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# TRAINING CONCEPT FOR SOFTWARE - ORIENTED PRODUCTS

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## 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
10 % on services (training, maintenance, support, update) and
80 % on staff costs for system operation.

Help functions in the software, 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 analytical, specialized level for the integration 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. PHOCUS, for example, offers:

- **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.

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 Zeiss systems, for example, this involves the following tools:

- Menu guidance based on WINDOWS for operators with no photogrammetric background knowledge (P-CAP),
- Menues prepared for the performance of bulk operations (PHOCUS)
- Dialog processing and command input for the advanced system user (PHOCUS),
- Process programming for the predefined control of measurement and evaluation prodecures (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, training on the operating system as offered by the computer manufacturers is not necessary for the operator.

## 2.2 Training concept for Zeiss products

The learning functions integrated into the system support the everday 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. Furthermore, the manufacturer would be fully justified in refusing to accept responsibility for costs caused by inadequate training and in charging them to the customer.

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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

## 2.3 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:

**Course for operators:**

| | |
|---|---|
| Subject: | learning the work sequences in a standard environment |
| Duration: | 5 days (standard) |
| Requirement: | basic knowledge of photogrammetry/cartography and EDP. |

**Course for systems engineers:**

| | |
|---|---|
| Subject: | creation of work environments, use of system management tools |
| Duration: | 5 days (standard) |
| Requirement: | PHOCUS knowledge of the operator course, basic EDP knowledge, knowledge of the operating system |

**Programming course:**

| | |
|---|---|
| Subject: | generation of user-specific program modules in the PHOCUS environment and communication with external programs via PHOCUS interfaces |
| Duration: | 5 days (standard) |
| Requirement: | PHOCUS knowledge of systems engineer 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.

In the field of PC software, the training is concentrated on one course for operators.

**Course for operators (Planicomp/PC):**

| | |
|---|---|
| Subject: | learning the photogrammetric work sequences, data acquisition functions in a CAD/GIS system |
| Duration: | 4 days (standard) |
| Requirement: | basic knowledge of photogrammetry and CAD/GIS |

**Special training**

The training in special applications such as aerotriangulation, DEM computation, orthoprojection or aerial photography 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.

## 2.4 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 Planicomp into pcARC/INFO.

Moreover, system management and the operation of complex computer networks call 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.

## 2.5 Follow-up 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. To take into account the enhanced performance which new revisions necessarily entail, Zeiss offers follow-up 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.

## 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.

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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.

## AUSBILDUNGSKONZEPT FÜR SOFTWARE-ORIENTIERTE PRODUKTE

ZUSAMMENFASSUNG

Photogrammetrisch-kartographische Systeme und Geographische Informationssysteme benötigen fundierte Kenntnisse und Unterstützung bei der Ausschöpfung ihres Leistungspotentials.
Softwaresysteme von Carl Zeiss beinhalten deshalb Lernmittel und Informationen zur unmittelbaren Unterstützung bei Ausbildung und Produktion. Anwendungs- und System-Spezialisten von Carl Zeiss vermitteln durch Kurse und Individualausbildung praxisorientierte Systemkenntnisse für Operateure, Systemmanager und Programmierer. Fortbildungsmaßnahmen und Support in Verbindung mit dem Software-Update-Service bieten die Möglichkeit, Wissen und Können weiterzuentwickeln.
Bei Carl Zeiss haben Entwicklung, Fertigung und Dienstleistungen gleich großes Gewicht.

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