Practical Aspects of Map Production

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The aim of a mobility map is to communicate information about the environment. Because of the limited information capacity of the tactual sense, it is most important to try and optimise the design of tactual maps.

(Slide 1 The process of design and production of a mobility map.)

The designer needs information about the environment and the user. Geographical information can be obtained from a sighted map but it is sometimes necessary to add landmarks such as bus stops and to take into account likely destinations of the user.

Ideally the designer would like to know the degree of useful vision of the user, as well as braille reading ability, experience with maps, type of mobility aid and whether the map should be portable. If the map is for a large number of users, certain assumptions will have to be made - such as that all the users can read grade 1 braille.

The designer has to decide on format, information density, coding and the mode for supplementary information. The map then has to be made and the user given suitable training. It is desirable to have feedback from the user in order to improve the design of future maps. It is also important to modify a mobility map as soon as it is out of date.

So one could envisage a system where the mobility instructor marks up a 1:1250 Ordinance Survey map with the extra information required by the designer. This would be sent to a central organisation for design and manufacture. The copies would be returned to the mobility instructor who would be responsible for providing training in the use of the map. Before embarking on such a system it would be necessary to evaluate the potential demand for tactual maps.

There is no unique satisfactory production method and the choice of method will depend on the application. It is important to differentiate between limitations inherent in systems and those which are just in the present configuration.

At present there is no numerical measure of quality of a tactual map but a successful measure should be based on how judiciously a blind user can utilize the information presented on the map.

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The slide attempts to compare some parameters of the various systems in current use. Material is subdivided depending on whether paper or plastic is used as the base material. Cost is subdivided into time, capital cost of the equipment, cost of the materials for the master and cost of the materials for the copies. Four factors which affect the quality are maximum elevation, maximum number of different elevations, accuracy and durability.

Single copy methods. There are numerous different methods but one popular method has been to emboss manilla paper. This material has the disadvantage that it deteriorates particularly if used outside in wet weather. An alternative system is to use Melinex but the maximum information density is very low.

Embossed zinc plates. This is the traditional method for producing braille in quantity. A pair of zinc plates are embossed and then used in a press for deforming manilla paper. This system is relatively inexpensive when a large number of copies are required but the system is effectively limited to producing dots and point symbols.

Solid dot. This system is used by Nippon Lighthouse for making orientation maps. The master is made by punching holes in stiff card and coloured ink is forced through the holes in the master. There is little control over the dot profile but there are obvious advantages for the partially-sighted user. Another advantage is that the system requires little capital expenditure.

Sinterred bronze. This method is used by RNIB for their large geographical maps. A block of sinterred bronze is hand engraved and plastic copies are vacuum-formed from the negative master. This method is expensive since it is very time consuming.

Metal or epoxy. A positive master is hand made from metal and epoxy resin paste. The copies are vacuum-formed as before. This method is also time consuming but is capable of producing excellent results. Most of the development work in this country has been done by Roger James.

Metal foil. A sheet of metal foil is manually embossed and then used as a master in a vacuum-forming machine. There is a limited range of textures unless a hybrid system is used.

The choice of type and thickness of plastic will depend on the specific application. There are sometimes advantages in using flexible plastic sheet instead of the more usual semi-rigid vinyls. When a large number of copies are required vacuum-forming tends to be time consuming but this is not an inherent limitation of the system.

String and sandpaper. This method involves building up a master from string, sandpaper, fabrics, buttons, matchsticks and cardboard. This system and the metal foil have the advantage that the only equipment required is a vacuum-forming machine.

Virkotype. Wet inkprint is dusted with a fine resinous powder which adheres to the wet ink and appears as a raised plastic symbol when heated. Unfortunately the maximum elevation is relatively low and the system only works reliably under laboratory conditions.

P.V.C. base. This very similar to the Virkotype system but the base material is PVC which is embossed on both sides. This system has been used by Kidwell and Greer for their recent map of MIT.

Photoetching. There are a variety of systems under development but the most advanced is the one by Plastron in Massachusetts. A photographic copy of the map is placed on top of a sheet of photosensitive plastic. This is exposed to ultra-violet light and the master is then chemically etched to the required depth. It is necessary to repeat the whole process for each different elevation on the map. Since both positive and negative masters are available, copies can be made by vacuum-forming of plastic sheets or by embossing paper, plastic or metal in a conventional press. This latter facility can be very important when a large number of copies are required.

Photolathe. A lathe is controlled from a photoelectric scanner. The machine developed by Jens Scheel in Germany is limited to a single elevation. Again both positive and negative masters can be produced.

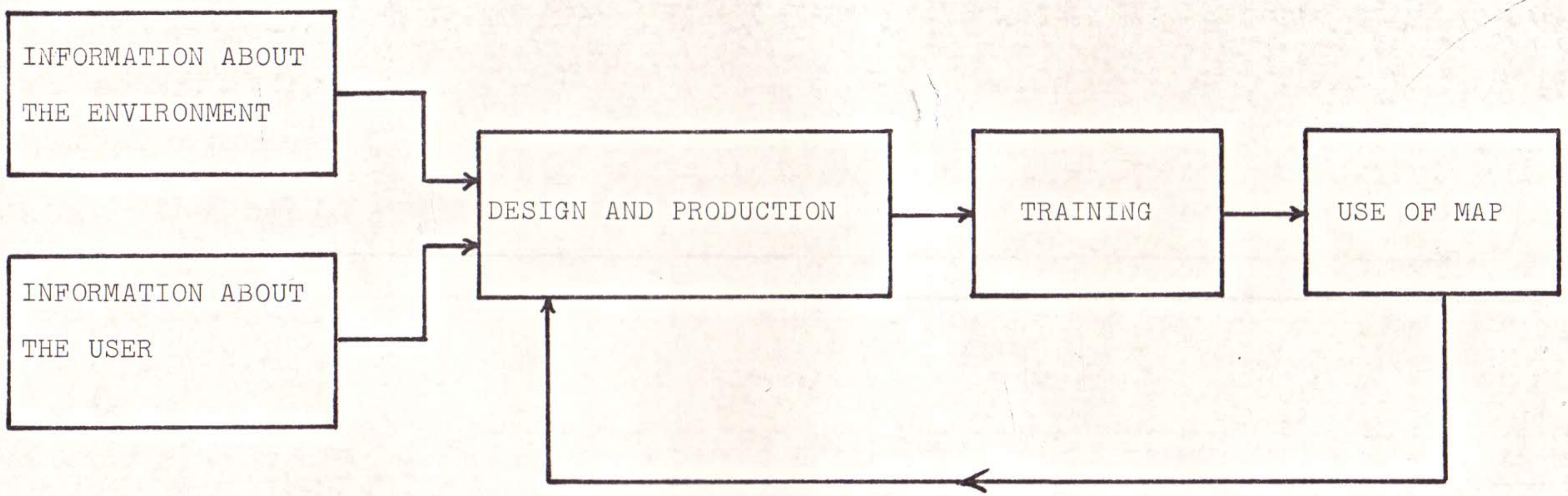
Drum embosser. In principle this is very similar to the photolathe but the cutting tool is replaced by a solenoid. The system is limited to producing diagrams in punctate form.

Relief printer. This is a flat-bed embosser which is being developed by SAAB in Sweden. It is also limited to producing diagrams in punctate form but it has been developed for use in a classroom situation.

N.C.M.T. stands for numerically-controlled machine tool. The Warwick system uses an engraving machine which is digitally controlled. The master is engraved in a sheet of laminated plastic, a positive copy is made in epoxy resin and copies are produced on a vacuum-forming machine.

Line embosser. Hallenbeck at Kansas University is using a computer line printer to emboss paper. The line printer is very fast - a typical diagram takes about 10 seconds to output. The quality of embossing is very poor but the significance of the system is that it is designed to be operated by a blind user.

These last two systems both use a computer. The normal input for the Kansas system is from a on-line terminal. Whereas the method of input for



THE PROCESS OF DESIGN AND PRODUCTION OF A MOBILITY MAP.

Information needed about the environment

1. Ordinary geographical information

2. Additional landmarks.

3. Slope.

4. Likely destinations.