

**ISSUES IN THE DEVELOPMENT OF GIS DATABASES  
FOR URBAN MAPPING IN NIGERIA**

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## **1 INTRODUCTION**

Urban growth in Nigeria is proceeding at a rather unprecedented rate. The rate of urban growth is currently put at 6% per annum. However, most of the urban centres are developing in an uncoordinated manner. This is largely due to the clear absence of appropriate and enforceable national urban development policy. For a continually changing environment such as the urban settlement there is need for a purposeful strategic planning process that would ensure that development takes place in a systematic manner. Unfortunately, owing to the current absence of well-spelt out urban development mission statements in Nigeria, the urban areas have continued to development in a haphazard manner. To worsen the already bad situation, the urban centres are frequently experiencing a high rate of population growth, due to the unabated influx of people from the rural areas.

Hence, following the lack of a comprehensive and coherent national urban planning and management policy in the country, coupled with the unregulated pattern of development of urban centres and the momentous rapid growth of urban populations, Nigerian urban centres are beset with a myriad of environmental problems. Prominent among such urban problems are traffic congestion, shortage of shelter, unemployment, inadequate supply of electricity and water, poor educational, medical and sewerage facilities, squatter settlement, blighted slums and environmental degradation. Not only that infrastructural facilities are in short supply in the urban areas, the few existing ones are not effectively managed and maintained.

## **2 NEED FOR URBAN MAPPING**

Urban centres are recognised as the most complex of all human habitat (Balogun, 1994). This complexity obviously derives from the fact that urban areas are centres of cultural activity that involve close interaction of many different variables such as social, economic, political and physical factors (Adeyemi, 1982). Thus, the urban centre needs to be properly planned and managed to ensure that its various facets (systems and subsystems) develop in an orderly and harmonious manner.

It is usually the preoccupation of urban planners and managers to foster the growth of cities that are functional and habitable. To achieve this noble idea management policy and strategies are usually fashioned in line with the perceived needs of an urban area. However, for effective and efficient urban planning and management policy to be formulated and implemented, relevant information is needed. As observed by Paulsson (1992):

"A broad and reliable information base is essential if cities are to be managed effectively. Lack of information contributes to problems such as ineffective urban development programs and activities; uneconomical and badly planned investment projects, poor functioning of land markets, property tax and transport and utility systems; and disregard of the environmental impact of development on the population"

The place of information in urban development cannot be over emphasised, especially given the fact that, as Dale (1991) points out, information and land are two basic resources that must be properly managed if the problems of urban growth are to be dealt with. Most, if not all, urban development activities are spatial in nature. This therefore makes it quite imperative to employ spatial or geographically referenced data/information in the formulation of urban development and management policy. Much of the spatial information needed for urban planning and management is commonly held in map form (analogue or digital). It is hence worrisome to note that (Paulsson, 1992):

"Throughout the world, urban managers and policy makers make strategic decisions on environmental protection, infrastructure development and maintenance, land development, and land administration and taxation.... Yet rarely do they have access to up-to-date base-maps and systematic information on the extent of settlements, land-use patterns, environmental problems, and infrastructure facilities."

Mapped data/information are indispensable in urban management. Maps are used (Balogun 1994), in planning the physical and socio-economic growth of the city, to gain useful insight into the historico-genetical evolution of the city, to show the relationship between socio-economic characteristics of the population and the fabrics of the city, in the execution of the master plan project and daily maintenance and servicing of the city such as locating utilities and implementing an effective city transportation system, and in the collection of revenue needed for the financing of various urban projects. No meaningful and sustainable urban development programme can take place without adequate land-use and land-cover mapping of the urban environment. To undertake any urban management initiative, the location, size, number and condition of existing (as well as proposed) urban facilities and resources, must first be known. Maps, more than any other tools, effectively furnish this knowledge. Urban mapping could therefore be seen as a *sine qua non* to sound urban planning and management.



### 3 URBAN MANAGEMENT MAPS

Urban centres are known to be complex and dynamic in nature. They also perform a multiplicity of functions. Moreover, urban management is a complex process. Obviously then, to adequately capture or portray the various facets of a city and its functions for proper management, more than just one type of map is definitely needed. The scale, projection, accuracy and subject matter of maps needed for urban management vary according to the specific needs for them. Theoretically, any shade of variety of urban maps could be produced. However, in practice, certain technical, institutional, human, and data factors limit what could be achieved.

Generally, there are four major qualities which typical urban maps must possess (Adeyemi 1982). These qualities are:

1. They must be up-to-date
2. They must be useful for multifarious functions
3. A large scale involving a great amount of details
4. Flexibility.

For convenience sake, Balogun (1994) has tried to categorize urban maps into base maps and thematic maps. (See Table 1)

**Table 1 Urban Management Maps**

| BASE MAPS     |                            |
|---------------|----------------------------|
| 1.            | Topographical Maps         |
| 2.            | Cadastral Maps             |
| 3.            | Township Maps              |
| 4.            | Street Guides              |
| 5.            | Photo Mosaic               |
| 6.            | Photo Maps/Orthophoto Maps |
| THEMATIC MAPS |                            |
| 1.            | Utility Maps               |
| 2.            | Transportation Maps        |
| 3.            | Urban Land Use Maps        |
| 4.            | City Master Plan           |
| 5.            | Tourism/recreational Maps  |
| 6.            | Population Maps            |
| 7.            | Others                     |

### 4 BRIEF REVIEW OF URBAN MAPPING IN NIGERIA

Both Adeyemi (1982) and Balogun (1994), have at various times tried to capture the state of urban mapping in Nigeria. The acquisition of large-scale aerial photographs of some towns in the country in 1966 marked the beginning of conscious efforts towards urban

mapping in the country. This is rather a relatively recent development when considered within the historical context of mapping generally in Nigeria which started several decades before 1966.

The federal government through the Federal Survey Department, is primarily involved in urban mapping in the country. Some state governments as well as private mapping outfits and corporate organisations, notably oil producing companies like Shell and Mobil, also occasionally engage in the production of certain urban maps. However, most of the urban mapping efforts of the private mapping establishments and corporate organisations were often concentrated at producing Street Guides. On the other hand, both the federal and state governments have been mostly concerned with the production of township maps. Thus Nigerian urban centres are grossly lacking in a variety of maps for managing their resources and facilities. Moreover, the existing urban maps are significantly outdated. The last set of township maps was produced in the early 1980s under the 1981-85 national plan period. So far, no new efforts towards further township mapping in this decade were made by government; in fact the Federal Survey Department is yet to complete the township mapping projects of the 1981-85 plan period! (Balogun, 1994). Table 2 shows the township mapping efforts by the Federal Surveys Department at various times.

## **5 ISSUES IN DATABASE DEVELOPMENT FOR URBAN MAPPING IN NIGERIA**

### **5.1 Need for urban information system**

The need for the development and implementation of a Nigerian national urban information system has been widely recognised by cartographers and urban planners in the country (Ayeni, 1992; Balogun, 1994; Adeyemi, 1982; Etc.). Such an urban information system will among other things, provide the much needed cartographic data bank for urban mapping. The multitude of benefits derivable from an urban information system are too obvious and numerous to be mentioned, just as the urgent need for such a system is quite apparent. As Juppenlatz (1991) has hypothetically argued, "effective urban management strategies depend on a comprehensive and up-to-date information base for the area." Given the fact that as much as 60-80 percent of the activities of urban areas are location related, it then becomes logical to insist that any urban management information base should be spatially defined and hence managed with a geographical information system (GIS).

Developing GIS databases is usually a strenuous exercise. The problem even becomes more daring if the exercise is to be carried out in a developing country such as Nigeria where the necessary technical, fiscal, data infrastructure, and institution, are often inadequate or even lacking. Currently, Nigeria is gearing up to join the global bandwagon of nations implementing GIS on a large-scale basis. This is indeed a healthy development. However, the enabling environment for a nation-wide full-scale implementation of GIS in Nigeria is grossly lacking (Balogun and Uluocha, 1998).

Various Sporadic efforts made by individuals to develop GIS databases for certain municipal functions, in the country have so far revealed some fundamental issues that must



be addressed before a successful and sustainable nation-wide GIS could be implemented in Nigeria. Some

**Table 2 Township Mapping by the Federal Surveys, Nigeria**

| Towns                         | Area<br>(sq. km)     | No. of<br>sheets | Year of<br>Photo-<br>Graphy | Scale of<br>Photo-<br>graphy | Scale of<br>Map          | Contour<br>interval<br>(metres) | Remarks   |
|-------------------------------|----------------------|------------------|-----------------------------|------------------------------|--------------------------|---------------------------------|-----------|
| 1. Abeokuta                   | 339                  | 1053             | 1976                        | 1:6,000                      | 1:1,000                  | 1                               | completed |
| 2. Greater Jos                | 496(old)<br>362(new) | 330              |                             | 1:10,000                     | 1:2,000                  | 2                               | completed |
| 3 Ogwashi-Uku                 | 562                  | 242              | 1977/78                     | 1:10,000                     | 1:2,000                  | 2                               | completed |
| 4 Katsina                     | 350                  | 270              | 1976                        | 1:10,000                     | 1:2,000                  | 2                               | completed |
| 5 Bonny                       | 371                  | 213              | 1977                        | 1:10,000                     | 1:2,000                  | 1                               | completed |
| 6. Enugu                      | 262                  | 720              | 1977                        | 1:6,000                      | 1:1,000                  | 1                               | completed |
| 7. Markurdi                   | 424                  | 276              | 1977                        | 1:12,000                     | 1:2,000                  | 2                               | completed |
| 8. Warri                      | 152                  | 127              | 1977                        | 1:10,000                     | 1:2,000                  | 2                               | completed |
| 9. Maiduguri                  | 336                  | 210              | 1976                        | 1:10,000                     | 1:2,000                  | 1                               | completed |
| 10. Lafia                     | 324                  | 216              | 1977                        | 1:10,000                     | 1:2,000                  | 2                               | completed |
| 11. Kafanchan                 | 213                  | 154              | 1977                        | 1:10,000                     | 1:2,000                  | 2                               | completed |
| 12. Damaturu                  | 61                   | 40               | 1977                        | 1:10,000                     | 1:2,000                  | 1                               | completed |
| 13. Ogbomoso                  | 220                  | 700              | 1977                        | 1:6,000                      | 1:1,000                  | 1                               | completed |
| 14. Biu                       | 49                   | 35               | 1977                        | 1:6,000                      | 1:2,000                  | 1                               | completed |
| 15. Ikorodu                   | 63                   | 185              | 1977                        | 1:6,000                      | 1:2,000                  | 1                               | completed |
| 16. Badagry                   | 39                   | 105              | 1977                        | 1:6,000                      | 1:2,000                  | 1                               | completed |
| 17. Epe                       | 75                   | 198              | 1977                        | 1:6,000                      | 1:1,000                  | 1                               | completed |
| 18. Atan Onoyom               | 71                   | 190              | 1977                        | 1:5,000                      | 1:1,000                  | 1                               |           |
| 19. Aba                       | 115                  | 270              | 1978                        | 1:6,000                      | 1:1,000                  | 1                               |           |
| 20. Lagos Area I              | 106                  | 2000             |                             | 1:6,000                      | 1:1,000                  | 1                               |           |
| 21. Kano                      | 944                  | 594              | 1976/77                     | 1:6,000                      | 1:2,000                  | 1                               | completed |
| 22. Kaduna                    | 842                  | 2200             | 1978                        | 1:6,000                      | 1:1,000                  | 1                               |           |
| 23. Ibadan                    | 520                  | 720              | 1977/78                     | 1:6,000                      | 1:1,000                  | 1                               |           |
| 24. Benin City                | 523                  | 720              | 1979                        | 1:6,000                      | 1:1,000                  | 1                               |           |
| 25. Calabar                   | 408                  | 270              | 1977                        | 1:6,000                      | 1:1,000                  | 1                               |           |
| 26. Ilorin                    | 1219                 | 3251             | 1981                        | 1:6,000                      | 1:1,000                  | 1                               |           |
| 27. Minna                     | 270                  | 720              | 1981                        | 1:6,000                      | 1:1,000                  | 1                               |           |
| 28. Sokoto                    | 603                  | 1608             | 1981                        | 1:6,000                      | 1:1,000                  | 1                               |           |
| 29. Bauchi                    | 622                  | 1659             | 1981                        | 1:6,000                      | 1:1,000                  | 1                               |           |
| 30. Akure                     | 561                  | 1496             | 1981                        | 1:6,000                      | 1:1,000                  | 1                               |           |
| 31. Igara                     |                      |                  | 1978                        | 1:10,000                     | 1:1,000                  |                                 |           |
| 32. Owerri                    | 792                  | 2112             | 1977                        | 1:6,000                      |                          |                                 |           |
| 33. Ubiaja                    |                      |                  |                             | 1:10,000                     |                          |                                 |           |
| 34. Abudu                     |                      |                  |                             | 1:10,000                     |                          |                                 |           |
| 35. Ikot-Ekpene               |                      |                  | 1977                        | 1:6,000                      |                          |                                 |           |
| 36. Oron                      |                      |                  | 1978                        | 1:6,000                      |                          |                                 |           |
| 37. Obubra                    |                      |                  | 1977                        | 1:6,000                      |                          |                                 |           |
| 38. Ugep                      |                      |                  | 1977                        | 1:6,000                      |                          |                                 |           |
| 39. Akampe (Uwet)             |                      |                  | 1977                        | 1:6,000                      |                          |                                 |           |
| 40. Auyo                      |                      |                  | 1977                        | 1:6,000                      | 1:2,000                  |                                 |           |
| 41. Opobo                     |                      |                  | 1977                        | 1:6,000                      |                          |                                 |           |
| 42. Etinam                    |                      |                  | 1978                        | 1:6,000                      |                          |                                 |           |
| 43. Abak                      |                      |                  | 1978                        | 1:6,000                      |                          |                                 |           |
| 44. Eket                      |                      |                  | 1978                        | 1:6,000                      |                          |                                 |           |
| 45. Federal Capital Territory |                      |                  | 1977                        | 1:10,000                     |                          |                                 |           |
| 46. Lagos Metro. Municipality |                      |                  | 1977                        | 1:2,700                      |                          |                                 |           |
| 47. Asaba/Onitsha             |                      |                  | 1978                        | 1:6,000                      | 1:1000-core<br>& 1:2,000 |                                 |           |
| 48. Uyo/Uwaniba               |                      |                  | 1979                        | 1:6,000                      |                          |                                 |           |
| 49. Port Harcourt             |                      |                  | 1977                        | 1:6,000                      | 1:2,000                  |                                 |           |
| 50. Oshogbo                   |                      |                  | 1977                        |                              |                          |                                 |           |
| 51. Auyo                      |                      |                  | 1977                        | 1:4,000                      |                          |                                 |           |

Source: Modified from Balogun (1994)



general issues critical to the implementation of GIS in the country have been identified and discussed (See for example, Fajemirokun, 1998; Balogun and Uluocha, 1998; Uluocha, 1997b and 1998a). However, our main concern in this paper is on those issues considered quite tangential to the development of GIS databases for urban mapping in Nigeria.

An ideal GIS database should contain data items (both geographic and attribute), that are accurate, comprehensive and current. Such database must be properly handled, and must lend itself to multifarious uses. The above database qualities become even more important when urban mapping for urban management is the prime consideration for which the database is to be developed. What then are the potential impediments to the development of ideal databases for urban mapping in Nigeria? The rest of this section is dedicated to answering this all-important question.

## **5.2 Shortage of data**

Apparently, the greatest problem of GIS database development in the country is shortage of data. This problem is being considered within the context of both data quantity and data quality. In terms of data quantity the country is significantly lacking in cartographic products such as large-scale base maps, aerial photographs, satellite imageries, photo mosaic and orthophoto maps which could be used in urban mapping. Currently, not all the towns in the country are mapped, only few big cities notably National and States capitals and some local government headquarters, are mapped to some extent. Even at that, most of the lucky urban centres only have medium scale topographic maps at 1:50,000 and large scale Township maps covering them; they lack other important cartographic bases such as cadastral and land-cover/land-use maps. For instance, presently only twelve of Nigerian towns have urban land-use maps which were published in the 1978 Atlas of the Federal Republic of Nigeria (Balogun, 1994). The urban centres involved are Lagos, Enugu, Port Harcourt, Calabar, Ibadan, Benin City, Ilorin, Kano City, Kaduna, Jos, Sokoto and Maiduguri. The problem of incompleteness of existing data is not limited to geographic or map objects alone. The associated attribute data of some of the features appearing on maps are known to be either incomplete or totally lacking. For example, where they exist at all, land parcels or building out-lines appearing on certain cadastral map sheets either lack attribute records or have incomplete records.

Apart from the problem of incompleteness, the issue of data currency would readily come to mind whenever any attempt is made to create a spatial database for urban mapping and management in Nigeria. The urban environment is a dynamic one. Hence, to properly manage an urban centre up-to-date information is essentially needed. This fact therefore makes one feel uneasy when viewed in relation to the Nigerian situation. Most of the existing cartographic base materials that could be used to create digital databases for urban mapping are simply out-dated. As mentioned above, the existing urban land-use maps in the country were published in 1978 and they have not been revised since then. Similarly, most of the extant urban cadastral map series were produced over three decades ago. Just as some of the mapped data are out-dated, so also are the descriptive attribute data of some of them out-dated. For instance, a casual perusal of the property records of some



municipal councils will quickly reveal that some of the entries in the records are incongruous with present realities on ground. There is no gain saying that the reliability of any databases created from these cartographic based and/or their related attribute sets, will be very much doubtful.

### **5.3 Fiscal Inadequacy**

Judging by any given standard, GIS database development for mapping and other spatial operations is usually a costly venture. Every aspect of GIS database implementation - data acquisition, conversion, storage, update and maintenance - involves a very significant spending in monetary terms. For this reason data has been widely identified as the most expensive component of GIS.

In view of the foregoing, one is compelled to pinpoint fiscal inadequacy as a major constraint to GIS database development for urban mapping in Nigeria. The annual budgetary allocation to surveying and mapping in the country often falls far below the minimum 2% recommended by the United Nations (UN) for its member States (Uluocha, 1997a). In fact, the budgetary allocation to the surveying and mapping sector in recent years had remained less than 0.3 per cent of the total capital budget (Adeoye, 1998). Therefore the annual amount of money set aside by the Federal Government for urban mapping over the years has been found to be "grossly inadequate to meet the amazing challenge to urban mapping and planning posed by the current high rate of urbanization process" (Adeyemi, 1982). There is hardly enough fund for the acquisition of data and data infrastructure, data conversion and training of personnel in GIS data-handling for urban mapping.

### **5.4 Shortage of Personnel**

Another important issue in the development of geo-referenced database for urban mapping in Nigeria is shortage of personnel. In this respect personnel refers to basically two categories of GIS people, i.e. those who can capture the analogue cartographic features into the computer, and those who can integrate and manipulate the digital data with the aim of generating suitable urban maps. (In some cases the two broad functions may be performed by one and the same person). In the contemporary situation, most, if not all of the data needed for developing GIS-managed databases for urban mapping in the country exists in analogue form. To develop such databases would therefore necessarily entail digitising the zillions of map sheets, aerial photographs and orthophoto maps that may be required for such a gargantuan project. Alternatively, the base materials may be scanned. However, whether the digitising or the scanning data input technology is used, or both, the fact remains that qualified personnel must be engaged to handle the overall data input process. With the necessary data now in digital form, there will next be the need to use the data sets to generate urban maps. This exercise will again require the services of people with expert knowledge in computer mapping.

A look at the GIS sector in Nigeria will quickly expose the crass shortage of both GIS data conversion and mapping personnel in the country. Although efforts are currently going on



in various academic and research institutions in the country to train GIS personnel, it will still take quite some time before the presently existing gap will be significantly filled.

### **5.5 Lack of Policy on Database Development**

More often than not, developmental programmes draw the needed impetus from the political machinery of government. Such machinery may be in form of policies, laws, bills or even decrees. Therefore public mapping often depends on government detects. In Nigeria, there is no clear-cut policy on geographic database development for urban mapping and other operations. The Surveyor-General of the federation made this much known in a recent newspaper interview when he noted that "the fact is that there has never been a consistent and serious effort to mapping policy. The governments in Nigeria over the past years have never appreciated the need for a consistent and serious effort in mapping policy. All of them, from independence to date .... The tradition of mapping in Nigeria is nil." Equally, there is no existing agency mandated to develop appropriate urban databases for various uses, especially for mapping. Specifically, there is need for a national policy on geographic data standards, collection, classification, referencing, conversion, copyright, pricing, access and use. The absence of appropriate policy on the development of geo-coded data in the country has unfortunately led to the present unbridled, inconsistent and uncoordinated manner of GIS database implementation in the country.

## **6 THE WAY FORWARD**

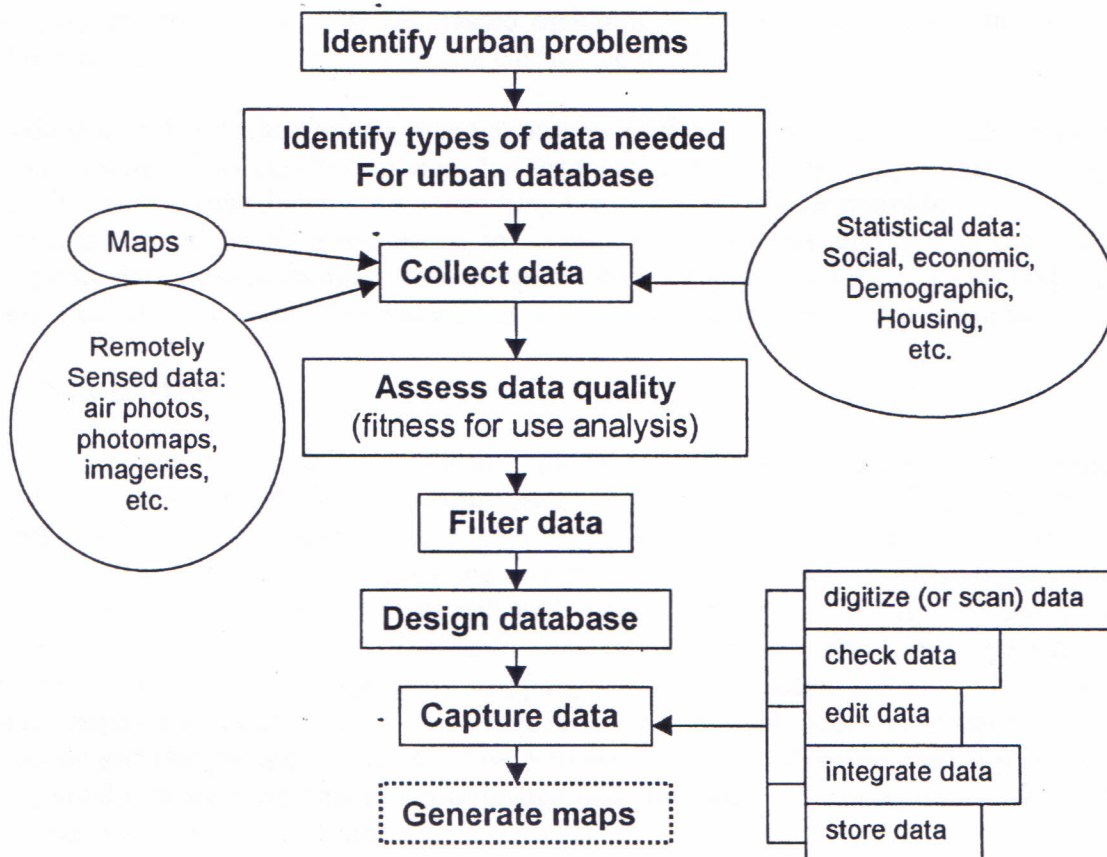
A basic argument of this paper is that without a comprehensive, accurate and timely geographic information, urban planning, development and management would proceed in a most haphazard manner. To ensure the ready availability of the needed geographic information, urban mapping must be vigorously pursued. The mapping process will be greatly facilitated and better co-ordinated if handled with the GIS technology. For this to be achieved in Nigeria, and indeed elsewhere, a national urban cartographic data bank (NUCD) must be established.

The government of Nigeria should come up with an all-embracing urban mapping policy that would encourage the use of the GIS technology. Through the arm of such a policy, an autonomous agency should be established to oversee the development of the needed urban cartographic data bank. Naturally, the agency should be given specific mandate in terms of the overall goal to achieve, the strategies that could be adopted, the various stages of the entire exercise and the particular tasks to be accomplished at each stage. Equally, a reasonable time-frame for each stage should be measured out. It has to be pointed out also that the mandate given to the agency set-up must be backed up with the necessary enabling legal power. Importantly, the urban mapping policy should contain irrevocable pronouncements on proper funding of the entire project. An urban database development and mapping Trust Fund could be established for the development of the NUCD. The Fund could either be managed by the agency established for this project or by the already existing Urban Development Bank.



Perhaps as a prelude to the creation of the proposed NUCD, an inventory of urban land-use/cover should be carried out for all the urban centres in the country. Expectedly, such exercise will yield very useful geo-referenced baseline data that will be used in developing the necessary data bank.

Presented in Fig. 1 is a schematic diagram of an urban database development model for urban mapping. As the model suggests, developing databases for urban mapping should commence with an identification of planning and management problems. The ultimate essence of urban mapping should be to provide appropriate data/information that would assist in tackling urban problems. Hence, as soon as the problems of the urban centre are fully identified, effort should be geared towards identifying the specific data types needed to build the desired database. Knowing the particular kind of data needed should naturally pave the way for data acquisition to commence. For the geographic entities the data could be in map form or in form of remotely sensed data held in air photographs, photo maps, or satellite imagery. On the other hand, the needed attribute or statistical data such as social, economic, demographic, housing and health data may be acquired from statistical and archival records or files maintained by various public and private establishments. Interestingly, in Nigeria, the Federal Office of Statistics (FOS) already has some of these data sets. However, it has to be quickly pointed out that most of the data maintained by the FOS are not geo-referenced.



**Fig. 1 An Urban Database Development Model for Mapping**



Usually, the mass of data assembled for the urban database development project may contain some significant shortcomings. For example, the aerial photographs may need to be interpreted and annotated, some mapped information may be obsolete, some of the statistical data may need updating, and so on. All these shortcomings and more underscore the need to assess fitness for use of the assembled data. Assessing fitness for use is a systematic exercise that entails determining whether the quality of the information is acceptable for a given application (Agumya and Hunter, 1997). The quality of geographic information could be measured by using parameters such as lineage, positional accuracy, attribute accuracy, completeness, and logical consistency. Agumya and Hunter have developed a model for systematically and objectively assessing fitness for use of geographic information.

The data quality assessment process often exposes data items that are 'misfits' for the intended application. Such data items, as indicated in Fig. 1, should be filtered or weeded away from the rest. Allowing such data to form part of the database could lead to data redundancy. However, before finally discarding the unwanted or unsuitable data items, caution must be observed to ensure that they should actually be dropped. Filtering away the wrong data may introduce serious errors into the database when it is finally created.

With the suitable set of input data now in place, the design of the database structure should be undertaken. (This stage however, can come earlier than now). The design would entail specifying the various files to be created including the file format, specifying activity modules and procedures for entering and editing the input data.

As indicated in Fig.1, the final stage in the process of developing an urban database should be data capture. This entails digitising (or scanning) the geographic input data, keying in the attribute data from the keyboard, checking the captured data for possible errors, editing the data to correct the observed errors, integrating the data items, and storing them in an appropriate data storage medium such as optical discs or magnetic tape or CD-ROM. The database can then be manipulated at will to generate any desired maps that it can support.

## 7 CONCLUSION

The present rapidly increasing urban management problems in Nigerian require urgent implementation of an urban information system. Such a system that will be supported by powerful national urban cartographic data bank, will among other things, be used to generate maps needed for urban planning and management. To achieve this all the policy, data, technical, personnel, institutional and fiscal problems currently inhibiting the development of GIS databases for urban mapping in the country, must be urgently addressed. Moreover, tackling urban mapping and GIS implementation problems in the country requires an interdisciplinary, intergovernmental and inter-sectoral approach. Both the public and the private sectors must be actively involved. More so, the project should be executed in a very systematic, co-ordinated and consistent manner as enunciated in the urban database development model herein discussed.



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