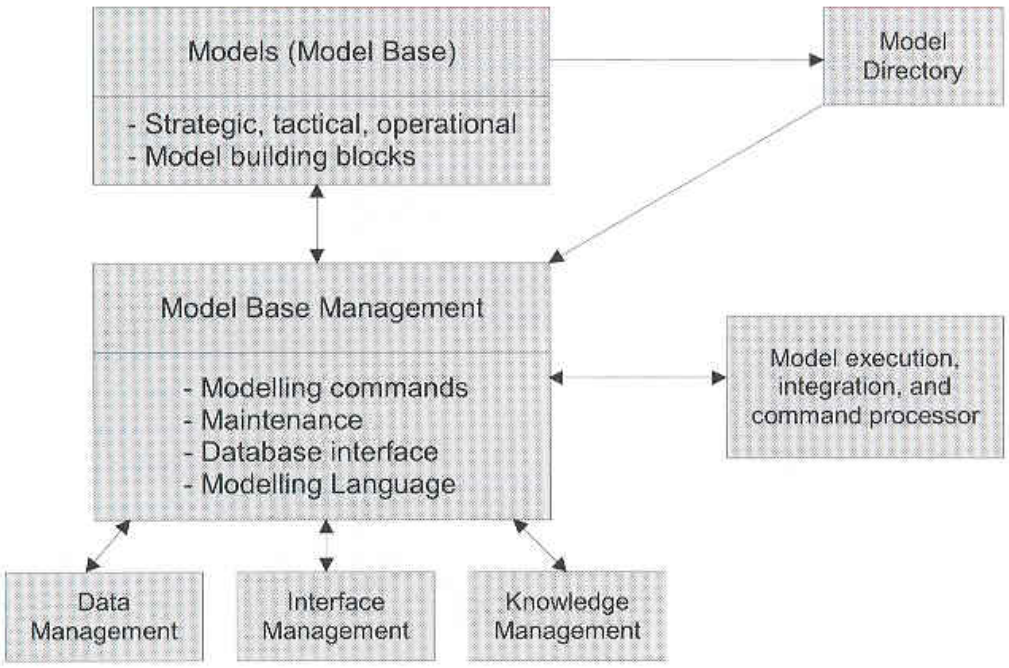

Figure 1.29 The structure of the Model Management System. According to Turban and Aronson 1998.

1.6.4 Urban modeling and GIS

- Model management system : called “model base”

  : necessary when org uses several models

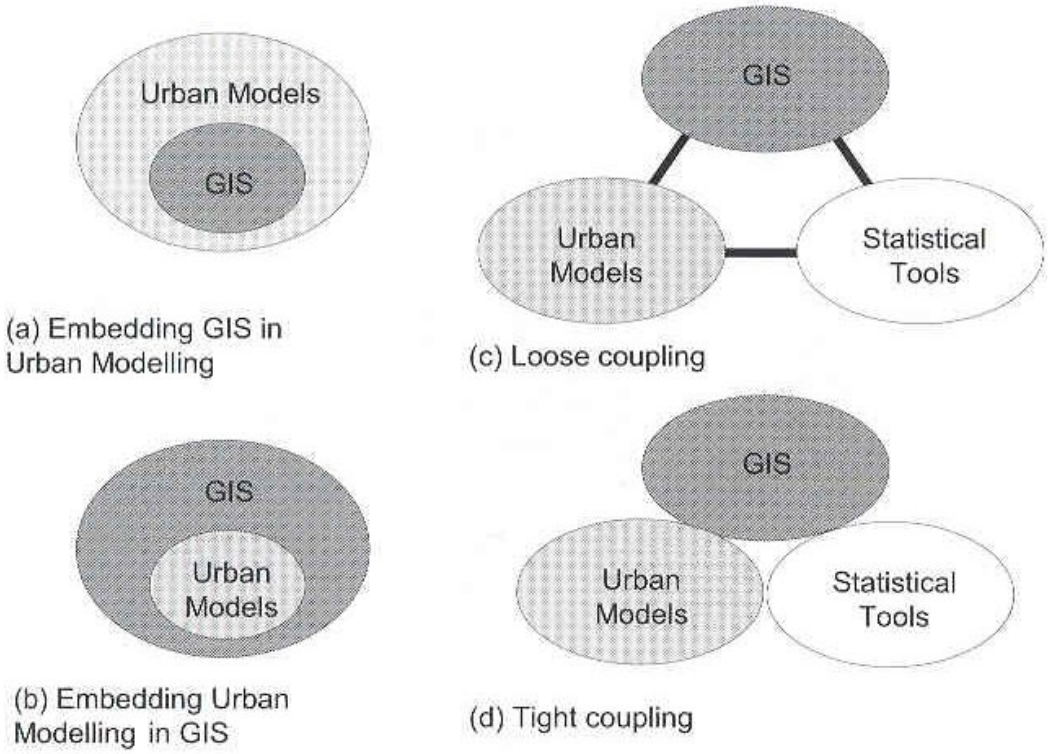

Figure 1.30 Integrating a GIS with an urban modelling package: current practices. (a) embedding a GIS in the modelling package. (b) the reverse. (c) loose coupling. (d) tight coupling.

1.6.4 Urban modeling and GIS

- Integration of GIS & urban modeling package

  a. embedding a GIS in the modeling package
  b. reverse
  c. loose coupling
  d. tight coupling

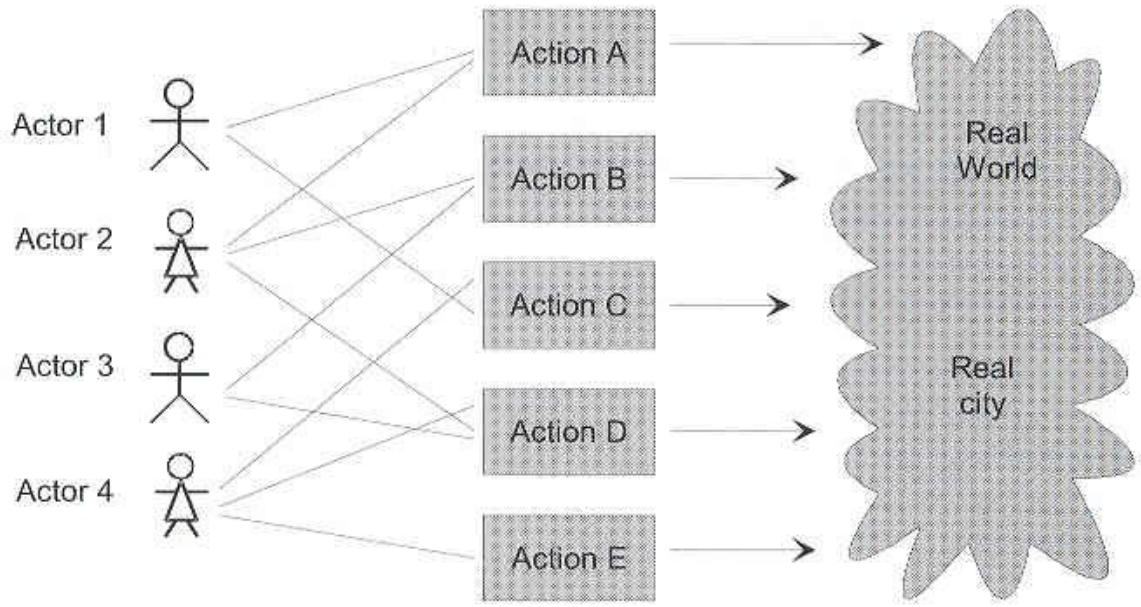

Figure 1.31 Multiple actors, multiple actions towards the real world/real city.

1.6.5 Actors and information systems

- Many-to-many relationships between actors & actions

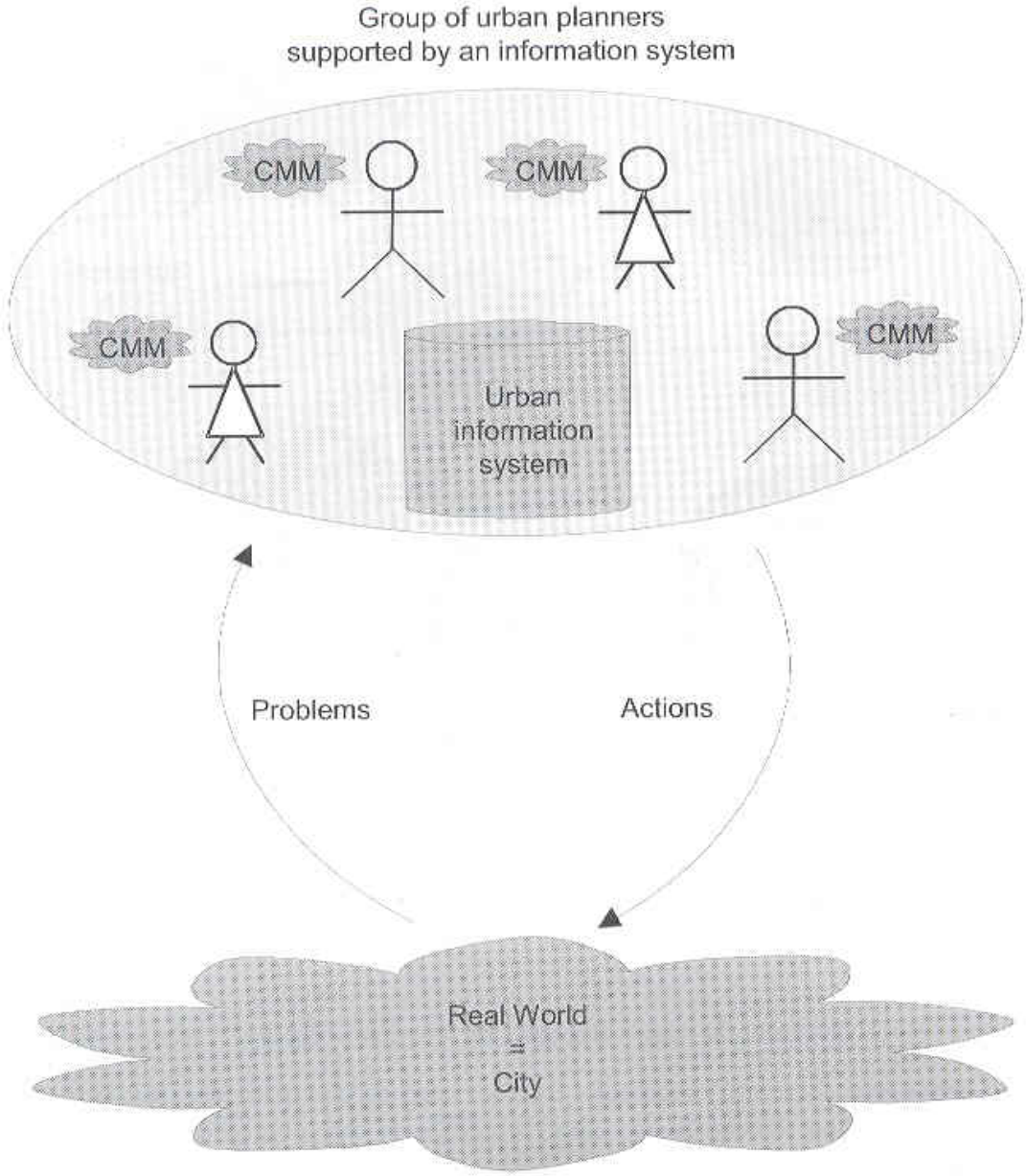

Figure 1.32 Group of urban planners in synergy for solving urban problems. Each actor has his own representation of the city by means of his city mental model (CMM).

1.6.5 Actors and information systems

- Group of planners & info sys & their actions

Table 1.2 Typology of urban actors

Names	*Definition*	*Examples*
De jure actors	• Actors appointed by an upper level of administration	• Local representatives of ministries
	• Actors elected by the people of the city	• City council, mayor
De facto actors	• Economic agents	• President of the Chamber of Commerce, CEOs of large local plants
	• Socio-political actors	• Presidents of some local associations, trade unions, political parties
	• *De jure* actors of neighbouring cities	
	• Some mob godfathers (*horresco referens*)	

1.7 Urban planning as a co-operative process

1.7.1 List of urban actors

- Urban planning : viewed as a process implying several actors

Actors : De jure actors
De facto actors

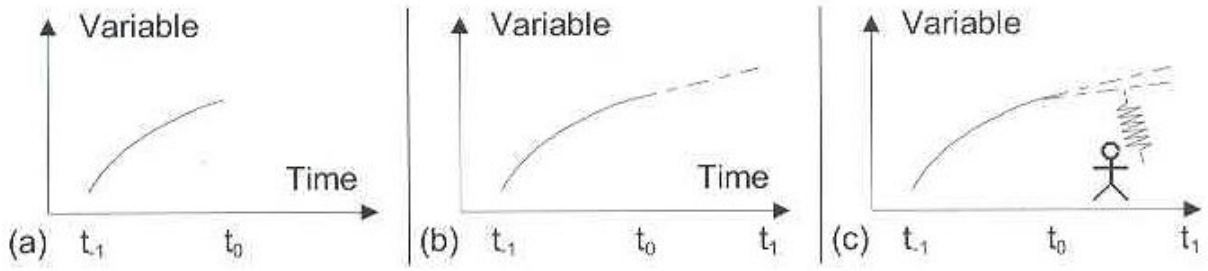

Figure 1.33. Evolution of an urban state variable (V) curbed by one actor. (a) Past evolution. (b) Forecast evolution when doing nothing. (c) An actor as a pulling force curbing evolution.

1.7.2 Relationships between actors

- Actors affect to the evolution of urban state variables

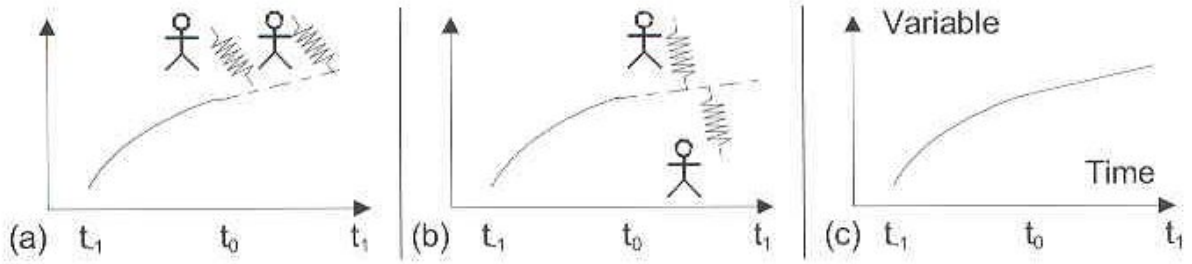

Figure 1.34 Evolution curbed by several actors and results. (a) Co-operative actors (in synergy). (b) Actors in conflict. (c) Evolution as a result of action plans carried out by several actors.

1.7.2 Relationships between actors

- in cooperation / synergy : work together to solve problems

  a. in conflict : conflict of objectives / means

  b. in negotiation : best interest is to work together

Figure 1.35 Layers of support for co-operative work. According to Klein 1997.

1.7.3 Info sys as a tool for cooperative urban planning

- Info sys is a tool for cooperation

- Three layers of cooperative contexts

  communication -> their collaboration -> coordination
  between actors cooperation

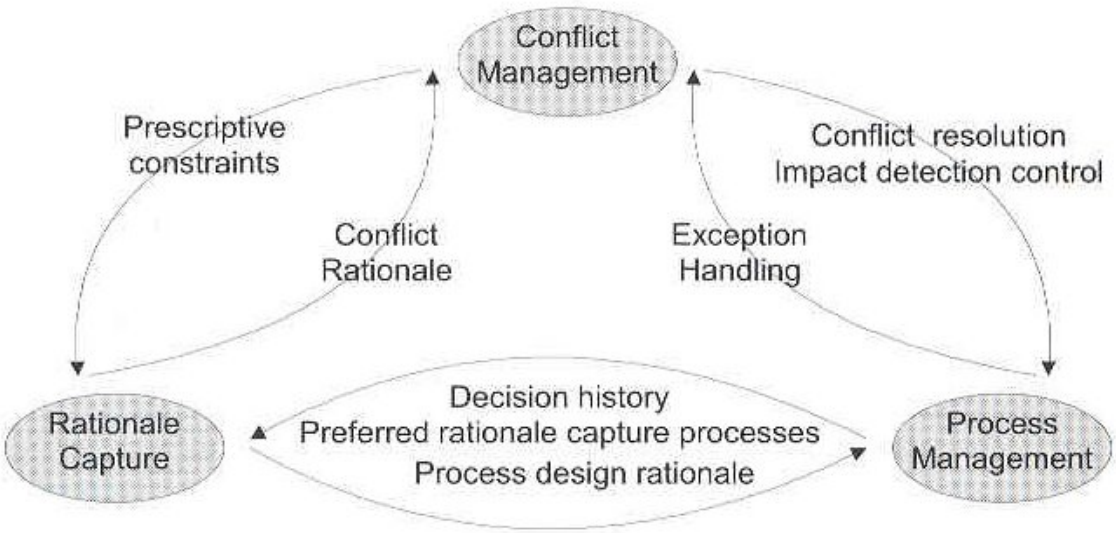

Figure 1.36 Synergism.
According to Klein, 1997.

1.7.3 Info sys as a tool for cooperative urban planning

- Synergism looks more important than cooperation
(Klein, 1997)

- Key elements of synergism :

  a. conflict management

  b. rationale capture

  c. process management

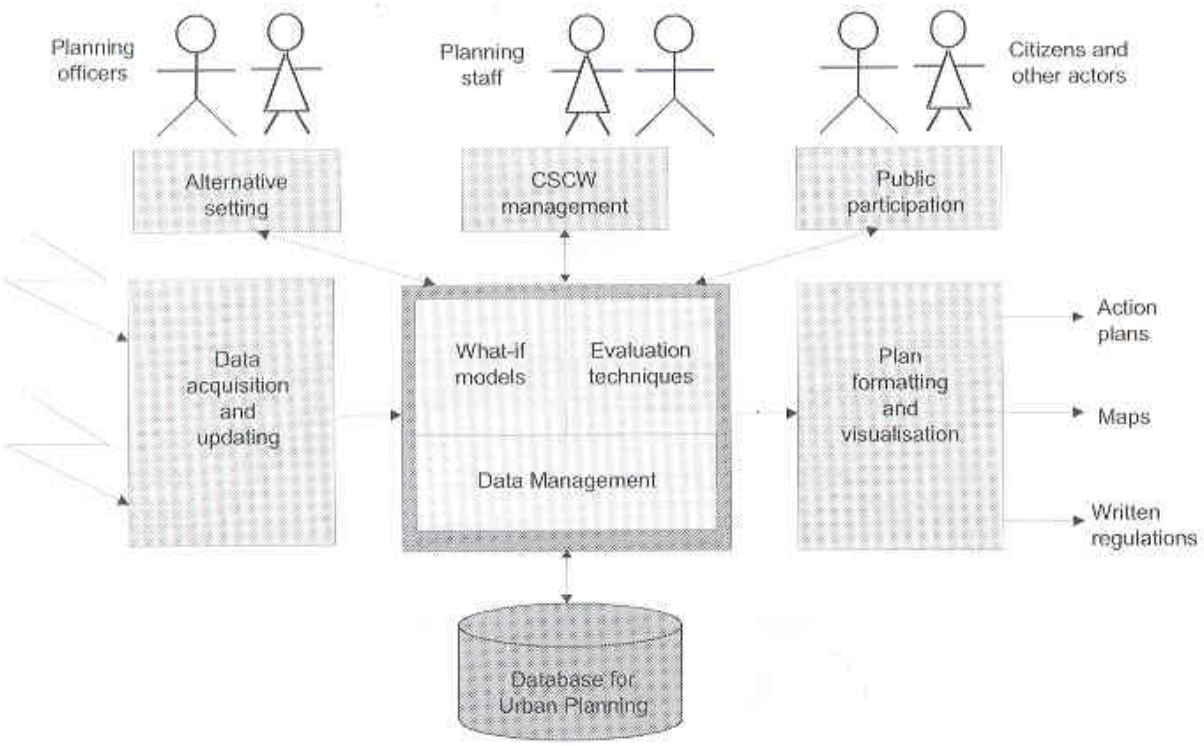

Figure 1.37 Sketch of an architecture for a computer system for urban planning.

1.7.4 Structure of a computer sys for urban planning

- Different from GIS / DSS

  alternative setting

  groupware management

  management of public participation

1.8 Urban planning in different countries

- Korea (?)

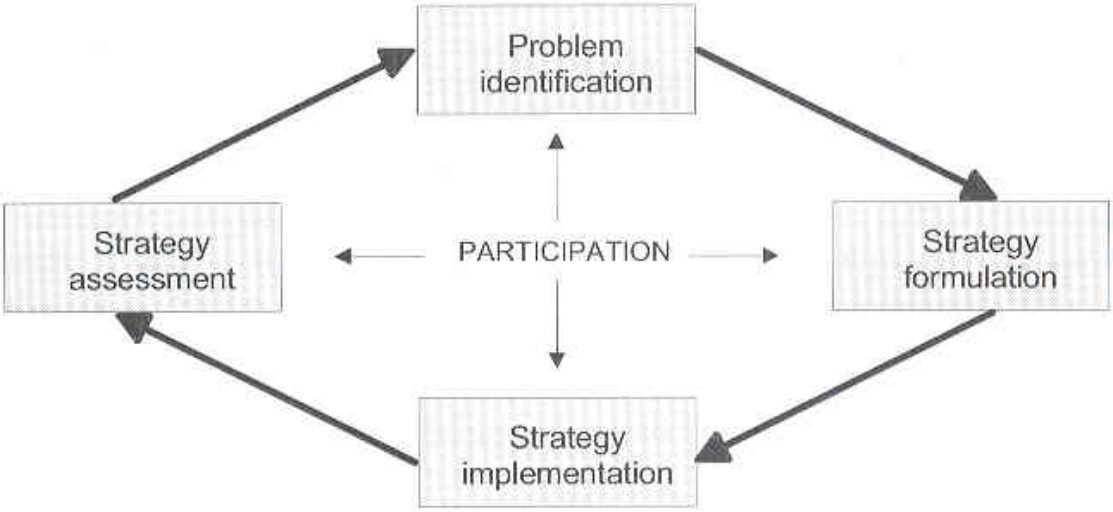

Figure 1.38 Brodhag wheel for strategy making and participation.
Source: Brodhag 1999.

1.9 Conclusion

- Brodhag wheel

  : strategy implementation & participation within the context of sustainable development

  -> also true for urban planning based on citizen participation