Comptroller and Auditor General

Report on Value for Money Examination

Ordnance Survey

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Arna fhoilsiú ag Oifig an tSoláthair

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Report of the Comptroller and Auditor General

Ordnance Survey

I have, in accordance with the provisions of Section 9 of the Comptroller and Auditor General (Amendment) Act, 1993, carried out a value for money examination on the Ordnance Survey.

I hereby submit my report of the above examination for presentation to Dáil Éireann pursuant to Section 11 of the said Act.

John Purcell
Comptroller and Auditor General

20 December 1996

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Glossary

Topography	The methodology for showing surface features such as rivers, roads and hills on maps
Geodetic	Relating to the shape of the earth
Cartography	The art or work of making maps and charts
Scale	The proportion that a map bears to the area that it represents
Photogrammetry	Map making from aerial photographs using stereoscopic equipment and methods

Summary of Findings

The Ordnance Survey (OS) is the State mapping agency with responsibility for the provision of maps and other data which are required by users of geographic information. The environment in which the OS operates has changed considerably since the late 1970s. In particular, advances in computer related technologies have had a major impact on surveying and mapping techniques

The study focused on

- the quality of service provided by the OS to its customers
- the financial performance of the OS
- the age profile of the map data
- the impact of changes to the operating environment of the OS

Customer Service

The study included a survey of a sample of institutional and corporate customers of the OS which was carried out with the assistance of a firm of market research consultants The results of the survey were generally positive, with customers expressing satisfaction with the quality of the product being provided However, a number of areas of concern were noted including out-of-date mapping data, speed of delivery of the required product, lack of customer feedback, complaint handling and difficulties in making contact with the OS It is recommended that the OS gives these matters its immediate attention

Financial Performance

Guidelines issued by the Department of Finance in 1989 set financial targets for the OS which were designed to progressively increase the level of self-financing Specific targets were set in respect of the urban mapping programme, the small scale mapping series and specialist contract work It was not possible during the study to evaluate the extent to which the individual targets are being met because of limitations in the management information system used by the OS However, a comparison of expenditure and receipts over the years 1989 to 1995 indicates that the overall rate of self-financing has progressively improved.

The OS should consider the potential for increasing revenue through better marketing of its products and services and through stricter enforcement of royalty and licence fee collection

It is recommended that the OS should consider the development of a comprehensive management information system which would provide

- accurate costing information
- facilities for pricing mapping data
- a facility to assess whether targets are being achieved
- a basis for identifying and deciding on strategic options

Under existing arrangements the OS does not produce separate annual financial accounts. Its expenditure and receipts are included in a combined annual Appropriation Account with the Valuation Office The OS should consider, in conjunction with the Department of Finance, the production of annual financial accounts relating to its activities including a trading account, profit and loss account and balance sheet

Age Profile of Map Data

The usefulness of mapping information is very dependent on the extent to which the information being provided to users is up-to-date An analysis of the urban and rural mapping databases showed that

- The urban mapping programme is currently being revised on a three-year cycle

- The rural mapping programme is considerably out-of-date Only 5% of maps in the series have been revised in the period since 1990, 31% were last revised in the period between 1950 and 1970 and the remaining 64% have not been revised since before 1950

The absence of up-to-date rural mapping has the greatest impact in areas on the periphery of urban centres which have been subject to considerable housing and commercial development in recent years

A recent example of the need for up-to-date rural mapping was the requirement by the Department of Agriculture for a database of land parcels in order to verify area aid claims from farmers The Department of Agriculture has stated that the additional costs incurred in developing the database in the absence of up-to-date mapping was approximately £1 6m.

The OS is currently considering the use of a less detailed specification for rural mapping which would meet customers' requirements and which would accelerate the revision of the rural mapping programme

Operating Environment

The introduction of computer-based mapping technologies has had a fundamental effect on surveying methods and on the mapping processes used by the OS This has enabled the OS to produce a wider and more flexible range of products in different formats to suit customers' needs

Efficiency gains through the use of new technology have enabled the OS to gradually reduce staffing from about 400 in 1981 to a current level of 278. However, as a result of non-recruitment, there is a serious imbalance in the age structure of OS staff with approximately 75% of staff in the 36 to 50 age bracket.

A major change in the structure of the OS was the establishment of six regional offices on foot of a Government decision in 1990. OS staff formerly employed in field work have been transferred into these offices, with consequent savings in travelling and subsistence costs. Nevertheless, the OS remains highly centralised, the regional offices do not provide services locally but act as off-site production centres. The OS has stated that there would be additional resource implications in expanding the role of the regional offices.

The Defence Forces have traditionally provided military personnel to the OS to carry out cartography duties on the same basis as their civilian counterparts The military personnel remain under the control of the Defence Forces and this has created difficulties for the OS in planning and managing its mapping programmes The Defence Forces Review carried out by the Efficiency Audit Group of the Department of the Taoiseach recommended the disengagement of military personnel from the OS and this matter is currently under discussion.

Ordnance Survey

Part 1 : Introduction

General

1 1 The Ordnance Survey (OS) is responsible for the official surveying and mapping of the State. It has custody of and maintains the national archive of geodetic and topographic data which has accumulated from its work over the years. The role of the OS is to collect, process, market and distribute geographic information in a form which satisfies customers' requirements

Funding and Accountability

1 2 Ministerial responsibility for the OS rests with the Minister for Finance The OS operates as a separate entity with its own management structure, although it is joined with the Valuation Office for administrative and accounting purposes under the responsibility of one Accounting Officer. The annual financial outturn of both bodies is accounted for in a combined Appropriation Account - Valuation and Ordnance Survey

1.3 The OS generates income through sales of its products and services, the charging of royalties and licence fees for the reproduction of these products and through contract work.

Staffing and Organisation

1 4 The OS is headed by a Director of Ordnance Survey, who is also the Commissioner of Valuation, Chief Boundary Surveyor and Accounting Officer A Director of Operations is responsible for the day to day management of the OS The number of staff directly employed in the OS was 278 at 30 June 1996 In addition, 45 military personnel were assigned to cartographer duties from the Defence Forces A breakdown of OS staff by function is given in Appendix A

1 5 The headquarters of the OS is located in the Phoenix Park, Dublin Since 1990, six regional offices have been established in Cork, Kilkenny, Ennis, Sligo, Tuam and Longford, with a total of 82 staff assigned to these offices

Main Features of OS Operations

Historical Background

1.6 The OS was established in Ireland in 1824 with the objective of providing large scale maps (1 10560 or 6 inches to 1 mile) to update land valuations for taxation purposes

1 7 By the time Ireland achieved independence in 1922 the OS had built up an archive of mapping ranging in scales from 1.1250 to 1·500000 By the mid 1960s the archive had

become significantly out of date, particularly in urban areas where the maps no longer reflected the true situation on the ground

1 8 This matter was addressed by the Advisory Committee on Mapping Requirements which had been set up to examine the mapping needs of the State It published its report in 1964 which recommended

- the introduction of the metre as the unit of measurement
- the establishment of a 1·1000 scale for mapping urban areas and the placing of this map series under continuous review
- the replacement of the 25 inch County series by a 1 2500 scale series to cover the whole country outside urban areas
- the replacement of the 1·63360 series by a 1 50000 series containing townland boundaries and the placing of this series under a 15 year cyclical revision

Current Operations

1 9 In 1989 the Department of Finance issued a policy directive which established guidelines concerning mapping priorities, financial targets and overall policy objectives for the OS These remain the basis for its current operations

1 10 The methods of map production used by the OS have changed dramatically since the late 1970s The OS has taken advantage of technological developments to improve its production processes which has reduced the heavy dependence on field surveying

1 11 During the past decade the use of new computer and digital technology has changed the map making process in terms of speed of production, product innovation and flexibility, and archive maintenance and storage

1 12 The archive of all OS map series is now stored in a fully structured digital database so that all mapping is available in both digital and graphical form. Digital mapping is the recording and storing of topographic and other map information in the form of numerical co-ordinates which facilitates the isolation of certain map features which may be required for specific purposes

1.13 The activities of the OS can be classified as follows

- Core activities which constitute the compilation and revision of map databases on a continuing basis These include the basic scales of 1:1000 urban mapping, the 1:2500 rural mapping and the 1:50000 tourism and leisure maps As these databases are deemed to be vital to the national interest, their production is funded largely from the Exchequer. In addition, mapping is also carried out at fixed rates using standard maps for clients such as local authorities, public utility companies and Government departments

- Contract mapping for specialist requirements which could not be met using standard mapping and which is charged on a commercial basis

OS Role and Mapping Policy

1.14 With the impact of new technology the role of the OS has expanded to that of a producer and distributor of geographic information. As well as providing paper maps, their derivatives and ancillary services, the OS also licenses the use of its data for a wide range of computer-based applications such as Computer Aided Design and Geographic Information Systems

1.15 In line with the Government's Strategic Management Initiative for the Public Service, a strategic management process is being developed in the OS A Statement of Strategy has been drawn up which states that the corporate mission of the OS is "to provide the maps and data essential for all users of geographic information".

1.16 The objectives of the OS are defined in the statement as being

- to provide a national up-to-date topographic database for users of mapping and geographic information systems in support of national economic and social development

- to continue to develop the service in order to exploit the potential of existing and new public and commercial markets

- to develop, within the business environment, a culture of unity and cohesiveness among all members in the organisation

- to secure regular and long term income streams to ensure the future viability of the organisation

1.17 These objectives are reflected in current OS mapping policy

- to maintain the urban mapping programme[1] in a fully structured digital database and to keep this in a current state by updating the maps on a three year revision cycle
- to resurvey and establish a fully structured digital database for the rural mapping programme[1] and to update these maps on a 5 year revision cycle
- to establish and maintain a small scale fully structured digital database to support graphical products at the 1 50000 scale
- to supply public and private sector customers with special purpose mapping in digital or graphical form on a commercial basis.

Purpose and Scope of Examination

1 18 This study set out to examine

- the quality of service provided by the OS to its customers
- the performance of the OS in meeting its financial targets
- the age profile of map data
- the impact of new technology, regionalisation and the role of military personnel on the operational environment of the OS.

1 *With current technology urban and rural maps can be output at any scale However, the usual scales are 1 1000 for urban maps and 1 2500 for rural maps*

Part 2 : Customer Service

Introduction

2 1 The products of the OS are used for a wide range of purposes including property and land registration, recording of assets such as utility pipelines, planning applications, education, tourism and leisure pursuits, environmental monitoring and for the security and emergency services.

2 2 With developments in computerised mapping technology the OS is facing increasing competition in some of its markets However, as the national mapping agency, the OS remains in a dominant position in many respects. For example, one of its most important customers, the Land Registry, is statutorily obliged under Section 84 of the Registration of Title Act, 1964 to use the latest edition of large scale OS maps for property registration.

2.3 The quality of service which the OS provides to its customers is critical to its success in achieving its corporate objectives and is a key performance indicator of the value for money being achieved for Exchequer current and capital funding.

2.4 As part of this study, an attitudinal survey of a sample of customers of the OS was carried out with the assistance of a firm of market research consultants [2]

2 5 The survey was conducted in two phases An initial qualitative research phase was carried out involving in-depth interviews with five of the largest OS customers [3] Following this a quantitative research phase involving a structured interview was conducted with 75 other large corporate or institutional customers. The sampling methodology for this phase is given in Appendix B 1.

Qualitative Phase

2 6 The purpose of this phase was to provide guidance on the design of a quantitative questionnaire by identifying the key issues It was also considered that the qualitative phase would provide more informal insights into attitudes to the OS than would usually be collected by structured questioning.

[2] *Irish Marketing Surveys Limited*

[3] *The Land Registry, Central Statistics Office, South Dublin County Council, Department of Agriculture, Food and Forestry and Telecom Éireann*

2 7 The main findings from the qualitative phase were that customers considered that

- There was a problem with the updatedness of maps, particularly in relation to the fringes of urban areas where rapid change has been taking place and that the OS should issue a regular bulletin on the updatedness of particular maps
- The quality of OS products was good, although some problems were encountered with digital maps.
- The OS was not sufficiently customer orientated and was not flexible enough in meeting changing customer needs. The OS is slow to take the lead in policy formation and in the co-ordination of clients needs
- The organisation has high technical standards but is greatly under-resourced

The detailed results of this phase of the research is given in Appendix B 2

Quantitative Phase

2 8 The quantitative phase of the research was designed to establish

- the familiarity with products and services used by OS customers
- the rating of the service provided by the OS across a number of different criteria
- the incidence of dealing with other mapping agencies
- the level of satisfaction with OS products
- the incidence of customers encountering problems with the products or services and how the OS dealt with these problems
- customer perceptions of the value for money of OS products and services.

Quantitative Survey Findings

Familiarity With and Usage of Specific OS Products

2 9 Three quarters of customers interviewed use the services of the OS continuously throughout the year and are also long-term customers having dealt with the agency for ten years or more

2.10 The OS products with which customers are most familiar are the 1 1000 urban maps, the 1 2500 rural maps and the tourist and leisure maps This high level of familiarity follows through to usage, with three-quarters of customers surveyed claiming to use these products

2 11 Table 2.1 details the survey results with regard to product familiarity, usage and expenditure by product type and customer category.

Table 2.1
Familiarity/Usage/Expenditure - OS Products

Product	Familiar	Use	Proportional Expenditure by Product	Usage by Customer Category		
				Govt. Dept/ Semi-State	Local Authority	Private Sector
1 1000 urban maps	84%	73%	20%	65%	91%	56%
1 2500 rural maps	88%	76%	34%	71%	94%	56%
1 50000 tourist and leisure maps	72%	53%	14%	71%	39%	60%
Contract mapping	53%	35%	9%	41%	52%	8%
Road and street atlases	61%	35%	4%	53%	24%	36%
Specialist or customised maps	49%	31%	8%	41%	30%	24%
Other	27%	27%	11%	29%	27%	24%

2.12 The higher usage of urban and rural mapping is reflected in the proportion of customers' total expenditure with the OS accounted for by those products (54%)

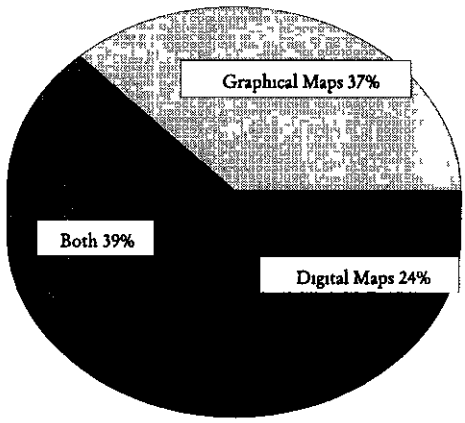
2 13 Table 2 1 also shows significant variations in usage of OS products by customer type Local authorities tend to use urban and rural mapping extensively while Government departments/Semi-State bodies make more use of small scale mapping, road and street atlases and specialised/customised maps Tourist and leisure maps find most use with private sector firms

2 14 The development and increased demand for digitised mapping is reflected in the finding that almost one quarter of respondents usually require mapping in digital format only, while almost two-thirds of respondents use both digitised maps and graphical maps Local authorities, specifically, and customers who spend most on OS

products in general are most likely to use digital maps Figure 2 1 illustrates the extent of usage of graphical and digital map formats

Figure 2.1

Map Format Used



2 15 The research also found that customers believe that the initiative to switch to digitised maps came mainly from them rather from the OS [4]

Service Delivery

2 16 Customers were asked to rate service criteria in terms of how they would expect a Government department or agency to perform and to rate the actual performance of the OS across the same service criteria This approach provides a means of directly comparing customers' perceptions of actual performance with what they expect of a Government department or agency The larger the gap between actual performance and expectation, the greater the level of dissatisfaction and the greater the scope for improvement

[4] *The OS has stated that it introduced digitised mapping in 1979 and has since then promoted the use of this form of mapping widely*

2.17 Table 2.2 details the results of this aspect of the survey.

Table 2.2
Service Delivery - Expectation Gap

	Expectation	Actual	Gap
Ability to meet your requirements	91	75	-16
Level of understanding of your requests	89	79	-10
Speed of delivery of product/service	88	68	-20
Ease of contacting the office	89	70	-19
Staff ability to answer your questions	88	80	-8
Speed of response to queries	88	72	-16
Staff knowledge and technical competence	87	81	-6
Willingness to adapt to meet your needs	86	73	-13
Being kept informed of progress	83	63	-20
Courtesy shown throughout dealings	81	85	+4
Level of contact maintained	79	67	-12

2.18 In general, customers perceive the staff of the OS to be technically proficient and courteous to deal with. However, there are a number of service dimensions with significant expectation gaps The more serious these perceived shortcomings, the greater the need and opportunity for improvement

2 19 Local authorities tended to give consistently higher than average satisfaction ratings. To a lesser degree, Government departments and Semi-State bodies also gave higher than average ratings Conversely, private sector customers consistently gave lower than average ratings across the service criteria

2.20 The research also found that 55% of customers consider that the service from the OS had improved over the past five years These customers tend to be local authorities, the bigger spending customers or customers who are using digital maps The reasons cited for the improvement are the increased range of products on offer through technological developments, computerisation and the better response to customer needs through faster access to information which this has facilitated

Competition

2 21 Although the OS enjoys a dominant position in the production of mapping it cannot ignore increasing competitor activity Three-quarters of customers surveyed claimed to be aware of other companies which provide a mapping service and over half of respondents have dealt with a company other than the OS. The reasons given included specialist requirements, cost, speed of delivery, ability to provide the product required at the right time and product range. The survey found that over half (53%) of such customers considered that the level of service actually provided by competitors was the same while 30% considered that the service received from other companies was better than that provided by the OS

Satisfaction with OS Products and Services

2 22 Customers' perceptions of OS products and services were also ascertained using the same performance measuring procedure as for Service Delivery However, in this instance, Table 2 3 shows the average satisfaction rating across a number of product/service criteria out of a maximum score of 100

Table 2.3
Products and Services - Customer Satisfaction

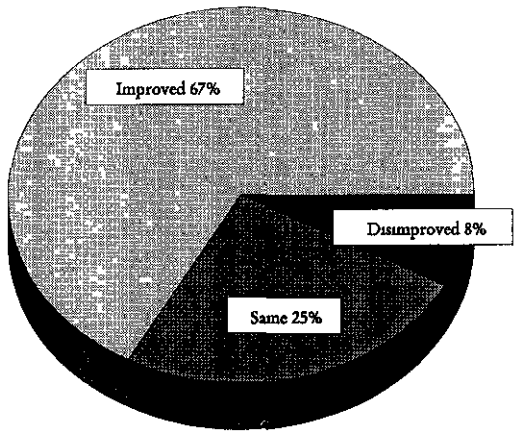
Satisfaction Criteria	Average Rating
Fulfilment of your requirements	77
Accuracy of maps	76
Updatedness of information	69
Level of detail shown	82
Degree of clarity/definition	80
Style of presentation	82
Quality of paper and ink	71
Overall cost	63
Range of scales available	79
Adaptability of maps (digital) to own system	75

2 23 In general, reaction to OS products and services is positive While there is room for improvement across all aspects, there are some areas which provide greater scope for product/service improvement The three product/service aspects where significant gaps emerged, indicating quite a degree of dissatisfaction, were the *'updatedness of information'*, the *'overall cost'* and the *'quality of paper and ink '* used

2.24 The survey also ascertained that, compared with five years ago, two-thirds of OS customers feel that the quality of products and services has improved Figure 2.2 illustrates the findings in this regard.

Figure 2.2

Product/Service Improvement



2.25 The research shows that the type of customers who are most likely to hold this belief are Government departments and Semi-State bodies, Dublin based customers, high spending customers and those customers who use both paper and digital maps. The three main reasons cited for this perceived improvement were, computerisation/new technology, new product ranges and product presentation.

2.26 Six out of ten customers claim to have required the OS to carry out special, non-standard, mapping work such as commissioning specific aerial surveys The OS appears to be meeting customers' specialist requirements reasonably well in that 70% of such customers indicated general satisfaction with the way the OS dealt with their requirements

Complaint Handling

2.27 One of the most important dimensions of customer service in any organisation is its capacity to resolve customer complaints with products or services to the satisfaction of those customers The customer survey found that 60% of respondents had encountered some problems with the service provided by the OS The majority of these customers (89%) brought their particular problem to the attention of the OS

2 28 The most common type of problem encountered related to late delivery of products Other areas where problems were encountered included the quality of products, pricing, inaccurate information, difficulty in making contact and product availability

2 29 The perceived performance of the OS in handling customer complaints reveals a wide dispersion in customer satisfaction. Table 2 4 details the survey's findings in regard to the level of satisfaction with complaint handling

Table 2.4
Level of Satisfaction with Problem/Complaint Handling

	% of Customers
• Completely satisfied	17
• Mainly satisfied	29
• Neither	17
• Mainly dissatisfied	20
• Completely dissatisfied	17

2.30 The survey also asked customers if they believed that adequate feedback mechanisms were in place in the OS to ascertain customers' views on products and services Table 2 5 shows the results

Table 2.5
Adequacy of Feedback Mechanisms

	Do Adequate Feedback Mechanisms Exist?		
	Yes %	No %	Don't Know %
All respondents	40	52	8
Govt Depts /Semi-States	41	59	-
Local Authorities	42	55	3
Private Sector Companies	36	44	20

Value for Money

2 31 The survey also asked customers to assess whether the products and services represented good value for money The findings showed that there was a positive perception of the value for money given by the OS with exactly 50% of customers perceiving the products and services to be particularly good value Over one-third of

customers were indifferent while only one in eight regarded the products and services as being poor value for money.

2.32 Those customers who were most positive about the value for money received are local authorities and other large customers Table 2 6 shows the detailed findings on this aspect of the survey.

Table 2.6
OS Products/Services - Perceived Value for Money

	Total	Govt. Dept./ Semi-States	Local Authorities	Private Sector
	%	%	%	%
Particularly good value	5	6	6	4
Good value	45	35	52	44
Neither	37	41	30	40
Bad value	12	18	12	8
Particularly bad value	1	-	-	4

2.33 There is an understanding among customers that the OS offers a sophisticated range of products and services and that the fees charged reflect this.

2 34 The survey sought the views of respondents on the payment system operated by the OS and in particular their attitude to royalty and licence fee payments The survey found that 84% of customers were aware of the royalty system. Not all respondents expressed a view on the payment system operated by the OS, but the majority of those who did, think it a fair system and a reasonable way to operate.

Summary of Quantitative Research

2 35 The results from the quantitative phase of the survey are generally positive when compared with other commercial enterprises which occupy a dominant position within their given market On the whole, the staff are seen as being courteous, approachable, technically proficient, and produce a good quality, sophisticated product However, there are clearly a number of key areas which require immediate attention, including access, speed of delivery, updatedness of information, cost, meeting requirements and complaint handling

Part 3 : Financial Performance

Introduction

3.1 This part of the report deals with the financial performance of the OS in the context of the Financial Guidelines issued by the Department of Finance

3 2 The OS, like any other public sector trading organisation, is obliged to operate in an efficient and cost effective manner, minimising its call on Exchequer funds while maintaining the quality of its work

Financial Targets

3 3 The Department of Finance guidelines include financial targets which were designed to progressively reduce the proportion of OS costs falling on the Exchequer.

3.4 The following specific targets have been set

- The 1 1000 urban mapping programme should be eventually self-financing in accordance with the following schedule

Year	Rate of Self-financing
1992	20%
1995	40%
2000	70%
2005	100%

- In regard to the 1 50000 series, 75% of the cost of maps and other products derived from the database should be recovered

- Contract work from non-standard mapping should contribute a full commercial rate of return comparable at least with that of private sector organisations

3 5 The guidelines also directed that the accounting system should be re-organised to ensure that all operations are fully costed for the purpose of reporting on the financial targets and for general cost control

3 6 Because of limitations in the Management Information System (MIS) used in the OS there is a high degree of estimation involved in the apportionment of costs between the various map series Consequently, it is difficult to accurately establish the extent to which the OS is meeting the targets established by the Department of Finance on a product by product basis (see paragraphs 3 9 to 3 11).

3.7 Table 3 1 shows the overall rate of self-financing in the years 1989 to 1995

Table 3.1
Rate of Self-Financing 1989 to 1995

Year	Expenditure £000's	Receipts £000's	Rate of Self-Financing (%)
1989	6,199	2,005	32
1990	7,634	2,326	30
1991	8,524	2,680	31
1992	8,676	2,786	32
1993	9,045	3,501	39
1994	10,568	7,502	71
1995	9,297	4,320	46

3.8 The figures in Table 3.1 represent the annual outturn on a cash basis The large increase in receipts in 1994 was due to map sales amounting to some £3 5m to farmers who required the maps for the purposes of claiming aid under the Common Agricultural Policy reform schemes. The rate of self-financing would increase to 78% in 1995, if outstanding debtors of £2 9m at 31 December 1995 were taken into account. While the increase in self-financing in 1994 and 1995 has been influenced by once-off occurances, the overall trend has been improving in recent years

Management Information System (MIS)

3.9 The MIS provides information based on regular reports from each of the four production divisions of the OS on the direct costs of producing the different map series and on the levels of production and income generated through the various activities.

3 10 The following limitations were noted

- The MIS only records the direct costs of map production
- There is no systematic method of allocating overhead costs to the different products
- The classification of direct costs is inconsistent across the divisions

- Information is mainly recorded on a manual basis which impairs the capacity to effectively analyse and summarise the information.

- The system does not include a production tracking system. As a result, it is not possible for divisions to readily access information on work-in-progress in other divisions and to keep customers informed on work-in-hand.

3 11 The OS has recognised the limitations in the system and has recently appointed a Project Manager whose responsibilities include developing a computer-based MIS and a production costing system to facilitate the accurate recording of costs and the monitoring of performance against agreed financial targets A group has also been set up, under the Strategic Management Initiative, to formulate and report on the management information requirements of the OS.

Contract Mapping

3 12 In 1995 income from contract work amounted to £1 1m, representing 26% of total income. There are two forms of contract – ad hoc mapping contracts and standard OS mapping contracts

3 13 Ad hoc mapping refers to map making for specific purposes such as local authority road projects which could not be met from the OS archive of standard maps It usually involves carrying out a once-off air survey from which the required mapping is plotted

3 14 Charges for ad hoc mapping are determined on the basis of direct costs plus an element for overheads to provide a commercial rate of return

3.15 At present most contract work is concerned with the provision of standard digital 1 1000 and 1 2500 maps Charges for these contracts are based on fixed prices together with an annual leasing charge.

OS Debtors

3.16 Royalties, licence fees and the bulk of OS sales are provided on a credit basis The total debtors balance at 31 December 1995 amounted to £2 9m, of which £1 66m was received from the Department of Agriculture in January 1996.

3 17 Approximately 400 debtors accounts are maintained by the OS with credit terms ranging from 14 days to 90 days Table 3.2 outlines the age profile of the debtors balances at 31 December 1995 (excluding the £1 66m due from the Department of Agriculture)

Table 3.2
Debtors Age Profile December 1995

No. of Days Outstanding	Amount	%
14-30 Days	£79,413	6 5
30-60 Days	£169,499	13 5
60-90 Days	£383,540	30 5
greater than 90 Days	£617,221	49 5
Total	**£1,249,673**	**100.0**

3.18 Although the majority of accounts have credit terms of 30 days or less, approximately half of the debtors balances were outstanding for more than 90 days. The average number of debtor days is 107 days based on the annual sales level and the year end debtors balance.

3.19 A total of £728,329 of the balance outstanding at 31 December 1995 remained outstanding in April 1996 The age profile of this amount is analysed by year in Table 3.3

Table 3.3
Outstanding Debtors 1995 - Age Profile

Year	Amount £	%
Pre 1991	14,416	2 0
1991	3,758	0 5
1992	13,452	2 0
1993	44,653	6 0
1994	115,074	16 0
1995	536,967	73 5
Total	**728,320**	**100.0**

3 20 The table shows that over £190,000 (26%) of the debt was outstanding from 1994 or earlier years

3.21 The examination of debtors also found that

- there were no upper limits on individual debtor accounts
- over 300 credit notes to a value of £272,000 were raised in 1995, many of which were required to correct errors in invoices

3.22 A professional accountant has been appointed to the OS, who is carrying out a review of this area As a result, credit terms are now being enforced and measures are being taken to collect outstanding debts In addition, debtor balances totalling £50,736 were written off in 1995 relating to bad debts incurred between 1984 and 1990 In the same period total revenues amounted to over £11m The £728,320 outstanding in April 1996 was reduced to £174,915 by September 1996

Copyright, Royalties and Licence Fees

3 23 The statutory basis of copyright in Ireland is the Copyright Act, 1963 and the Copyright (Amendment) Act, 1987 Under this legislation, copyright in every work prepared, printed or published by or on behalf of the Government of Ireland shall belong to the Government for a period of fifty years from the date of first publication of the work

3 24 Permission to reproduce OS material may be subject to the payment of a royalty which is usually assessed on the basis of the number of copies of each reproduction and the size of the area covered. In the case of parties who reproduce OS material on an ongoing basis, licences are usually issued on payment of a fee Licence holders include printing and publishing firms, local authorities and other public bodies, business firms and professional practitioners.

3.25 Income from royalties and licence fees has been increasing in recent years as illustrated in Table 3 4

Table 3.4
Royalty and Licence Fee Revenue 1989 to 1995

Year	Amount £000's	% of Total Income
1989	575	29
1990	723	31
1991	859	32
1992	1,006	36
1993	987	28
1994	1,345	18[a]
1995	1,803	42

Note [a] *This percentage is low because total revenue was greater in 1994 due to sales of maps to farmers under the Common Agricultural Policy reform schemes*

3 26 The growth in this income source is due to the success of the OS in negotiating royalty agreements with its high volume users such as the Land Registry, Department of Agriculture, local authorities and utility companies like the Electricity Supply Board (ESB) and Telecom Éireann.

3 27 Licence fees or royalties for high volume customers are negotiated on an individual basis. They usually take the form of phased payments over the period of the agreement and are based on the use which the organisation or individual makes of OS material and the quantity involved

Small Licence Holders

3.28 Small licence holders are so designated because of their relatively low level of reproduction and use of OS material. They mainly include professions such as solicitors (conveyancing), auctioneers and estate agents, consulting engineers and architects.

3.29 Royalty income of £1 8m in 1995 included £31,085 in respect of 134 small licence holders representing an average of £232 each. Fees payable are calculated using a formula based on the number of staff employed by small licence holders The maximum fee payable in 1995 was £460.

3.30 The 134 small licence holders who paid fees in 1995 represent 3% of such professional practices These are shown in Table 3 5.

Table 3.5
No. of Practices in Certain Professions

Profession	Number of Practices
Auctioneers[a]	1,541
Solicitors[b]	1,734
Consultant Engineers[b]	318
Architects[b]	716
Total	**4,309**

Source [a] *The Office of the Revenue Commissioners are the licensing authority for this profession*
[b] *Central Statistics Office (CSO) Census 1991.*

3.31 The amount of potential fee income which the OS could realise through expanding the current small licence holders base is difficult to quantify due to the lack of specific information on the degree to which OS material is being reproduced and by whom.

3.32 At present the OS does not have the resources to determine the extent of licence fee liability and to pursue amounts due. However, given the potential for increasing fee income, the OS should consider carrying out an assessment of the potential returns against the resources required

Part 4 : National Mapping Archive

Introduction

4.1 The usefulness to users of the information contained in the national mapping archive is determined by the extent to which it reflects the current topographical situation on the ground, i.e., the updatedness of the mapping data. As the main function of the OS is to maintain and update the topographic survey of the State and make this information available according to the needs of the users, the coverage and updatedness of the mapping archive was considered to be a key value for money issue and was accordingly examined

Archive Coverage

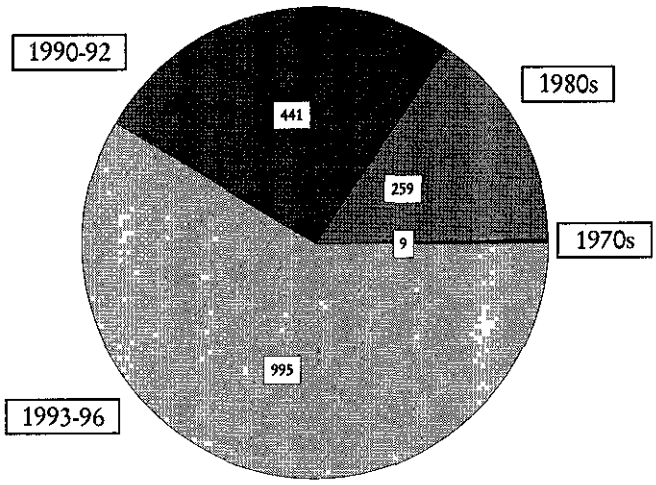
Urban Mapping

4.2 The urban mapping programme, the 1·1000 series, generally covers all towns with a population of 1,500 or more. In addition, other factors such as population density and economic development are taken into account All other towns and the remaining areas of the country are included under the rural mapping programme.

Urban Mapping - Coverage and Age Profile

4 3 Under the 1989 Department of Finance guidelines the 1 1000 urban mapping series should be maintained in a current state The OS, with its existing resources, implements this policy through a three year revision cycle In May 1996, 709 (41 6%) of the total 1,704 maps in the series were outside the three year cycle Figure 4 1 shows the periods in which the maps in the series have been revised

Figure 4.1
Age Profile of 1:1000 Map Series at May 1996



4 4 The OS have stated that the number of maps outside the three year cycle has been reduced to 318 by September 1996 The target is to have all maps revised by the end of 1996 The OS is also considering reducing the cyclical revision time for this series to two years from the current three year period

Small Scale Mapping

4 5 A small scale database is being compiled which is being used to produce the 1.50000 series. This series was established to meet the needs of the tourism, security, heritage, leisure and outdoor pursuits sectors. The target is to complete a minimum of 10 map sheets annually and by the end of 1996 it is expected that 47 of the 71 maps in the series will have been published

Rural Mapping

4.6 Rural mapping is covered by the following basic scales

- 1:2500 National Grid series
- 1:2500 National Photogrammetric Survey
- 25" series[5]
- 6" series [6]

4 7 In 1990, the OS established the National Photogrammetric Survey (NPS) whereby all mapping was produced at a standard scale of 1.2500 using air photography As at September 1996, 4,159 map sheets in the series had been completed out of a potential 23,000 map sheets which would be required to cover the total area within the rural mapping programme All work on the series to date has been carried out on foot of contracts, mainly for local authorities in respect of roads projects such as town by-passes

4 8 No revision policy was suggested by the Department of Finance for the 1 2500 series in their 1989 guidelines However, it is the policy of the OS to revise this mapping on a five year cyclical basis This has been guaranteed in contracts with some customers.

[5] *This series commenced in 1887 and was completed in 1913 covering the whole country except for the mountainous areas of counties Wicklow, Donegal, Mayo, Galway, Cork and Kerry*

[6] *This series is used to cover the mountainous areas of the country*

Updatedness of Rural Mapping

4 9 The rural mapping programme was analysed to establish the date of the last revision of the area covered on the database. This is illustrated in Table 4.1

Table 4.1
Age Profile of Rural Mapping

Period of Latest Revision	Area Ha[a]	% Ha
1990 to 1996	332,700	5%
1970 to 1989	1,265,826	18%
1950 to 1969	913,708	13%
pre-1900 to 1949	4,434,690	64%
Total	6,946,924	100%

Note. [a] *Map coverage is expressed in hectares (Ha)*

4.10 With present resources the OS is aiming to complete 640 map plans annually, representing 192,000 hectares At this rate of progress it would take a considerable time to complete the series The OS is considering using a revised specification which would meet the requirements of digital database users

4 11 The absence of up-to-date rural mapping is of greatest significance in those areas which have experienced a high level of topographical change such as the fringes of large urban centres where housing and commercial development occur. An analysis of the updatedness of rural mapping in a sample of counties which include large urban developments is shown in Table 4 2

Table 4.2
Updatedness of Mapping in a Sample of Counties

Period of last revision	Dublin		Cork		Limerick		Galway		Waterford	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
1990/96	24,088	44	11,100	2	17,886	7	9,600	2	25,200	15
1970/89	15,642	29	208,690	32	223,033	82	136,800	32	110,100	67
1950/69	14,770	27	3,900	1	-	-	2,700	1	-	-
pre 1900 to 1949	-	-	420,000	65	30,081	11	274,098	65	30,000	18
Total	54,500		643,690		271,000		423,198		165,300	

4 12 The areas included in the table cover the rural areas of each county apart from mountainous areas covered by the 6" series. It is recognised that the need for up-to-date mapping is generally localised within counties to areas where topographical change is occurring

4 13 An indication of the topographical change which may not be reflected in the mapping is the level of planning permissions granted in these counties Table 4 3 outlines the planning permissions granted in the counties examined in the period since 1986

Table 4.3
Planning Permissions Granted - January 1986 to June 1996

County Council	Total in Period	Annual Average
Dublin[a]	38,304	3,648
Cork	35,952	3,424
Galway	22,643	2,157
Limerick	13,689	1,304
Waterford	6,651	633

Note: [a] *Since 1994 Dublin County Council has been divided into Fingal, Dún Laoghaire/ Rathdown and Dublin South County Councils.*

4.14 Other examples of topographical changes which affect areas covered by rural mapping are afforestation and developments in farming. For example

- 163,500 hectares of forest have been planted between 1984 and 1995 according to Coillte Teoranta

- 36,000 farmers have been paid grants towards farm building and farm waste and pollution facilities under the Farm Improvement Programme.

4.15 An example of the need for up-to-date rural mapping occurred in 1995 when the Department of Agriculture was obliged to develop an alpha-numeric Land Parcel Identification System (LPIS). The purpose of this system was to provide the Department with a database whereby land parcels (farms) could be verified in respect of area aid claims by farmers. As OS rural mapping was considerably out-of-date, it was necessary to carry out an air survey of the country to provide the additional geographic information required for the database.

4 16 The Department of Agriculture has estimated that the full cost of developing the LPIS is approximately £10m, part of which is recoupable from the EU. The Department has also estimated that the additional costs incurred arising from the absence of up-to-date rural mapping was approximately £1.6m (excluding VAT) As the aerial photography is being used by the OS to compile the small scale database for the 1:50000 series, the cost of the aerial survey was shared with the Department.

Part 5 : Operating Environment

Introduction

5 1 Since the early 1980s the environment in which the OS operates has changed considerably The substantial development of computer and related technologies has had a radical impact on the surveying and mapping process and has also produced unprecedented growth and development of what has come to be termed the geographic information industry

5.2 The two main areas of change within the OS have been

- the introduction of computer-based mapping technology
- the establishment of six regional offices

Computer-Based Mapping Technology

5 3 In the period 1990-1995, the OS has incurred expenditure of some £10 5m on computer-based mapping technology and £2.7m on related servicing and maintenance as shown in Table 5.1

Table 5.1
Technology Expenditure/ Service and Maintenance 1990 to 1995

Year	Capital Expenditure £000's	Service and Maintenance £000's
1990	1,486	495
1991	1,550	547
1992	1,713	434
1993	1,618	382
1994	2,249	492
1995	1,844	381
Total	**10,460**	**2,731**

5 4 The objectives of this investment programme were to improve the efficiency of operations and to take advantage of the opportunities presented by the growing geographic information industry

Impact of Computerisation and New Technology

5 5 The main benefits obtained by the OS from this investment were that

- It enabled the OS to take advantage of technological developments to improve its production processes

- It facilitated the digitisation of the mapping archive which is now stored on a fully structured digital database This enables maps to be supplied in digital and graphic form to customer specification The database has also eliminated the requirement for physical storage of paper maps The Office of Public Works (OPW) estimated that a building for storage of the computerised data in paper form would cost at least £1m

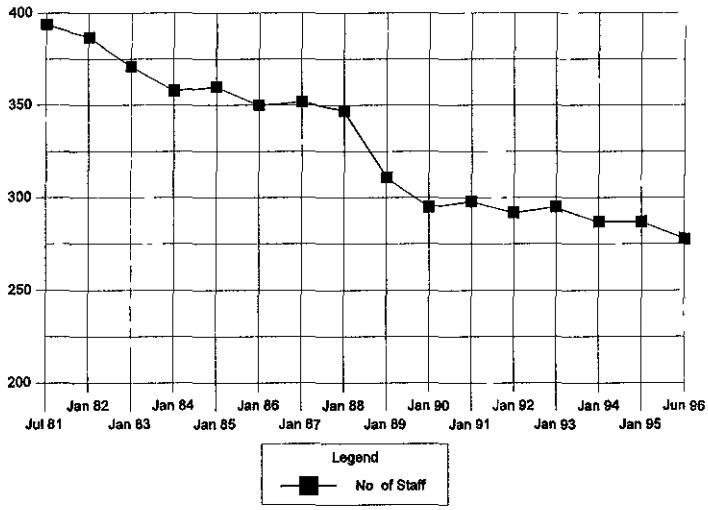
- As virtually all tasks are now computer driven efficiency gains have been achieved through the acceleration of production processing times and outputs

- It has provided a capability to develop new and innovative products

Staffing

5.6 Staff numbers in the OS have been gradually declining as illustrated in Figure 5 1

Figure 5.1
OS Staff Numbers

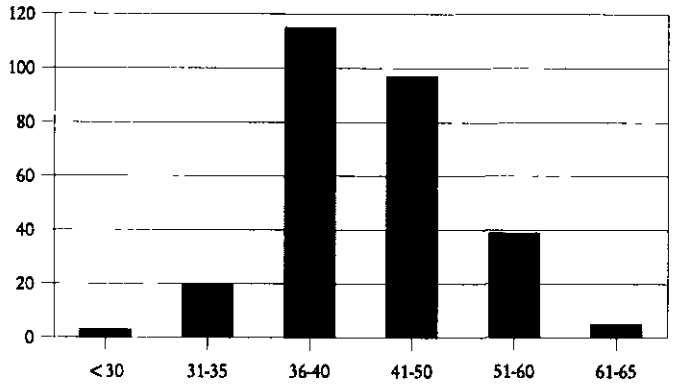


Source· Department of Finance

5.7 The reduction in staff numbers has been achieved through the non-replacement of staff. For example, the last civilian recruitment to a technical grade (cartographer) occurred in 1980. Figure 5 2 illustrates the current age profile of OS staff

Figure 5.2

OS Staff - Age Profile



5 8 As a result of non recruitment there is now a serious imbalance in the age structure of OS staff Approximately 75% of OS staff are in the 36 to 50 age bracket.

Regionalisation

5 9 The most important change in the organisational structure of the OS was a Government decision in 1990 to establish six regional offices at Cork, Kilkenny, Ennis, Longford, Tuam and Sligo. The impetus for the establishment of the regional offices came from the move away from field surveying to the use of aerial photography as the means of capturing topographical data

5 10 In 1990, when the issue was being considered, it was estimated that basing the field survey staff in headquarters would cost £480,000 but that this would be offset by savings in travel and subsistence of £250,000 per annum However, the setting up of regional offices would yield an equivalent saving in travel expenses as any field work required would be carried out in the immediate catchment area of the particular office

5.11 Set up costs of the regional offices were mainly related to the installation of computer equipment and mapping technology. These costs amounted to £1.4m in the period 1990 to 1995 An annual rental charge (£28,800 in 1995) is payable in respect of two of the offices while the remaining four offices are part of State-owned properties on which no rent is charged

5.12 Reference was made in Paragraph 35 of the 1993 Annual Report of the Comptroller and Auditor General to the establishment of the regional offices and particularly to the delay in providing an office in Tuam, which was not occupied until December 1994 It was estimated that the cost of this delay amounted to some £210,000 per annum

5.13 There are now 82 staff working in the regional offices as shown in table 5 3.

Table 5.3
Regional Offices Staff

Office	Number
Kilkenny	19
Cork	18
Ennis	14
Longford	13
Tuam	9
Sligo	9
Total	82

5.14 Each regional office has responsibility for the cyclical revision of the urban mapping series within its own catchment area. In general, the nearest office to the area of work also carries out the field work and compilation work for rural mapping

5.15 Although the OS has regional offices, it remains highly centralised in its operations The regional offices act as off-site production facilities The regional offices are not open to the public and do not provide normal OS services locally such as map sales The OS points out that there would be additional resource requirements in providing more autonomous arrangements in the regional offices.

Military Involvement with the OS

5.16 Historically, there has been a strong association between the military and the OS This relationship goes back to a time when a main purpose of surveying and mapmaking was to provide accurate maps for military use. Traditionally, many of the senior managers in the OS have come from a military background.

5.17 The Army's Ordnance Survey Engineer Company is located at the OS headquarters in the Phoenix Park, Dublin At present 45 military cartographers, over and above the civilian cartographer complement of 101, are attached to that company and they carry out the same mapping duties as their civilian counterparts

5 18 The payroll costs of the military personnel are borne by the Department of Defence However, military personnel are an integral part of the resource base and are crucial to the OS in meeting its production targets and in completing its mapping programmes

5.19 It was noted that the use of military personnel has caused difficulties for OS management in planning and carrying out the work programme For example

- military personnel are obliged to engage in military duties from time to time while assigned to the OS
- military personnel may be recalled for long periods to serve with the UN
- the terms and conditions which apply to military personnel are different to those applying to their civilian counterparts

5 20 The Air Survey Division which is responsible for the data collection of large and small scale mapping programmes is the main area affected A total of 36 staff are employed on data collection in the division, of which 15 are military cartographers. Most of these staff operate expensive stereo plotting instruments on which they require up to nine months training in order to reach an acceptable level of proficiency

5 21 In the period January 1996 to July 1996, the Air Survey Division recorded a total of 418 days absences for its military personnel, made up of annual and sick leave and military duties The amount due to military duties was 76 days. The absences represent an average of 32 days[7] per person which compares with 18 days per person for equivalent civilian personnel

5 22 An Implementation Plan drawn up by the Department of Defence in February 1996, arising from the Defence Forces Review carried out by the Efficiency Audit Group of the Department of the Taoiseach, includes a provision for the Ordnance Survey Engineer Company in the Phoenix Park to be disestablished. This matter is still under discussion

[7] *Excluding two military cartographers serving with the UN*

Appendices

Appendix A

Staffing in the Ordnance Survey[a]

Function	Number	
Management		
Director of Operations	1	
Controller of Mapping	Vacancy	
Manager Data Collection	1	
Administrative/Financial Controller	Vacancy	
Project Manager	1	3
Mapping Operations		
Divisional Controller	4	
Higher Placenames Officer	1	
Chief Superintendent Mapping	8	
Chief Placenames Officer	1	
Archaeologist	2	
Placenames Officer	3	
Superintendent Mapping	37	
Assistant Superintendent Mapping	65	
Cartographer	101	222
Administration and Support		
Superintendent Mapping	3	
Assistant Superintendent Mapping	9	
Cartographer	7	
Staff Officer	1	
Clerical Officer	4	
Clerical Assistant	2	
Storeman	5	
Services Officer	3	
Gate Porter	1	
Labourer	10	
Cleaner	8	53
Total Staff		**278**

[a] *Position as at 30 June 1996.*

Appendix B.1

Quantitative Research - Customer Sample

The aim of this phase of the research was to measure customer satisfaction with the products and services supplied by the OS across a broader range of customers than was feasible in the preliminary qualitative phase

In the course of this phase seventy-five customers were interviewed using a structured questionnaire Fifty of these were randomly selected from the list of OS corporate or institutional customers and the remaining twenty-five were selected with a bias in favour of high-volume customers

Table B 1 analyses the customer sample by type and number

Table B.1
Customer Sample

Category	Number
Government Departments	6
Local Authorities	33
Semi-State Bodies	11
Private Sector Companies	25
Total	75

Appendix B.2

Survey Findings from Qualitative Research

A number of key issues were identified during the qualitative phase of the survey Table B 2 sets out the views of the five customers interviewed on these issues

Table B.2
Qualitative Research Findings

Issue	Customers' Views
The updatedness map data	• Too many maps are out of date • Not enough is being done about it • 5 year revision cycle for digital 1:2500 maps is too long • Lack of updatedness in areas where change is occurring rapidly, particularly in suburban areas • Considerable problems with updatedness, not just in the major cities but in other urban areas as well • Definite need for regular bulletin from the OS of updatedness of specific maps
Product Quality	• Awareness that with limited resources there is a balance to be achieved between accuracy and updatedness and between meticulous attention to detail and speed of delivery • Historically, the OS has tended to err in favour of meticulous accuracy, a position for which there was a good deal of respect although often tinged with irritation and impatience • No desire that the OS's high standards be compromised to facilitate speed of delivery • Some accuracy problems had been encountered with digitised maps • Quality control procedures might not be as meticulous in relation to digitised maps • Quality of graphical maps in terms of paper and ink had improved considerably in recent years • Tourist maps were described as excellent
Customer Focus	• Staff were very responsive, courteous and easy to deal with However, few describe the OS as being truly customer orientated The impression given was that it is driven more by its own internal needs rather than by its customers' needs

	• The OS was felt to be very much focused on the product and the process and the provision of services on their terms without any pro-active seeking out of customer needs. • The OS was considered to be a little rigid in its operations and to cling to practices which may have worked well in the past but may be less well suited to the present or the future The OS was also considered to show insufficient flexibility or adaptability to individual client needs. • There was considered to be a sense of old fashioned exactness about the organisation and an insufficient focus on the often changing needs of the marketplace. • Some customers found the OS extremely difficult to contact and complained of inadequate back-up systems If the main contact in the OS was unavailable, there was no other official able to deal with the matter.
Cost	• None thought cost was a critical factor. • Main issue was value rather than cost • Customers considered the cost of digital maps to be rather high
Internal Issues	• OS perceived to be under-resourced • OS perceived as understaffed and age profile of staff was perceived to be high. • Age profile contributed to the organisation's conservatism and could impair the OS's ability to keep up with new developments and embrace new technology
General Policy	• Customers were not aware if OS has a long-term strategic plan. • There was a suspicion that priorities tend to vary with the commercial imperatives of the day. • There was a lack of feedback mechanisms to ascertain customer views • There is no mechanism in place for sharing of specialist mapping information. • OS take a rather aloof attitude to data which they have not collected themselves rather than taking a pro-active role in collecting, integrating and marketing such data • OS perceived as being somewhat passive in influencing Government policy and in insisting on sufficient funding

Appendix C

Composition of the Mapping Archive

Traditionally, map making has been based on certain designated scales depending largely upon the use made of the mapping information. The OS maintains the national archive on its computer based Map Archival and Retrieval System which permits maps to be output at any scale required by the user.

While the storage and maintenance of the archive in digital form facilitates graphical output (paper maps) at any scale, its main benefit is the flexibility and complexity of its digital output which comes in three basic forms

- Vector - positional data in the form of coordinates at the ends of line segments
- Rastor - a map encoded in the form of a regular array of cells
- Height - contours and digital terrain models

Within each form, data outputs are available according to the scale of the source map series from which they were produced or surveyed These series are outlined in Table C 1.

Table C.1
OS Mapping Series

Scale	Description
Urban Mapping Programme	
1:1000	Commenced in 1968 and covers centres of population in excess of 1500.
Rural Mapping Programme	
1:2500 (NPS)	National Photogrammetric Survey (NPS) Series Commenced in 1992
1:2500	National Grid Series , commenced in 1976 and was replaced by the NPS series.
1:2534(25" map)	Commenced in 1887 and was completed in 1913 The 25" archive does not cover the entire country as mountainous land in counties Wicklow, Donegal, Mayo, Galway, Cork and Kerry are not covered
1:10560 (6" map)	Commenced in 1832 and was totally updated using the 25" mapping. This series is currently used to cover the mountainous areas of the country only
Small Scale Mapping	
1:50000	Tourism and leisure map series - commenced in 1989 and is 66% complete.
1:63350 (1" map)	Commenced in 1856 and was completed in 1865. The maps are without contours and were derived from the 6" series
1" townland index	1" map series which includes townland boundaries which was derived from the 6" series
1:126720 (½" Map)	Countrywide coverage of this series commenced in 1900 and was completed in 1910.
Miscellaneous	Street maps and atlases