Knowledge Management for e-Learning

Philip Barker

**Invited Keynote Presentation
KMICE '04
Penang, Malaysia**

Human-Computer Interaction Laboratory

University of Teesside, UK

Overview

- Background Issues

- The Knowledge Conundrum

- e-Books for Knowledge Management

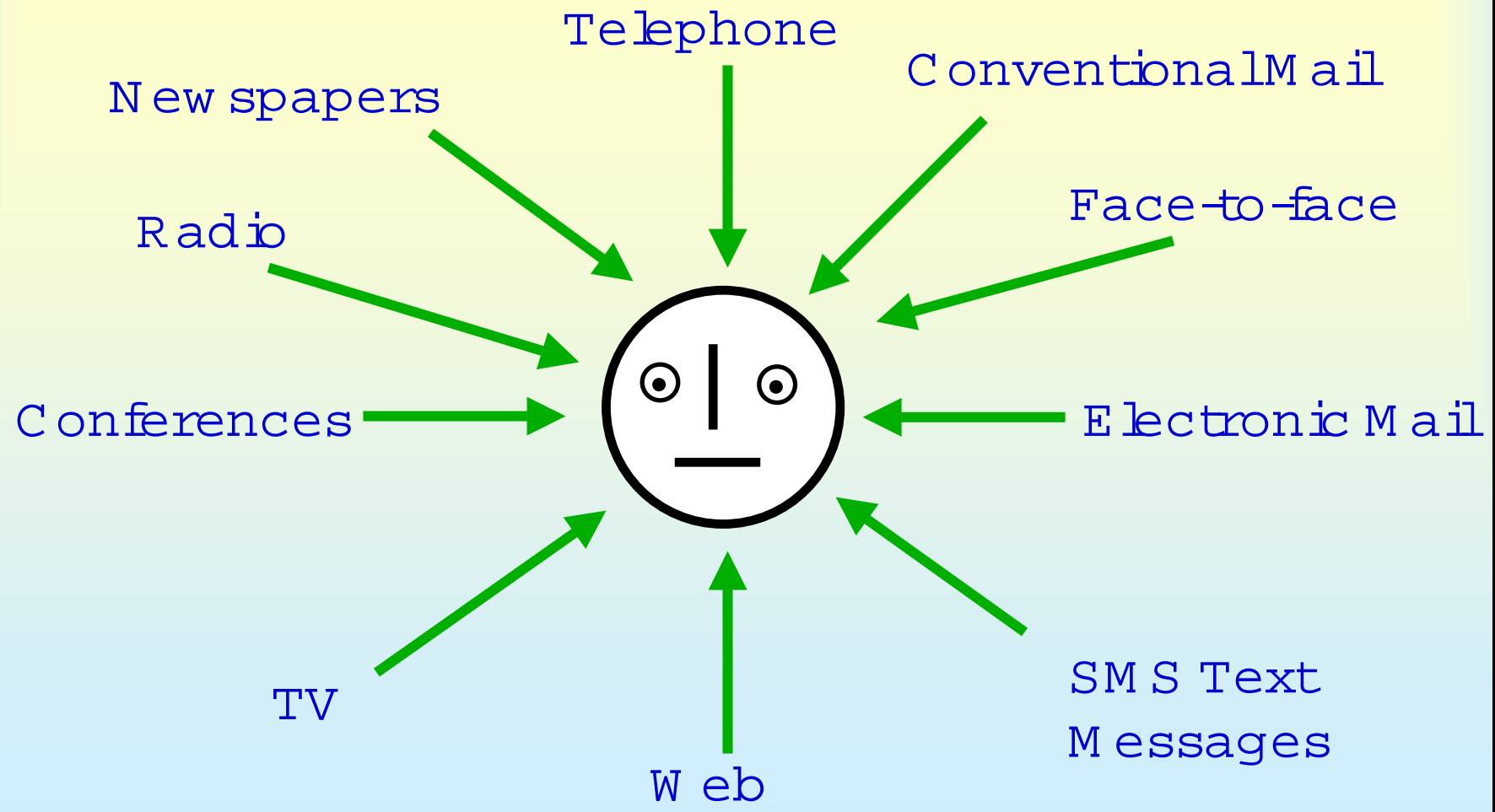- Knowledge Management for e-Learning

- Concluding Remarks

1.Background Issues

- People in System s

- Consum ers and Producers

- SoftExplosions!

- Com plexity Issues

- Tools to H and le C om plexity
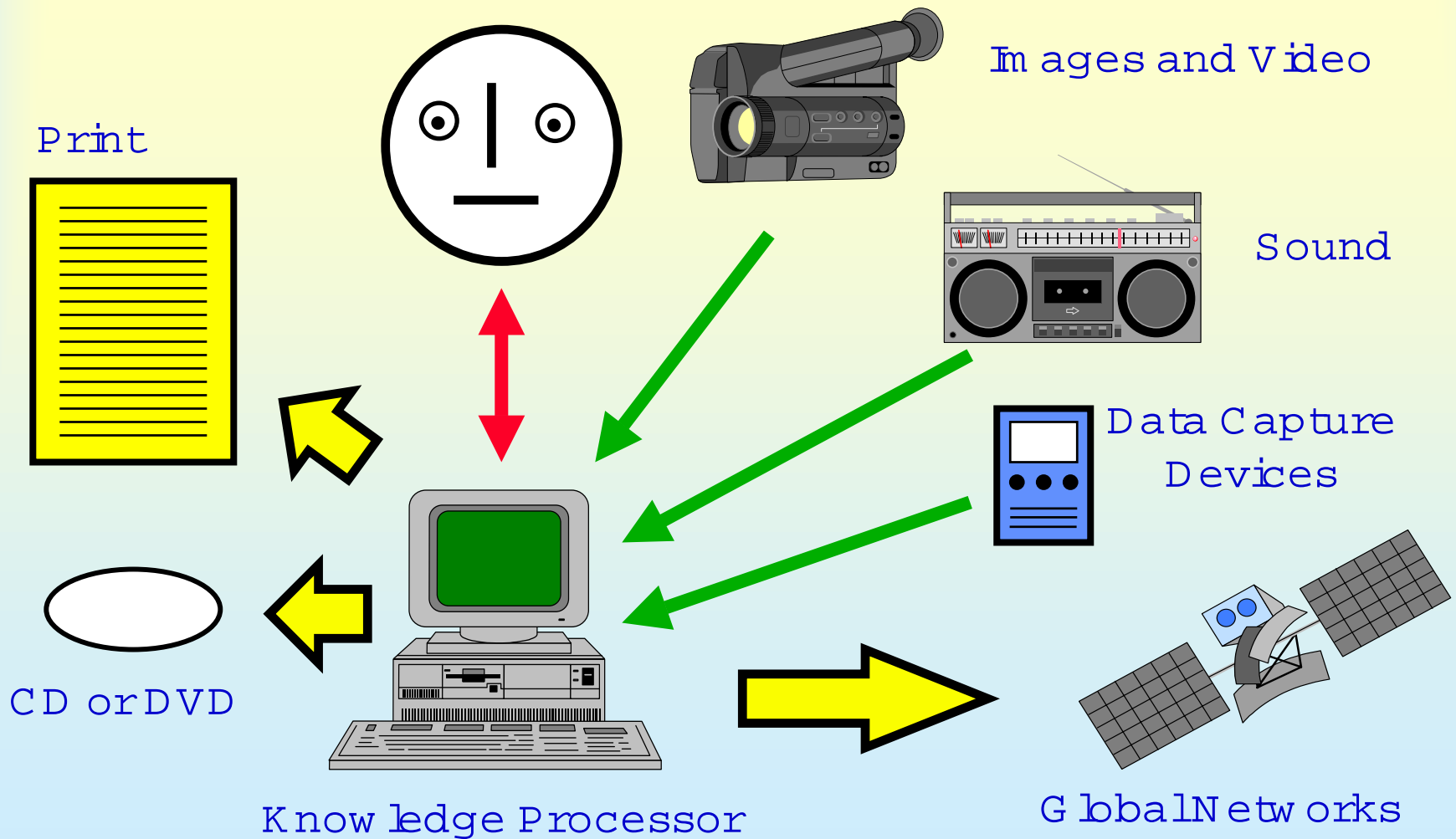
- Know ledge M anagem ent

People in Systems

- people often exhibit complex behaviour

- people in systems introduce complexity

- people generate very large amounts of data, information and knowledge

- sadly, human minds are fallible

- humans have both physical and cognitive limitations

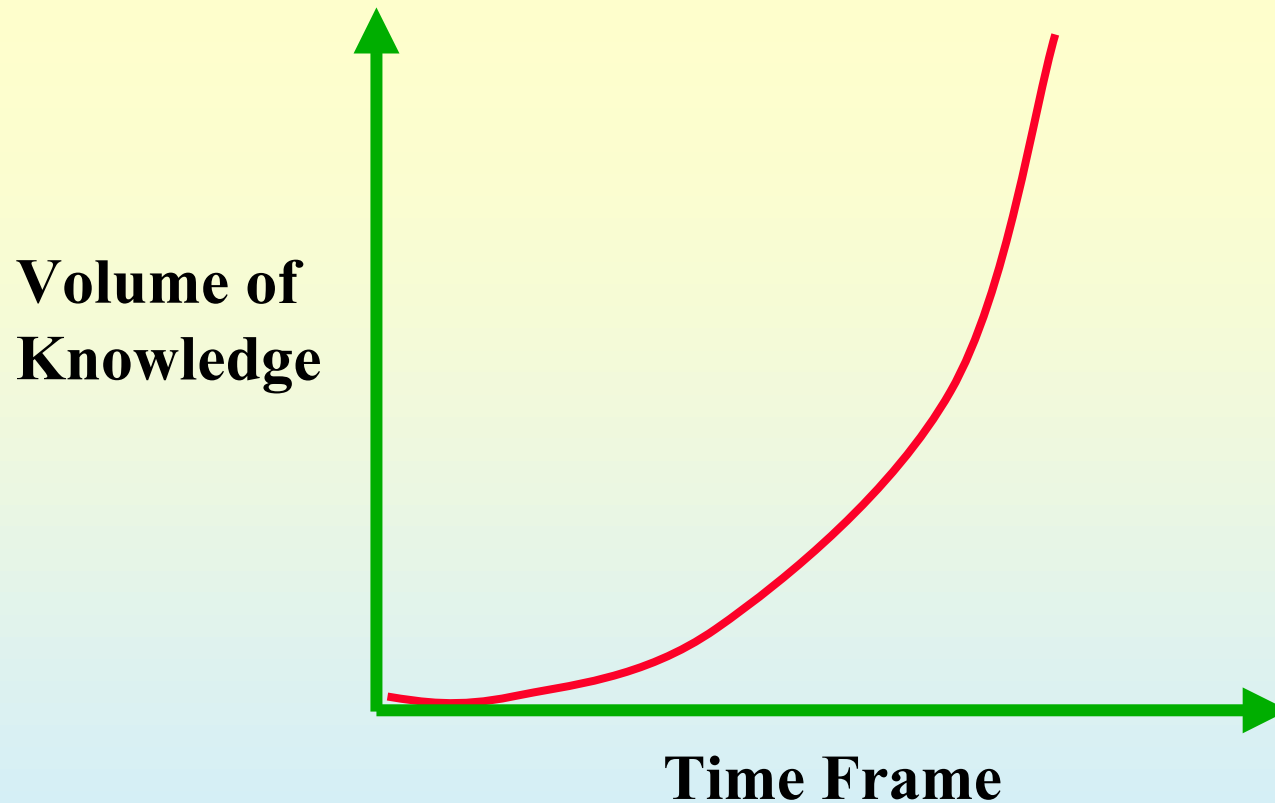- human 'memory' shortcomings can often cause disasters!

People as Consumers of Knowledge (Media' Effects)

Telephone

Conventional Mail

Newspapers

Face-to-face

Radio

Conferences

Electronic Mail

TV

SMS Text Messages

Web

People as Producers of Knowledge

Images and Video

Print

Sound

Data Capture Devices

CD or DVD

Knowledge Processor

Global Networks

Soft Explosions!

Volume of Knowledge (y-axis)

Time Frame (x-axis)

How do we develop coping strategies?

**University of Teesside, UK**

Quote from Computing Newspaper

Joe Tucci writing in Computing Newspaper, page 72, 16th October, 2003 - quantifying the 'information explosion

"… the World had just created 1.5 billion gigabytes of information in the prior year alone …"

"… that is equivalent to 250 Mb of information for every man, woman and child on Earth …"

"… most new information is 'born digital', so IT is preserving for posterity an unprecedented record of human experience that otherwise would be lost …"

Knowledge (& Information) Life Cycles

Volume of Knowledge in a Given Domain

Plateau

Decline

Rapid Growth

Time Frame
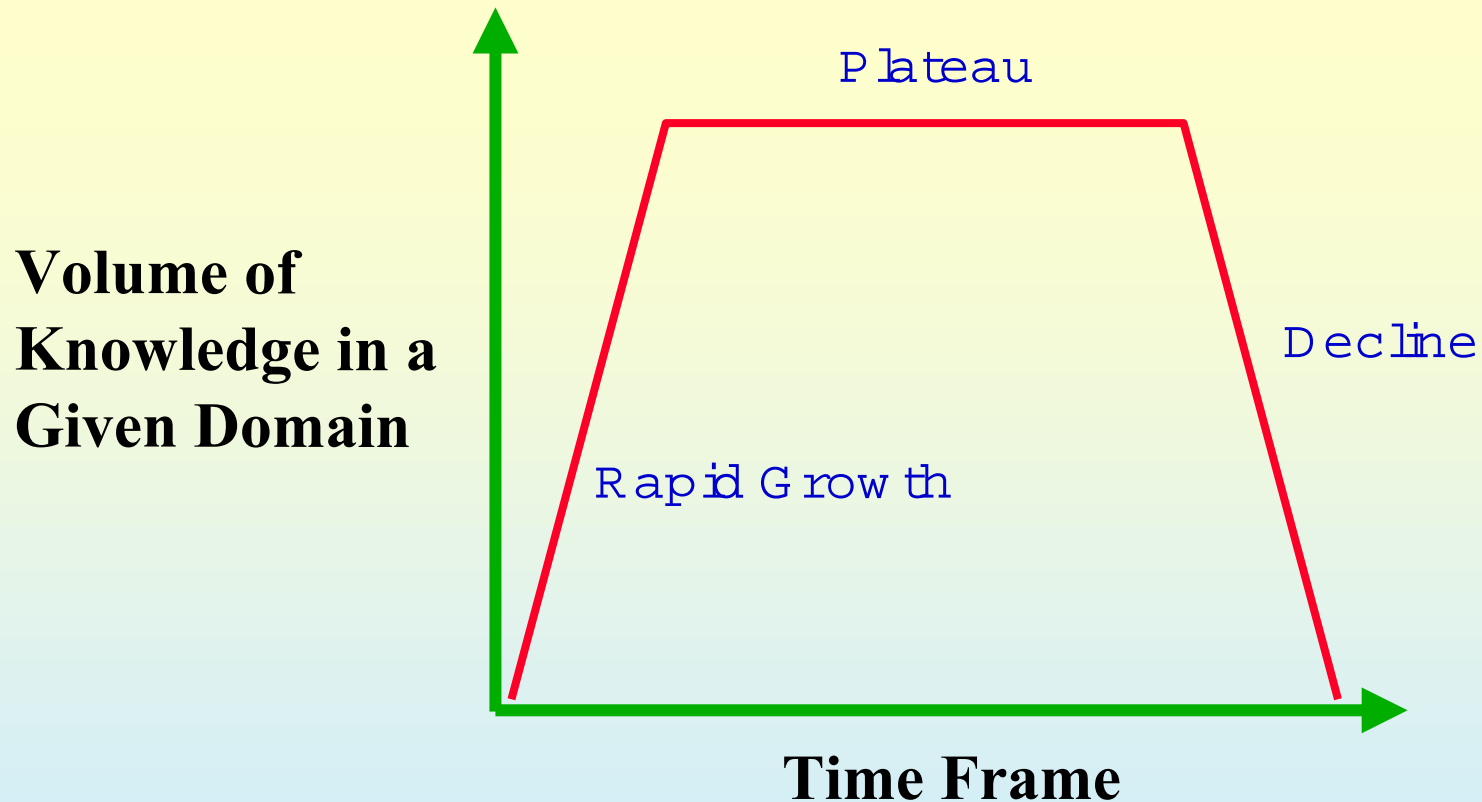
Time windows define the value of knowledge.

University of Teesside, UK

Complexity Issues

- modern life is very complex

- competition enhances choice

- choice introduces complexity

- complexity if not controlled can lead to chaos

- we need tools to handle complexity

- Knowledge Management is one such tool

- but there are others

University of Teesside, UK

The Problem of Choice!

Competition implies Choice

⬇

More Information is needed

⬇

Harder to make decisions

⬇

CHAOS

"Organised Knowledge Combats Chaos"

Example: Vitamin Pills

Case 1:

1 type of pill - no choice - easy life!
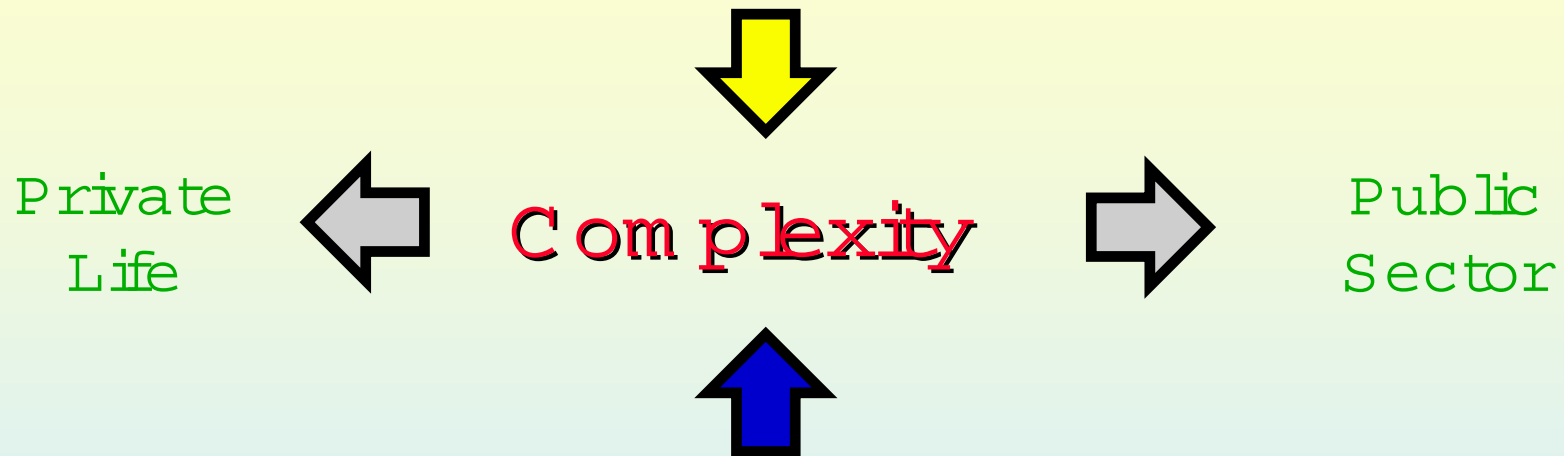

Case 2:

20 variants of a pill

How do we choose the correct one?

Extra information needed to decide.

Greater time to make a decision.

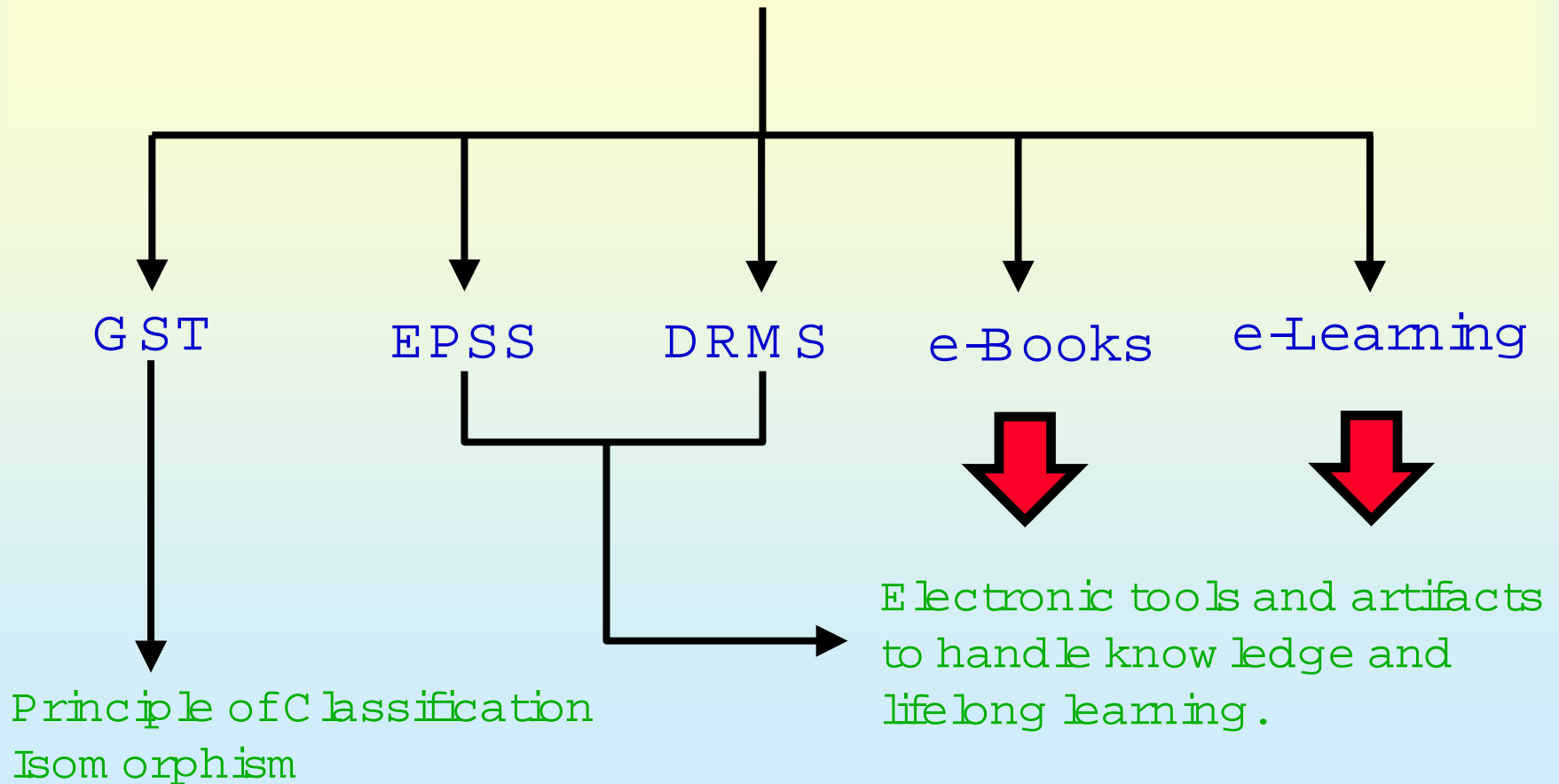# Handling Complexity Issues

Growth in Knowledge and Information

Private Life

Complexity

Public Sector

Tools for Handling Complexity

(Knowledge Management)

Tools for Handling Complexity

Knowledge Management

↓

GST   EPSS   DRMS   e-Books   e-Learning

⬇   ⬇

Electronic tools and artifacts to handle knowledge and lifelong learning.
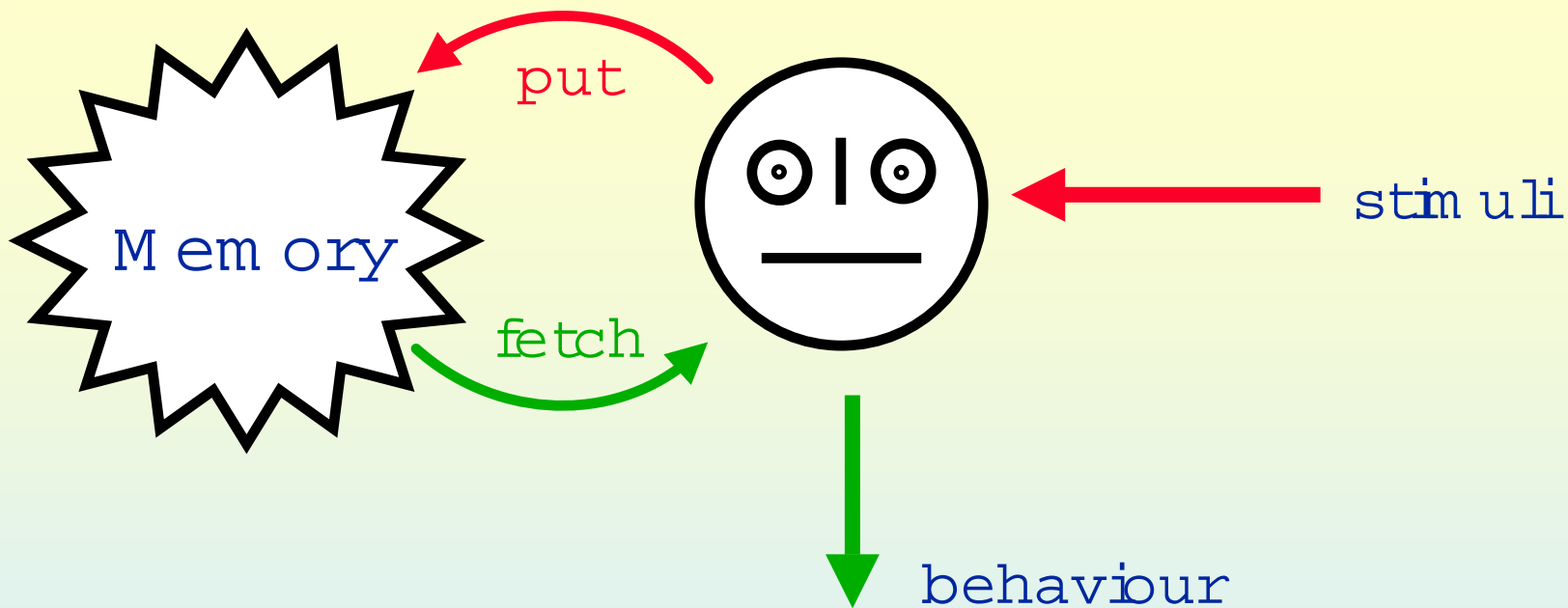
Principle of Classification Isomorphism

2. The Knowledge Conundrum

- What exactly is Knowledge?

- Where does it come from ?

- The Role of Mental Models

- Interactive Learning

- Knowledge Assets

- How can we manage them ?

- Knowledge-based Societies

What is Knowledge?

put

stimuli

Memory

fetch

behaviour

Knowledge is what we have 'in our heads' and which controls higher order behaviour.

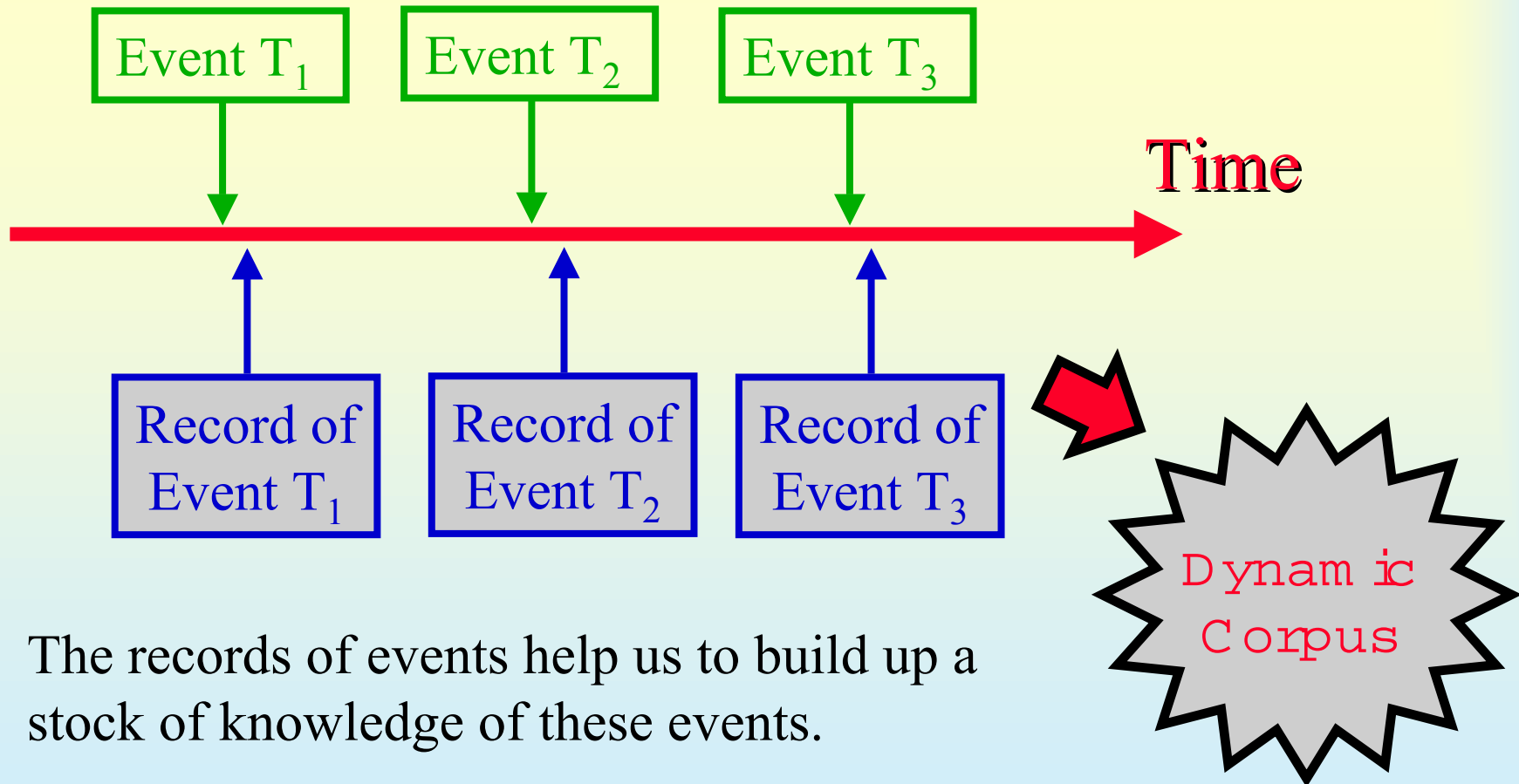# What does it mean to know something?

X as stimulus

Talk about X

Magic Force

Write about X

Understand, reflect upon and make deductions and inferences about X

University of Teesside, UK

Event-Driven Words

Event T_1	Event T_2	Event T_3

Time

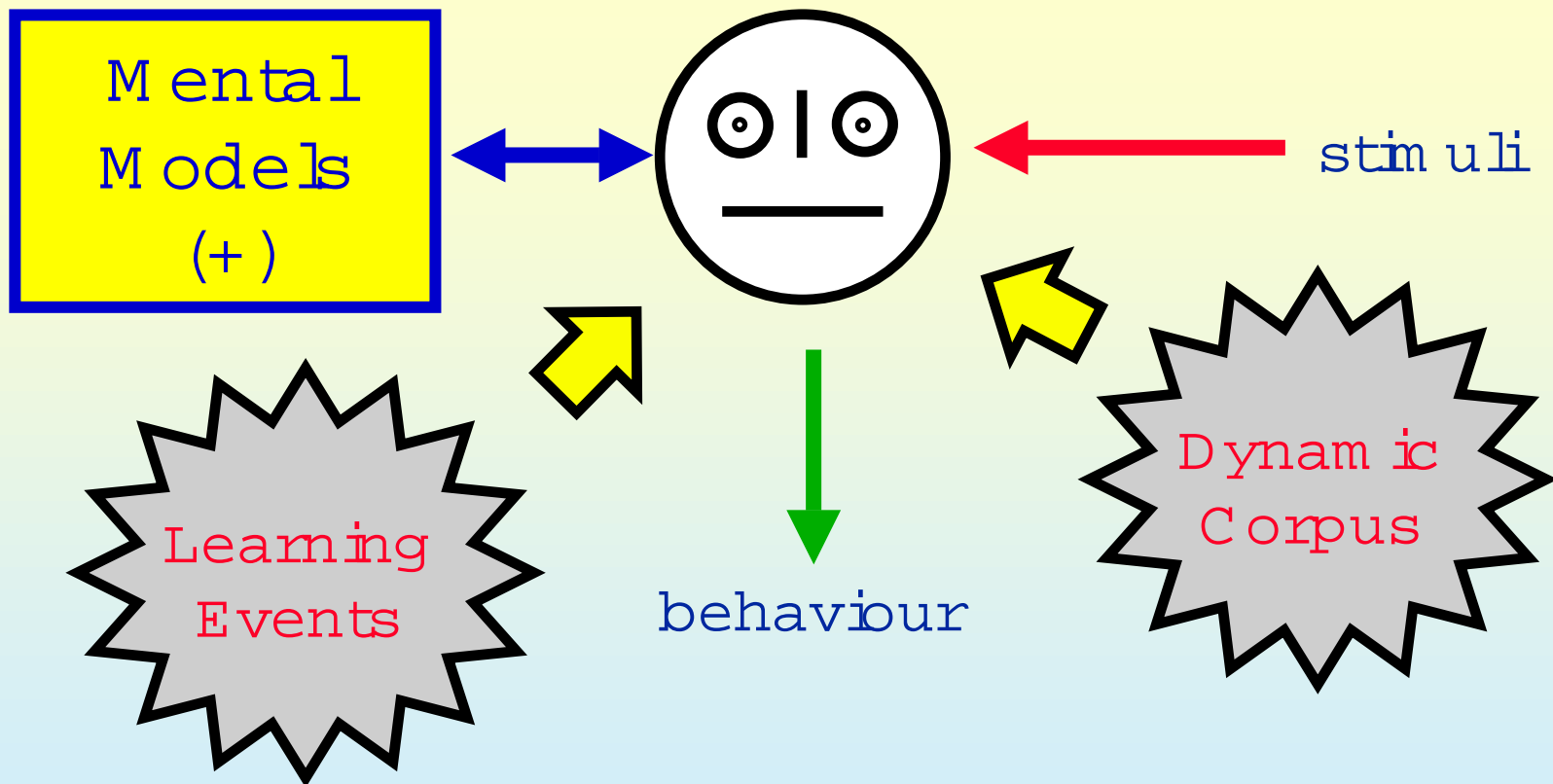| Record of Event T_1	Record of Event T_2	Record of Event T_3

Dynamic Corpus

The records of events help us to build up a stock of knowledge of these events.

"History is lost unless it is recorded"

Mental Models Embed Knowledge

Mental Models (+) ↔ face ← stimuli

face → behaviour

Learning Events

Dynamic Corpus

So, what causes the development of mental models?

Important Cognitive Processes

It is imperative that we understand the nature of some of the basic processes that influence the development of mental models:

Realisation

that you do not know something

Motivation

to want to learn something

Learning

constructivist learning builds knowledge structures

Interaction

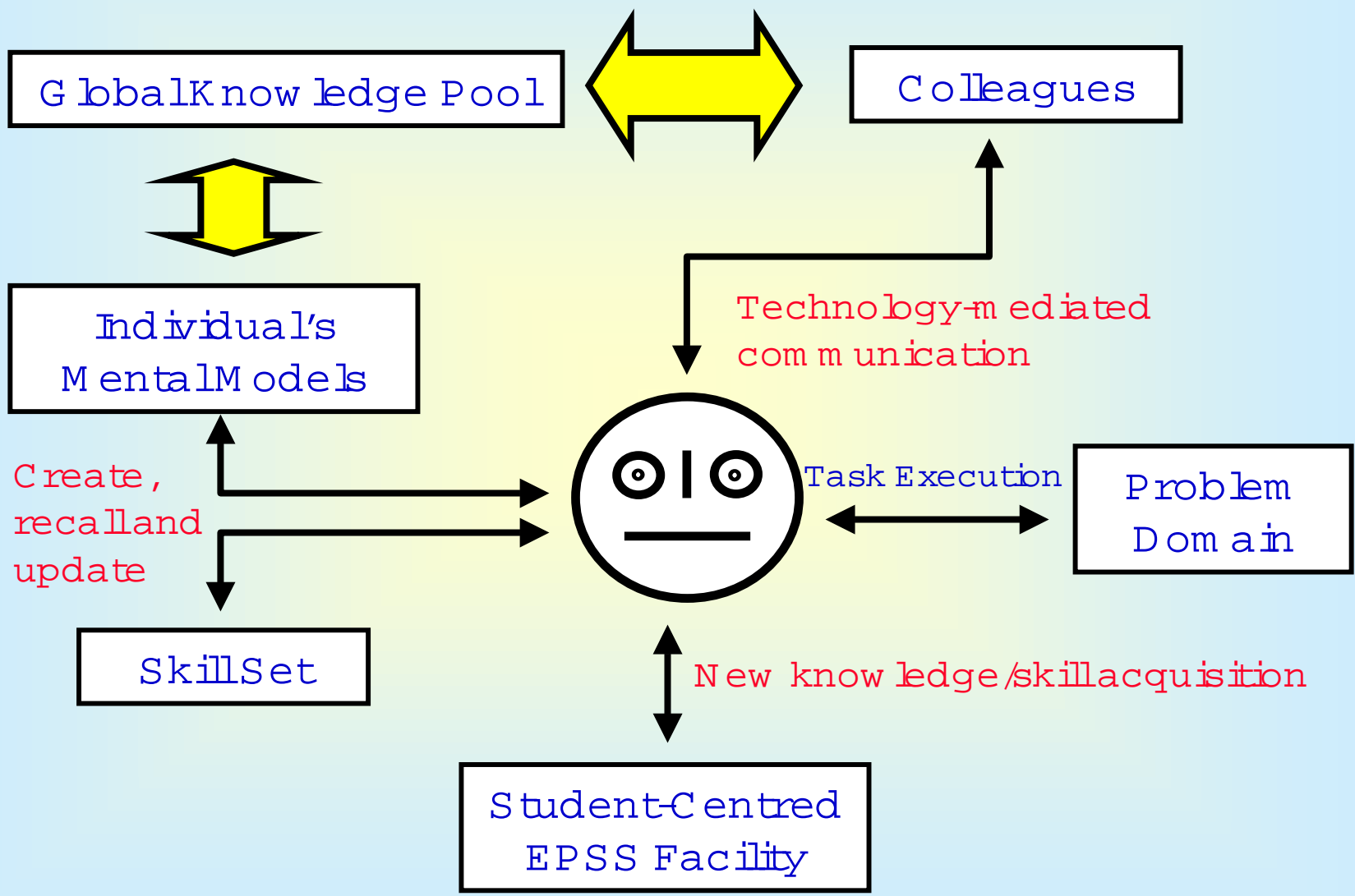with others, learning events and knowledge corpora

Reflection

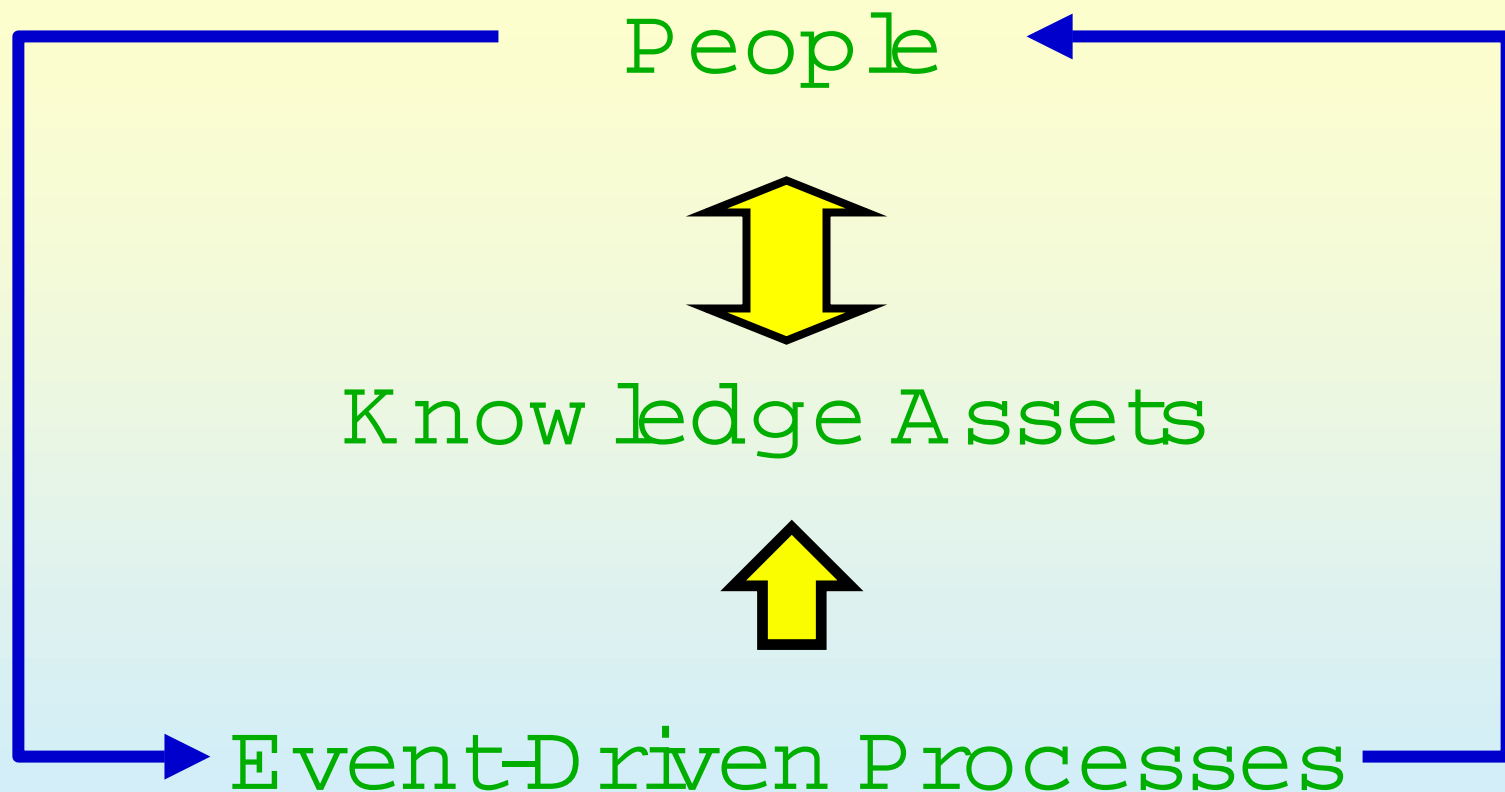analysing situations & creating new knowledge internally

Testing
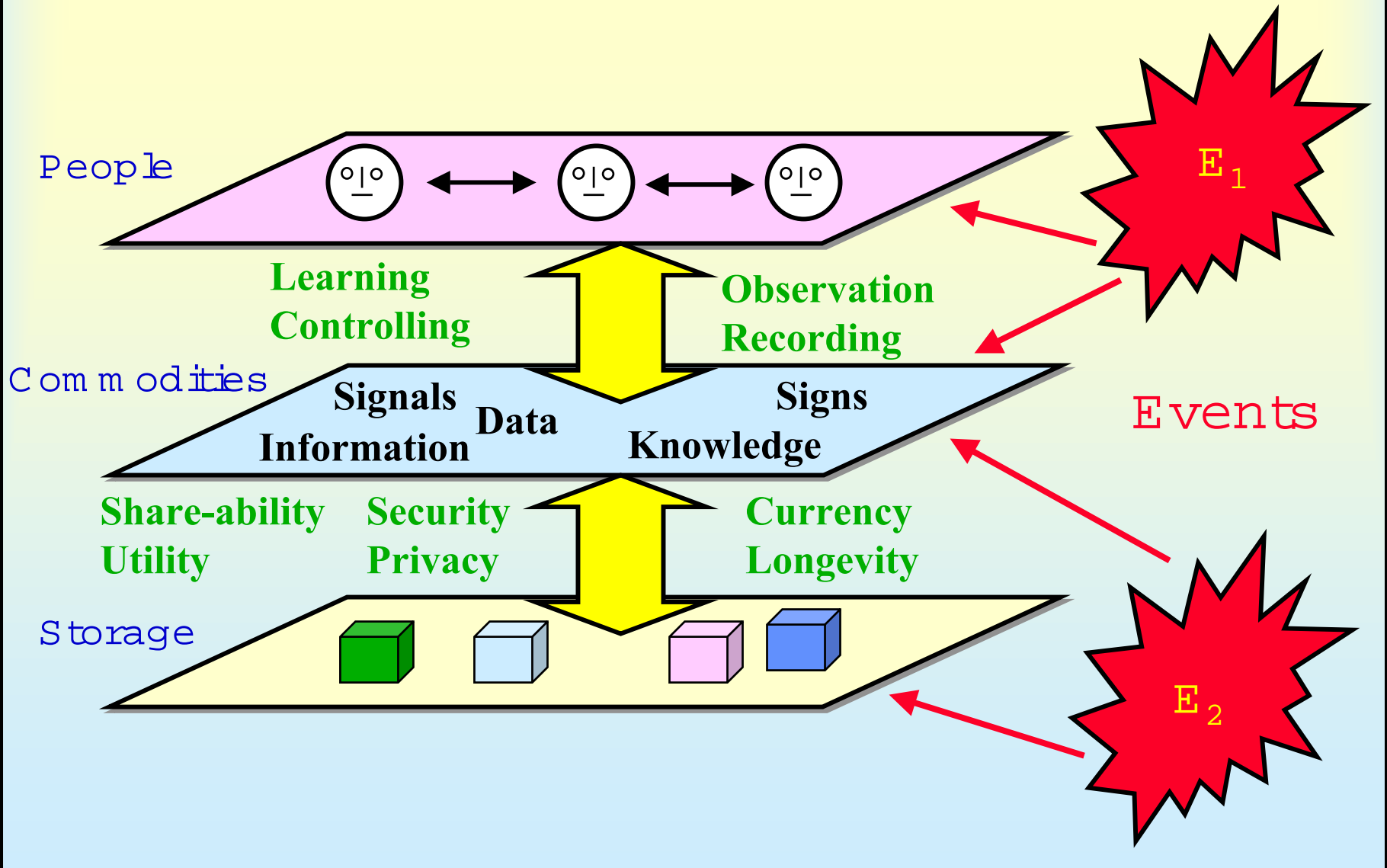
how accurate and useful is the knowledge we have?
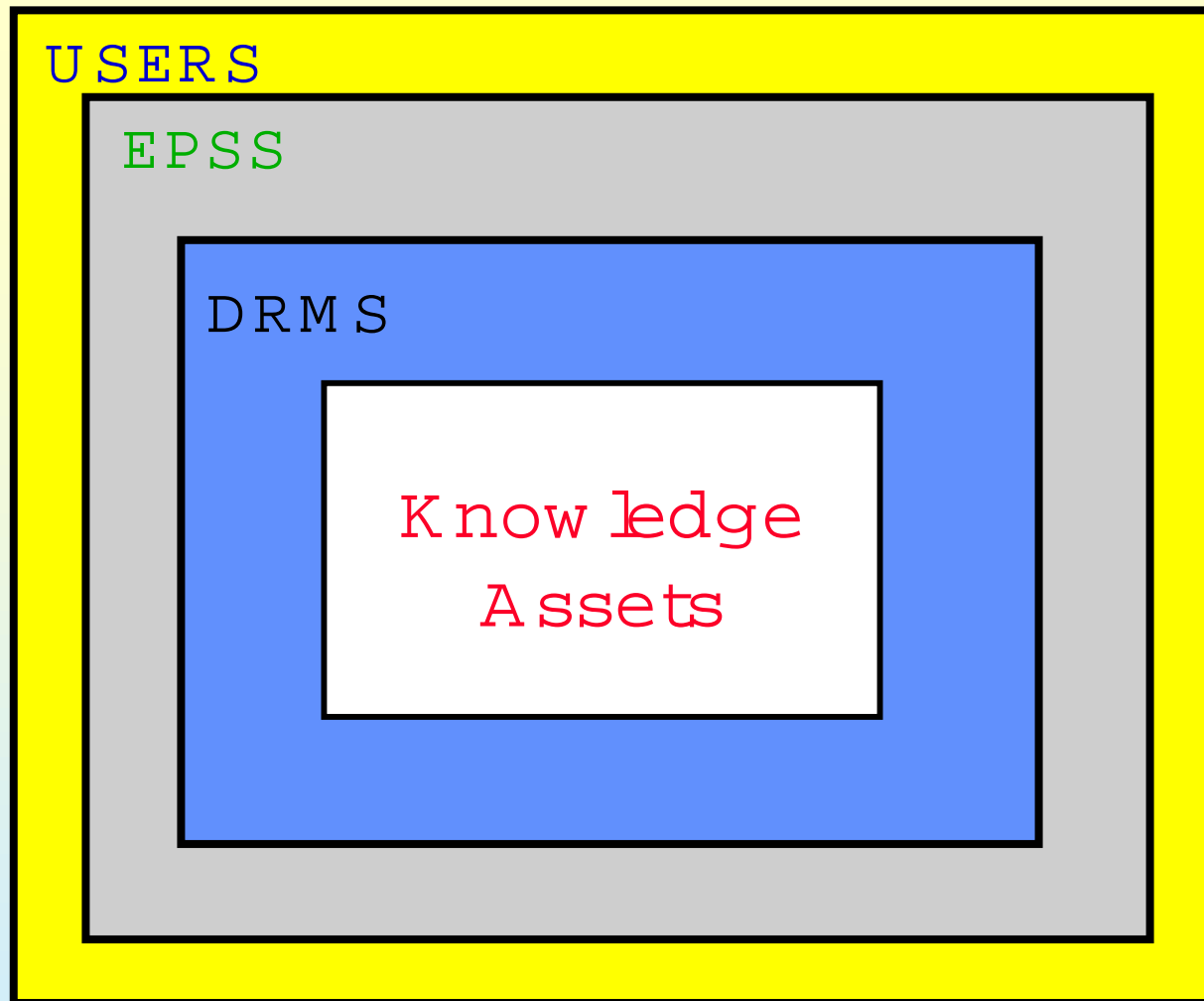
Interactive Learning Environments

Global Knowledge Pool

Colleagues

Individual's Mental Models

Technology-mediated communication

Create, recall and update

Task Execution

Problem Domain

Skill Set

New knowledge/skill acquisition

Student-Centred EPSS Facility

Accumulating Knowledge Assets

People

Knowledge Assets

Event-Driven Processes

Building a Knowledge-based Society

People

E_1

Learning
Controlling

Observation
Recording

Commodities

Signals
Information

Data

Signs
Knowledge

Events

Share-ability
Utility

Security
Privacy

Currency
Longevity

Storage

E_2

HCI Laboratory

University of Teesside, UK

Managing Knowledge

USERS

EPSS

DRMS

Knowledge Assets

Knowledge Assets --- electronic artifacts --- access to artifacts

(e-books) **(e-universities)**

3. Using Electronic Books

- The Theory

- The Book Metaphor

- Basic Tools

- An Example – GPS Navigation

My Basic Theory

Because we live in an era of dynamic change, we need new electronic artifacts to help us cope with the growing amounts of knowledge and information that we need in order to survive.
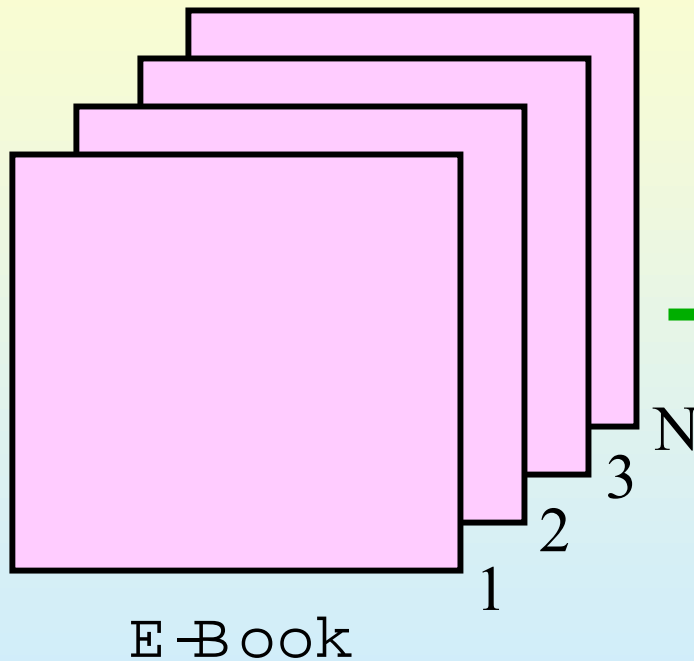
Basic Tools

- The computer as a 'knowledge archive' (assumes the availability of e-knowledge)

- global networks such as the Internet and personal intranets

- hand-held portable devices linked to both private and public knowledge networks

- metaphorical artifacts like 'electronic books are needed to help users navigate through complex electronic corpora

The Book Metaphor

Electronic Library ➡ Bookshelf ➡ Book

⬆

[Index] + [Contents]
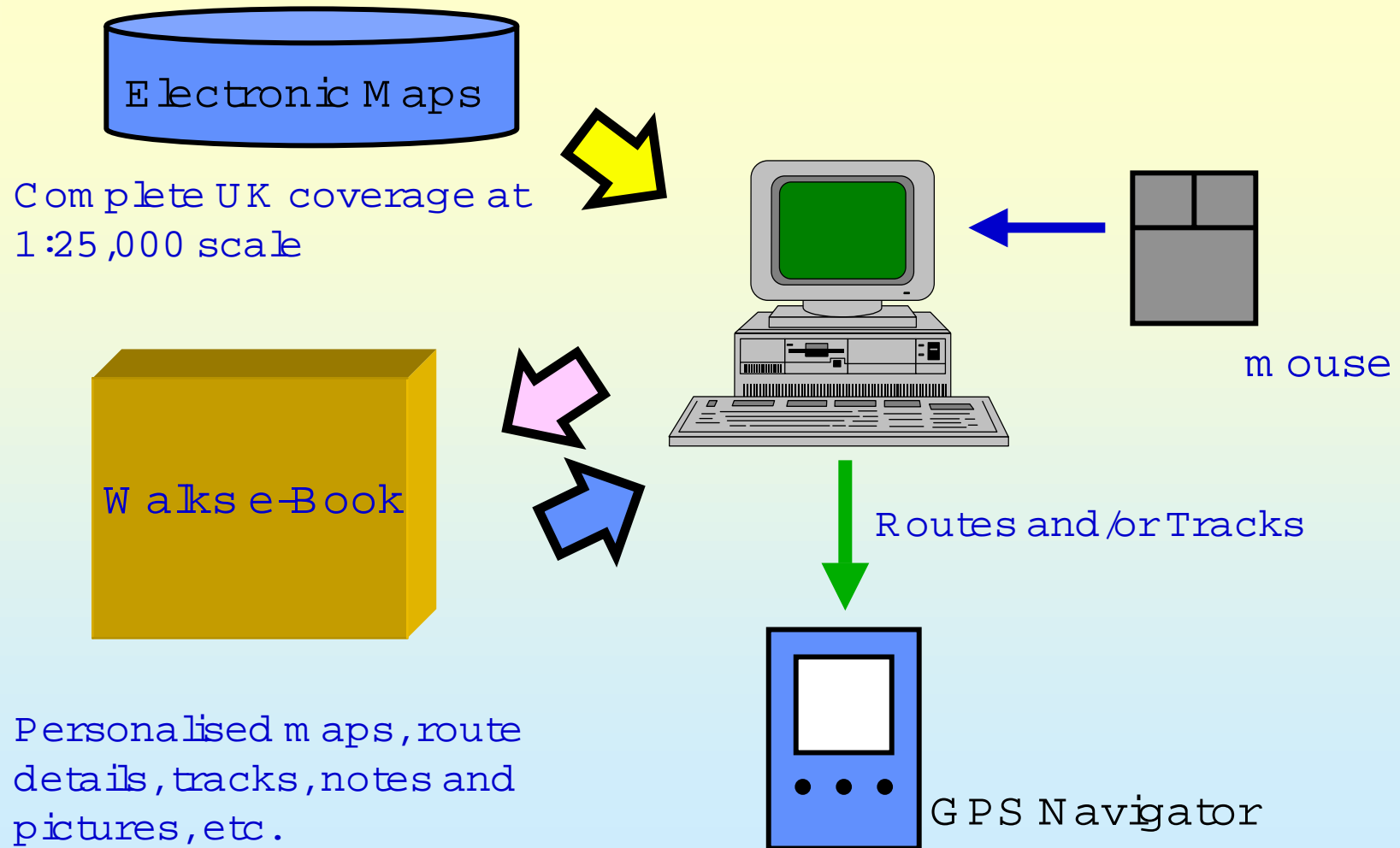

E-Book

1 2 3 N

Index

Search Engine

Example: Navigating with a GPS

Electronic Maps
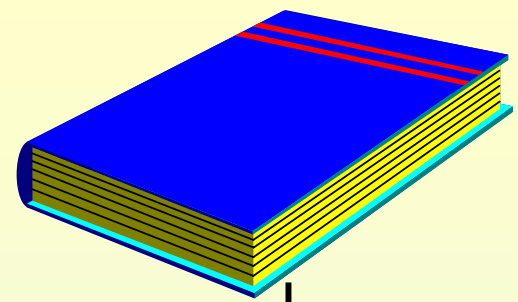
Complete UK coverage at
1:25,000 scale

Walks e-Book

mouse

Routes and/or Tracks

Personalised maps, route
details, tracks, notes and
pictures, etc.

GPS Navigator

Defining a Route

CRT Screen

OS Map 1:25,000

A

B

Height

A   Distance   B

HCI Laboratory   **University of Teesside, UK**

A Walking Expedition

Electronic navigation and Tracking

GPS Electronic Compass

Start[A]

Track Log

Finish[B]

camera

speech recorder

PDA
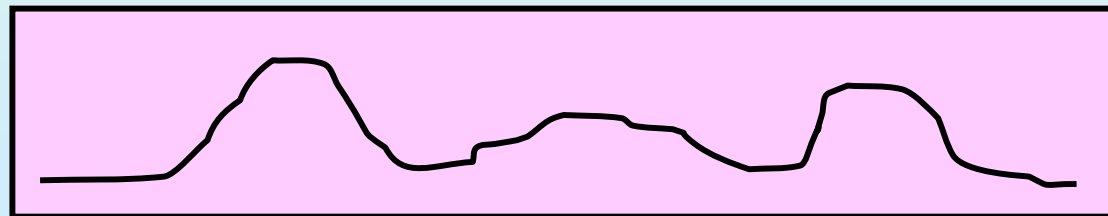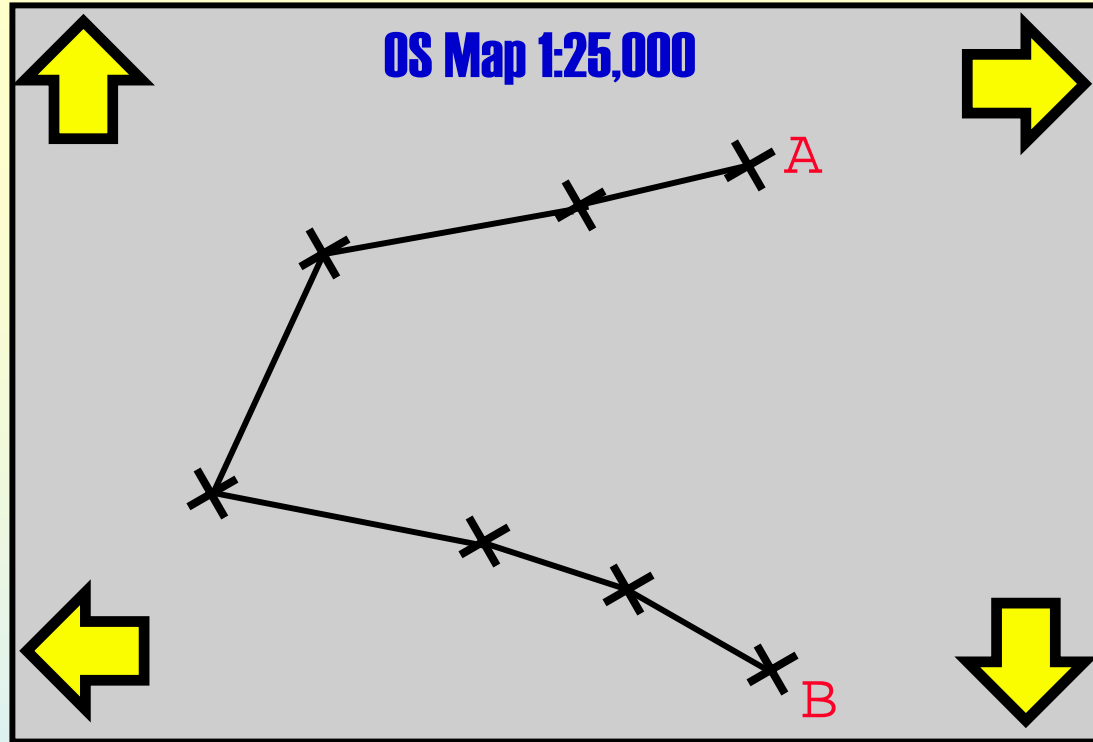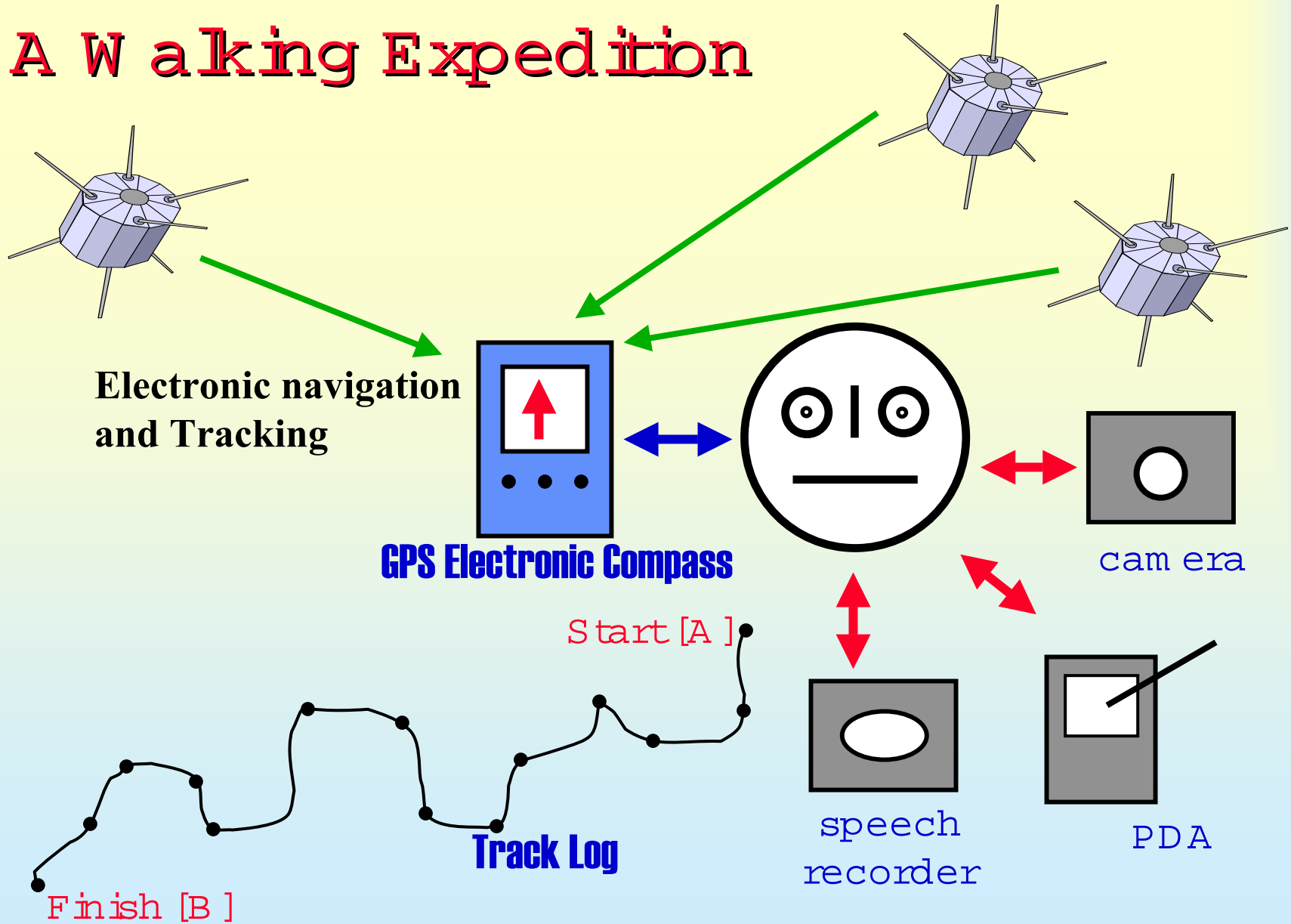
A Multimedia Walks' e-Book

Chapter 1   Chapter 2

Chapter N

photo icon

video icon

Map page

Text & Image pages

sound recording

notes icon
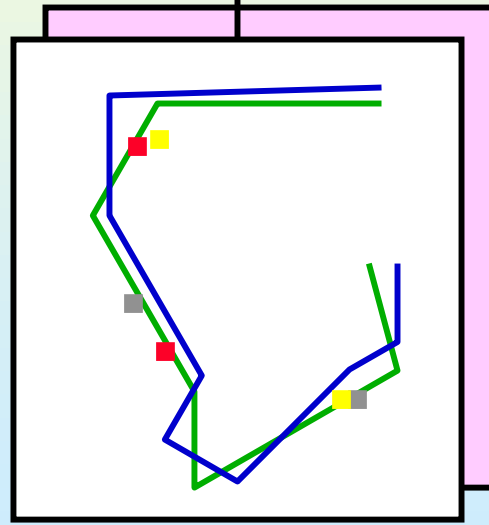
Publishing my Walks e-Book

Walks e-Book
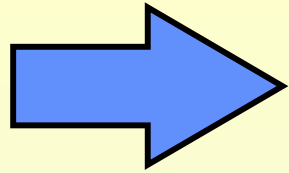
→ **World Wide Web**
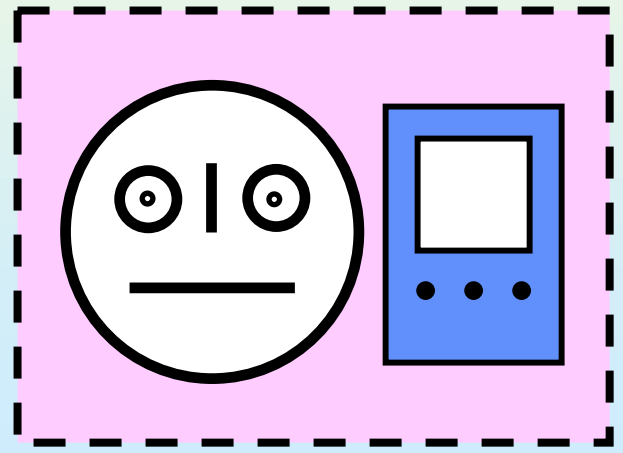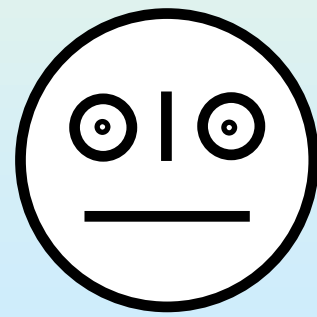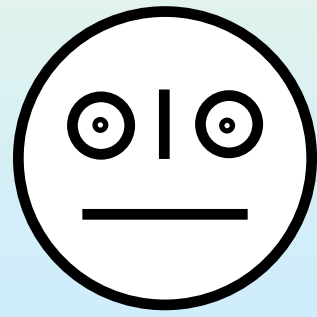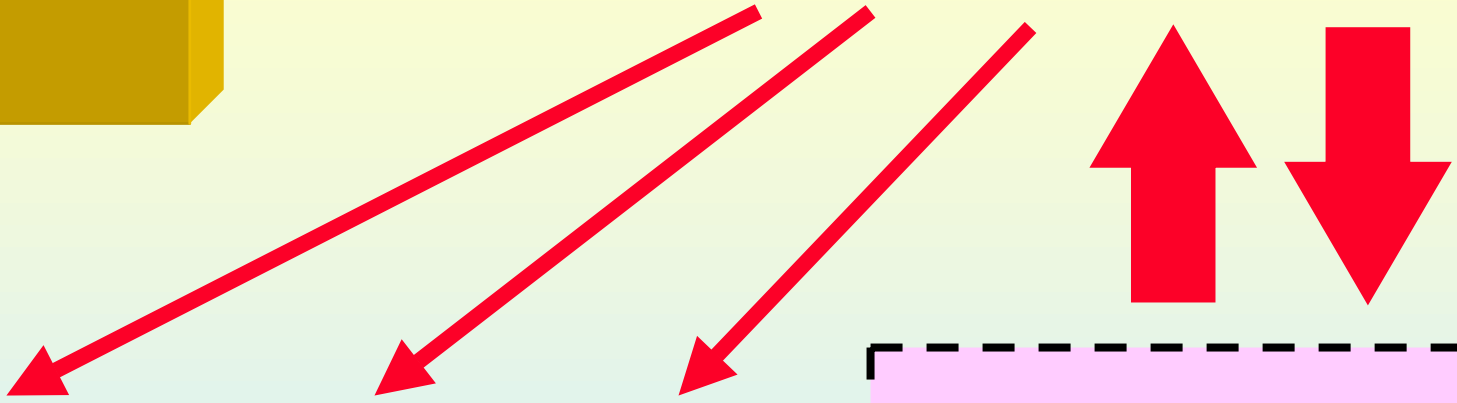
4.KM for Electronic Learning

- Rationale

- Online Courses (e-Learning)

- Virtual University Concept

- Web-based Learning Facilities

- An Example - VUSIL

Rationale for e-Learning

- Rapid Change
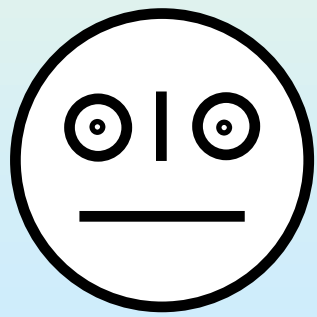
- Skills go out of date

- Need to continually 're-learn'

- Lifelong learning is important

- New approaches to learning needed

- importance of 'e-knowledge'

Online Courses

Some Examples:

MDA 3005 - University of Teesside

TU 170 - Open University

T171 - Open University

More and more courses are being made available online

Virtual Universities are a very useful knowledge management concept
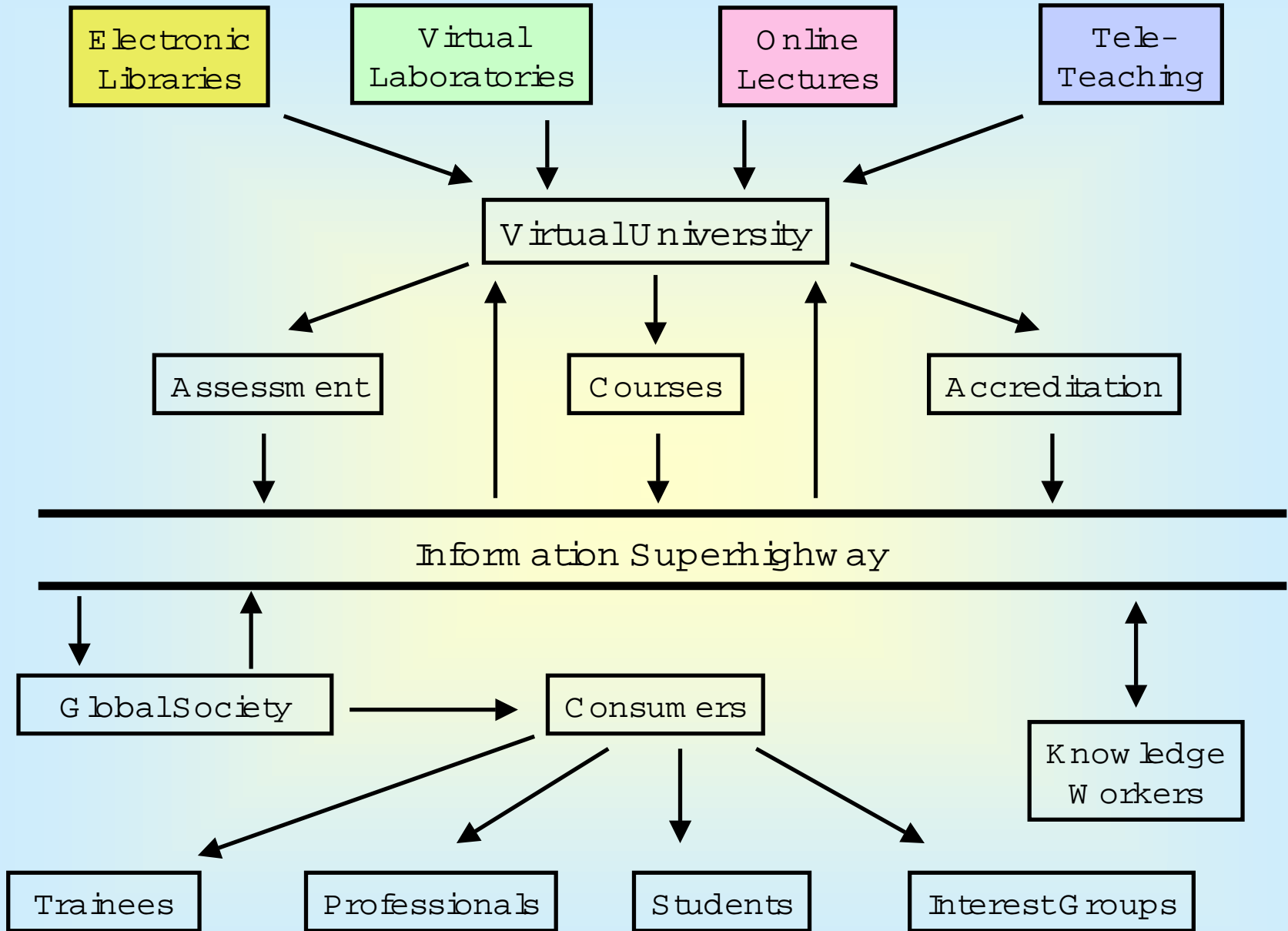
Definition of a VU

A Virtual University is:

"… one which exists only within the confines of a cyberspace environment that is created using a suitably configured host computer system."

Barker, P.G., (1998). The Role of Digital Libraries in Future Educational Systems, Online '98 Conference Proceedings, London.

British Initiatives

(1) The University for Industry (UfI)

(2) UK eUniversities Worldwide (UKeU)

"UKeU delivers the best of UK University Education online. We enable students across the world to study for recognised UK qualifications, using the Internet, any where and at any time."

(http://www.ukeu.com)

A Web-based e-Learning Facility

LocalResource Set   DistantResource set

- local resource
- local resource
- ---------------------
- distant resource
- distant resource

Testing Facility

Monitoring Facility

Communication Facility

Course Management Facility

Web-Based Interactive Learning System

S_1 S_2 S_3 S_n

Personal Web Management

Information Service Providers

Portfolio Management

Online Community

Student

Other Students

Other Internet Users

Instructors

Experts

VUSIL
(Virtual University Server in Lebanon)

Basic Objective:

To build a VU system and explore users' attitudes to using such a system for studying.

Basic Hypothesis:

"The availability of a digital university system is both an acceptable and an effective way of supporting learning activities for lifelong learners (in Lebanon)."

VUSIL Components

- Administration Office

- Lecture Hall

- Electronic Library

- Course Catalogue
  - "Internet Basics" Course
  - "Advanced Internet" Course

- Forum Facility

- Developer's Toolbox

Our Evaluation Findings

- Needs analysis used to identify audience and courses to develop

- Pilot Study identified changes that needed to be made

- Fully-fledged evaluation (110 online users)

- Pre-tests and post-tests used to assess knowledge acquisition

- Questionnaires used to collect attitudinal data

- Regression analysis used to explore relationships between experimental variables

- Results provided evidence for our initial hypothesis

5. Concluding Remarks

- knowledge is a 'dynamic' commodity

- because of the rapid changes taking place in the world, we continually need to review the 'adequacy' of what we know

- skill and knowledge updating are vital for the survival of individuals, groups and nations

- new electronic artefacts are needed to facilitate this task

- electronic books are useful KM tools

Concluding Remarks (Continued ...)

- virtual universities are a useful and powerful knowledge management and dissemination tools

- however, we need to continue the search for new KM artefacts and easier to use knowledge representation techniques for e-knowledge

- most people have computers but do not understand what is involved in representing their knowledge within them

- Thank you for listening to me!

- Enjoy the rest of KMICE 04

HCI Laboratory

University of Teesside, UK

ContactDetails

W W W Address:

http://www-scm.tees.ac.uk/users/philip.barker

EmailAddress:

Philip.Barker@tees.ac.uk