

# Web-Based Training and E-Learning

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# Agenda

- ≡ Introduction
- ≡ Definition
- ≡ Advantages
- ≡ Disadvantages
- ≡ Requirements for a good WBT-system
- ≡ Additional features of some systems
- ≡ Three examples
- ≡ Comparison
- ≡ Conclusion

# Introduction

## ≡ Internet-technology got improved since the 1990s:

- ≡ Faster internet-connections
- ≡ Mobile internet-access
- ≡ New technologies like PHP → enabled interaction in web applications
- **More potential for web-based training**

## ≡ New needs for learning and training in modern society

- ≡ People have to be lifelong learners
- ≡ Learning should be done more flexible
- **Web-based training can realise that**

# Characteristics of WBT

## ≡ Definition:

- ≡ Subset of E-Learning
- ≡ A system, which provides learning-content is called a web-based training system, if..
  - ≡ it uses the world wide web infrastructure
  - ≡ it makes use of the special features of the www (to gain advantages to normal learning)
  - ≡ It's contents is adapted to the www

# Characteristics of WBT

## ≡ Advantages:

### ≡ Accessible from everywhere

- Enables distant learning
- Fast submission of new or updated contents

### ≡ Accessible at every time

- Enables on demand learning

### ≡ More scalable

- Size of the learners' group has no effect on the tutors effort

### ≡ Single point of access

### ≡ Effective use of resources

# Characteristics of WBT

## ≡ Disadvantages:

- ≡ Staff may simply put existing material on the web without redesigning it
  - bad usability
- ≡ Low bandwidth can prohibit people from using WBT-systems
  - ≡ Some users do not have high speed internet access
  - ≡ Multimedia-add-ons can cause huge amount of data traffic
  - Consideration: Support for all users or many multimedia-features?
- ≡ Too less privacy protection
  - ≡ Sensible information (e.g. about the user's knowledge) is stored in user profiles
  - ≡ Third party institutions can be interested in gaining access to that information
  - ≡ Access to the user profile information has to be secured
  - ≡ Not implemented in current WBT-systems

# Basic Requirements (1)

## ≡ Good Usability

- ≡ Clear structure and navigation of the learner's interface
- ≡ A good search-engine for contents should be provided
- ≡ Compatible with the existing working-cycles of the tutors and content providers/editors
- ≡ Effort for the tutors and editors should not be increased

## ≡ Integration of Existing Material

- ≡ Own contents and applications
  - ≡ Third party contents and applications from the web
- has to be compatible with existing standards

# Basic Requirements (2)

## ≡ Modularity

- ≡ New parts should be easy to integrate
- ≡ Easy replacement and improvement of existing parts
- Additional internal interfaces are necessary

## ≡ Reuse of Content

- ≡ Content separated into content elements
- ≡ A description of the content element's semantic has to be added (--> Semantic Web)
- ≡ Description is stored in a manifest (meta-file, e.g. in XML)
- ≡ Manifest is added to the related content element
- Automatic or manual reuse of content elements

# Basic Requirements (3)

## ≡ Customisable to the Context

- ≡ Different versions for different use cases or different sub sides
- ≡ Different presentations for different terminals (e.g. mobile phone, PDA, PC)
- ≡ Contents divided into content elements, arranged in different ways

## ≡ Customisable to the Learner

- ≡ Customisation to a single user:
  - ≡ Adapted to the learner's knowledge, requirements, etc.
  - ≡ Information about the user's context has to be stored in user profiles
- ≡ Customisation to groups/types of users
- ≡ Semantic description of the contents is not sufficient
- ≡ Manifest amended with navigation rules
  - ≡ Information gained by asking or observing the user

# Additional Features (1)

## ≡ Profiling Exercises

- ≡ Results of the exercises should change the user's knowledge-value stored in the profile
- ≡ Additional information has to be added to the manifest of the content element
- ≡ Gives the learner a clue about the own knowledge

## ≡ Feedback and Hints for the Learner

- ≡ Feedback about the learning progress
- ≡ Hints, what helped other learners in similar situations
- ≡ Storing that information in the user's profile or the content element's manifest is not sufficient
- ≡ An additional structure in the database should be added to store such information

# Additional Features (2)

## ≡ Feedback for the Tutor

- ≡ about the user's learning progress
- ≡ about the usefulness of the different content elements

## ≡ Communication Between the Users

- ≡ Via discussion boards, chats, (private) messaging systems and comments
- ≡ Purpose: Discussing about the learning material

## ≡ Collaboration

- ≡ Working together on projects
- ≡ Solving exercises in groups
  - ≡ Interface for the tutor: groups solution will be shown, possibility to assign marks
- ≡ Space has to be reserved for each group with access rights for all members and the tutor

# Different approaches of WBT

- ≡ Early WBT-System of Technikum Joanneum (1997)
- ≡ UCL Key Skills Model (2002)
- ≡ Knowledge On Demand (KOD) (2002)

# Early WBT-System of Technikum Joanneum (1)

- ≡ Developed in 1997 → one of the first “WBT”-systems
- ≡ Good requirements stated in the development phase
  - ≡ Integration of existing material
  - ≡ Reuse of content
  - ≡ Modular design
  - ≡ Customisability
- ≡ Simple system based on HTML with multimedia plug-ins
  - Stated requirements could not be fulfilled
- ≡ Tutors had to edit html-pages (no interface)
- ≡ Students used the system with a simple web-browser
- ≡ Content reusable in a simple manual way, no manifest with description
- ≡ Tool “TopClass” for user management, but not customisable to the user’s context

# Early WBT-System of Technikum Joanneum (2)

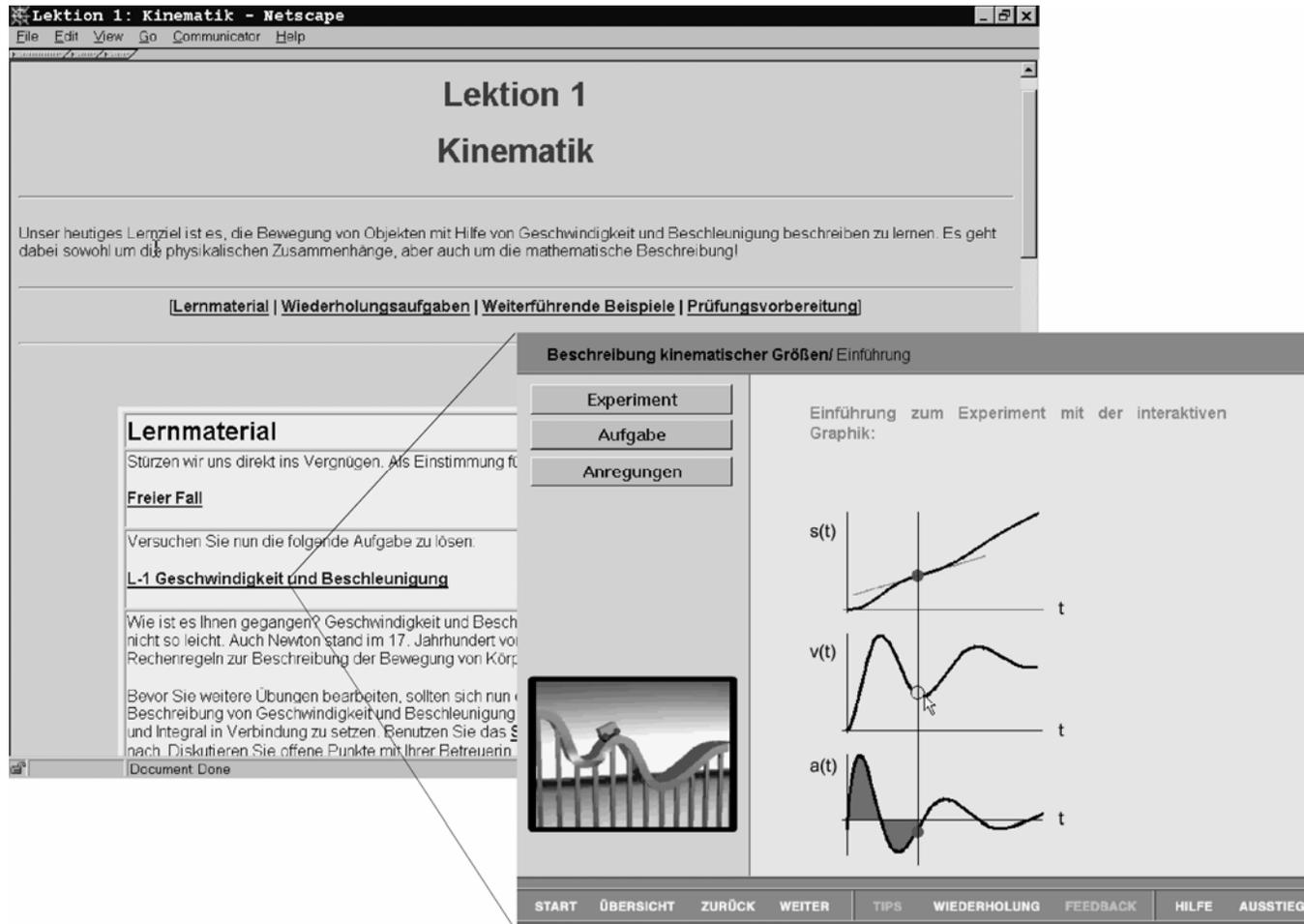


Fig. 1: The interface of the system of Technikum Joanneum (Koubek et al., 1997).

# Early WBT-System of Technikum Joanneum (3)

- ≡ Usability is ok, but improvable (structure ok, no search function)
  - ≡ Not customisable to users or user-groups
  - ≡ Limited customisable to the context of different use cases, only manual by the editor
  - ≡ No real modularity
  - ≡ No easy reuse of content or integration of existing material
- Does not fulfil all requirements
- 
- ≡ No additional features like exercises, feedback, discussion boards
- ➔ Bad WBT system, suits to the evaluation result: No improvement of the learning efficiency

# UCL Key Skills Model (1)

- ≡ Developed in 2002 by the University College London (UCL)
- ≡ Provides an central access point to all contents and also customised pages
- ≡ Contents are divided into content elements (for reuse in different contexts)
- ≡ Profiling exercises
  - ≡ Only for download (offline exercises)
  - ≡ Not to amend user profiles with data
- ≡ A meta search is provided
- ≡ Well structured interface

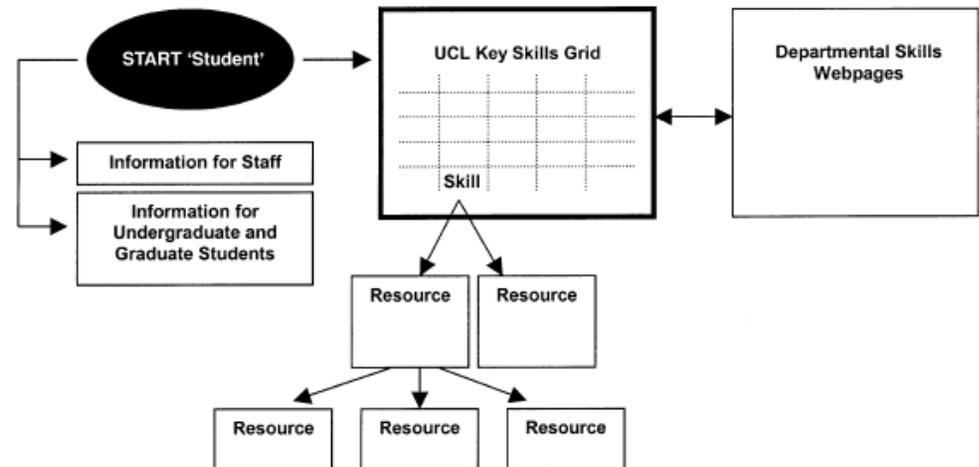


Fig. 2: Main entrance and departmental sites in UCL (McAvinia and Oliver, 2002).

# UCL Key Skills Model (2)

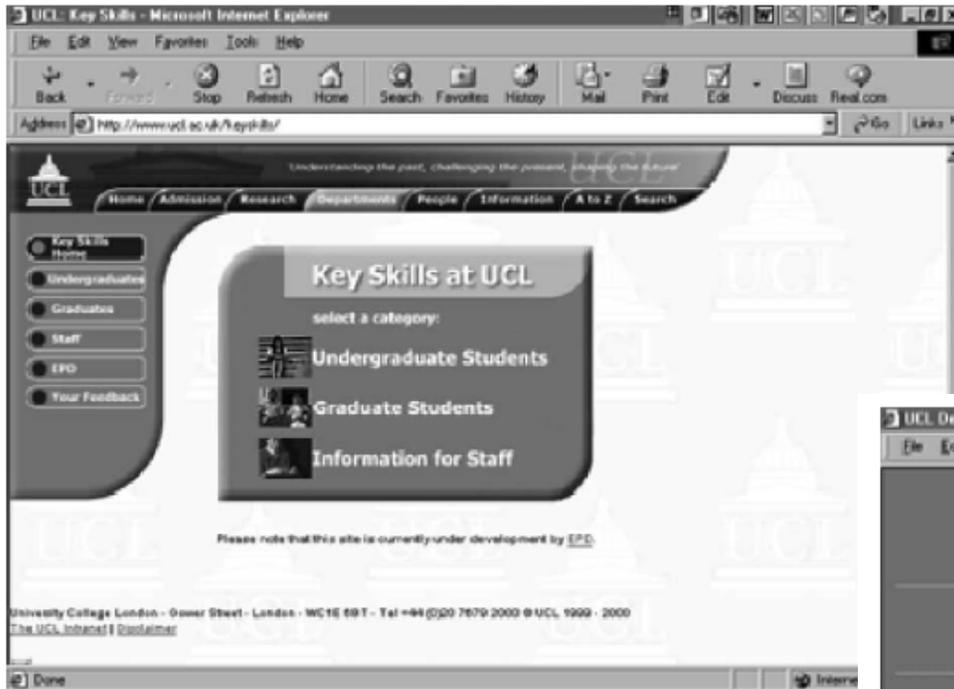
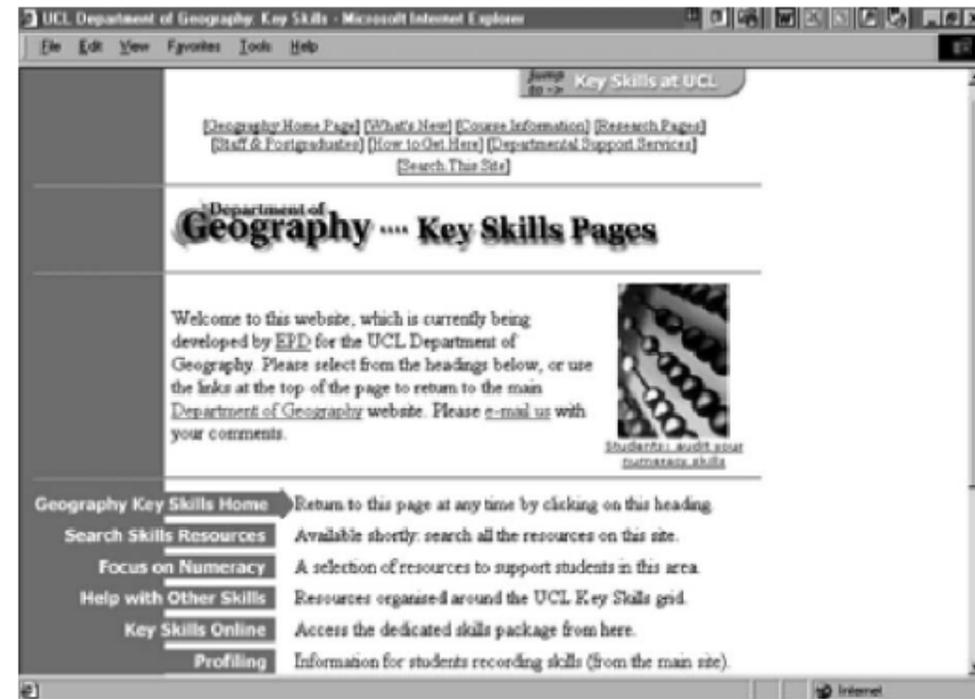


Fig. 3: Main page of the UCL Key Skills System (McAvinia and Oliver, 2002).

Fig. 4: Sub page of the UCL Key Skills System for the Geography department (McAvinia and Oliver, 2002).



# UCL Key Skills Model (3)

- ≡ Good usability (good structure + meta search)
- ≡ Reuse of content and integration of exiting material only manually
- ≡ Not stated if it is built modular
- ≡ Customisation to contexts only in a manual way
- ≡ Not customisable to the user's context
- ➔ Also does not fulfil all requirements
  
- ≡ No additional features
  
- ➔ Not very good WBT-system, but better than the first one

# Knowledge On Demand (KOD) (1)

- ≡ Developed in 2002 with a focus on reusability of contents and customisation
- ≡ Contents reusable, common content format
  - ➔ Interchange of content possible
- ≡ Uses a user profile for each user
  - ≡ Short questionnaire at the first access
  - ≡ Automatically updated (e.g. after profiling exercises)
- ≡ Customisable, also to the user's context through additional information in the content objects manifest (XML file):
  - ≡ Meta-data, rules, suitable exercises, agents, ...
  - ➔ Knowledge packing format, improvement of IMS
- ≡ Uses agents to arrange the contents according to the user profile and the manifest

# Knowledge On Demand (KOD) (2)

**tele-radiology content:**

Concepts	Learning asset	Format
Introduction - General Aspects	Introduction Movie	Movie
	Presentation slides	Powerpoint
	Web resource on General Aspects	HTML
	Web resource on Tele Radiology	HTML
Definition	"Teleradiology can be defined as ..."	HTML
	Telemedicine	HTML
	Still Images	Word Doc
	Service definitions	Powerpoint
Implementation	Possibilities of Tele Radiology	HTML
	Chapter 3 - Implementation	Word doc
	<b>Acquisition Systems</b> ←	Word doc
	Basic knowledge of multimedia data exchange	Word doc
	Example implementation	HTML
Basic Parts of a Tele-radiology System	Chapter 3 - Closure	Word doc
	The basic parts	HTML
Image Acquisition and Management	Types of radiology - analogue output*	HTML
	Walter the radiographer - part 1	Movie
	Image acquisition	Movie
	Walter the radiographer - part 2	Movie
	The Gammex Site	HTML
	Acquisition Systems	Word doc
	Film Digitizer Site	HTML
	Image standards being exchanged	HTML
	Standardisation Bodies	Word doc

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Fig. 4: Personalised KOD-Interface (Sampson et al., 2002).

# Knowledge On Demand (KOD) (3)

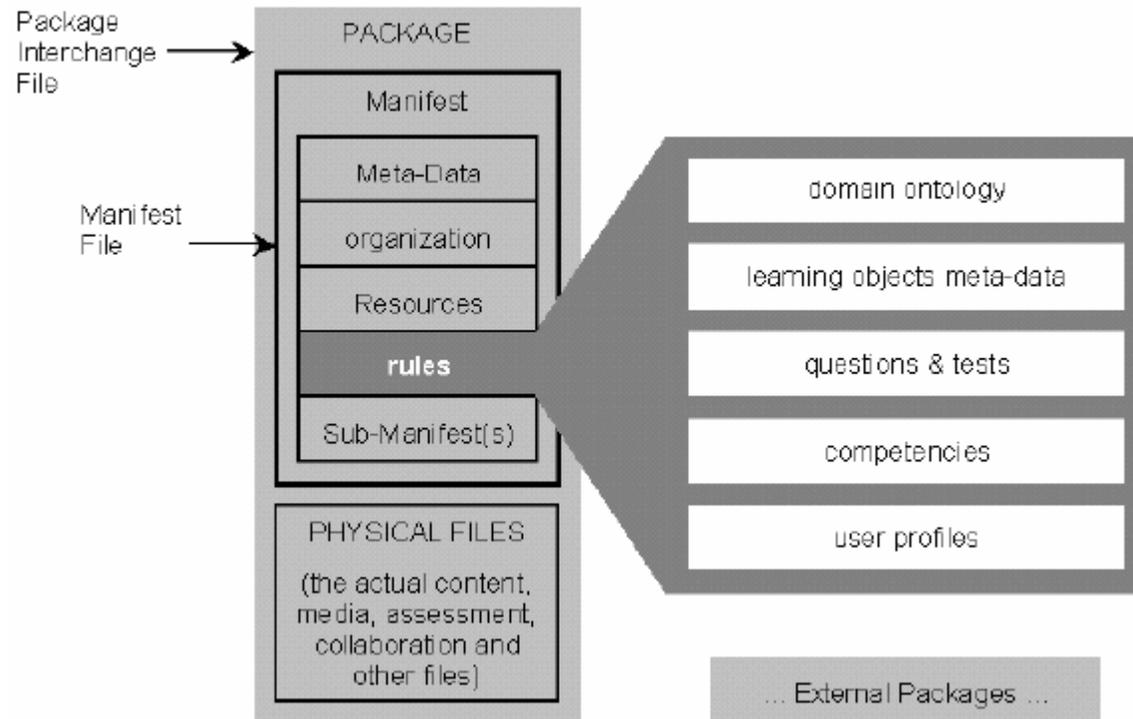


Fig. 5: Knowledge packing format in KOD (Sampson et al., 2002).

# Knowledge On Demand (KOD) (4)

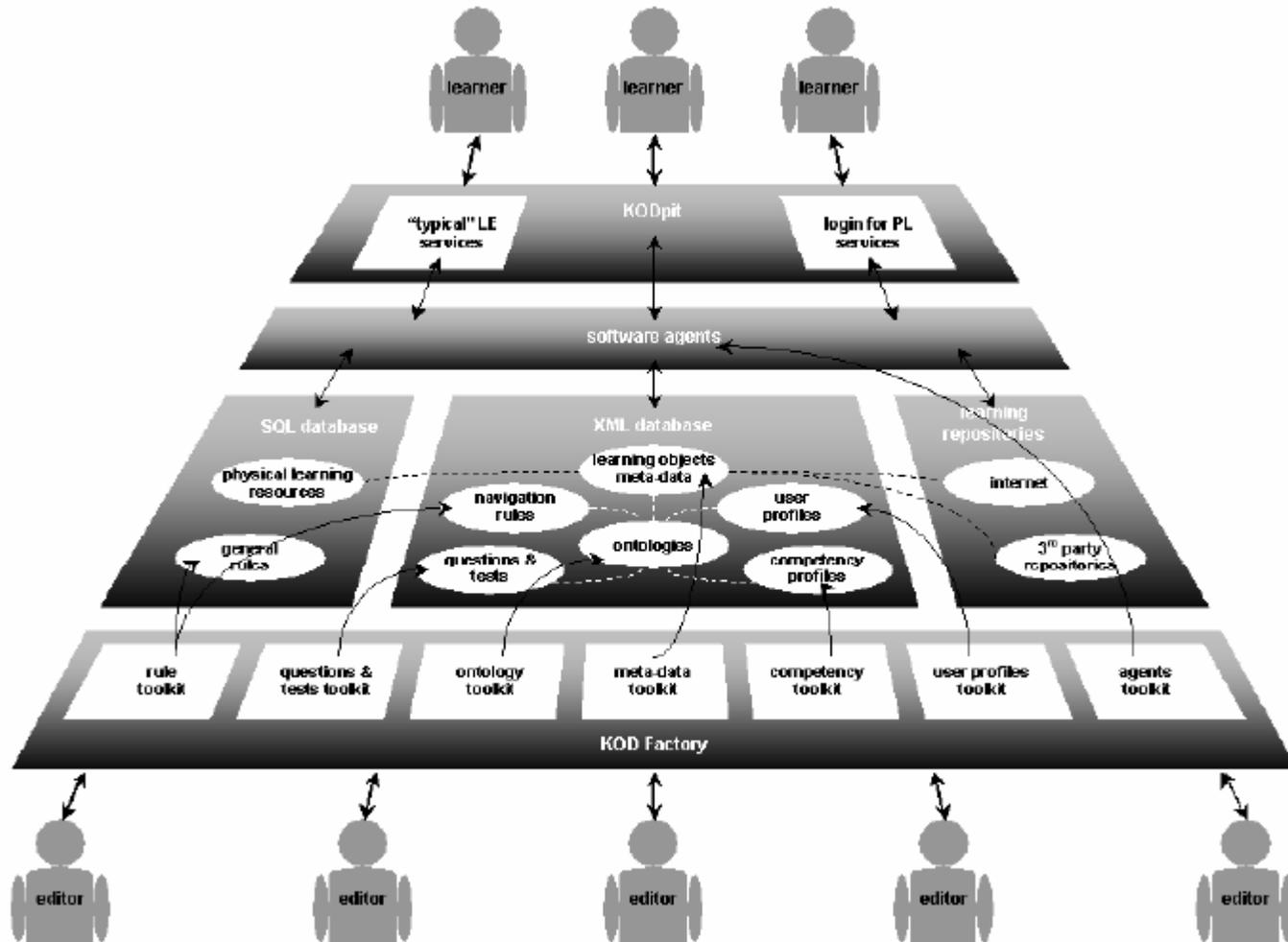


Fig. 6: The architecture of KOD (Sampson et al., 2002).

# Knowledge On Demand (KOD) (5)

- ≡ Usability is ok, but improvable
- ≡ Not stated if it is built modular
- ≡ Reuse of contents and integration of existing material is supported
- ≡ Customisable to different contexts
- ≡ Customisable to each learner
- Nearly all requirements are fulfilled
  
- ≡ Provides profiling exercises and questionnaires
- ≡ No additional hints for the learner, feedback or communication, but possible to implement
- ≡ No privacy protection (stores user profiles)
  
- Best WBT-system of the reviewed systems, but it still has a little lack of:
  - ≡ Additional features
  - ≡ Privacy protection

# Comparison (1)

Fulfilled requirements:

Requirement	Early system of Technikum Joanneum	UCL Key Skills Model	KOD Model
Good usability			
Integration of existing material			
Modularity		?	?
Reuse of content			
Customisable to the context			
Customisable to the learner			

# Comparison (2)

Provided additional features:

Requirement	Early system of Technikum Joanneum	UCL Key Skills Model	KOD Model
Profiling exercises			
Feedback and hints for learners			
Feedback for tutors			
Communication			
Collaboration			

# Conclusion

- ≡ Non of the reviewed systems is perfect
- ≡ Newer system are better than older ones (impact of the www-evolution)
- ≡ Three main problems:
  - ≡ Too little information about the user's activities in the system
  - ≡ Too little information about the learner's needs
  - ≡ Missing of adequate additional information, like navigation rules for the content elements→ Solved by KOD
- ≡ Best system: Knowledge on Demand (KOD)
  - ≡ Main drawbacks:
    - ≡ Possible features are not implemented → little additional features
    - ≡ No protection of the learner's privacy (despite use of user profiles) → common problem of many WBT-systems
- ≡ Implementation of a very good WBT-system in the near future is possible,  
but the issue of privacy protection should be solved