A main purpose of considering a system to supply information is to fulfill information demand for decision making. Le Clercq put forth that the decision making process in planning is really a choice between alternatives (Le Clercq 1990). To make choice, better knowledge is required. It is seen that current practice of an information update in development authorities is by means of fresh physical surveys (Vagale 1995, Joseph and Pathak 1995) (Figure 1.1). This is a time consuming, as well as a costly affair. Hence, it is done at a long interval of time, which means lack of up to date data (UNCHS 1982). It is also seen that the development control is a process that acts as an interface between physical environment and the plan in operation. It is supported by many studies in that development control has underlying characteristics of socio-economic, political and a physical sphere (Figure 2.1). It is also seen that development control could be utilized as an early warning system to interpret socio-economic, political, aesthetic characteristic of a given area. Since the development control also possesses temporal, spatial and process mode of development, it stands out as extremely useful technique for cross sectoral analysis of actual development in an area.

As the information design for planning will have to be contextual depending on the problem addressed, information system designed for planning on a rigid outline like inventory approach is bound to fail planning applications, as it cannot associate itself to a situation which is not predefined in the overall system. For example, information system designed to deal with land-use classification of an area would do little on traffic generation of that
area (Row 1977, Gurusamy 1990). Hence, utilization of information generated out of development control is a segment of overall information system for planning. It's survival is perpetual on it's flexibility to adjust to the information wants of overall system (Juppenlatz 1985). This could be designed by keeping development control process as the grass root to generate basic information and at the next level to synchronize with the associated activities and at third level to synthesis information for overall planning process.

4.1 DEVELOPMENT CONTROL AS A RESPONSIVE PLANNING TOOL

The UNCHS, after a review of planning process in developing countries identified a series of gaps in the information base and current data for an operational plan (UNCHS 1989). Information relevant to planning decisions is constrained by non availability of relevant data (UNCHS 1982; Jain 1990; Cartwright 1987; Davis and McDonold 1992). It is observed that factual information is to be captured from the changing environment at a closer interval. It is under this context that each of the planning department should define what kind of information they should capture in order to satisfy the information demand for effective functioning (Brail 1990).

Information capturing initiates two activities: One, identification of appropriate method to acquire the missing information, and second, recognition of an information source relevant to the planning process in question (Le Clercq 1990). Since a given planning problem is unique to a situation, it cannot be generalized. This is the major denominator for failure of general data base in urban planning, wherein a vast amount of data is collected or identified, does not fulfil the discrete requirement of individual planning decision in question (Nunamakar and Konsynski 1982).

In order to overcome this difficulty, Juppenlatz postulates a basic urban information system (Juppenlatz 1985). This consists of land information
system, resource information system, activity information system and peoples information system. He also identifies that the land information system is the basis for other three information system components. This is being strongly supported by Le Clercq who breaks down the urban planning operation and identifies possible information sources (Le Clercq 1990). The major difference between this approach and that of data identification models such as Urban Information System (URBIS) is that the first one has the flexibility to adopt to a given situation, and consequently identifies data items depending on the need of operation, and the later model simply identify data elements rather as a data bank (Rao et al. 1977, TCPO and ICOR 1983). Under this broad principle, there could be three layers of information modules to be designed.

* Information on physical entities including resources and their changes are to be monitored;
* Socio-economic system that manipulates the physical entities that are to be monitored; and
* Regulating the mechanism that governs the forces of changes are to be captured.

Information related to physical entities are the basis for any basic planning process. Development control mechanism in various means shape the physical form. This information is the baseline information for any type of planning practices and should satisfy:

"at the minimum is the availability of records on existing land use, development density and ownership; along with accurate physical information on soil characteristics, locations and capacity of existing utility and services" (Schmitt 1983).

In current practice of urban planning, specially in India, these information are pooled by the planning department from various sources.
Since the sources are the various departments, their updation is at various time intervals, besides variation in spatial level aggregating information for a given planning decision/process is very difficult. At best, they are at most collected only once during the whole life cycle of the master plan especially during master plan preparation and normally not updated in between (MUD and GOI 1995, Basu 1993). It is seen that BCDM metropolitan development regulations are through planning permission (Chapter 3). It is also seen that development control also has varied linkages to socio-economic and physical environment. It is hypothesized in this research that the information generated in the process of development control is a good source of information to update the base line information, at the first level which have universal applicability. On this first level baseline information, associated activities could be woven around. These associated activities could be social, political and aesthetic characteristics of physical environment (Leary 1987). These associated activities are unique to situations and therefore, should be designed and used for specific urban environment. At third level, information designed at base level and the associated activities could be synthesized for various spatial units (Fig 4.1) (Maidment and Evans 1992).

There are three basic tasks to identify while designing information to operationalize this model.

**Task one**

Identification of physical characteristics of base line data. This includes data on physical characteristics that are used for planning permission applications, such as ownership parcel details, existing land use at parcel level, proposed land use, developments that are already permitted, characteristics of planning permission procedures, capturing all generic information and identification of information elements that could be drawn for the needs of associated activities at higher level (Savas 1982, Sekar 1993).
Figure 4.1 Information Synthesis from Development Control

**PROCESS**
- Process and spatial level of synthesis
- Associated activities
- Baseline information update through development control

**Spatial Resolution**
- Metropolitan / City / City sub-system level synthesis
- Building to city level depends on the planning problem in hand
- Building plot level

**Example**
- Traffic added to the existing fleet, consequences, linkage between zones, bottlenecks, etc.
- How much traffic generated due to new flats / residential units at zone level, sub city level
- Building permit for residential plot (no. temporal, size, location, related use)
Task two

Defining associated activities that are unique to cases and are to be identified based on the planning process. Since the planning process is drawn based on planning problems in question, associated activities, should have the flexibility to add and delete certain planning process elements.

Task three

Designing a system for synthesis should focus around the policy and decision making process. It should also have scope to integrate information to and from other sources for coordinated development.

4.2 EXPECTED FEEDBACK FROM DEVELOPMENT CONTROL PROCESS

The requirement of feedback in the urban planning process stems from the fact while trying to find evidences of results of the plan. It is not but natural to seek information on the account of planning life cycle. There may be certain queries such as, not certainly limited to, how much of the plan proposals have been achieved? Location wise details on areas of development pressure (McNamara and Healey 1984); areas of slackness; which of the policies that are received by public well and what are their effectiveness? To understand such developmental issues, planners may require information on stages of development. Under this context, planners try to capture information for analysis from all possible sources. It is the kernel of the present research to identify information base that is offered by the process of development control.

In this context, it is to be understood that urban planning field is quite different from laboratory testing like physical science. In physical science the relationships of variables are well established and available under control
of laboratory tests, whereas, the urban planning process is an open system. The concept may be the same, but the field reactions to each of the instrument adopted are received differently. This result to a situation wherein the parameters of physical environment are beyond the control of urban planners. The physical development is dynamic. The scope of development is fluid and pose puzzles in understanding the vibrant characteristics, too little on spatial designations of these developments. Developers have scope to make his plan with a lot of flexibility on type of use, location, and size. How then planners could measure the effectiveness of their plan? On many occasions planners do not get the information what they readily needed (UNCRD and CPR 1991b). Many times they apply pseudo data for analysis. The nature of the plan, its implementation and reviews are so crafted that planners are 'hungry' for data (Lee 1974 and 1994).

One way to satisfy the data/information need of the planners is to go for a primary survey as often as possible. This approach in the field of urban planning is economically miserable. Alternatively, Faludi argues which is less costly and have fewer flaws is to "keeping one's ear to the ground" (Faludi 1984) i.e., keep refreshed every now and then about what is happening in the field. To do this, one way, is to open channels in the planning process which brings in about the field truth. This feedback could be potentially used to codify the sources of planning failure (Sorensen and Auster 1989). One such attempt is to look at the development control system as a channel to bring in field truth to the planning system.

To tap the possible information to evaluate the policy, the relationships of the development control with the development plan, with the applicant, with the social, economic and political system can be exploited (Leary et al. 1988). The logic is run parallel to the marketing management. To know about a consumer product, the manager keep that product inventory as denominator. Quite often, they do not conduct survey to know how much of that product consumer has purchased. It is the same logic that could be
adopted in urban planning. To know about the health of planning, the planners can assess planning permission cases as 'inventory' of development, rather do a costly, time consuming field survey every time. It is also logical to note that the development control procedure do not contribute information for each and every wants of urban planners (Davies et al. 1986). However, it do generate very valuable site level information, and has the potentiality to be used in urban planning process as feedback from the field. Three major factors are perceived in this context:

1. What are the information need/requirements, in general, to validate sources of planning failure?
2. By venture of operation of development control and its contacts with applicant, social, economic and political system, could be used to capture information to synthesize planning process.
3. To answer the temporal, spatial events of happenings, how best the development control system could be exploited?

In this context, the urban planning process can be abstracted in three major stages (Figure 1.1). Firstly, it is the problem of identification and plan preparation. Secondly, it is the plan evaluation, and thirdly it is plan implementation. Each of the processes has its own interaction before maturing to reach other stage. The spatial level, frequency and the current sources of information used in analyzing each stage is explained in Chapter 1 (Figure 1.1). Some more details of the process of each stage with contextual information requirements would be the focus of the present research and to conceptualize the need to condense the process of development control. Since the planning process is a wide subject, some help of simple cases are considered to explain the situation more clearly. Since the context of analysis of the present research is with reference to development control which invariably involves planning permission, the cases are deliberately drawn towards that for explanation; therefore it is not the end of all the information and synthesizes out of development control procedure.
The concept of urban planning process has its core in the real environment it is dealing with. Actual environment is also interfaced with many other sub-systems which have some hold in manipulating it. Over the time, there are some changes takes place. The causes for such changes originate either from itself or from other major sub-system such as urban planning process. Each of the sub-system ideally models the actual environment, to suit its requirements. Therefore, the image or model of the actual environment by these sub-systems is unique, having the primary controlling or influenceable variables in forefront of the model, and keeps all others with secondary importance. In this fashion, each sub-system tries to hold or control variables of actual environment and manipulate it so as to achieve its own objectives. Hence, the actual environment is being altered, manipulated influenced and presented by many sub-systems, but never be totally controlled by a single system at a given instance.

The urban planning system conceptually consist of five segments (Figure 1.4). One among them is the data base. The data base may be field information, compiled data, qualitative information, knowledge of given town. The function of this segment could be to feed information whenever it is demanded by various analyses to understand and implement plan and schemes in urban environment. This segment may not be a separate entity in many cases and might be embedded in the urban sub-system such as planning units of an urban development authority. The data for this segment may be through surveys and hold data for common references. There may be set of procedures to access data from this sector by urban sub-systems.

The second segment is the stage of urban planning process which is broadly classified as problem identification and plan preparation, plan evaluation and plan implementation. At a given point of time, each of these stages involve many functions simultaneously. The intensity of activity of these stages depends on how the urban system of a given case is pursued.
Each of this stage, while in process, undergoes interaction, thereby initiates process, analysis and switches on the next stage on maturity.

The third segment is the role of decision makers in urban planning process. They may be professional planners, technocrats or bureaucrats. A hierarchy system looks after each level of function. The structure of the system is broad based triangle. At bottom the number of decision makers would be more but their decision making level would be simple and straightforward cases. At top, only one or two decision makers would be there. They take decision on complex cases, may be policy decisions. In between these two levels, there would be tactical planners, and strategies planners who on conditions of cases, under consideration, take decisions, some time using their discretionary powers.

The fourth segment is the urban sub-system. Each of this sub-systems is engaged in carrying out specific target oriented approach like land-use, housing, new town development, transportation planning and the like components. There is no standard list of sub-system, depending on the problem in hand and the priorities set by the urban development authority and number of new sub-system may be added or excluded from the existing subsystems (Klosterman 1994a, Wegener 1994).

The fifth segment may be the models applied by planners and decision makers. As that of data base, models are again embedded with the nature of urban sub-system. Under given conditions, the planners with reference to the stage in the planning process may like to construct a model to forecast the future state or to evaluate the on going programme or formulate schemes.

The five segments explained with examples above are in static mode i.e. having zero time base, whereas to give life to this conceptual model, a starter problem may be introduced. It can be in any of the segments explained
earlier. To have better understanding of this conceptual model, a typical case may be introduced. Further, the case may be assumed to start from plan implementation stage as the present research is concerned with development control which fall under the category of plan implementation.

Development control is a part of plan implementation. While looking after development control, the given authority, by statute, has the responsibility to receive the planning applications for process. In decision making hierarchy, the planning permission cases, by routine, reach the transaction planning. Decisions may take place in transaction planning itself, if the given applications do not warrant decision by higher officials. If it warrants decision making at higher level, it will be passed, to higher level. On deciding the case by higher officials, it will be routed back to transaction planning and finally communicated out. This is a case based analysis.

Apart from this, in the context of development control, each level of planners in the hierarchy do synthesize whole system. For example, in the context of development control, at transaction level planners, worry about disposal of planning permission applications. Planners at this level, do not comprehend, for example, 'what if', if so many applications are permitted in a given land use area? whereas planners or politicians or administrators at top level would worry, for instance, about what happen if number of multistoryed building applications are permitted in a given area and its relationships between plan and permission issuance. Therefore, even though the process under question is planning permission, planners at different levels view it differently and their comprehension about a plan also vary widely. In doing so, planners at different levels, adopt different model building activity, may be simple mental map about the whole system. To do this planners at various decision making level, call for or compare information from various urban sub-systems. During such calls for information each urban sub-system, like housing, search for information from its possession, if not, it may try to supply it by collecting it from the actual environment. Hence, demand and
supply of information is floated at every instance of planning process. In the context of the present research, the characteristic of the whole model is to be deliberated that:

- The real world is dynamic and changes very fast, all the actual changes may not be required as information for urban planning system;

- The information regarding the state of the real world with reference to the planning process (or to a problem under study or overall urban system) is staggered and updated only when the current factual is captured from the real world;

- The image of the real world in the urban planning process is not current and, therefore, there is a factual gap between what is happening on the ground to that of images that urban planning system holds about urban environment;

- Certain decision making process such as planning permission for development (development control) access the case files only till the decision is taken. Afterwards the file is closed; rarely attempts are made to update the image with whatever little information is brought about by the development on the ground. Under this circumstances, any attempt to refer to the database in hand at that point of time would be out dated database.

For example, in ASHBY model on urban planning process, as a multi-stable system consists of three layers. The first deals with the planned sub-system with the examples of rate of the future development of the urban area (may be a plan). The second layer is the reacting part of the planned system to the ground. The third layer is the feedback and validity testing of critical variables of the plan that is implemented (Chadwick 1978).
For every study, planners try to capture data in order to update knowledge about the field. This is the reason the planning is quoted as 'data hungry' process. The efficiency on decision making, be it preparation of plans or studies about urban sub-system such as housing, would have considerable impact on the database it has (Klosterman 1994). It is interesting to note that for every study in urban planning, some form of data/information is collected afresh from the field apart from supplemented by secondary data. It is interesting to know at what stage the information about the image that is held in the database would be updated fully or partly. It may be fully updated only when a comprehensive survey, such as land use is made for preparation of development plan. It may be partly updated in case of any study on urban sub-system such as infrastructural facilities, is carried out or while implementing a large scale project.

4.3 OPTIONS TO UPDATE THE IMAGE ABOUT THE URBAN ENVIRONMENT

4.3.1 Near live information update

It may employ a system, which captures the required details from the field, and update the data. For example, the planners want up to date map on existing land-use, near live, or traffic data about a road or development pressure in a planning unit or physical impact of a policy decision (Willson 1995). It would be a difficult task to collect such information, near-live, for analysis (Minnery 1985). Even a system of that composition is pressed to work, it would be very costly affair and uneconomical. Yet another technical problem in such a system is the compilation of vast data to the planner's required format. For example, the traffic flow on all roads of an urban area could be captured through some system, live. This data in raw form, does not give much meaning to the planners, except to identify bottle necks. In a wider context, the planners would require information regarding land use of different zones and traffic generation. To do this the raw data on traffic should be synthesized and synchronized to the reference of zones (Harris 1994).
Considering the overall priority given to urban development by the government, it would not be possible for any development authority to go in for such a large scale live data collection (Lichfield 1979) if at all it is technically feasible.

### 4.3.2 Priority based information update

This approach is based on problems of the urban area in question as well as the priority fixed by development authority. The development authority for a given urban area should have by virtue of operation for long time, fixed certain urban sub-systems as problematic areas. Moreover, for each of such problems, the authority would have fixed certain priority. In accordance to this, the authority would be collecting information for monitoring the projects. These projects and their implementation are vital for the improvement of the specific towns and cities. If a detailed muster is maintained about these projects that itself would contribute ample information of the specific city or part there of (Larkham 1990).

Two major limitations in having this method to update information on the image of the urban system are, one, the inflow of information into the system from these projects are staggered and totally depend on the mechanism adopted by the project to go to the field for updating the working of the project. Secondly, the developments that are beyond the scope of projects such as real estate promoters, individual owners who develop personal properties are beyond the net of this method. It is observed that sizable development takes place through this channel.

Moreover, the projects and schemes that are handled on property basis, especially in developing country, are towards limited physical development of the city. For example, limited government investment go towards infrastructure, inner city redevelopment, industrial development and
private housing. Therefore, by adopting the second option, major part of non-governmental developments are beyond the comprehension of the authority.

4.3.3 Planning process based information update

In option one explained above, though the information capture is comprehensive, is not cost-effective. There are occasions like preparation of development plan, when such options are employed. Over a period, such information capture does not serve the purpose of routine planning process. The option two is not comprehensive on account of the limited development that takes place through that option, whereas the nature of planning process needs comprehensive spatial and temporal information on various development.

Many of the studies in the areas of development control suggest that it has potential use as a image building activity of the city (Pountney and Kingsbury 1983). Moreover, the developmental issues pass through development authority with many local details and structural and exterior details. As against the option two, explained above, the development control would include almost all the private development in its sphere. The urban planning process require wealth of spatial dimension of development, rather numerical composition. By virtue of processing planning permission applications, development control process possesses detailed dimension of developments. Also, over a period of time the trend of development can also be pictured at various spatial scale. With the rapid input, access and output analysis media, the development control could classify information about areas of extra-ordinary development or under developed areas could be plotted out. With the combined efforts of option two, the development control process could potentially be used as 'urban image refresher'.

The major limitation of Option 3 is the scale of operation of development control and the development plan. The development control
operates on the individual property as the basis. The development plan on the other hand operates, in most cases, at planning unit or sub-urban scale. Compiling the planning permission cases to that of the plan requires, scale conversion for each of the development that is permitted; then only, it could be incorporated in the plan. This should be done on the spatial form to generate topology of similar or related or contradictory development comparing to the plan. Second limitation is the compilation of attribute data on planning permission. That is, if a development for residential flat is allowed, the attribute data may refer to additional households to be added, their income level, or anticipated social and infrastructural needs. These attribute data could be collected in an appropriate form that would allow to access based on some classification. For example, to list out, for making decisions, all the buildings having more than four floors and located in a given area where there is already a stress for infrastructural facilities. In certain cases, development authority may have to monitor the development agreement that it had signed with developer (McNamara and Healey 1984, UNCRD and CPR 1991b). Number of such occasions would raise in daily decision making process of development authority. Is that then the option three explained above is anticipated to provide solutions to all the information need? The methodology indicated in the option three has bounds. The decision making process in the model expressed endless commitments (Figure 1.4). Perhaps option three would satisfy, for example certain specified development trends. Development control and specific projects operated by the development authority is limited by its operational boundary. Therefore, if the authority need information, for instance, to prepare development plan or master plan then the option one with option three should be invoked. As it is synthesized from the philosophy of development control (Chapter 2), the domain of development control that could be exploited are as follows, but not limited to:

- Development control has clear interaction with land use/zonal/development plan;
Development control refers to a wider range of legal aspects for decision making; development control has bearing on the nature of social, culture conditions of the society and to certain extent it governs the social development; development control and economy of the city are interdependent; development control has a role to play to bring aesthetic order in the city; the nexus between development control and the political decision on appeal cases could be tabled for rational decision and upholding urban planning process.

On all these aspects of development control, decision making has underlying components of time, space and type of process. For instance, the political or administrative ruling on appeal to reclassify land uses in an urban area for a given time period has meaningful information to draw inferences. Instead, if it is supplemented with number of such decisions, with attribute information such as amount of floor area, in a fast intensifying secondary commercial district of a city for the last six month or a year, would carry more meaning to urban planning process (Pountney and Kingsbury 1983).

In the context of conceptualized model of information base for urban planning analysis, the development control could contribute specific, but limited, information base. At one angle, it has a domain of relationships with the sub-systems such as, technical, legal, social, economic, aesthetic and political aspects of society and governing rules. By virtue of its scale of operation, it has three level of data disaggregation. They are time, space and process dimensions. Time in the sense it has continuous process of planning permission cases, hence has the capability to mould it to be user required time frame. It has spatial dimension, referring to individual cases in detail and to a specific location. Therefore, topologically capable of manipulating to any spatial scale with lowest resolution of individual property boundary. It has
process mode since each of the application and it's process has valid
parameters that governs urban environment such as how slow or fast or
biased are the decisions. Overlaying these aspects would depict the
combinations of process possible out of development control (Figure 2.1).

The report and the information that could possibly by generated in
the domain of development control should have utility and meaningful
interpretation. The need for such information should be outlined and format
drawn from the information base that has been conceptualized (Figure 1.4).
It is also seen that urban growth is dynamic nature. Planning authority and
the planners can not effectively consider all the aspects and all the areas of
urban development at a time (Rivkin 1978). Planning authorities that govern
the urban development fix, time to time, certain guiding principles and
priority areas and outlines development targets apart from general growth
guidelines. The intersecting elements between these growth guidelines (may
be a plan) or priority areas and aspects of development control become the
utility function of information generated from the development control
(Chadwick 1978). Designing a system to report on this utility junction is to
be selective in nature and in accordance to the urban planning process
adopted for individual town or city.

4.4 ISSUES IN DESIGNING DEVELOPMENT CONTROL FOR
INFORMATION FEEDBACK

4.4.1 Dynamism in planning process

A time horizon of 15 to 20 years of development is normally
considered while preparing master plan. Absolute increase of urban
population over comparatively smaller spatial extent contribute to rapid
change especially in developing country like India (Taylor and Williams 1984,
UNCHS 1989a). Over and above this, resources constrains and lack of
infrastructures pose a major technical challenge to urban planning process, to
cope with long standing perpetual plan for a rapidly changing environment
Le Clercq proposes that the planning decision elements are continuously influenced between planning problem, opportunities, political options and decisions (Le Clercq 1990). In order to make a rational decision, the decision making authority should broadly understand the current status of environmental pressure for change in terms of opportunities, policies and options (Dueker 1982). These parameters therefore, need to be assessed and reassessed dynamically from the physical environment and, whenever necessary, revalidate the plan at closer interval to make it dynamic in character.

The main challenge arises as to design a system to make the need for effective framework for monitoring, control and evaluating progress of implementation of urban development plans (Sridhar Rao et al. 1977). Dynamism in planning process is the denominator for success in urban planning practices in developing countries especially in India.

### 4.4.2 Components of Dynamic Planning Process

Basically, there are two spheres of domain existing for each planning action (Solesbury 1974): One is the plan domain, and the second physical environment and an array of associated activities. Plan envisages future of the physical environment. Physical environment on the other hand, is put to pressures for a change. The pressures are exerted by various factors. These factors are exogenous in character, influenced heavily by the act of societal needs. Cities and towns, unique in character, act differently under similar circumstances of problems (Taylor and Williams 1984). Pressures on the environment and decision to change are not always similar in a city. It all depends on an array of prevailing development conditions. In order to improve the decision making process, it is suggested, that there are four major activity components that need to be attended. They are improvement in regulating mechanism, increasing responsiveness of planning tools, financial and inter-
sectoral investment coordination and integration of planning and environmental management (UNCHS 1989).

4.5 CONCEPTUAL FRAMEWORK OF DEVELOPMENT CONTROL
FOR INFORMATION FEEDBACK

Development control by its nature of process have operating mechanism which extends from a building plan at the lowest level to master plan at the higher level. It scrutinizes the blue print at building level, analyses the site plan at site level, subdivision with reference to development plan, land use map at zone level and city at master plan level.

By simple procedure of recording the plan at building and layout/subdivision could be aggregated or desegregated to reveal the change at any other conversant spatial unit of the city. By mapping changes through planning permission, over space and time at various spatial scale of the city would depict the temporal development (Table 4.1). This forms the base line information. In addition to this temporal development, it is observed that development control information are to be linked to associated activities (Figure 4.1). It is also seen that integrating development control to other functional units of urban development and the other development agencies is essential for effective coordination. In order to do this, the development control mechanisms are to be studied closely and the problems of its operations are to be carried out first. This would eliminate the ambiguity for integration. Studies reveal that issues of development control process are to be improved for better mechanism for issuing planning permission, registering developments, and to bridge them to overall planning process. A schematic approach to this end is illustrated in Figure 4.2. This approach identifies four operational components by synthesis. They are issues, process, spatial scale of operation and computing requirements. These four factors interact differently at various level (Figure 4.2).
Figure 4.2 Schematic Framework of Information Feedback from Development Control Process
4.5.1 Problem domain of development control

Problem domain of development control process is broadly addressed to the improvement of mechanism to issue planning permission at faster rate, and recording generic information and bridge development control to policy and planning analysis. It should have check on consistency on decision making, recording case history, allow to synthesize planning permission cases to socio-economic, political factors and admit free public participation.

Table 4.1 Spatial and temporal out-come of development control process

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Level of Plan*</th>
<th>Spatial Scale*</th>
<th>Certain outcome of temporal and spatially aggregated information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Building plan</td>
<td>Buildings</td>
<td>Change in use, bulkiness of development, intensity of development</td>
</tr>
<tr>
<td>2.</td>
<td>Site plan</td>
<td>Site</td>
<td>New access, micro climatic change</td>
</tr>
<tr>
<td>3.</td>
<td>Sub-division plan</td>
<td>Sub-division</td>
<td>Development trends</td>
</tr>
<tr>
<td>4.</td>
<td>Land use plan</td>
<td>Layout/sub division</td>
<td>Change in use, intensity of development</td>
</tr>
<tr>
<td>5.</td>
<td>Master plan</td>
<td>City</td>
<td>General guiding force</td>
</tr>
</tbody>
</table>

* Based on Maidment and Evans (1992).

To utilize the information generated by development control, certain general issues of functional units and other agencies are to be dealt. The basic question related to information call from development control are, definition of data requirements, format of data elements, frequency of collection, accessibility of data through network, data conversion, security and synthesis of information are to be solved while designing a system.
4.5.2 Process design of development control

Process design of development control is centered around the standardization procedures for development control. This would also address the design problems of aggregating and desegregating information on spatial and temporal scale.

It is seen that the potentiality of integrating information from development control to other functional units of planning department and other development agencies are having vast scope (Raj 1977). However, it is to be noted that these departments carry out activities at too different spatial scale (Kingsley 1991). Standardization and effective information exchange would be a challenge at this context. It requires rigorous exercise of coding normal routine activity of these units and its relevant information and to development control process.

4.5.3 Computing requirement of development control

At the first level, development control needs documenting capacity of cases. At second level, information need to be called on decision making elements of development control; it should store and retrieve cases on demand. It should also update relevant information, reporting them to be used for functional units of planning department and to other developmental agencies in the metropolitan area.

Since information between development control and the functional units are the crucial factor, computing power for searching, matching, filtering, accessing, forecasting, assessing and estimating requirements of planning problems under question requires powerful computing facilities either manual or digital.
4.5.4 Spatial scale of development control

The lowest spatial scale of development control is the individual building or plot, whereas, general urban planning process analyze are carried at site level, zonal level and lastly, at city or metropolitan level (Table 4.1). In order to have meaningful interpretation of associated socio-economic and physical activities, dynamically transforming information from development control is mandatory.

As the functional units of planning departments operate on the basis of planning problems on routine and special nature, the spatial scale can not be generalized. These functional units and other development agencies attending to micro level operations; i.e. property level details, development control system has the scope to supply such information. However, there are limitations of information if the details are required at sub-property level.

4.6 Scope and Limitations of Information Feedback from Development Control Process

The conceptual frame explained above, for supply of information from development control process is a planning process dependent system (Le Clercq 1990). It, therefore, has the scope to supply only details that are related to the planning process handled by development control. It can update knowledge on physical developments that have come into its process. So called illegal or unauthorized developmental details can not be explored using this system. If the unauthorized developments are sizable in overall development of metropolitan area, there is a need to investigate and link them to development control process to tape those details (Kidokopio 1991). While designing such a system, possibility of capturing unauthorized and illegal developments through, for instance, integrating development control to land registration, or electric supply system or water supply or sewage departments are to be made (Sridhar Rao et al. 1977).
It is crucial to consider to include process of land registration with that of development control data, since all unauthorized or illegal developments pass through the knowledge of land registration office (IIPA 1977). On similar lines, the system developed based on development control hardly could list information related to associated activities of physical development. For example, it may be most valuable information to estimate traffic that may be increased from and to a residential area where large scale development permits are issued. These are contextual information for any planning analysis, wherein there is no limit to add additional attribute to physical development. For example, Los Angles Municipal Information System (LAMIS) has used 250 sub system components, 9000 program modules on a 24 hours on line database (Tamaru 1982). In San Diego study, it was identified at least 17 different state and local government connected for project planning and impact analysis (Dutton 1982).

It is to be noticed that the designing information system for urban planning is the most complex one, needs very large scale integration and flexible system to operate. Many case studies reveal that large scale data models in urban planning failed due to variety of reasons, but most common among them are the ones developed independent of planning process. It is also suggested by other studies that information system developed for urban planning in developed countries may be modulated in such a manner that it is accepted by the users at the first instance rather than going for much high-tech so as to be rejected at the beginning itself. It is suggested that development of information system for urban planning should be modulated and adoptable for the day to day operations of the departments besides carrying out process closest to the manual practice at the beginning for which MMDA has been selected for detailed study and application of the system.