UNIVERSITY OF KAISERSLAUTERN

Centre for Distance learning and Continuing Education

Distance learning course “Staff Development in the Learning Company”

Final written paper on the subject of:

Design of e-learning provision based on WBT for pharmaceutical field workers for a new market launch

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Contents:

List of abbreviations

AMG	Arzneimittelgesetz (law relating to the manufacture and distribution of medicines
approx.	approximately
ARCS	Attention, Relevance, Confidence, Satisfaction
BIPKG	Boehringer Ingelheim Pharma KG
CBT	Computer-based training
cf.	compare
CCP	Co-Promotion Partner
DP	data processing
DVD	Digital Video Disk
e.g.	for example
e-learning	electronic learning
ELM	Essen Learning Model
ELM-C	Drawing up curricula (C-level) in the Essen Learning Model
ELM-D	Development of learning sequences (D-level) in the Essen Learning Model
ELM-E	Planning and implementation of learning units (E-level) in the Essen Learning Model
etc.	etcetera
EU	European Union
Fig	Figure
FW	Field workers
GB	gigabyte
HP	Hewlett Packard

ID	identification
i.e.	that is
IHK	Industrie und Handelskammer (Chamber of Industry and Commerce)
IP	information processing
ISDN	Integrated Services Digital Network
IT	Information Technology
LAN	Local Area Network
m	millions
MB	megabyte
MHz	megahertz
MS-SQL	Microsoft Structured Query Language
PC	Personal Computer
Pub.	Publisher
re.	relating to
SCORM	Shareable Courseware Reference Model
WBT	web-based training

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1. Introduction

In the words of Dr. Werner Müller (1999), Bundesminister für Wirtschaft und Technologie [Federal Minister of Economics and Technology],*"Social and economic development demands a great deal of people in terms of qualifications, technical competence and character. Economic and technical changes occur with increasing rapidity and demand constant willingness to reorientate and to learn. The individual employee as well as the organisation must continually face new challenges"*.

This change places increasing demands on the employee. At the same time the half-life period of knowledge is diminishing due to the fact that innovation periods are becoming increasingly shorter. This means that hardly anyone who has completed a course of training has "finished learning". The terms "lifelong learning" and "learning on-the-job" are therefore peculiar to adult education (Brödel 1998, p. 1; Severing 2001, P. 149). "Employability" is a key term in this connection. Here it is a question of the employees' willingness and ability to update their own qualifications sufficiently to meet the changed demands of the modern world (Schlaffke & Weiß 2001).

Investment in vocational training provides an insight into the high priority afforded to specific in-service training: in 1998, private companies in Germany invested a total of approximately DEM 34.3 bn voluntarily in their staff (IWD 2001). Nowadays companies increasingly expect the content of any training to be delivered in condensed and focussed form. Investment in staff is regarded in much the same way as investment in plant and machinery. It has to be worthwhile. Thus the knowledge possessed by the staff becomes a production factor equal in value to capital and labour.

The following objective was set at Boehringer Ingelheim Pharma KG (henceforth referred to as BIPKG) at the beginning of the year 2001: by the middle of the year 2002 approx. 50% of all field workers must be trained for the market launch of an innovative drug[1)]. The personnel come from different marketing lines, therefore their prior medical knowledge differs greatly. Thus, more than 40% of the staff who are to introduce this product first have to be taught basic knowledge of the respiratory tract before product training can commence. Certain conditions were laid down by Management, such as, for example

- minimal loss of market presence days and

[1)] For reasons of confidentiality, internal figures are only given in relative terms in this paper

- motivation of the staff for the innovation to be introduced.

A concept was developed based on these conditions, in which “web-based training“ (WBT) is to play a central role for the first time for BIPKG.

The aim of this paper is to present a design for a process of vocational training in which e-learning[2)] , WBT in particular, is used, taking particular account of procedural models. This paper is divided into 4 chapters:

After the introduction and setting of objectives in Chapter 1, Chapter 2 deals with the topic of in-service training. In Chapter 3 the “face-to-face event” and “distance learning” are introduced as forms of vocational training. The focus here is on “e-learning” and “WBT“. This is followed by a brief summary of the history of the development of didactic designs, followed by procedural models for software development and multimedia learning environments. In Chapter 4 the WBT vocational training concept and development process is described, starting with the general background: field workers, previous types of vocational training, technical conditions and the works council. Then there is a description of the WBT development process . Here the procedure of “instructional design” and the network structure of the “Essen Learning Model” were used as models. This Chapter concludes with a cost comparison calculation, the vocational training concept and the measures envisaged for analysis and evaluation. Then, finally, in Chapter 5 there is a critical reflection.

2. In-service training

In 1995, in its White Paper “Teaching and Learning”, the EU favoured professional and work-related qualifications as a means of meeting the requirements of the “lifelong regeneration of human resources” (Brödel 1998, S. 3). Attempt is made with “lifelong learning” or “in-service training” to link learning and working. This type of linkage can result in either the demands of the workplace acting as a filter for educational content or in extra skills being acquired over and above the current requirements (Severing, 2001, p. 149). According to the second aspect, in addition to specialised competence, competence in methodology and social skills are important quantities in integrated in-service training (Arnold & Bloh 2001, p. 12 f.).
The contents, tasks and relative importance of vocational training for employees have changed considerably in recent decades. This is clearly shown in the investment

[2)] In the literature there is no uniform method of writing the expression “e-learning”. In this paper we have chosen to use “e-learning” throughout.

made by private companies in vocational training (Table 1).

Table 1: Development in investment in vocational training by private companies (Schlaffke 1996, p. 9).

Period	Source	Investment (DEM bn)
Early 70s	Edding Kommision	2.1
Early 80s	Institut der deutschen Wirtschaft	8.0
Mid 80s	source not given	14.7
1987	IW [Institut der deutschen Wirtschaft] company questionnaire	26.7
1992	Institut der deutschen Wirtschaft	36.5

By contrast with investment by private companies, government investment has remained almost constant for the last two decades in terms of gross domestic product [GDP] (Brödel 1998, p. 18). Schlaffke (1996, p. 9) in his 1996 publication reaches the conclusion that the German economy invested approximately DEM 60 bn in "human capital". This was at that time more than half the entire government education budget.

Current and future educational concepts of in-service training measures are subject to new requirements (Fig. 1).

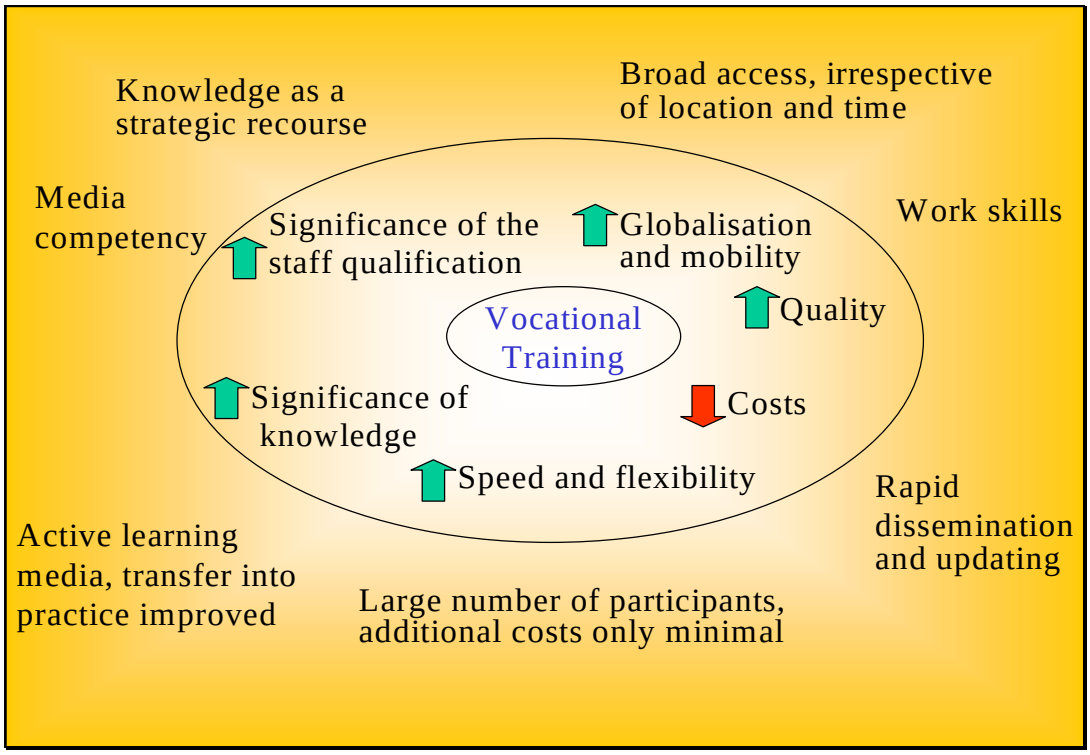

Fig. 1: Vocational training in the environment of new requirements (Seufert 2001, p. 22)

Adequate solutions are being sought for these more complex requirements. The focus is on questions and corresponding answers to the teaching-learning process which is to encourage this process. In this connection, when concepts of educational measures

are being drawn up, discussion often turns to the use of "new media" in association with self-directed through to self-organised learning. Here, however, it is simultaneously emphasised that these new media are no substitute for traditional training measures, but should only be regarded as supplementary (Eidel 2001, p. 48). The possible forms of in-service training are examined below in greater detail, also from the above-mentioned points of view.

3. Forms of in-service training

3.1. Face-to-face events

Face-to-face events are currently still the most common type of in-service training. These "face-to-face" events are mostly in the form of a seminar or workshop.
There is no doubt that some types of subject matter in vocational training are best conveyed through the medium of face-to-face events. This subject matter includes for example, rhetoric, behavioural training, sales and motivation. Nevertheless, nowadays computer-assisted programs are available with precisely this form of content. Many people find it more attractive and much easier to learn in a group than alone in front of a computer or using a script.

The cost of the face-to-face events is an important criterion in decision making. In general, for face-to-face events, one can expect to incur the following costs: the fees charged to participants generally cover the cost of the training materials, the trainer and venue and catering costs. The level of these costs depends on several variables, such as, for example, the number of participants, external or in-house trainer, qualifications or reputation of the trainer. In addition there are also travel, food and possible accommodation costs, expenses, continued salary payment and the cost of the loss of production to be taken into consideration.

3.1.1. Advantages of face-to-face events

The advantages of face-to-face events can be looked at from the point of view of the learner or the teacher. The possibility of direct communication is of equal importance to both. This synchronous communication makes it possible for everybody to receive the information in the same order. Verbal communication can be further enhanced by a number of non-verbal (e.g. mimic, line of vision) and paraverbal indications (e.g. voice modulation). The social presence and thus extensive contextual information can enhance learning for the group participants and motivate them. On the other hand, the instructor can get direct feedback for his activity at any time in face-to-face

events. By alternating methodology and media he can utilise all the learning channels.

3.1.2. Disadvantages of face-to-face events

Face-to-face events outside the company incur a whole range of different costs which can add up to a considerable sum. These costs can be minimised if in-house events can be offered. In addition to the cost of the external trainer, it is necessary to evaluate his competence and check whether he fits in with the company and the staff who are to be trained. External events have set schedules and can accommodate a limited number of participants. The prior knowledge the participants have of the subject matter of the event can vary greatly. As a result the participants may be overstretched or underchallenged and motivation may suffer accordingly.

3.2. Distance learning

Open learning, distance learning, distance education, self-directed learning, self-determined learning, self-directed learning, self-study etc.
These slogans have enjoyed a growing popularity for many years. Do they mean the same thing? Closer inspection reveals a difference in emphasis:

In *"open learning"* the student works from instructions, e.g. on texts or tasks which he works through on his own. Technical aspects are not a necessary requirement for this. The term *"distance learning"* on the other hand, is mostly used in connection with technical, often electronic advantages in the learning process (Williams et al. 1999, p. 2).

In *"distance learning"* and/or "d*istance education"* there is geographical distance between the learner and the trainer. It is the respective temporal elements that are referred to in synchronous or asynchronous learning. Synchronous means that the sender and receiver can send their message simultaneously (two-way communication) and can establish direct feedback or interaction over distance (e.g. chat). Asynchronous means that learner and trainer transmit their messages/information chronologically one after the other. Feedback or resonance is, therefore, staggered in time (e.g. forum, e-mail).
Distance learning has a long history which has been linked to the technological developments of the media. Williams et al. (1999, p. 4) differentiate between 3 "levels" in the development of distance learning measures (Table 2.).

Table 2: Continuous development of distance learning measures

	Level 1	Level 2	Level 3
Time	from 1880	from 1960	from 1990 to 21st century
Interaction	Passive	Transition from passive to average activity	Highly interactive, virtual classroom, hybrid networks
Examples	printed media, audio- and video tapes, radio	interactive audio- and video tapes, teletraining, CBT, computer confer-ences, electronic mail	Digital television with multi-tasking systems, Multi-media CBT, on-line video, Internet,
Learning environment	asynchronous	synchronous	synchronous

By "passive" (Level 1) the authors indicate that there is no opportunity for the learner to interact simultaneously with the trainer or instructor (asynchronous learning).

The development and use of new media for distance learning presents new challenges for all those who take part in the teaching-learning process. This means that additional competences must be acquired and adapted to the current technical requirements. Since 1974 the question of competences in distance learning has been investigated in detail in 9 studies. According to these, the first 5 core competences are (Williams, et al. 1999, p. 24 f.):

(a) program design and program development,
(b) understanding of adult education,
(c) needs analysis and needs diagnosis,
(d) determining suitable training requirements and methods,
(e) identifying individual ability.

Those taking part in the development of distance learning measures must, therefore, have didactic tools at their disposal which can be adapted to the respective new media and, in the field of in-service training, must be geared to adult education. These competences are not normally found in one single person. Therefore several specialists, such as, for example, designers, specialists, didacticians and producers must work together to develop the documents for a distance learning course. It is therefore not surprising that the role of the coordinator is considered the most critical factor (Williams et al. 1999, p. 24 f.).

The roles of learner and trainer have also been forced to change as a consequence of modern forms of education. The following comparison illustrates this:

Table 3: Change in the perception of roles as a function of the learning forms (Brinkmann 2000, P. 43)

	Role of the learner		Role of the teacher
Traditional learning forms	learner	⟷	teacher
	classic student	⟷	classic imparter of knowledge
Modern learning forms	Self-educator	⟷	advisor
	training learner	⟷	trainer
	player learner	⟷	game organiser
	member of learning team	⟷	moderator
	surfer	⟷	producer of educational media

At this point the question of whether learning results directly from teaching requires clarification. According to Holzkamp's subject-oriented approach this is not the case. According to this approach teaching does not automatically result in learning. In teaching, one can only create the optimal conditions conducive to learning so that there is a high probability that the learner actually learns. The topic "management of knowledge" should also be understood in terms of the status quo in this sense (Goertz & Reißberg, 2002). After all, it is the learner him/herself who decides whether the educational content is considered relevant or not (principle of viability).

In the theories and models of modern forms of learning, the learner is frequently made the focus of the learning process. This is then referred to as self-determined, self-directed or self-organised learning. Arnold & Schüßler (1998, p. 66) use the following terms:

- self-determined learning: the learner is able to participate in the selection of content (what?) and learning objectives (to what end?),
- self-directed or self-regulated learning: the learner's participation is limited to regulating the learning (how?, when?), but the educational content and goals are predetermined,
- self-organised learning: the learner's participation in shaping the teaching and in the teaching process taking humanistic and/ or education-economic orientated approaches into account.

3.2.1. e-learning

There are various definitions of e-learning. Broadly speaking, e-learning means learning using electronic media; in the narrower sense, this is learning using the computer. Where e-learning is used as a synonym for online learning, it refers to learning on the Intra- or Internet. (Hernandez 2001).

Brinkmann (2000, p. 166) names two prerequisites for the development of multimedia electronic forms of learning:

1) Technological development: here the invention and continued development of microprocessors, the spread and general use of the computer, the networking of computers through to the world-encompassing Internet and finally the easy-to-use user interface of the "World Wide Web".
2) Change in the didactic concept: linear-design "programmed instructions" or "programmed teaching" as learning programmes through to didactic or instructional design and the continued development of these.

In advertising, e-learning providers attempt to associate the two points above with "easy learning", "entertaining learning" or "effective learning" (Dichanz & Ernst 2002, p. 46). Irrespective of its description, in the final analysis, the focus of e-learning should still be on "learning".

Both of the above named points must be given critical consideration in the new development of CBT and WBT programs. As a rule the only difference technically between these two program options is whether the program is launched using CD-ROM or online. a detailed description of CBT is not given here but rather the WBT is dealt with in more detail.

3.2.2. Web-based Training (WBT)

"Web-based training" is inconceivable without the invention and development and universal use of the Internet. The differences between Internet and Intranet are minimal. The Intranet is an "island solution" for selected users. Thus, there are Intranets within companies, authorities etc.; in-house data is made available to the employees. User rights regulate the respective group of people who have access to this data. "Firewalls" are designed to prevent "outsiders" from being able to gain access to the data.

Web-based Training epitomises learning with the aid of courses on the Internet or Intranet. The term WBT is used when learning applications can only be accessed online, i.e. via an Internet or Intranet connection. Another prerequisite, in addition to the hardware and software, is Internet / Intranet access. There is differentiation between the two different options provided by WBT:

On the one hand, WBT is available as a "download" and on the other, there is so called "browser-playable WBT". References to WBT from this point onwards refer to the second option . If the WBT program is downloaded from the Internet onto the

hard drive and worked on from there, it no longer has the main (online) feature of WBT but rather meets the prerequisites of CBT.

WBT is understood to be *"selective learning"*, *"learning on demand"* or *"learning just in time"* (Grabener 2000; Horton 2000, p. 7; Töpfer 2001, p. 81). *"Selective learning"* means that the course participant only selects those parts of a seminar that he has not yet mastered. *"Learning on demand"* means that the learner only calls up the information that he needs at that particular point in time. *"Learning just in time"* implies that whenever employees require additional knowledge for their job, they are able to acquire this quickly and easily.

In the WBT functionality, distinction is made between "learning environment" and "course environment" (Rose 2001, p. 37 f.). The course environment is embedded in the learning environment. The learning environment includes (Fig. 2):

- "administration" (e.g. course enrolment, payment, statistics),
- "skill management" (e.g. creating a network of experts),
- "content management" (e.g. organisation of cross-course or cross-company know-how) and
- "community" (e.g. participants exchange know-how).

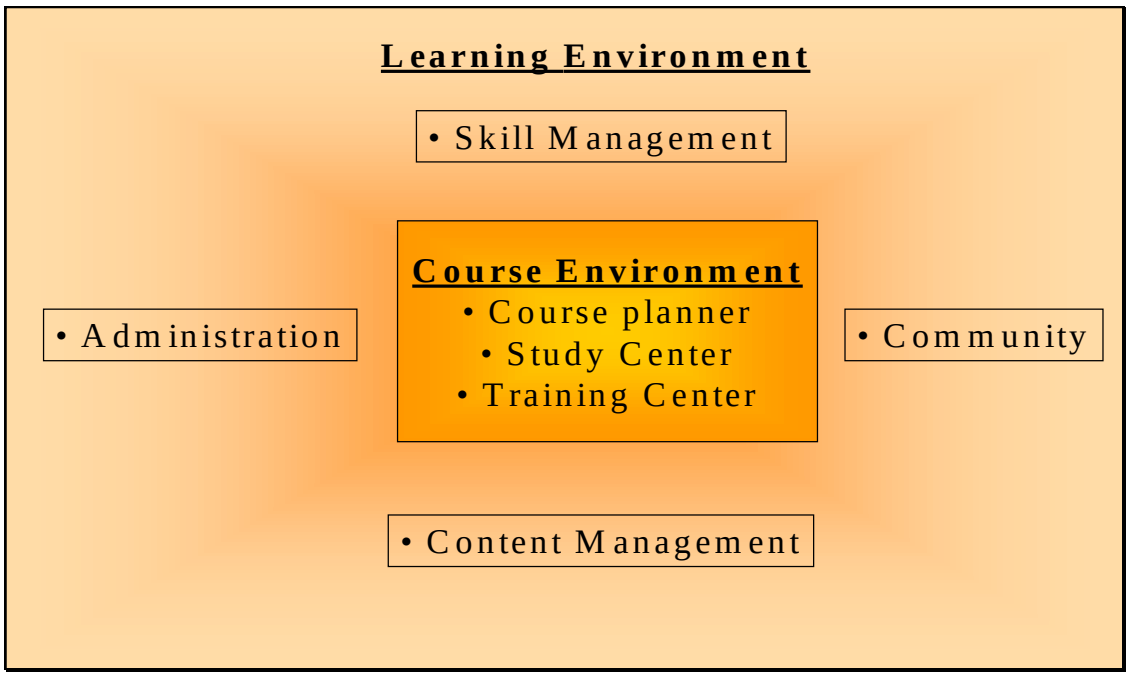

Fig. 2: The learning and course environment of WBT

The course environment includes:

- the "course planner" (information on the respective course),

- the “Study Centre” (processing tasks, storing personal comments and subject matter) and
- the “Training Centre” (of the course to be followed, i.e. vocational training takes place here).

In many programs the “Training Centre” is incorporated into the “Study Centre”. WBT programs are also often embedded in a platform. As a rule, the platform provides a basis for the provision of a variety of different educational media, analytical and administrative tools.

According to a survey by MMB (2000), around 7% of companies in Germany are currently using vocational training options via the Internet or Intranet. In most cases these are large companies with in excess of 1000 employees. The sluggish development and slow-moving expansion of WBT are attributed to inadequate technical facilities and low level of acceptance of WBT among companies – especially smaller companies. By comparison, 41% of the large organisations in the USA were using “online-training” in 1999 (Horton 2000, p. 9).

3.2.2.1. Advantages of WBT

As described in the technical literature, the uses or advantages of WBT relate primarily to four criteria: location, time, cost and learner achievement.

The advantages of WBT lie in the geographical and temporal independence it gives to the learner. Moreover, personal, direct and synchronous contact can be made with teachers as well as with other learners. Compared to CBT, the time and effort required to update the content and make this available to the learners is significantly less. Up-to-date educational content is in theory available 365 days a year, 24 hours a day. The only time restriction is the period within which the entire course must be completed. The learner can for the most part fit the material he needs to master into his own learning pattern. Chat room, e-mail and discussion forum offer possibilities for tutors or other learners to provide concrete support: the learner can therefore learn on his/her own, but is not left alone. The possibility of social contact is, therefore, also a positive feature of WBT, as opposed to other vocational training options which are not established in the face-to-face event domain.

The question of whether the use of WBT also saves learning time is a controversial topic of discussion in the literature. Thus on the one hand, there is reference to a 30 – 80% saving in learning time (Töpfer 2001, p. 82; Horton 2000, p. 52), on the other

hand, it is claimed that 20 – 40% more learning time is required by the learners (see Chapter 3.2.2.2).

Depending on the content and provider, the cost can vary considerably for the WBT participant. The tutorial-assisted course "Microsoft Excel 97 Basics" lasting 16 hours costs € 106.76 at the IHK, Bayreuth (2001) for example. A comparable course covering only eight hours is available on the web pages of the Ministry of the Interior of North-Rhine Westphalia (2001) for € 7.50, without tutor support however.

As a rule, the cost of development of company-specific WBT is a great deal higher and may reach six figures. Cost parameters are for example: quantity and length of the subjects to be learned, media used (video, animation, images, text, speakers etc.) and tools (forum, chat, analytical tool, platform etc.).

The fixed cost coefficient must be taken into consideration when calculating educational investment for the development of new WBT. According to this, the proportion of fixed costs per participant reduces in proportion to a rise in the number of participants. In his comparative calculation based on 250 participants, Hempelmann (2001, p. 42) calculated that there was practically no difference in cost between WBT and face-to-face events. Vering (2001) perceives a positive cost/benefit effect with upwards of 500 participants. Keller (2002, p. 155) talks of a potential saving of 60% with 1000 participants. If WBT is used as a strategic resource, numerous calculations indicate clear cost savings using WBT as compared to face-to-face events (Töpfer 2001, p. 82 f.). There is practically "no limit" to the number of participants and courses per year using WBT, even on the basis of a useful life of maximum 3 years (Kerres 2001, p. 24).

It is practically impossible to make an objective comparison of different cost calculations as the bases of the calculations are mostly different. Therefore those responsible in the educational sector each have to make their own cost comparisons for their specific tailor-made vocational training provision.

The literature also indicates that learning achievement is greater when WBT is used as opposed to face-to-face events. An American survey used the students' marks as the criterion for estimating the learning achievement. Students who had completed part of their course using WBT were more successful than students who had participated exclusively in face-to-face lessons (Töpfer 2001, 82f). It also showed that students with WBT experience were more likely to apply important concepts in subsequent courses. They had learned to work on their own responsibility and to fil-

ter out what was important. This distance learning measure encouraged creative problem-solving and increased the individual‘s competence in methodology. This had a positive effect on student motivation.

The following table summarises the advantages of WBT, compared directly with other vocational training measures:

Table: 4 Selected features relating to individual forms of education
(Rose 2001, P. 40)

	Available on call	Adapted to the individual	Dialogue facility	Individual learning speed	Access	Interaction
face-to-face training		✓	✓			✓
Book	✓			✓	✓	
Business TV		✓	✓			
Video Audio	✓			✓	✓	
CBT	✓			✓	✓	✓
WBT	✓	✓	✓	✓	✓	✓

The ticks in the fields indicate that the respective feature is available in that form of vocational training. According to this table WBT is the only form of vocational training to fulfil all the requirements set. Ideally WBT would embody all the advantages of a distance learning measure.

3.2.1.2. Disadvantages of WBT

The acquisition of the necessary hardware for using WBT is very cost-intensive and the employees, as is also the case when CBT is used, must have a basic understanding of how to use a computer. Also, direct synchronous communication is only possible by setting specific times for chats, for example . Moreover, the security aspect must not be underestimated. Those responsible in the company are justifiably anxious as regards data security, in particular when it involves the Intranet.

According to Horton (2000, p. 34 f.) other disadvantages are:

- 40 – 50% extra effort required on the part of the tutors for the respective feedback,
- 20 – 40% more learning time is required on the part of the learners e.g. in online discussions, brainstorming sessions and problem-solving activities in comparison with face-to-face events.

If WBT is to be successful, it must be exceptionally well designed. Since for the greater part of the learning time the tutor is not present to correct minor errors or to

clear up any misunderstandings, the preparation of the learning material must be precise and specific.

3.2.3. History of the development of didactic designs and models of multimedia learning environments

The history of the development of didactic design, or models of multimedia learning environments goes back to Skinner's theory of learning, operand conditioning. "Programmed learning" or "programmed teaching" was derived from this. Educational computers which provided the learner with learning material progressively in small doses were further developed by Crowder for branch learning programs. These branch programs are typical today of computer-assisted learning (Hesse & Niegemann 1998a, p. 2). Even at that time, individualisation, adaptability and control were defined as quality criteria for computer-assisted learning.

A renaissance of this learning form did not occur until the mid 80s with the spread of the personal computer (PC). It was the constructivist view of learning (Bruns & Gajewski 2000, p. 14 f.) in this period that provided the crucial stimuli for creating new educational media. According to this, everyone actively constructs his / her own world. Learning is considered an individual process. The only aim can be to stimulate the learning process in the learner so that he /she can build up his /her knowledge on his / her own. Motivation, authentic situations, different perspectives, independent and open learning routes, as well as teaching times, duration of learning and learning speed are fundamental features of the learners and of the conveying of educational content.

The learning of the individual always takes place in dualism between self-determination and determination from outside. In his studies on the effectiveness of planned games, Leutner (1989) came to the following conclusion: learners with little prior knowledge should be given more instructions, and learners with good prior knowledge should be allowed to act with more freedom. This statement certainly applies to computer-assisted or multimedia learning as well. With that argument, a tutor-directed approach prevails where knowledge is being acquired and when basic skills are being built up using new educational media. On the other hand, a learner-directed approach prevails in the application of acquired knowledge, in practice and in independent problem-solving.

To do justice to these claims, WBT developers must have an appropriate didactic repertoire. Therefore procedural models for multimedia learning environments and software development are presented below.

3.2.4. Procedural model for software development

There are numerous models for the development of software. In the following, three approaches are presented in brief (Pawlowski & Adelsberger 2000, p. 7 f.):

- The *Waterfall Model*: this is a multi-stage model which subdivides the development process into phases. Milestones and feedback mechanisms are defined for each stage. This allows for transparency in the project structure; however, this system is relatively inflexible because the sequential order of events does not, as a rule, permit any activities to run alongside at the same time.
- The *Prototype Model*: this model is based on the application of possible executable models. The exact definition and specification of requirements are adapted together with the users, and the end product is not necessarily an "further development", but can also be a "new development". Compared to the Waterfall Model, this requires a greater degree of time and effort for development and makes more demands on communication and coordination. As the user is involved at an early stage in this model, the level of acceptance is generally high.
- The *Spiral Model*: This is a further development of the approaches named above. Here the individual phases of the development process are run through several times for the purposes of optimisation. Changes and feedback are incorporated dynamically through the inclusion of prototypes. A regular risk analysis ensures the success of the development.

These models aim to make the software development process plannable and transparent (Disterer 2000), whereby these procedural models deal with three aspects (Balzer 1998):

- the structuring of operations (sequence of work-flow, activities, definition of components and production criteria),
- the organisational structure (employee qualifications, competences, responsibilities) and
- the general description criteria (standards, guidelines, methods and tools).

The following illustration shows the stages of development of WBT and temporal dimensions:

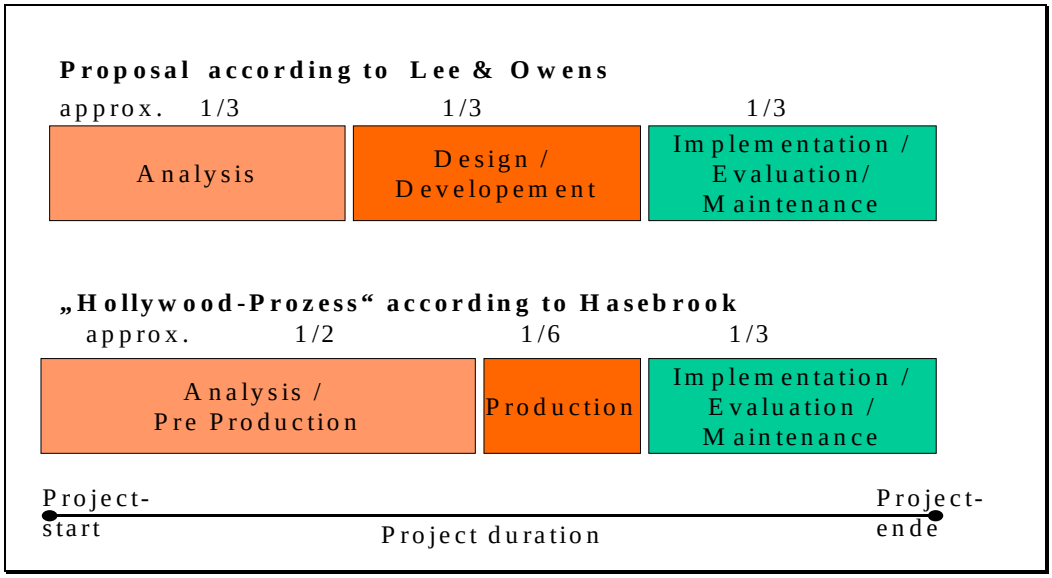

Fig. 3: Stages of development of WBT and temporal dimensions

According to Lee & Owens (2000, p. 16) 1/3 of the duration of the project should be allocated to each stage. Hasebrook (2002) on the other hand, recommends investing much more time in the first stage (approx. 50% of the total duration of the project). He uses the term “Hollywood Process” to illustrate that the preparation of the scripts for WBT could be likened to preparing a script for a film. A great deal of time, creativity, knowledge of subject matter and methodology must be invested in the preparation of the script.

3.2.5 Procedural model for multimedia learning environments

The term “learning environment” is used to describe all the external factors – i. e. those not coming from within the person of a learner – such as sources of information, other persons, machines, materials etc. (Niegemann & Hesse 2001, p. 217).

The following procedural models of learning environments are briefly discussed below:

- Didactic design and
- Instructional design.

“*Didactic Design*” is concerned with the planning, design and implementation of the educational options through to quality assurance and evaluation. In the narrower sense of the term, it often only refers to the design of the user interface (T-Systems 2001). A general function of didactic design is to seek out options i.e. alternative ways of acting or decision-making at the various levels of the planning process. Constructivism forms the basis of didactic design. It thus moves away from the traditional idea that it is possible to exert direct influence on the learning process. The ac-

quisition of knowledge can only be influenced indirectly, and that is through the design of the learning environment. Furthermore, this model is based on two questions with different theoretical concepts (Hesse & Niegemann 1998a, p. 42):

- Which variables must be taken into consideration when planning and designing learning environments ("instructional design theories" or "didactic design in the narrower sense") and
- Which approaches in designing learning environment that are capable of abstraction are most likely to ensure the highest quality in the resultant educational measures ("instructional systems design" or "didactic design in the broader sense")?

Pawlowski & Adelsberger (2000, p. 8) are critical of the fact that this model makes no reference to new technical developments, yet can be used for general didactic planning.

"*Instructional Design"* describes the systematic and structured process of developing learning products, from the analysis of different fields, design of the learning environment, production through to implementation, use and evaluation (T-System 2001; Lee & Owens 2000, P. XIV). Planning instructions provide for five categories of learning goal – from linguistic knowledge through cognitive strategies to motor skills. Nine learning stages are differentiated for each learning goal category– from gaining attention through directing learning to securing transfer (Hesse & Niegemann 1998b, p. 27 f.)
Pawlowski & Adelsberger (2000, p. 8 f.) criticise the focus on teaching activities and neglect of learning activities.

In the meantime, further models have been developed which claim to be more comprehensive:

- "Four-component Instructional Design Model" according to van Merriënboer (1997),
- "Learning Object Design and Sequencing Theory" according to Wiley (2000a),
- "Essen Learning Model" according to Pawlowski & Adelsberger (2000).

As the Essen Learning Model roughly describes the approach to planning and developing its own WBT, it is described here in brief:
The "*Essen Learning Model"* (ELM) was evaluated with regard to cross-subject use to improve the quality of learning and follows the spiral model for developing soft-

ware. This system is modular with a operational structure shown in the flow chart below:

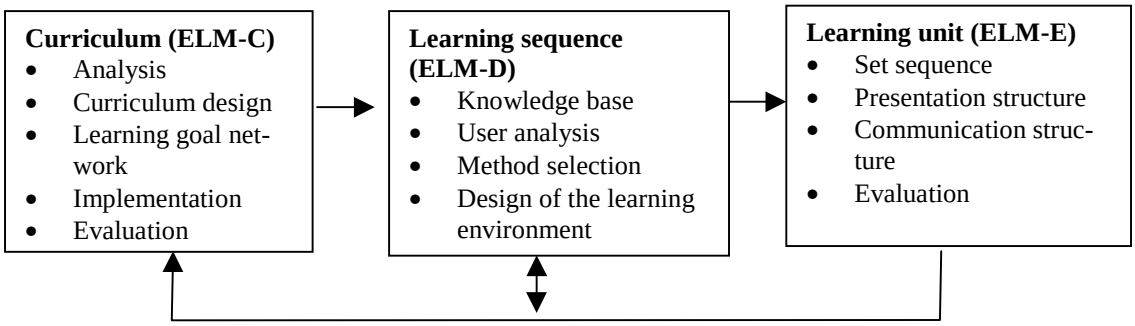

Fig. 4: Overview of the Essen Learning Model (ELM)

At curriculum level (ELM-C) the focus is on creating a learning goal network in accordance with the instructional design as a function of the requirements of the company, the future user groups and the respective prior knowledge. Here, learning sequences and their interconnections are only roughly structured. The concrete development of the learning sequences takes place at the next level (ELM-D) with the focus on the learning methodology. This means that the content must be designed as a function of the future user so as to enable effective and efficient learning. At the last level (ELM-E), the individual learning units are finally prepared and implemented. The creation of a navigation framework provides guidelines, and not a rigid sequence pattern in the sense of the “drill & practise - programme”. In addition, the concrete procedure in the development process, as defined by the spiral model, is dynamically optimised at each level.

Despite the advantages of individual WBT, based on whichever model, there are still questions to be raised: how can the “consistency of courses already created be maintained in respect of the retrieval of relevant and significant information for the given thematic and didactic context, as well as in respect of the rights of use and remuneration”? (Redecker 2001). In addition, there is no didactic (meta-) information which provides details of possible use within the framework of teaching-learning contexts.

It is against this background that standardisation committees have been formed, such as, for example:

- “Learning Technology Standards Committee” (LTSC) of the “Learning Objects Metadata Working Group” (Wiley 2000b) and

- "Campus Engineering Centre", with the project: "L^3-Lifelong Learning" (Handelsblatt 2000).

The committees have set themselves the goal of defining open technology standards for computer-assisted learning environments and educational products and the characteristic metadata (Redecker 2000).

Thus in the pilot project *"L^3-Lifelong Learning"*, the following was defined, given here in summarised form (Redecker 2000): Distinction is made between learning units and knowledge units. Learning units are thematically grouped units of knowledge with 20 - 40 minutes of active learning time. Knowledge units must not be larger that one screen page or, in the case of videos or mini CBT, no longer than 2-4 minutes of active learning time. Units of knowledge, therefore, can be made up into learning units and can be flexibly combined within these.
In this paper we will not go into a more detailed discussion of teaching functions, teaching systematics and learning models. Reference will be made to these at the appropriate points in the following chapters.

Following on from these theoretical discussions, the concept of a vocational training measure is introduced in the form of a case study. Here e-learning, in particular WBT, assumes a pivotal role.

4. The design of vocational training measures

The design of vocational training - and thus also e-learning measures covers 5 areas. In the development of this design, these areas are covered following the spiral model (Fig. 5):

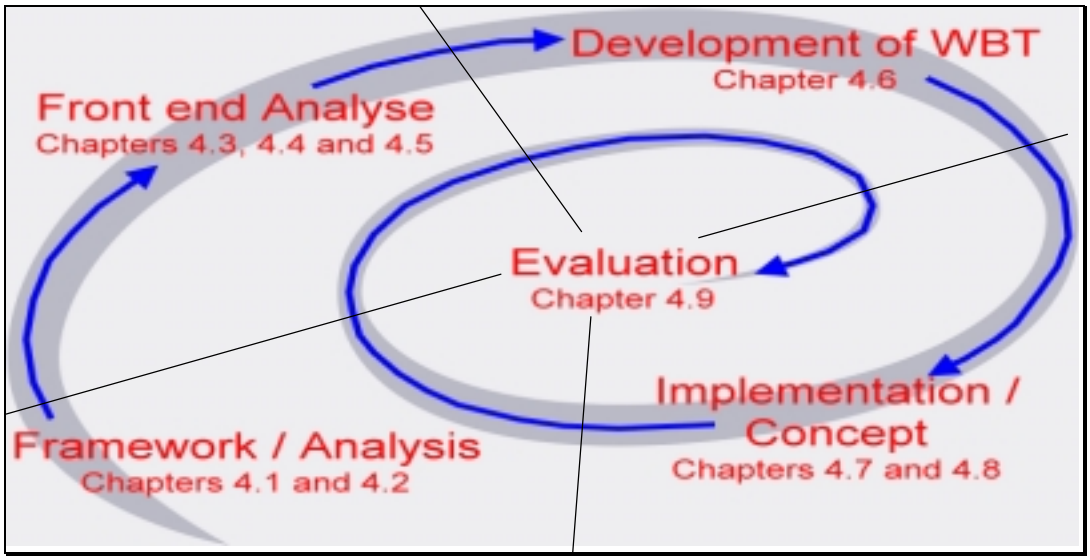

Fig. 5: The five areas of the design

The individual areas are described in more detail in the following chapters.

4.1 Background to the new launch

In 2002 BIPKG is launching a new product onto the market in the field of disease of the respiratory tract . Market research shows that this product is potentially a world-wide blockbuster (more than € 500 m turnover per annum).

The field workers (FW) at BIPKG are divided into "lines". Thus there are FW who visit general practitioners or hospital doctors. While the hospital FWs are responsible for all the products for the hospital and hence for all indications, the FWs for the general practitioners are organised according to area of indication. 2 lines from the GP section and 1 hospital line are involved in the introduction of the new product. The two lines from the GP section are divided into 10 regional groups and the hospital line into 6 regional groups.

Comparisons with other large pharmaceutical companies reveal that expected turnover is only possible with a correspondingly large sales team. It was for this reason that in the middle of 2001 the company entered into a co-promotion with another pharmaceutical company to launch and market on a world-wide basis. This means that twice the number of FWs have to be trained in the new product. In this case, the initial situation with respect to prior knowledge on the topic of the respiratory tract is very varied.(Table 5).

Table 5: Field worker lines for the new launch and their prior knowledge of disease of the respiratory tract (N = proportion of the FWs as a percentage)

Company	Line description	N	Prior knowledge of respiratory tract system
BIPKG	respiratory tract line	20.7%	good
	hospital line	10%	average
	cardiovascular line	19.3%	poor
Co-Promotion Partner (CCP)	1st line	20.6%	poor
	2nd line	20.6%	poor
	3rd line	8.8%	poor

The respiratory tract line employees have traditionally always discussed the products for disease of the respiratory tract and have, therefore, a great deal of prior knowledge relating to this area of indication. It is only in the last 2 or 3 years that, in addition to the hospital products, the hospital line employees have been discussing two selected respiratory tract products with low capacity planning. Their knowledge is, therefore, not as highly developed as in the respiratory tract line. The cardiovascular

line employees only had contact with respiratory tract products in exceptional cases. Therefore, on average, their prior knowledge is classed as negligible .

The CCP‘s employees had not previously been active in the respiratory tract area. Therefore, the FWs first need to obtain medical grounding so that they can then be trained in the subject matter of the new products.

In addition to this large number of field workers, the trainers from both companies need to increase their knowledge to a high level by means of “train-the-trainer” measures.

The Management of BIPKG’s prerequisites for a training concept were as follows:

- Minimal loss of market presence days,
- Motivation of the employees for the new launch,
- Comparable and accessible high level of knowledge in sales/ in-house staff and
- Improvement in communication and cooperation between the individual marketing lines.

4.2 Analysis of the field workers at BIPKG for the new launch

Full details of the FWs of the CCP are not given here - only an analysis of the field workers at BIPKG. According to the personnel department, approximately 1/3 of the FWs have academic training, approximately 1/3 fulfil the requirements for possession according to the law on the sale of drugs (2000, §75) and approximately 1/3 are direct entrants from other professions. The age structure of the 330 FWs in question can be seen in Fig. 6, the cut-off date being 31.12.01:

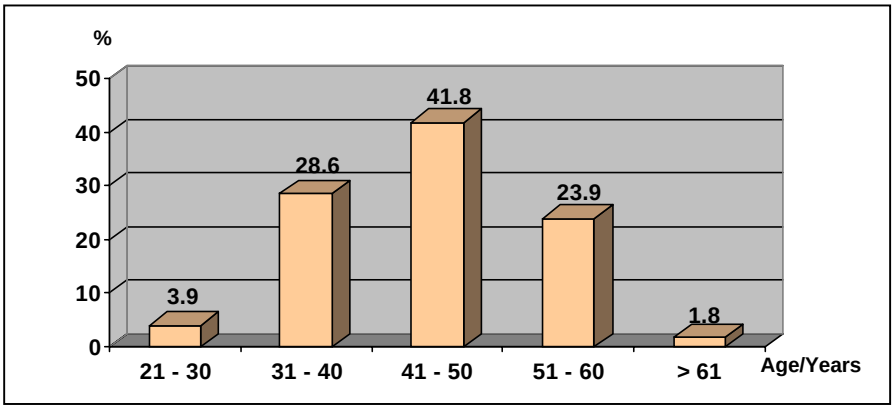

Fig. 6: The age structure of the participating field workers

On the cut-off date, the youngest FW was 26 and the oldest 65. 53.7% of the FWs are male, 46.3% are female. Computer-literacy inter alia is important for WBT. In general the level of computer–literacy is very varied. Estimates are based on the as-

sumption that approximately 30% of FWs have a high level of knowledge of PCs. Some of them also own a PC themselves and use it intensively or are training themselves in this field of their own accord. Approximately 50% use a laptop and software to conduct company business without any great difficulty. Approximately 20% experience more or less great difficulty in using the laptop to conduct company business. Experience from previous education and other education events on the PC and various software programs indicate that older employees are more likely to have problems using software and hardware than are younger employees; even so, in exceptional cases, older colleagues do have a very extensive knowledge of computers.

4.3 Analysis of previous vocational training for the FWs at BIPKG

In the past, when dealing with vocational training measures for FWs, BIPKG used open learning measures with scripts in combination with face-to-face events. These events lasted between 1 hour and up to 10 working days, depending on the subject matter to be taught. Recently there has been increasing criticism from executives that where open learning was used, it proved impossible to analyse the level of knowledge of the participants before the subsequent face-to-face events. For one thing, under a company agreement at BIPKG, performance assessments relating to individuals are not permitted at present, and for another, the respective fixed timeframe and resources were not sufficient for an anonymous survey.

E-learning measures are still in their infancy at BIPKG. In the past a large CBT project was carried out at great expense, implementation stretching over several years and found little acceptance among field workers. CBT programs on MS Office software were offered by the staff development group. According to them, the reaction was extremely poor. All in all, it can be said that there is currently no strategic and conceptual guidance in the realm of e-learning at BIPKG.

There is no standard rule at present in BIPKG for the use of the Internet or Intranet by field workers. Although all the field workers have the opportunity to access the BIPKG Intranet, this source of information has never, however, been taught to field workers and thus not made transparent. On the other hand, access to the Internet was also activated for special field workers, and the employees involved were also informed of it. However, to date there has been no training on how to use or apply the Intranet or Internet. The conditions for the use of e-learning measures are therefore

not optimal. Nevertheless the Management opted for the development and use of WBT in addition to the traditional forms of vocational training.

4.4 Initial technical situation

In both companies, FWs have laptops so that they can process, for example, their visiting activities, expense reports and business correspondence by e-mail. Electronic processing by FWs was introduced at BIPKG in the middle of 1991, and a few years later at the CCP. Both companies offer the use of Intranet (ISDN connection). This is a summary of the current technical resources at BIPKG:

- Hardware: Laptops (HP Omnibook 6000, Pentium III, 700 MHz, 128 MB, 10 GB, DVD, Disk Drive, Sound Card). The employees were specially trained for these.
- Software: MS Office and the field workers information system (FWIS).

The following tools are essential for the communication and transfer of data:

- Standard Telecom EuroISDN, Router, 3 Com LAN Card and Secure ID Card at the home workstation, dial-in router and Firewall in the company.

The technical resources for WBT are thus optimal.

The initial technical situation in the two companies is very different. Whereas all the FWs from BIPKG have standardised conditions, at the CCP, there are currently three different laptop versions with different screen resolutions. A screen resolution of 600 x 800 Pixel is possible on all the laptops and this will be the aim when developing WBT.

The “IT world” has been developed in the two companies independently of each other. Thus, for example, at the CCP, Access or MS SQL Server is used as the database server, ORACLE is used at BIPKG. Therefore, on this point, separate database interfaces need to be set up.

4.5 The role of the works council at BIPKG

At BIPKG there is an “Outline Company Agreement on the use of DP systems” dated 17th April 2000. This regulates for example that currently no performance analysis relating to any one person can be carried out using DP systems without the consent of the works council. However, an analysis which retains the anonymity of the individual may be carried out in any form (cf. Chap. 4.9).

The works council was integrated into the project by the project group in the middle of 2001, and the council has been involved in design in three sessions up to now. The works council assisted in setting up a pilot group in which shop stewards from the field workers and FWs from the “Product Group S” will be involved. This pilot group has been given the task of testing the WBT modules at the preliminary stage from their home workstations. The focus is on technical details, handling and navigation of the WBT.

4.6 Selecting the agency and development process for the WBT

Five agencies were considered in two stages according to the following criteria : past examples of implementation, knowledge of didactic methodology, performance, medical knowledge, IT requirements and the implementation of a practical trial. Further criteria were collected by a representative group (employees from Marketing, IT, Sales services and Training) from BIPKG, using a standardised questionnaire (Appendix 1). It was decided to develop WBT in conjunction with !KnowHow, a Stuttgart-based company and the Seemedia Agency based in Konstanz. !KnowHow is in charge of the development process of the WBT, Seemedia of implementing the content. The scope of the assignment includes:

- Guided Tour (stand-alone learning object, guidance notes on working with WBT),
- 14 learning objects, divided into 4 blocks,
- 2 learning achievement tests (principles of the respiratory tract, product: Spiriva®),
- Glossary (explanations, definitions of essential terms),
- Consolidating information at a second learning level,
- Forum (asynchronous communication medium),
- Media integration (integration of sound files, animation, text and image material),
- Testing (technical testing of the finished WBT lessons and tools),
- Editing tool (learning objects can be changed and updated),
- Administration tool (user and content administration, protocol).

The structure and navigation of the 14 learning objects are modelled on an Explorer tree (Appendix 2). The FW does not have to work on the learning objects in a set order, but can move about freely within and between the learning objects. However, working on the learning content and learning objects in the given order is recommended, this being especially important for those employees who still feel unsure of

their medical knowledge of diseases of the respiratory tract . Each individual learning object will have a “wave length” of 10 to 25 minutes and thus corresponds to a learning unit in the “L^3-Lifelong Learning” project. The duration of a “unit of knowledge” is on average between 1 – 1.5 minutes and thus is also in line with these recommendations. All the learning objects together have a “wave length “ of approximately 270 minutes. In addition, a second level was set up with consolidating information for various units of knowledge which can be accessed on an interactive basis.

With the exception of video sequences, all other media were used in the WBT: text, images, animation and voice. Four types of questions were used for the two achievement checks: multiple choice, cloze, drag and drop and text input. All in all, 2 x 75 questions, with the corresponding answer options, were drawn up for the two achievement tests, whereby the suggestions made by the FWs were incorporated.

The software development process is based on the spiral model and the Essen Learning Model (Fig. 7).

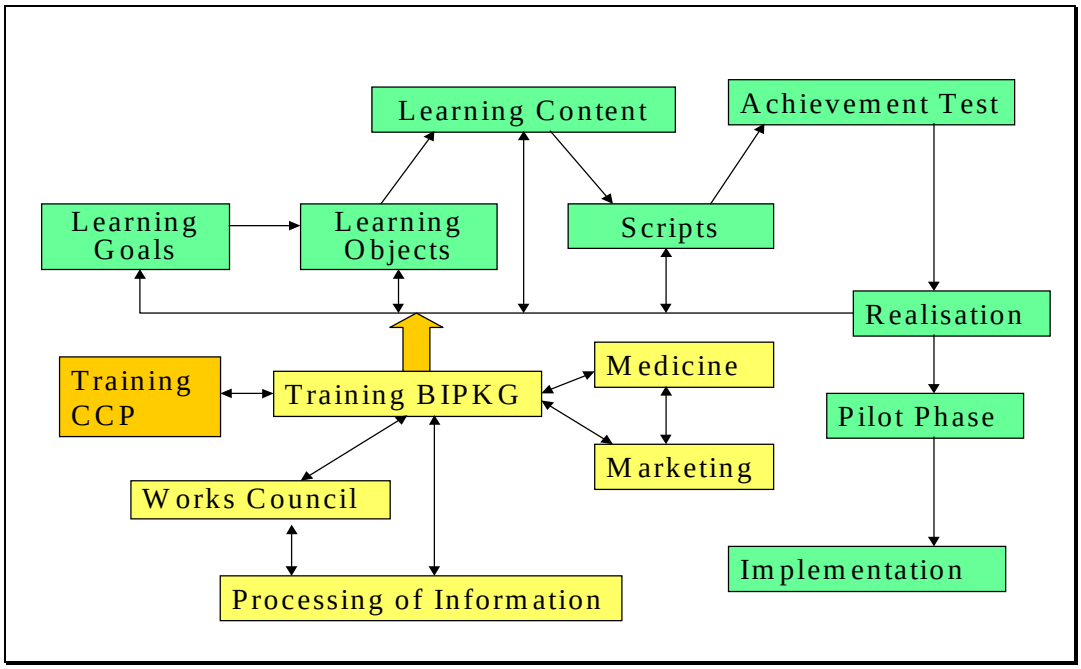

Fig. 7: Development process of WBT

In the analytical phase, the first step was to formulate cognitive learning objectives along the lines of Bloom’s taxonomy of learning objectives. For this, three learning objective stages were used: familiarity, ability/understanding and consolidation. In this phase the subject matter had already been roughly defined. Out of an initial 16 learning objects, 14 were defined during the development process. After this, the fi-

nal form of the learning content was drafted in line with the learning objectives. Thus a separate script with envisaged narrator text, written text, examples of illustrations and animation, initial links and practice questions was drafted for each individual learning object. In general, there were at least two editing runs before each individual script was accepted. This allowed the respective quality criteria of modern computer-assisted instruction systems (interaction, control instance, individualisation and adaptability) to be optimised in the development process.
The agency developed the scripts in parallel, one for each of the three learning objects, up to the achievement tests. The next learning objects were developed in the editing phase. The individual "learning object packages" passed through different development cycles consecutively. A final optimising cycle followed the first realisation. In their temporal dimension the individual development stages are very similar to the "Hollywood Process" according to Hasebrook (cf. Chap. 3.2.4).

As can be seen from Fig. 7, the BIPKG Gruppe Training [group training] plays a crucial role in the development process. It coordinates the input of the various BIPKG departments and the CCP Group Training throughout the entire development process. For its part, the CCP Group Training coordinates input from its company. This ensures that the two external agencies have only one contact person and, in this way, communication and coordination are harmonised.

4.7 Budget / Costs

A budget was provided to develop and produce the training media (script, CBT and WBT). Appendix 3 shows a detailed cost comparison calculation for BIPKG. The cost of the vocational training process for Option 1 (using only face-to-face events) and Option 2 (alternating between distance learning and face-to-face events) were calculated and compared. As the development of the CD-ROM was carried out exclusively by the CCP, the costs were not taken into account in the comparative calculation. The basis of computation for the costs of a working day per FW is taken from data from loan employment agencies for sales personnel. These agencies charge between € 460 and € 511 per employee per day. The basis of computation for the calculation is € 485. In total, the second option involves additional costs amounting to € 24,262.50, the equivalent of 1.9%.

If WBT is updated on an annual basis, one can assume a useful life of approximately 3 years. The plan is to use this WBT in the future for training new medical sales agents. Experience shows that annual fluctuation is around 8 – 10%. This means that

using this new medium approximately 100 new medical sales agents could be trained in 3 years. In addition, the BI Head Office plans to use the electronic media at international level. The translation and adaptation of WBT into English costs, according to the current tender, approximately € 50,000. This would allow approximately 3,000 additional FWs to be trained.

4.8 Vocational training Concept / Implementation

At this point we will introduce the concept. Neither medical content nor marketing aspects will be dealt with in detail.

In order to meet the Management‘s requirements, a multi-phase education and vocational training concept was developed, whereby self-study phases and face-to-face phases would take place alternately. This was aimed at providing the “teaching stages of instructional design”, from “gaining attention”, through “activating prior knowledge of FWs “, to “ensuring retention and transfer”. The medical principles are is established in the first two phases, and in the two following phases knowledge of the new product is imparted. Figure 8 shows the development and its associated media:

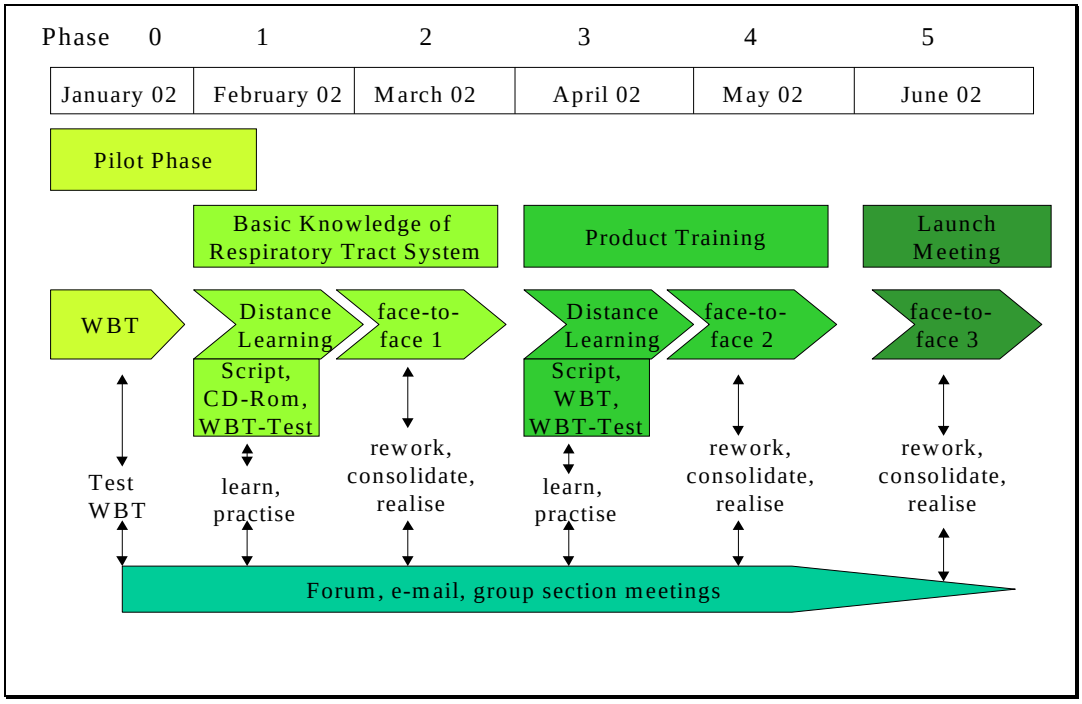

Fig. 8: Concept flow chart (rough outline)

The self-study times (“distance learning”) of phases 1 and 3 are scheduled in the so-called “low visit periods”. For the staff in the “general practitioner section” this is Wednesday and Friday afternoons. In the hospital field service, it is Monday morn-

ings and Friday afternoons. This means that at each stage the employees can take control of the preset learning time of 6x1/2 day within 6 weeks themselves as part of self-regulated learning.

Scripts are developed and implemented in modular form for phase 1, where attendance is compulsory for the staff from the cardiovascular line. In addition the FWs have the option of using a CD-ROM which was developed in parallel by the CCP. The aim of this phase is to impart the necessary basic medical knowledge. This self-study phase is followed by a web-based achievement test which is anonymous. The Marketing Department is planning an incentive to motivate staff members to complete the achievement tests. The WBT system allows performance to be certified on a local basis and hence anonymously. However, at the time this final paper was drawn up, no final decision had been taken on this matter. The BIPKG FWs in the respiratory tract line, in particular, were asked to assist in the formulation of questions and answers during the development process of the achievement tests. Of the FWs approached, 24% responded and, all in all, provided over 120 suggestions in the form of questions, answers or focal topics. These suggestions were incorporated.
In phase 3 the FW has the option of using WBT for product training. The basic conditions are otherwise as in phase 1.

Both “traditional” and “new media” were deliberately developed to ensure optimal integration of all staff members into the training process. The staff are free to choose which medium they want to use to learn at any stage. It is the success of the learning process that is the critical factor, the end rather than the means.

The aims of the face-to-face phases 2 and 4, each of which take up 1.5 days, are as follows: revision or consolidation of the subject matter, practical implementation, transfer, discussion and motivation of the FWs. The detailed plan for phase 2 can be found in Appendix 4. Here particular care was taken to incorporate the elements of the teaching function according to Klauer (1985), taking into account the ARCS model (Hesse & Niegemann 1998b, p. 41 f.).

The introductory meeting takes place about 2 weeks prior to the product launch. The following training elements are planned: revision of the most important medical subject matter and statements, formulation of core statements and practising lines of argument for the new product, as well as comprehensive training in discussion tech-

niques on the new product. One focus in this type of event is the motivation of the members of staff for the planned launch of the product.

A new forum dealing with the entire vocational training process is being set up for the first time for the field workers at BIPKG, the aim being to optimise cross-line communication. A trainer and a member of staff from the Drugs Department will lead this forum.

MS Project was used in the preparation and realisation of the concept. Thus more than 110 individual positions were defined and amendments and additions dynamically adapted as in a spiral model. These individual positions represent a network for directing the individual activities. This network is summarised in a trainer guide illustrating the respective activities and backgrounds dynamically along a time axis.

4.9 Analysis / Evaluation

The analysis and evaluation of the data from this vocational training process are based on two blocks running alongside the process and are each collected anonymously:

- 2 feedback questionnaires and
- analysis of WBT (learning objects and learning achievement tests).

At the end of each self-study block the FW is provided with a specially designed questionnaire . The questionnaire is designed to provide an overview of the level of acceptability of the media used, the self-study times etc. This questionnaire will be drawn up and evaluated externally (see below).

The analysis of WBT is undertaken by !KnowHow‘s “Administration Tool”. The “user tracking” facility of this tool and of the learning objects was realised using Advance Distributed Learning’s international standard SCORM 1.1. User tracking means that the system can record the routes the learner chose within the learning program or the mistakes he / she made (Müller & Dürr 2002, p. 170). In this way the Administration Tool supplies data on the WBT learning objects and the achievement tests. Thus data is recorded “per user” and for a predefined “user group” (regional group level). This data is per FW:

- processing time of a learning object (entry and exit),
- processing time of learning achievement test (when and how long) and
- outcome of the achievement test as a percentage.

The data can be freely combined, sorted and evaluated. In addition the responses to each individual question in the achievement test are evaluated separately and thus allow conclusions to be drawn as to the general level of knowledge of the FWs and the level of difficulty of each individual question.
An interim evaluation is made before each face-to-face event to obtain information as to the participants' level of knowledge. The input from the forum will also be taken into consideration for this evaluation. Thus the following evaluation areas adapted from Janetzko (2002, p. 105) will be chosen: participants, material, technical system, support and administration.

The order for evaluation and analysis was deliberately placed externally in order to maintain a critical distance. A suitable subject for a thesis was agreed with Prof. Volker Herzig, Department of Economics, Fachhochschule Bielefeld (Bielefeld College). The aim of this thesis is to analyse and evaluate the vocational training process under discussion here, and in particular the use of WBT. The thesis will be prepared by Silke Möhlenbein, Bielefeld, between March and June 2002. She will also design the questionnaires and analyse the answers. A member of staff from BIPKG has been assigned as her contact.

5. Discussion

The vocational training concept is deliberately made up of new and traditional forms of teaching-learning in the sense of "blended learning" (Sauter & Blasberg 2002) . This approach allows initial experience in the development and use of WBT while simultaneously minimising potential risks. In this way different training procedures, training stages and teaching aids can be offered and implemented at the same time in order to optimise the teaching-learning process. As mentioned earlier, the coordination and communication aspects involved a great deal of time and cost. This resulted mainly from the relatively poor starting position:

- development of WBT, without having didactically prepared documentation available beforehand,
- lack of medical knowledge in the region of the respiratory tract among the CCP staff and both agencies,
- no experience in developing a complex WBT program either at BIPKG or the CCP,
- no strategy and no concept with respect to long-term use of e-learning at BIPKG. At the present time WBT must be regarded as an "insular solution" and

- not all FWs are optimum candidates for the use of WBT (tasks using the PC and knowledge of the Intranet).

The following areas of tension are reflected in these points:

- Learning vs. operational business,
- Strategy vs. operational business,
- Training vs. cost,
- Individual vs. organisation,
- New Media vs. traditional media.

The objectives of each individual "pole" should be harmonised and adjusted along the lines of an integrated solution. The optimum preparation and introduction of e-learning also means that, in the sense of "change management", the corporate culture may change. This may then result in, for example, roles being redefined at different levels. For BIPKG this means that:

Provided that e-learning plays an important role in the future, a comprehensive strategy must be developed for using e-learning. This means that all sections must contribute as part of a complex staff development. In subsequent detailed concepts the provision of the required conditions must extend right into the operational level. This means that an interdisciplinary project group must be set up to carry out the appropriate preparatory work.

The development envisaged represents a good initial approach. Members of staff from the areas of training, data processing, medicine, marketing, personnel and from the works council worked on this project at an interdisciplinary level. One factor which proved to be very valuable for the development process was that the crucial levels at BIPKG were integrated at an early stage, along the lines of: "involving those affected".

The time and effort involved in communication and coordination, especially following the decision to opt for a co-promotion, was clearly underestimated by the project group. This decision meant that now two different corporate cultures had to come together in one interdisciplinary project. Competences, objectives, subject matter and responsibilities had to be coordinated as part of an integrated solution,.

The project passed through all the critical levels for innovation projects according to Weber (2001, p. 98): the technical, political, emotional and cultural levels. He com-

pares in particular the last three levels mentioned with an iceberg, 9/10 of which lies below the surface of the water. It is therefore not surprising that Weber (2001, p. 103) supports the thesis "that innovations or change are not manageable or completely calculable – but are, at best, controllable or guidable .....".

The professional involvement of the members of staff of the two agencies was crucial in achieving "controllability" and "guidability". They had experience in handling non-linear processes. For this reason, in addition to the information given in Appendix 2, the following priorities have emerged in retrospect for selecting external agencies when developing WBT:

1. Planning the project course of non-linear processes,
2. Didactic know-how, including knowledge of procedural models,
3. Knowledge of technical content.

In conclusion, it can be summarised as follows: the development of this concept involved a great deal of time and effort and is currently in the process of realisation. Numerous models and approaches from theories have been included in this concept. No statements can as yet be made as to the success of the realisation of the concept. The chances of success are rated high, as approval was expressed by all executives – whether they were directly involved or had only heard of it. However, a final analysis will have to be completed at a later date before more information is available on this.

"Those who follow in the tracks made by others should not wonder that they leave no impression. If you want to lead the way, you have to break new ground!" (Weber 2001, p. 97)

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Appendices

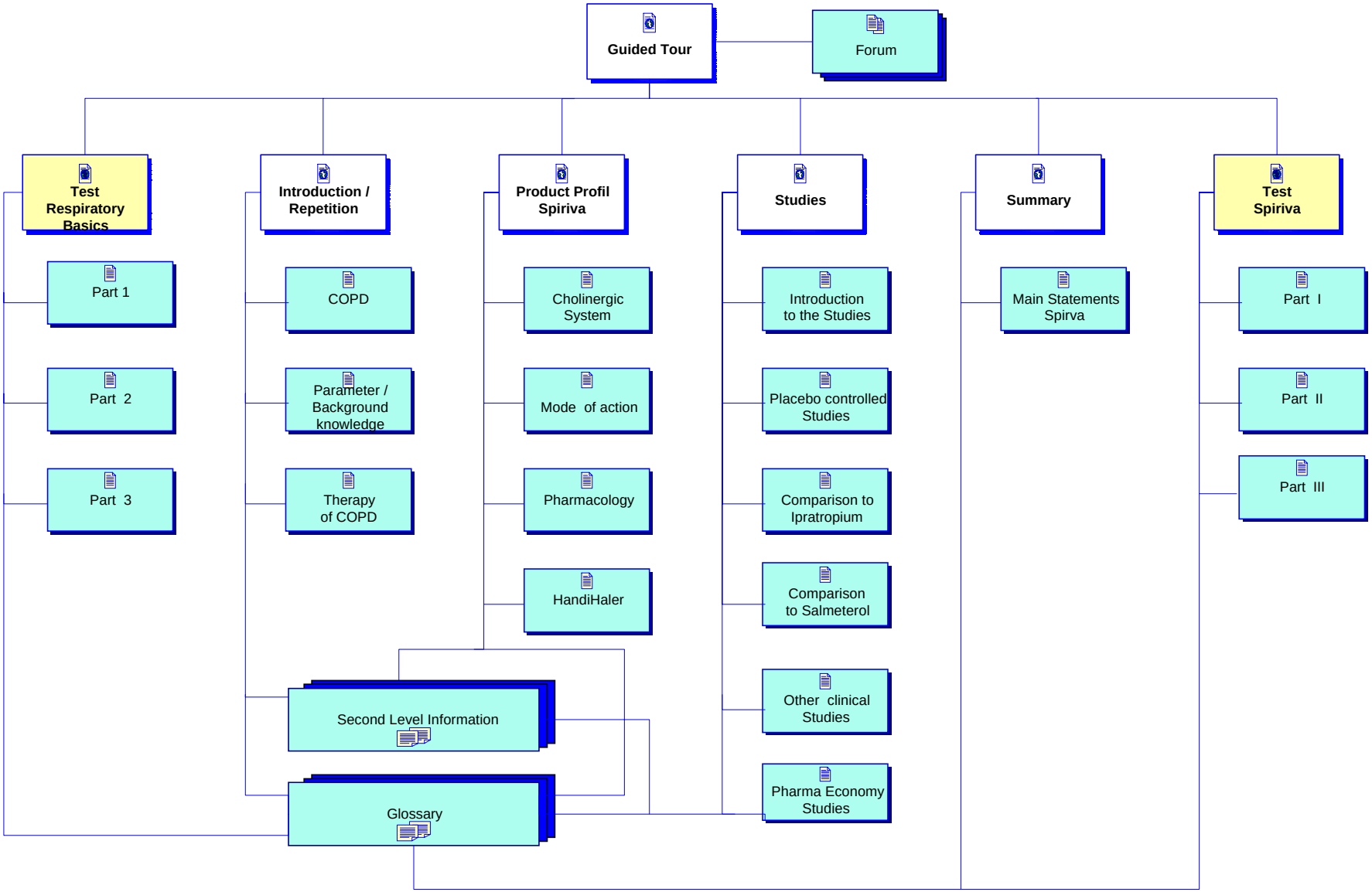
Appendix 1: Selecting the agency:

Wn 09.03.01

Company:		Contact
Albit		
Know How		
Liedler		
Engram		
Link und Link		

Topics / Contents	Remarks:
About the company:	
- number of staff	
(didacticians, graphic artists, systems developers etc.)	
- capacities from May – August	
- translation facilities (English – German)	
- liaison with doctors	
References	
- Positive	
- failed projects	
- examples of costs	
Impression of the program	
- clarity of structure	
- graphic presentations	
- simple to manoeuvre, navigate	
- networking set-ups	
- media use (video, audio, text, images)	
- methods used	
- techniques used	
Buttons on every page	
- menu (subpoints visible)	
- forward / back	
- Help / Contents	
- End	
Interaction Cycles	
- how many	
- at what point (collectively or by section)	
- media (video, audio, text, images)	
Individuality / Navigation through the program	
- linear procedure (sequenced learning option)	
- networked procedure (open learning option)	
- feedback facilities	
- bookmark option	
Control Possibilities	
- experience	
- tools (already available)	
- access times	
- performance (individual, groups, all)	
(practice offline (number of practice activities), option to send online?)	
- feedback:	
- strictly correct /incorrect	
- variation possibilities / synonyms	
- local / global error analysis / diagnosis	
- type of feedback (comments, consequences)	
- depth of information (explanations, tips)	
- relativity of answer (general / specific)	
- branches related to answer (links, tips)	
- sophistication of branches	

<u>Appendix 2:</u> Structure and Organisation of the Learning Objects, Achievement Tests and Guided Tour



Appendix 3: Cost Calculation

1st Option: face-to-face events only

Face-to-face event	Cost in €	Cost in €
Basic knowledge of respiratory system		
Standard allowance for loss of working hours	465.115,00	
Overnight expenses for the members of staff	95.900,00	
Trainer days (€ 500 per day)	35.000,00	
Costs for training in basic knowledge of the respiratory system		596.015,00
Spiriva-training		
Standard allowance for loss of working hours	480.150,00	
Overnight expenses for the member of staff	99.000,00	
Trainer days (€ 500 per day)	33.000,00	
Costs of Spiriva training		612.150,00
Documentation for the members of staff		25.000,00
Total costs 1st Option		**1.233.165,00**

2nd Option: WBT and face-to-face events

WBT / Self-study		
Development costs	158.000,00	
Administration of WBT	26.500,00	
Discussions		
Forum	7.400,00	
Internationalisation / Editing Tool	32.700,00	
Total	224.600,00	
50% by BI Pharma KG		112.300,00
Standard allowance for loss of working hours		679.485,00
Face-to-face events		
FW training in basic knowledge of respiratory system		
Standard allowance for loss of working hours		99.667,50
Overnight costs		27.400,00
Trainer days (€ 500 per day)		7.500,00
FW training in new product		
Standard allowance for loss of working hours		240.075,00
Overnight costs		49.500,00
Trainer days (€ 500 per day)		16.500,00
Documentation		25.000,00
Total costs for Option 2		**1.257.427,50**

The 2nd Option involves € 24,262.50 (1.9%) more in costs than Option 1

Appendix 4

Training design for the Spiriva face-to-face event in March 2002

General:	11th calendar week:	3 regional groups
	12th calendar week:	3 regional groups
	12th calendar week:	4 regional groups
Module:	- COPD / Definitions of Asthma / clinical characteristics	
	- Diagnosis (pulmonary function / interpretation of the analyses / hands-on practice	
	- Therapy (graduated therapy / anticholinergics / comparison with competitors	

The time frame for completing the required training course and the marketing input involves, as agreed, 2 days. The training will be at regional group level in these face-to-face events, i.e. the respective trainers involved remain stationary in their rooms and the groups visit each training room to train in the three modules mentioned above.

one trainer – one topic			11th – 12th calendar week	
Trainer/Room 1	Trainer/Room 2	Trainer/Room 3	Trainer/Room 4	Group 1 ✚
✚	○	□	△	Group 2 □
□	✚	○	△	Group 3 ○
○	□	✚	△	Group 4 △

Suggested schedule for the first day:

09:30 – 10:30	Plenary session: welcome and presentation of the programme schedule
10:30 – 10:45	Groups visit the first rooms
10:45 – 12:45	First face-to-face module (including coffee break)
12:45 – 13:45	Lunch
13:45 –15:45	Second face-to-face module
15:45 – 16:15	Coffee Break
16:15 – 18:15	Third face-to-face module

Suggested schedule for the second day

08:30 – 10:00	Plenary session: discussion / résumé of the previous day and feedback
10:00 – 10:30	Coffee Break
10:30 – 11:30	Pneumologist presents COPD patients, their daily routine and the clinical characteristics live in plenum
11:30 – 12:00	Marketing: COPD identification and market figures
12:00 – 13:00	Lunch
13:00 – 13:45	Screening: objectives, strategy, concept
13:45 – 14:45	Screening action, implementation, contents of the documentation /materials
14:45 – 15:15	Coffee Break
15:15 – 17:00	Training in discussion

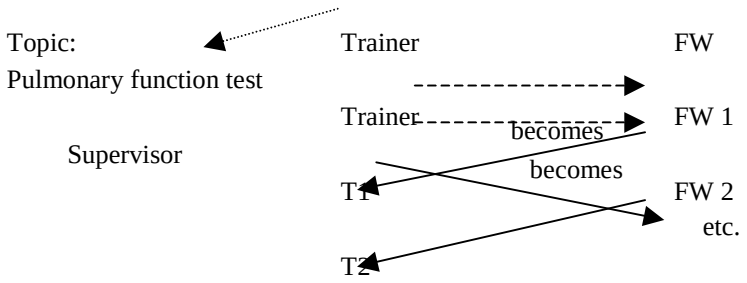
The above-mentioned modules in face-to-face events start at the same time for all the regional groups, whereby each group will attend a different module, i. e. group 1 might start with diagnosis while group 2, for example, starts at the same time with COPD.
The three face-to-face modules have the following contents:

1st Module: COPD

a) This training module is designed to revise the clinical characteristics of asthma and COPD in an interactive tutorial discussion involving the trainer and the group. This group should then be split into two single groups dealing with the respective topic, asthma or COPD and their differences. As part of this group work, the pathognomic clinical characteristics for API's and pneumologists are drawn up and presented to each of the other groups.
b) Following on from this, the two groups are involved in a joint question and answer session. The questions are taken from the script, so they are familiar. A small competition is set up between the groups with an incentive for the winner.

2nd Module: diagnostics

a) Interactive tutorial between trainer and group on general diagnosis.
b) Measurement of pulmonary function. Here again the group is divided into two individual groups. The trainer talks to a FW, explains how to measure the pulmonary function, measures the pulmonary function together with him, and then asks him to repeat this with another FW in his group. The same is done in the second subgroup so that each participant will be both instructor and instructed.



c) The pulmonary function measurements taken serve as an example for interpreting the individual parameters measured.
d) The measuring curves are then used to illustrate a classic emphraxis or also other flow charts that are relevant.

3rd Module: Therapy

a) The group is split into three individual groups and given the task of compiling the known graduated therapy program from single cards without making a mistake. The trainer's task is to correct the graduated therapy program in a tutorial discussion and give a résumé.
b) Interactive tutorial discussion between trainer and group on the subject of anticholinergics / core statements from the marketing concept / receptor story.
c) The group is again split up into the previous three groups, and given the task of compiling the respective medications in the graduated therapy program, working as a group, and presenting it to each of the other two groups. The trainer's task is to correct this presentation, or to generally point out the differences and the benefits of the new product in a final summing up. The marketing aspects should also be taken into consideration here and the respective core statements and differences should be explained together using the corresponding study references as guidance.

I hereby declare that I have prepared this study independently using only the sources and supporting material listed herein, further that I have clearly marked those parts taken verbally or in content from the sources.

Date Signature