

TRAINING CONCEPT FOR SOFTWARE - ORIENTED PRODUCTS

Reiner Schwebel, Carl Zeiss, Germany

ABSTRACT

For full utilization of their capabilities, photogrammetric-cartographic systems and geographic information systems require comprehensive knowledge and support.

Software systems from Carl Zeiss therefore include learning functions and information for direct support in both training and production. By means of courses and individual training, Carl Zeiss systems and applications specialists convey practice-oriented knowledge of the system to operators, system managers and programmers. Follow-up training and support in conjunction with the software update service permit ongoing extension of knowledge and skills. Equal emphasis is placed by Carl Zeiss on development, production and services.

KEY WORDS Education, Photogrammetry, Training

1. INTRODUCTION

Geographic information systems and photogrammetric-cartographic systems have become essential tools in modern regional planning and environmental protection. The effective use of these systems is primarily determined by the following factors:

- the performance of the hardware, including the computer,
- the efficiency of the software,
- the user's know-how and
- the service and support provided by the manufacturer.

Cost analyses have shown that the costs in the GIS field, based on a 10-year service life, are allocated as follows:

- 10 % on investment in the system hardware and software
- 10 % on services (training, maintenance, support, update) and
- 80 % on staff costs for system operation.

The user interface, training and support have a decisive influence on the staff costs and operational efficiency. Reputable systems manufacturers such as Carl Zeiss therefore consider it a task of prime importance to supply the customer not only with high-performance products, but also with expert services. The spectrum of services offered by Carl Zeiss comprises:

- Applications and systems analysis and support
- System installation and integration
- Applications training
- Hardware service
- Software update service and
- Programming support

Our motto for support and training is

Helping the user to help himself

Only well-trained, proficient and motivated personnel will be able to fully utilize the potential of advanced systems. The training provided by Carl Zeiss is concentrated on a few vital areas which are outlined in the following.

2. TRAINING CONCEPT

A training concept must be tailored to both the intended application of the system and to the user. It must incorporate the learning functions and user interface of the system, while taking into account the different degrees of difficulty of the tasks involved and the personnel's technical knowledge. The training concept is based on the following levels:

- the **operator level** for the use of the system functions in a prepared work environment;
- the **system level** for work preparation and EDP management
- the **program level** for the adaptation of the system software to special tasks;
- the **specialized level** for the analysis and utilization of collected data.

System-integrated learning functions, training courses by experts and systematic follow-up training and support are available for each individual level.

2.1 Learning functions of the system

State-of-the-art software systems include a great variety of learning and help functions for the user, which considerably facilitate operator handling of the system, in particular. Carl Zeiss systems such as the

PHOCUS system for photogrammetry, cartography and land information and
PHODIS photogrammetric image processing system

offer the following system-integrated learning functions:

- **Help functions** (on-line), detailed instructions for the performance and continuation of the task on hand, which can be called up on the monitor at any time and include cross references to the tutorials;
- **Tutorials** (on-line) with an introduction to the major processes of a task, including cross references to the manuals;
- **Manuals** ("off-line") with a detailed description of the overall system, its operation and programming, either in printed form or stored in the computer and accessible via the software.

2.2 User interface

In addition to these direct aids, the user interface and intelligent system functions play an important role in the training concept. An optimized user interface reduces the training necessary at the operator level, but increases the requirements at the system level. However, since more operators than systems engineers usually work with the system, the optimization of the user interface is also justified from the viewpoint of cost-effectiveness. In the Carl Zeiss systems, for example, this involves the following tools:

- **Menu guidance** based on WINDOWS (P-CAP PC software) for operators with no photogrammetric background knowledge or based on OSF-Motif for PHODIS
- **Screen and paper menus** prepared for the performance of bulk operations (PHOCUS, PHODIS)
- **Dialog processing** and **command input** for the advanced system user (PHOCUS, PHODIS),
- **Process programming** for the predefined control of measurement and evaluation procedures (PHOCUS transfer files),
- **Program interfaces** with subroutines and documentation for user programming of special tasks.

Improvements in process technology and the implementation of expert knowledge in the software may result in a marked reduction in training requirements, as the example of automatic error elimination in block adjustment clearly illustrates.

Similarly, only minimum familiarity with the operating system is required at the operator level due to the superimposition of easily comprehensible application functions on the operating system. As a result, special training on the operating system as offered by the computer manufacturers is not necessary for the operator.

2.3 Training concept for Zeiss products

The learning functions integrated into the system support the everyday work and production process on the system. In the initial stage, however, it is absolutely essential that the relevant knowledge be conveyed to the user by systems experts. Such training held in the form of a dialog, including practical exercises and supported by suitable documentation, is and will remain the most effective and economic way of ensuring a smooth production start-up. Considering the predominance of operation costs in the overall system expenditure, any attempt to economize in the necessary training must be regarded as short-sighted.

The training content is based on the four above-mentioned levels. The following types of training are provided:

- **standard courses at Carl Zeiss** providing basic knowledge on system operation, system management and programming,
- **individual training at Carl Zeiss** in fields of special interest,
- **on-site training**, taking into account the user's special work environment.

2.4 Implementation of the training concept

The implementation of the training concept is dependent on the software product involved. For PHOCUS, for example, the central information system for photogrammetry, cartography and land information from Carl Zeiss, the training program is structured as follows:

- **Basic course:**
Subject: learning the work sequences in a standard work environment, basic system management functions.
Duration: 5 days (standard)
Requirement: basic knowledge of photogrammetry/cartography and EDP.
- **Follow-up course:**
Subject: creation of new work environments, optimum use of system management tools
Duration: 4 days (standard)
Requirement: PHOCUS knowledge of the basic course, basic knowledge of the operating system
- **Programming course:**
Subject: generation of user-specific program modules in the PHOCUS environment and communication with external systems via PHOCUS interfaces
Duration: 5 days (standard)
Requirement: PHOCUS knowledge of the follow-up course, basic knowledge of the operating system, experience in programming (Fortran)

It is recommended that these courses be spread over a certain period of time, and that extensive courses be completed in two separate sections. Several months of experience with PHOCUS will be useful for the programming course.

The training concept for PHODIS has a similar structure as that for PHOCUS.

In the field of PC software, the training offered by Zeiss is concentrated on the photogrammetric use of the systems

- **Course for operators (Planicom/PC):**
Subject: learning the photogrammetric work sequences, data acquisition functions in a CAD/GIS system
Duration: 4 days
Requirement: basic knowledge of photogrammetry and CAD/GIS
- **Special training**
The training in special applications such as aerotriangulation, DEM computation, orthoprojection or photoflight management is usually held on an individual basis in Oberkochen or on site on the customer's premises. Since the level of previous knowledge varies widely from one user to another, careful preparation and course planning are essential here.

2.5 Training for partner software

Photogrammetry and cartography are increasingly being incorporated into LIS and GIS systems. A high degree of flexibility in production is demanded of the service companies in the field of mapping. To meet both of these requirements, software packages from different manufacturers must be used and mastered side by side. Examples of close connections between Zeiss and partner softwares are:

- the combination of a data base for geometric data with a data base system for attributes, e.g. PHOCUS and the relational data base ORACLE or
- the integration of an analytical plotter into a CAD or GIS system, e.g. P3 Planicom into MicroStation PC.

Moreover, the operation of complex computer networks calls for detailed knowledge of the operating system and networking software. In such cases, especially if the partner software is intensively used, we recommend that users make direct use of the proficiency, training facilities and support capabilities of the partners involved.

2.6 Further training and support

Due to the dramatic development in the field of EDP and software, continuous updating of knowledge and skills is of vital importance. For new software modules and new revisions, Zeiss offers further training and individual support by applications and systems specialists. The following is available:

- **Telephone backup** as part of the software update service
- **Personal on-site support** in application and system problems to extend the user's knowledge and optimize operational sequences
- **Update courses** on new revisions
- **User meetings** for the exchange of information and experience
- **Programming support** for the development of programs by the user

The objective of each of these measures is the independent and proficient handling of the system by the user. In addition, adequate further training is of vital importance for staff motivation.

3. OUTLOOK

As pointed out at the beginning, the training concept of Carl Zeiss concentrates on the efficient conveyance of practice-oriented knowledge of the system.

Training in theoretical fundamentals such as basic knowledge of data processing and GIS techniques or metrological skills is not the duty of a system manufacturer. It is and will remain the domain and responsibility of institutions established for this purpose: universities, colleges, schools for operators, further training organizations and courses, etc. These institutions create the basis on which specialist knowledge of the systems can be nurtured. The success of this joint task of teaching institutions and industry will lay a sound foundation for the bright professional future of photogrammetrists and surveying experts.