Cartographer

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Job Description

The term cartographer embraces almost all activities associated with map-making. A map, as defined by the International Cartographic Association (ICA) (http://www.icaci.org/) , is 'a conventionalised image representing selected features or characteristics of geographical reality designed for use when spatial relationships are of primary relevance'. Maps are vital for many purposes: answering emergency call-outs, planning holidays, walking, studying geology, developing land, identifying political trends, etc. Cartographers are concerned with the scientific, technological and artistic elements of the mapping process. They present complex information in the form of diagrams, charts and spreadsheets, as well as in conventional maps. Geographical information systems (GIS) and digital-mapping techniques dominate the work.

Typical Work Activities

Cartography is concerned with the communication of data. The traditional methods employed in map making, painstaking drawing, scribing, masking and lettering, have very largely been superseded by the use of information technology, enabling the generation and manipulation of dynamic images on screen. These developments have led to changes in the nature of the profession and are reflected in the work of cartographers. Differences in approach may be reflected by the size and purpose of the organisation concerned. Within map making, for example, almost all the data is collected and transmitted electronically, whereas in cartographic illustration the change has been less marked. In commercial cartographic publishing, the work has more in common with book publishing, requiring innovative design skills.

Typical work activities may include:

- designing maps, graphics, illustrations, layouts, etc;
- effectively communicating information through the use of colour, symbolisation, style, etc;
- using computers to compile and produce graphs for specialist and general consumers;
- researching, selecting and evaluating map source data for use in the preparation or revision of maps and charts at various scales;
- analysing information, evaluating mappable information;
- collating data provided by remote sensing techniques: the means by which spatial and environmental data about the earth is acquired by sensors located in satellites and aircraft;
- operating a photogrammetric plotting instrument or a Digital Photogrammetric Workstation, which views the photographs stereoscopically. Using stereoscopic vision with overlapping photographs to plot heights and positions in the preparation of maps;
- working with Geographical Information Systems (GIS), using digital maps to see, model and analyse what is happening in the world;
- capturing, maintaining and outputting digital geographic data;
- generalising map data to allow for a reduction in scale (derived mapping);
- working accurately, attending carefully to details and procedures;
- checking and appraising the content and accuracy of maps, charts and printing proofs.

For some, work will also involve:

- topographic surveying: accurately measuring heights and distances, physical and natural features such as roads, houses and woodlands, and plotting them onto maps;
- hydrographic surveying: accurately measuring depths and distances, physical and natural features such as buoys, lights, harbours and coastline, and plotting them onto charts.

Graduates can expect to become increasingly involved in the management of these activities and, as their career develops, in the determination of policy.

Work Conditions

- Range of typical starting salaries: £14,000 - £16,000 (salary data collected Feb 03).
- Range of typical salaries at age 40: £23,000 - £42,000 (salary data collected Feb 03).
- Salaries and conditions vary between employers and between the public and private sectors.
- Working hours are mainly nine to five, usually based at a work station. Flexi-time is common. Most work is office based, usually at a workstation.
- Short-term contracts are increasingly common in the private sector. Consultancy work is possible with considerable experience. Academic opportunities are scarce.
- Jobs are quite widely available but government departments, especially those involved in cartographical publishing, are located in the South of England and South East England. Outside large government departments, geographical mobility, in order to move laterally across the job market, may be necessary in your early career. Currently around 40% of the profession are women but this number is rising. There are equal opportunities.
- There is occasional travel within a working day but absence from home at night and overseas work or travel is uncommon.

Entry Requirements

Relevant degree subjects include cartography, GIS, physical/mathematical/applied science, and urban and land studies. In particular, the following subjects may increase your chances:

- civil and structural engineering;
- computer science/software engineering;
- computing and mathematics;
- earth sciences;
- geochemistry;
- geography;
- geology;
- geophysics/geotechnology;
- marine sciences/oceanography;
- surveying.

Relevant HND subjects include physical/mathematical/applied science, urban and land studies. In particular, the following subjects may increase your chances:

- built environment studies;
- environmental science (physical);
- geographical and land studies;
- geographical information systems;
- geography;
- land/estate management;
- land/estate surveying;
- planning;
- surveying.

Graduates are preferred but HND entry is possible.

Occasionally, school leavers can obtain a junior post and progress through day-release study.

Possession of a postgraduate qualification can be an advantage. These are offered in remote sensing, photogrammetry (often referred to as geomatic engineering), GIS, oceanography, surveying, cartography and topographic science.

Pre-entry experience is not necessary but entrants often need:

- an interest in geography and the environment;
- an eye for layout and design;
- basic ability with operating computers;
- good spatial awareness and colour vision;
- analytical ability - to include what is important;
- high standards of accuracy, a systematic approach, attention to detail and attention to set procedures;
- collecting and organising ability;
- problem-solving ability;
- accurate recall of facts, data and procedures;
- the ability to interpret data, graphical representations and symbols;
- ability to work independently;
- ability to work with other people to produce joint outcomes;
- a clear understanding of tasks and objectives;
- flexibility to adapt to new technologies.

Entry problems may be encountered from early 40s to early 50s, age being more of a factor with some private sector employers.

Training

On-the-job training may be provided in areas such as IT systems, software packages, digital mapping, map design, hydrography, topography, photogrammetry and Geographical Information Systems (GIS). Courses related to land surveying are likely to be provided as initial training. Sponsorship for postgraduate study and opportunities to attend short courses are increasingly provided by employers across both the private and public sectors.

Government departments generally provide structured initial training courses for new entrants in-house. For example, The Hydrographic Office (UK) provides 18 weeks' basic training. The first 12 weeks are knowledge-based, providing a broad background into marine cartography. This covers such topics as navigation, hydrography, buoyage, lettering, navigational dangers and office systems. The remaining six weeks are more practical, concentrating on digital data capture and production systems. Projects and exercises are assessed during the course and field trips allow students to relate chart layout, symbols, etc to navigational requirements at sea. Skills and knowledge are then developed within the workplace, often with the aid of a mentor, for the remaining probationary period.

Future training at the Ordnance Survey is currently being redesigned to meet new technological and commercial challenges. It is likely to be more knowledge based, more design oriented, to be innovative with new media, to include marketing skills and encourage business acumen.

Career Development

Progression is often dependent not only on the qualities and motivation of the individual, but also on the size, structure, nature and even the demographic make-up of the employing organisation. Geographical mobility may, therefore, be important for those employed by small employers, where opportunities can be more limited. Mobility has also become more important with the increase in fixed-term contracts. The continuing trend to provide opportunities to obtain qualifications with national recognition should enable greater movement.

Conditions vary quite widely across the industry but government departments are often seen to offer better pay and better conditions, including structured promotion, where progress to team leader and functional management positions is common. Within larger organisations there are more opportunities to transfer to other parts of the business. Developments in the new media and increasing use of technology have increased the opportunities for cartographers to move into photogrammetry, remote sensing, Geographical Information Systems (GIS), and some areas of IT-related consultancy.

There are also more opportunities for self-employment, supplying a specialist product or service to other cartographic companies, although the hardware costs can sometimes be prohibitive. Increasingly, too, the work of government departments and agencies is likely to be broken down and outsourced to small, specialist providers.

Typical Employers

Many cartographers are employed by the government. They work mainly in the following departments:

- Ordnance Survey (and the Ordnance Survey of Northern Ireland (OSNI), in Belfast) Britain's national mapping service;
- The Defence Geographic and Imagery Intelligence Agency Headquarters (DGIA), responsible for the provision of geographic digital data, land maps and air charts for UK Defence Forces;
- The Hydrographic Office (UK), which produces the nautical charts required by the Royal Navy.

Small numbers are employed in other government departments such as:

- The Department for Environment, Food and Rural Affairs (DEFRA) and its equivalents: The Scottish Executive Environment and Rural Affairs Department (SEERAD) (http://www.scotland.gov.uk/who/dept_rural.asp) and Agriculture and Rural Affairs Department (ARAD) (http://www.wales.gov.uk/subiagriculture/index.htm) (Wales);
- The Met Office;
- Department for Transport.

The public utilities, eg electricity, gas and water, employ cartographers as do local authorities, for example, within their planning departments. Cartographers are also employed by oil companies (eg BP Exploration), by commercial map publishers and private consultancies.

Cartographers work in publishing and produce commercial maps such as the A to Z series, road atlases which need constant updating, and historical and commemorative maps. Other employers include: commercial publishing houses; service agencies (eg AA, RAC); land and air survey consultants; and the Macaulay Land Use Research Institute.

Sources of Vacancies

- British Cartographic Society;
- Society of Cartographers (http://www.soc.org.uk/) ;
- Prospects Today;
- Prospects Finalist;
- Prospects Directory;
- Hobsons Graduate Careers Directory;
- GPS World (http://www.gpsworld.com/gpsworld/) ;
- GI News;
- Geomatics World;
- national press.

Recruitment agencies rarely handle vacancies.

Related Occupations

- Geographical information systems manager
- Graphic designer
- Land/geomatics surveyor
- Hydrographic surveyor

Information Sources

Bibliography

AGCAS and Graduate Prospects products are available from higher education careers services.

AGCAS Publications

Geographical Information Systems, Surveying and Related Courses, Vocational Course Survey

Graduate Prospects Publications

Prospects Directory
Prospects Finalist
Prospects Today

Other Publications

Careers in Cartography, British Cartographic Society, 2002
The Geologist's Directory, Geological Society Publishing House, Annual
Geomatics World, P V Publications, Bi-monthly
GI News, GI News Ltd, bi monthly
Hobsons Graduate Careers Directory, CRAC/Hobsons Publications, Annual

Websites

Agriculture and Rural Affairs Department (ARAD), http://www.wales.gov.uk/subiagriculture/index.htm
GEO, http://www.geoplace.com/default.asp
GPS World, http://www.gpsworld.com/gpsworld/
International Cartographic Association (ICA), http://www.icaci.org/
Scottish Executive Environment and Rural Affairs Department (SEERAD), http://www.scotland.gov.uk/who/dept_rural.asp
Society of Cartographers, http://www.soc.org.uk/

Addresses

Association for Geographic Information (AGI), 12 Great George Street, London, SW1P 3AD Tel: 020 7222 7000 URL: http://www.agi.org.uk

British Association of Remote Sensing Companies, c/o Mr David Morten - General Manager, Nigel Press Associates Ltd, Crockham Park, Edenbridge, Kent, TN8 6SR Tel: 01732 865023 URL: http://www.npagroup.co.uk

British Cartographic Society, School of Planning, Oxford Brookes University, Gipsy Lane Campus, Headington, Oxford, OX3 0BP Tel: 01865 483346 URL: http://www.cartography.org.uk

Defence Geographic and Imagery Intelligence Agency Headquarters (DGIA), Room 17, Watson Building, Elmwood Avenue, Feltham, Middlesex, TW13 7AH Tel: 020 8818 2422

Department for Environment, Food and Rural Affairs (DEFRA), Nobel House, 17 Smith Square, London, SW1P 3JR Tel: 020 7238 6000 URL: http://www.defra.gov.uk/

Department for Transport, Great Minster House, 76 Marsham Street, London, SW1P 4DR Tel: 020 7944 3000 URL: http://www.dft.gov.uk

The Hydrographic Office (UK), Admiralty Way, Taunton, Somerset, TA1 2DN Tel: +44 (0)1823 337900 URL: http://www.ukho.gov.uk/

Macaulay Land Use Research Institute, Craigiebuckler, Aberdeen, AB9 2QJ Tel: 01224 318611 URL: http://www.mluri.sari.ac.uk/mluri.htm

Met Office, London Road, Bracknell, Berks, RG12 2SZ Tel: 0845 300 0300 URL: http://www.metoffice.com

Ordnance Survey, Romsey Road, Maybush, Southampton, SO9 4DH Tel: 023 8079 2000 URL: http://www.ordsvy.gov.uk

Ordnance Survey of Northern Ireland (OSNI), Colby House, Stranmillis Court, Malone Lower, Belfast, BT9 5BJ Tel: 028 9025 5755 URL: http://www.osni.gov.uk/homepageX.htm

Royal Institution of Chartered Surveyors (RICS), RICS Contact Centre, Surveyor Court, Westwood Way, Coventry, CV4 8JE Tel: 0870 333 1600 URL: http://www.rics.org.uk

The Survey Association, The Survey Association, Marine House, Thorpe Lea Road, Egham, Surrey, TW20 8BF Tel: 01784 223760 URL: http://www.tsa-uk.org.uk

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