

5th IS4ALL seminar

Prof. C. Stephanidis
IS4ALL Project Coordinator

Agenda

- ☞ Welcome
- ☞ Part A – The Health Telematics context
 - Invited talks by
 - Dr. J Devlies
 - Ms. S. Maglavera
 - Mr. L. Leondaridis
 - Mr. L. Schilders
- ☞ Part B – IS4ALL methods
 - Methodology, goals & technical approach
 - IS4ALLmethods landscape
- ☞ Part C – Discussion

IS4ALL seminars

- Part of the project's outreach work plan
- In total the IS4ALL project will carry out six seminars in different European countries
- Focus and content of seminars varies
 - 1st Seminar in Rotterdam, NL (19 November 2001) focused on universal design practices
 - 2nd Seminar in Brussels, B (13 December 2001) focused on Health Telematics scenarios for universal access
 - 3rd Seminar in Budapest, H (25 August 2002) focused on code of practice
 - 4th Seminar in Paris, Fr (23 October 2003) followed by the 2nd IS4ALL Workshop
 - 5th Seminar in Heraklion, Crete, GR (26 June 2003) followed by the 3rd IS4ALL Workshop) in the context of HCII'2003

Purpose of IS4ALL seminars

- Present consolidated outcomes
- Raise awareness of a wider audience about universal access
 - The **design** challenge
 - The **methodological** basis
 - The **engineering** ground
- Promote proactive thinking

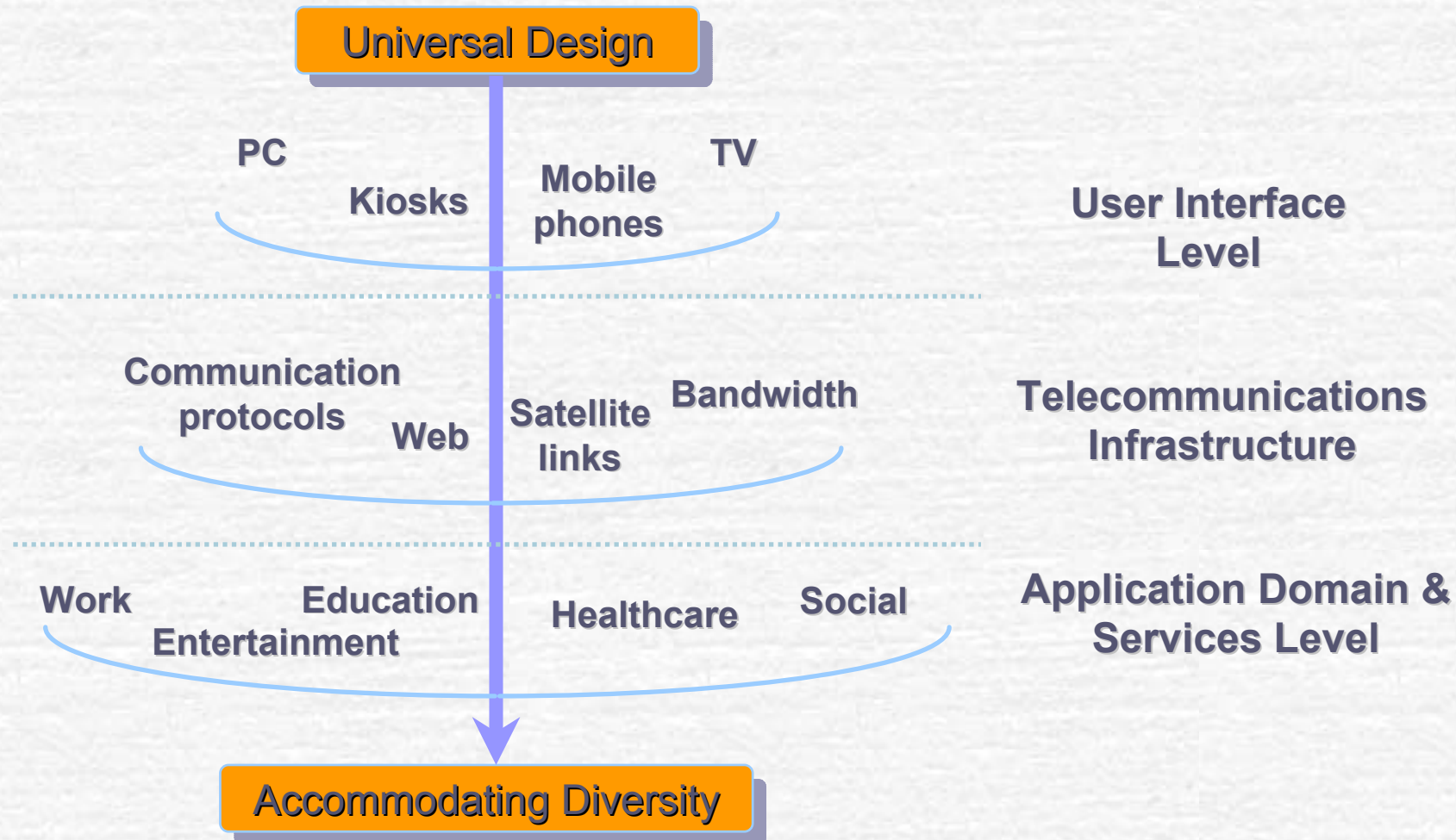
Universal access in the context of IS4ALL

Project web site
<http://is4all.ics.forth.gr>

Universal Access

- Universal Access concerns the right of all citizens to obtain and maintain access to a society-wide pool of information resources and interpersonal communication facilities, given the varieties of context of use
- To this end, the field of Human-Computer Interaction (HCI) has a critical and catalytic role to play

Universal Access: levels of concern



Health Telematics requirements

- ☞ “Just-in-time” information delivery
- ☞ Seamless integration of different types of information
- ☞ Personalisation and adaptation to the context of use
- ☞ Task-based and task-aware devices towards intuitiveness

Emerging challenges in HT

Large design space due to diversity in:

- application areas
 - EHCR, tele-consultation, tele-care & monitoring, education & training, Hospital Information Systems, ...
- technological platforms
 - existing and forthcoming hardware (not only computers) and software (operating systems, applications, etc.)
- contexts of use
 - hospital, office, home, nomadic, mobile, social environment, ...
- target user categories
 - abilities and skills to perform interactive tasks, preferences regarding the interaction, educational and cultural background, domain-specific knowledge, ...

International Scientific Forum (ISF)



- A network for collaboration, discussion and exchange of experience and practice on the broad range of issues related to the accessibility, usability and ultimately of the acceptability of the emerging Information Society
- The objective of the International Scientific Forum was to promote the establishment of a favorable environment for the creation of an Information Society acceptable to all citizens
- http://ui4all.ics.forth.gr/isf_is4all/index.html

ISF activity overview (1997 – 2000)

☛ Three meetings

- San Francisco, USA, August 29, 1997 (1st meeting)
- Crete, Greece, June 15-16, 1998 (2nd meeting)
- Munich, Germany, August 22-23, 1999 (3rd meeting)

☛ Two white papers

- Common **vocabulary**
- **Research agenda**
- Contribution to the EC IST Programme (**CPAs**)

☛ Foundation for IS4ALL

IS4ALL (IST-1999-14101)

What it is...


- A **Thematic Network** (Working Group) establishing a wide, interdisciplinary and closely collaborating network of experts to provide the **European Health Telematics industry** with a comprehensive code of practice on how to appropriate the benefits of **universal access**
- Not an RTD project

PART A

The Health Telematics context

Invited talks by
Dr. J Devlies, Ms. S. Maglavera,
Mr. L. Leondaridis and Mr. L.
Schilders

PART B
**IS4ALL goals, approach and
methodology**



D. Akoumianakis
ICS-FORTH

Plan of the presentation

- ☞ The Thematic Network IS4ALL
- ☞ Aims and objectives
- ☞ Participants
- ☞ Technical approach
- ☞ Expected results

The IS4ALL Thematic Network

- A **Thematic Network** (Working Group) establishing a wide, interdisciplinary and closely collaborating network of experts to provide the **European Health Telematics industry** with a comprehensive code of practice on how to appropriate the benefits of **universal access**
- Building on the success of the International Scientific Forum on “Towards and Information Society for ALL”
- Bringing together the Health Telematics and the Universal Access communities
- Emphasis on validating results of collaborative R&D in the context of Health Telematics

Objectives

Four main objectives:

- **Consolidate** existing knowledge on Universal Access in the context of IST into a comprehensive code of design practice.
- **Translate** the consolidated wisdom to concrete recommendations for Health Telematics.
- **Demonstrate** the validity and applicability of the recommendations (through implementation of concrete scenarios)
- **Promote** the Universal Access principles and practice in Health Telematics

Participants

Main contractor

- ICS-FORTH, Greece

Members

- MS-HUGe, Belgium



- EHTEL Association, Belgium



- CNR-IFAC, Italy



- INRIA, France



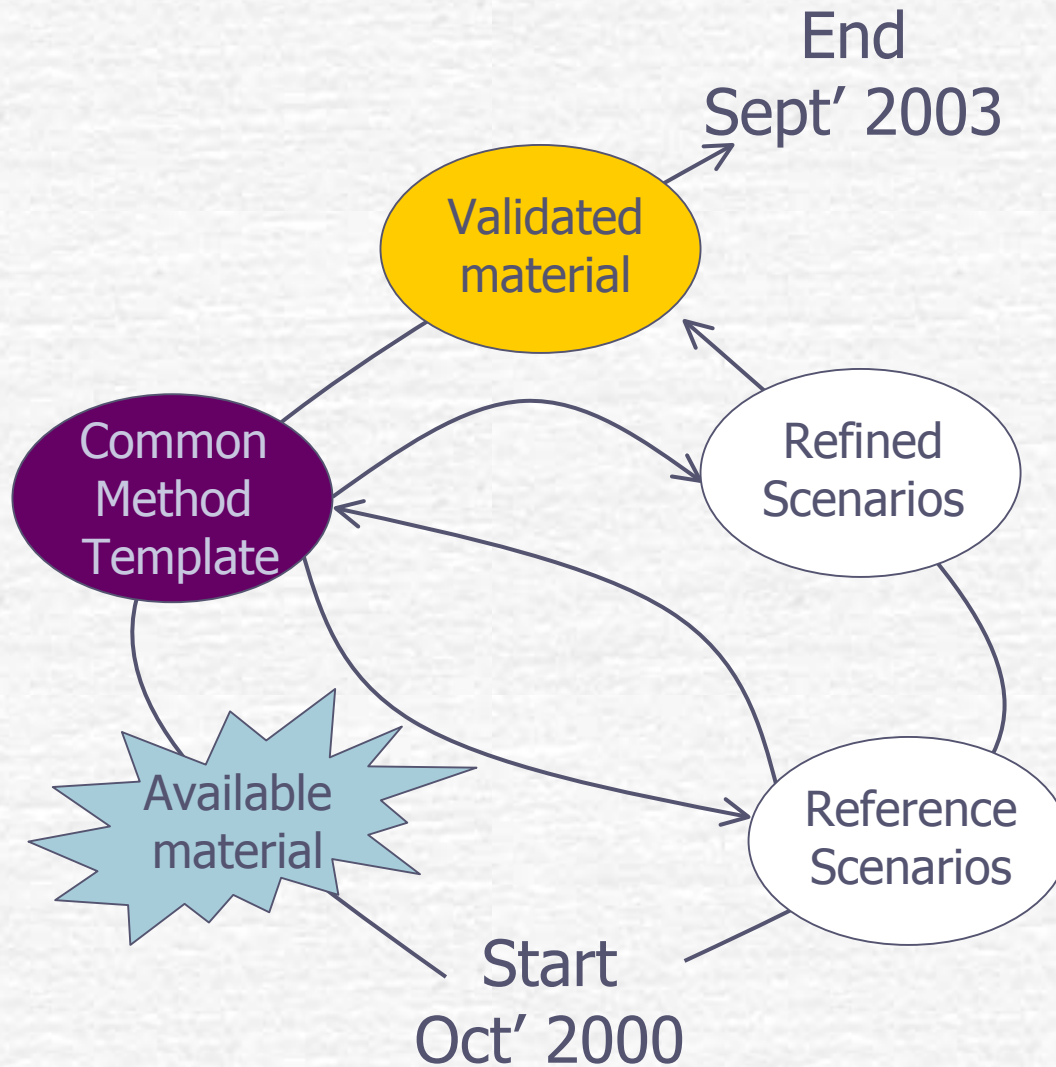
- FhG-IAO, Germany



- FhG-FIT (formerly GMD), Germany



Methodology



Expected results

- ☛ Universal access code of practice (CoP) to provide design support at the macro- and micro-level:
 - Macro-level: A **process-oriented** protocol to explain to practitioners the steps and phases involved
 - Micro-level: Definition and examples of **techniques** to be used to attain specific targets (i.e., requirements gathering, design, development, etc)

Universal access: Some issues

- ☞ Why is universal access a distinct feature?
- ☞ Can we not address it through conventional practices?
- ☞ Why is universal access different for accessible design?
- ☞ Is it appropriate?
- ☞ Is it feasible?
- ☞ Is it economically effective and efficient?
- ☞ ...

A definition

- A system is universally accessible if it can be accessed effectively, efficiently and with satisfaction by all authorized users, anytime and from anywhere, without applying other actions or means than those provided for this purpose for the software considered

Some implications

- ☛ The definition implies that
 - universal access is more than mere (low-cost) access
 - universal access assumes high usability
 - universal access means adaptation on behalf of the software
 - universal access entails user perceived qualities but also features related to the development process
 - universal access requires explicit accounts of the global execution context of tasks

An example

Patient: Stathiakis Nikolaos

Patient Data
Name: Stathiakis Nikolaos Father Name: Dimitrios Birth Date: 27/3/70
Perif. Doctor Office: Anoageia Folder no: K08-978

Demogr. History Visit Clin. Gyn. Blood Bioch. Radiol.

Previous Diagnosis
Stathiakis Nikolaos Profile
- Asthma
 - Episode on 3/7/97 11:26
 - Episode on 3/1/97 11:55
 - Drug Treatment
- Shoulder Pain
 - Episode on 3/7/97 11:26
 - Episode on 3/1/97 11:55
 - Drug Treatment
- Appendicitis
 - Episode on 3/7/97 11:26
 - Episode on 3/1/97 11:55

Stathiakis Nikolaos' Profile
 Smoking Drinking
 Operations
Allergies
 Food: Sea food
 Drugs:
 Con/tions:
 Other: Bees

Patient: Stathiakis Nikolaos 3:31p

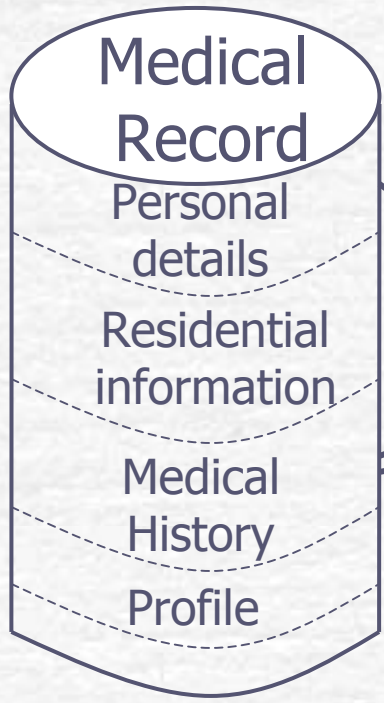
Patient Data
Name: Stathiakis Nikolaos Birth Date: 27/3/70
Father Name: Dimitrios Folder no: K08-978
Perif: Doctor Office: Anoageia

Visit Clin. Gyn. Blood Bioch. Radiol.

Demogr. History Diagn. Action Emerg.

Previous Diagnosis
Stathiakis Nikolaos
- Asthma
 - Episode on
 - Episode on
 - Episode on
- Shoulder Pain
 - Episode on
 - Episode on
- Appendicitis
 - Episode on
 - Episode on

Patient Profile
 Smoking Drinking
 Operations
Allergies
 Food: Sea Food
 Drugs:
 Con/tions:
 Other: Bees



Universal access development practice

- Parallel development processes
 - Starting with a version, the development team develops an alternative system
- Concurrent development processes
 - From the start the development team sets out to build different versions of the same system making use of common architectural units (e.g. databases, search mechanisms) whenever possible
- Unified development process
 - An alternative recently proposed to cope explicitly with universally accessible interactive software
- In all cases, universal access needs to be designed into a system

As an illustration

- Let us assume that an electronic medical record is available in a hospital information system under a conventional Windows environment. An alternative version can be developed for the WWW.

Parallel development

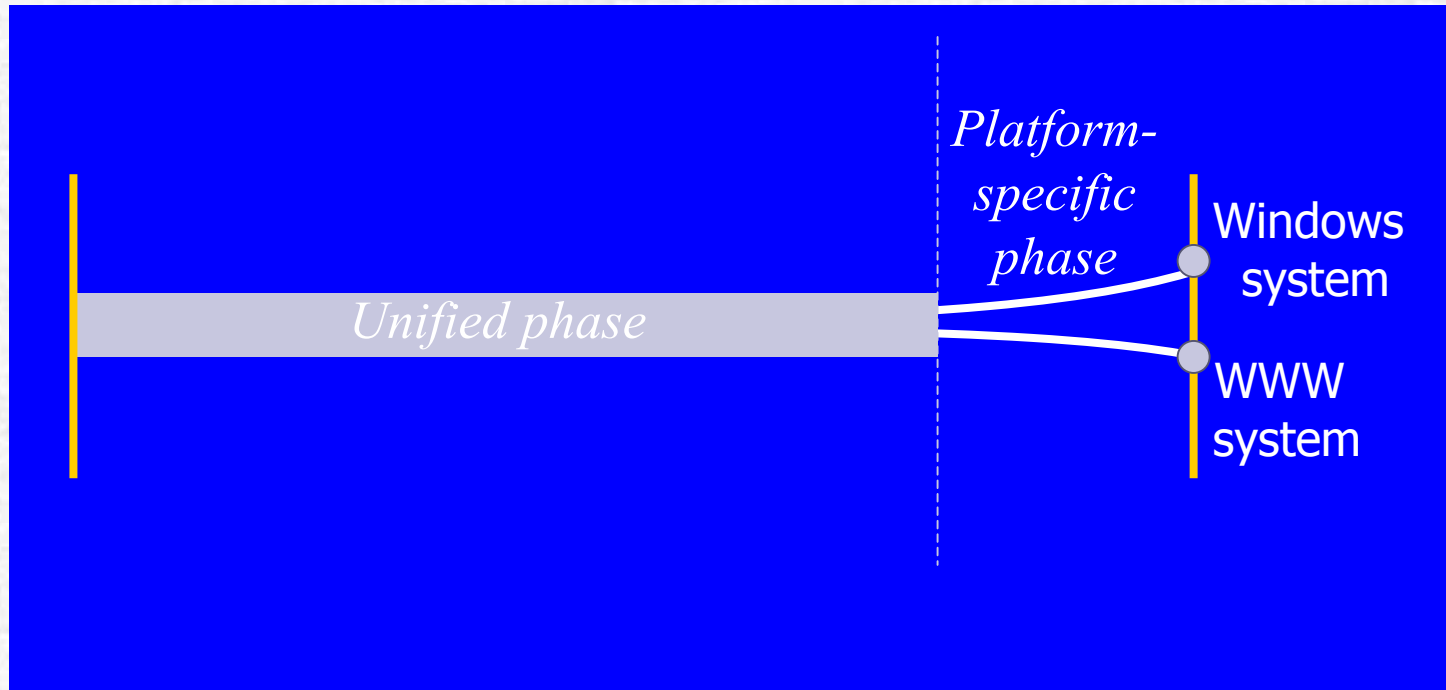
*Windows
development
process*



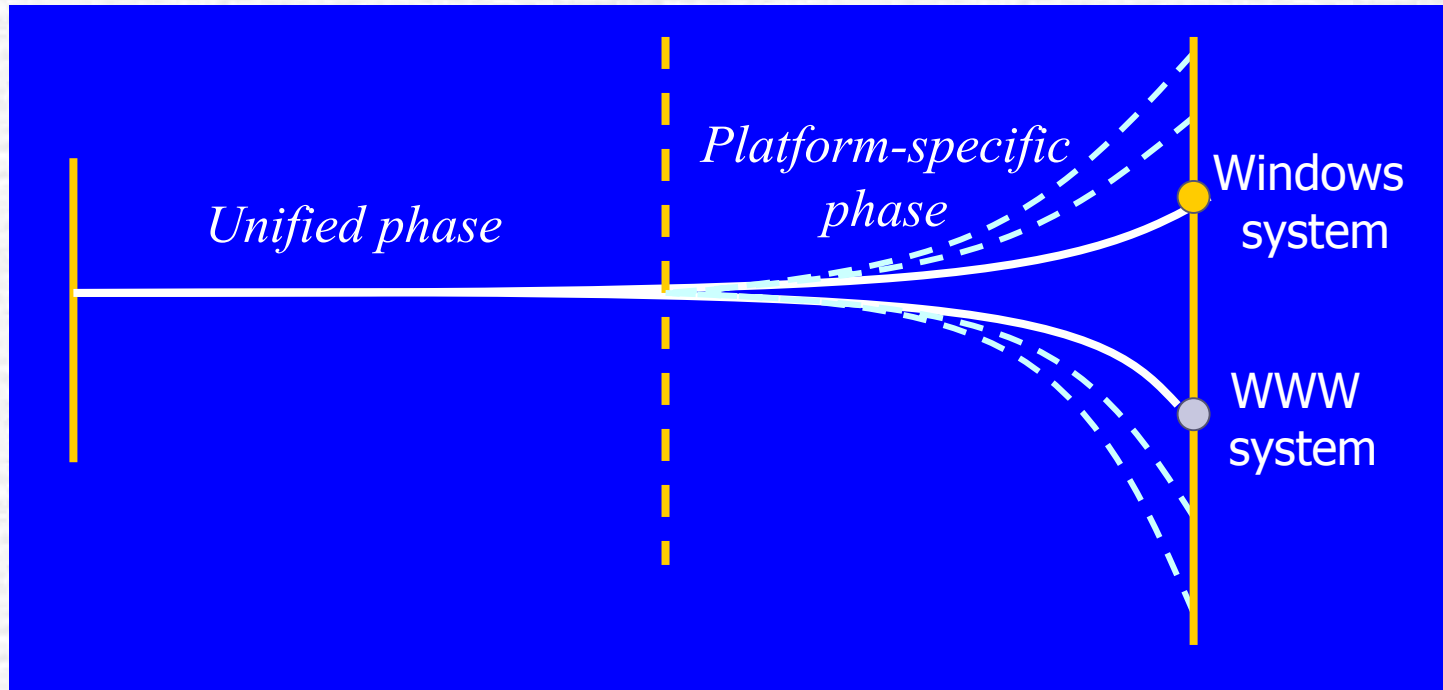
Concurrent development



Unified development process



Benefit of unified development



Concluding remarks (1/2)

- A design/development teams tasked to address universal access should pay attention to several development milestones, such as the following:
 - Focus should be not only on the target users but also on the interaction platforms and the foreseen contexts of use
 - Design should explore and the global execution context
 - Development should be based on suitable architectural abstraction and engineering tools

The focus of IS4ALL (2/2)

IS4ALL is biased towards design

- Macro-level or the process
 - What is to be done
 - In what sequence
 - What should be the outcomes
 - How can we verify the outcomes
- Micro-level
 - What technique is appropriate
 - How to use the technique
 - What outcomes should be derived
 - Assumptions be preserved
- Validation

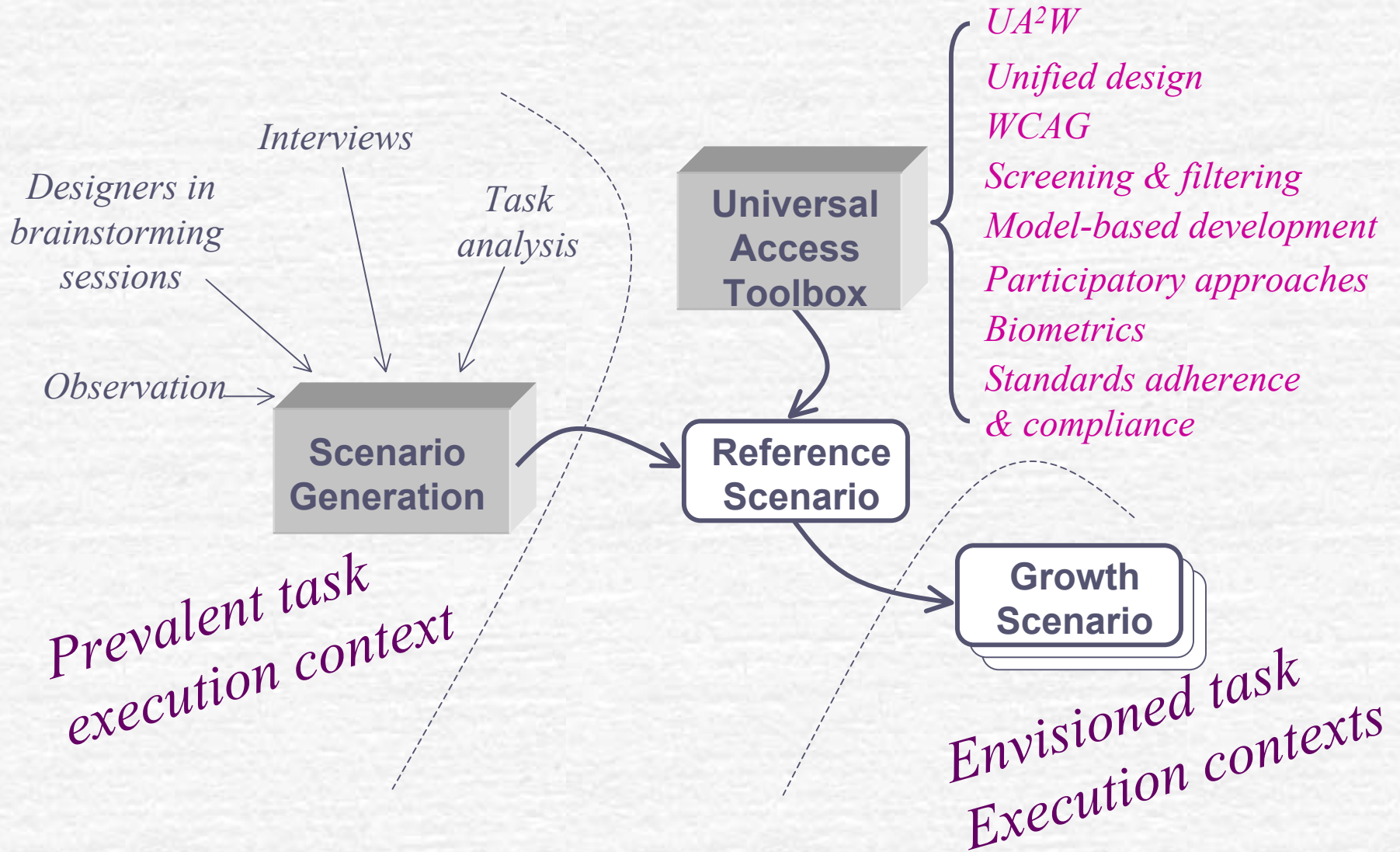
PART B – IS4ALL methods landscape

Overview, rationale and
description of methods

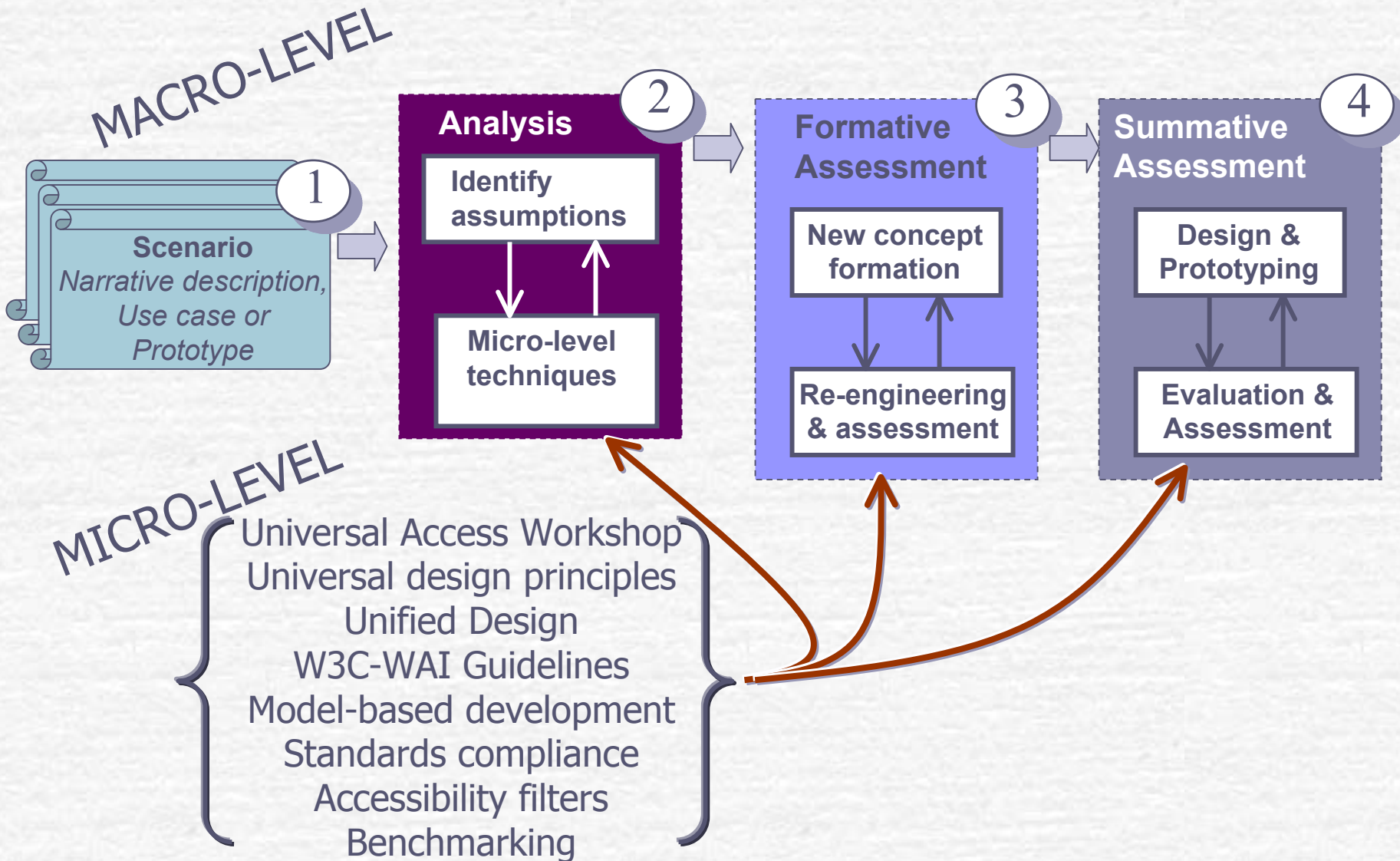
The IS4ALL technical approach

- A scenario-based approach, featuring proactive and analytical insight to universal access
- Scenarios emphasizing access to Electronic Health Records by different users in various contexts of use, making use of a range of access terminals

Illustration of methodology



Methodology



Micro-methods

Sub- | Literature | Interview | Focused | Short |

Scenario

Problem being addressed

HYGEIANet

Device (technique, tool or representation) used to address the challenge

MEDIBRIDGE

WARDINHAND

Procedure for using the device

Model-b

UniLINZ

Austria

Partici

Outcomes

EMPIRICA

Germany

Underlying assumptions

UniKENT

U

Practical example (I.e. an interface mock up or a process outline)

WARDINHAND

ISO,
CEN/ISSS

Guidelines

Pisa, UCL

SPERIGEST

Scenarios

- ☞ A description of a possible set of events that might reasonably take place in a Health Telematics environment
- ☞ Stimulate thinking about
 - possible occurrences of artefacts
 - assumptions relating to these artefacts
 - possible opportunities and risks
 - courses of action

Approaches to scenario generation

☞ Sessions with *designers*

- Gathering designers in brainstorming sessions
- Situated sessions e.g., interpreting the reaction of users with certain artefacts

☞ Sessions with *prospective users*

- Prospective users as audience
 - e.g., designers present a concept to prospective users and stimulate discussion
- Prospective users as active participants
 - e.g., designers ask prospective users to experience and use a tentative mock up of a system, while designers simulate the task of the device
- Situated and participative performances
 - e.g., sessions situated in every day life of people with their participation

Scenarios in IS4ALL

- ☞ A complete scenario should:
 - aim at a purpose (e.g. describe an activity)
 - be expressed in a form e.g., narrative, visual, (semi) formal notation
 - it should provide content to describe
 - the **context of use** of an activity and where / how it is carried out
 - the **platforms** in place (or the artefact)
 - the target **users**

Generating meaningful scenarios

☞ Intention

- Scenarios should depict how a system or an artefact is actually used and the user's experience

☞ Sources

- Existing practices / systems
- Projects (national/European)
- Envisioned situations

Phases in scenario generation

- ☞ **Phase 1: Agreement with user community**
 - Explanation of the type, nature and scope of the scenario-based inquiry
- ☞ **Phase 2: Narrative description**
 - Using mock-ups (paper- or computer-based prototypes), explain how the task is currently being accomplished using the existing system
- ☞ **Phase 3: Revision & Confirmation**
 - Narrative description revised and confirmed by real users

Scenarios being considered

EC-funded projects

- WARD-IN-HAND (IST-1999-10479)
 - <http://www.wardinhand.org>
- C-CARE (IST-1999-10217)
 - Frame of reference is MediBRIDGE in Belgium

National initiatives

- Medical information islands (SPERIGEST)
 - The IFC Information System
- Austrian reference scenario (University of Linz)
- German reference scenario (Empirica)
- HYGEIAnet
 - Regional Health Telematics Network of the Island of Crete
 - <http://www.hygeianet.gr/>

An example scenario

Microsoft FrontPage

File Edit View Insert Format Tools Table Frames Window Help

Normal (default font) Normal **B** *I* U

Views

- Page
- Folders
- Reports
- Navigation
- Hyperlinks

D:\Projects\IS4ALL\Miscellaneous\IS4ALL Seminars\4th IS4ALL Seminar\W

WARD-IN-HAND Reference scenario

Dr Fred is preparing for his morning visit to the patients in the ward of the hospital. To assist him, he makes use of his iPAQ to access the WARD-IN-HAND service, which was recently installed in the hospital. As part of the login procedure, Dr Fred selects the preferred language and then specifies the user name and password. For this purpose the system displays an on-screen keyboard which allows Dr Fred to type in text by selecting characters from a selection panel.

Normal HTML Preview 0 seconds over 28.8

New Page 1 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites

Address D:\Pr Go Links Norton AntiVirus

New Page 1 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search

Address Go Links Norton AntiVirus

Internet Explorer 15.15

Login:

En It De Es

Username:

Password:

Visual. Strum.

New Page 1 - Microsoft Internet Ex.

File Edit View Favorites Tools t

Back Forward Stop Home See

Address Go Links Norton AntiWir

123	q	w	e	r	t	y	u	i	o
Tab	a	s	d	f	g	h	j	k	l
Shift	z	x	c	v	b	n	m	;	'
Ctrl	á	ú	@	&		,	.		

Done My Computer Done My Computer

WARD-IN-HAND (Cont)

The image displays a screenshot of a computer desktop with several windows open. The primary window is Microsoft FrontPage, which is editing a web page titled "WARD-IN-HAND Reference scenario (cont)". The page content describes a user login process and a doctor's actions in a ward. The text is as follows:

WARD-IN-HAND Reference scenario (cont)

Upon successful login, the system presents the user with the main menu. By this time Dr Fred is at the bedside of the first patient and can review the list of patients registered in the ward. The doctor finds out the patient's name and selects the corresponding record using the styles of the iPAQ to select from the list. Once a particular patient record is selected then the doctor can initiate a range of tasks from the main applications menu, such clinical overview, admission details, treatments assigned, examinations ordered etc.

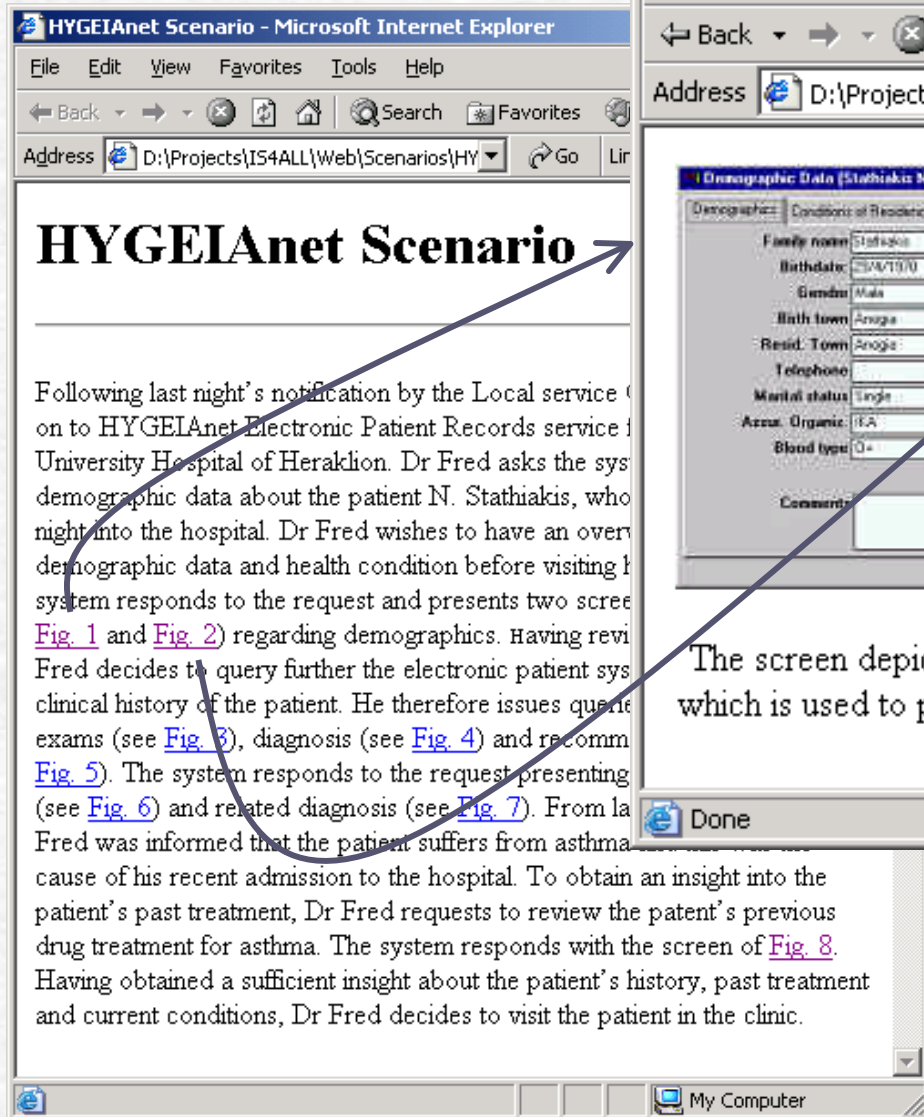
Three orange arrows originate from the text in the FrontPage window and point to the corresponding browser windows. One arrow points from the word "menu" to the top Internet Explorer window. Another arrow points from the word "selects" to the middle Internet Explorer window. A third arrow points from the word "applications" to the bottom Internet Explorer window, which displays a "Navigator" interface with various icons for clinical tasks.

The "Navigator" interface in the bottom browser window includes the following elements:

- Time: 15.21
- Buttons: Clinical record, Personal data, Phys. signs, Treatments, Tests, Admission, Workflow, Logout
- Visual. Strum. (Visual Structure)
- Done button
- System tray: My Computer

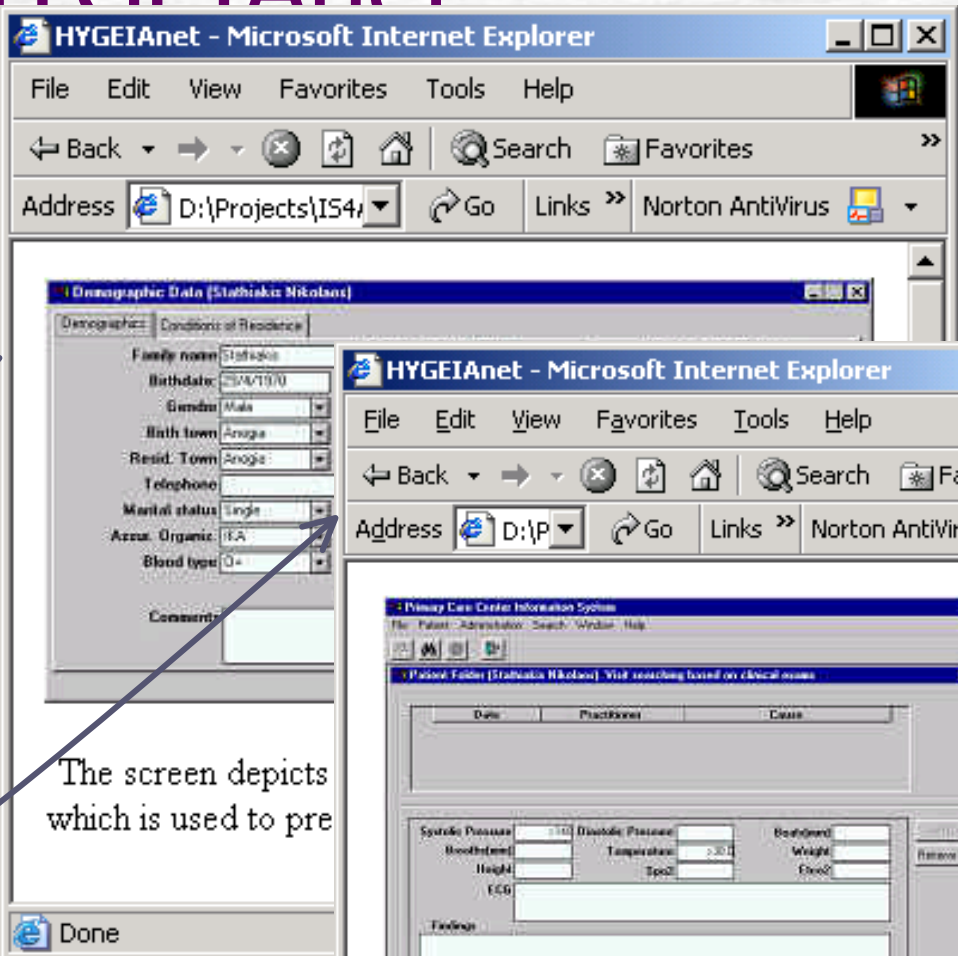
The desktop taskbar at the bottom shows the Start button, a clock displaying "0 seconds over 28.8", and the "My Computer" icon.

HYGEIAnet



HYGEIAnet Scenario

Following last night's notification by the Local service (on to HYGEIAnet Electronic Patient Records service) at the University Hospital of Heraklion, Dr Fred asks the system for demographic data about the patient N. Stathiakis, who was admitted the night into the hospital. Dr Fred wishes to have an overview of the patient's demographic data and health condition before visiting him. The system responds to the request and presents two screens (see Fig. 1 and Fig. 2) regarding demographics. Having reviewed the data, Dr Fred decides to query further the electronic patient system for the patient's clinical history of the patient. He therefore issues queries for the patient's past exams (see Fig. 3), diagnosis (see Fig. 4) and recommended treatments (see Fig. 5). The system responds to the request presenting the patient's past treatments (see Fig. 6) and related diagnosis (see Fig. 7). From the information received, Dr Fred was informed that the patient suffers from asthma as the main cause of his recent admission to the hospital. To obtain an insight into the patient's past treatment, Dr Fred requests to review the patient's previous drug treatment for asthma. The system responds with the screen of Fig. 8. Having obtained a sufficient insight about the patient's history, past treatment and current conditions, Dr Fred decides to visit the patient in the clinic.

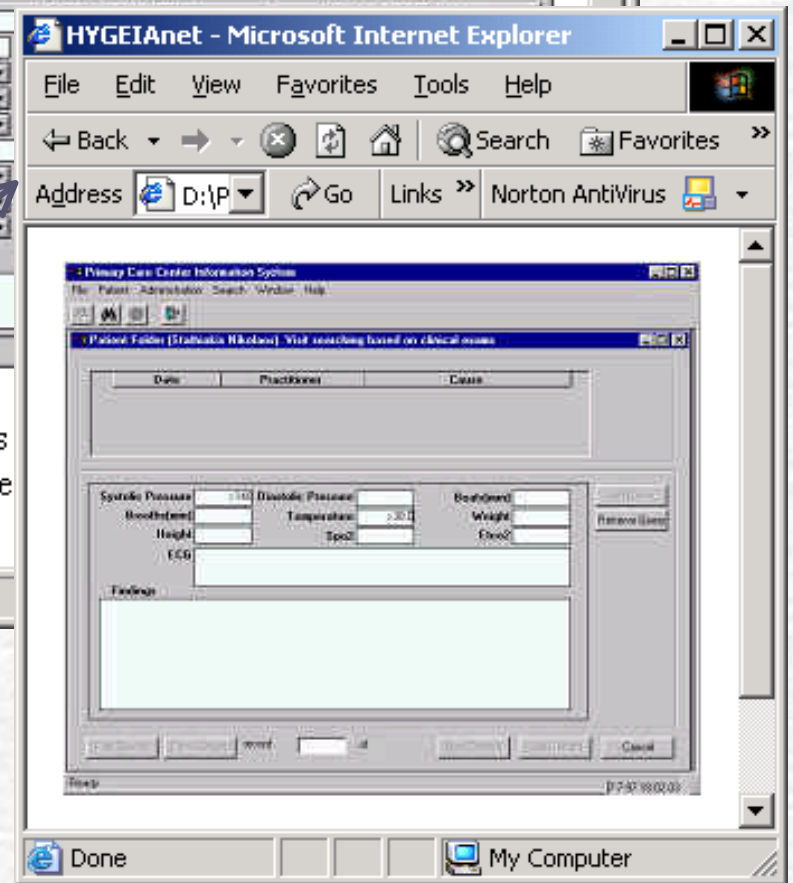


Demographic Data (Stathiakis Nikolaos)

Family name	Stathiakis
Birthdate	23/04/1970
Gender	Male
Birth town	Anoiga
Resid. Town	Anoiga
Telephone	
Marital status	Single
Assoc. Organic	IRA
Blood type	O+

Comments

The screen depicts the patient's demographic data which is used to pre-



Primary Care Center Information System

File Patient Administration Search Window Help

Patient Folder (Stathiakis Nikolaos) - Visit searching based on clinical notes

Date	Practitioner	Cases

Systemic Pressure: 110/70 Diastolic Pressure: 70 Body Temp: 37.5
Blood Pressure: 110/70 Temperature: 37.5 Weight: 70 kg
Height: 170 cm Speed: 60 km/h ECG:

Findings:

HYGEIAnet (Cont.)

The screenshot displays the HYGEIAnet web application interface within a Microsoft Internet Explorer browser window. The main content area is titled "HYGEIAnet" and contains a section for "Demographic Data (Statistical)". Below this, there is a table with columns for "Date" and "Practitioner". A search bar is visible, and a red watermark "Search Using diagnosis" is overlaid on the interface. The search results show a list of ICD-9 codes and their corresponding comments:

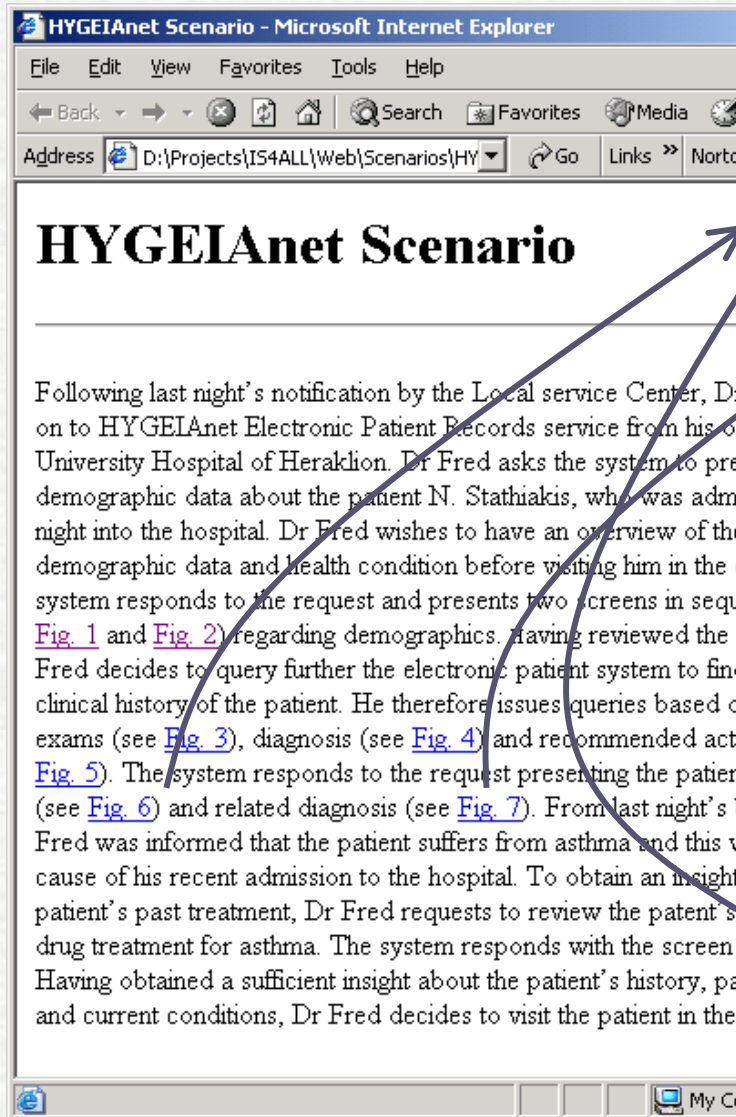
ICD-9 Code	Comments
018	Neurospecific dysfunction
400	Hypertens
001	Toussing
002	Asthma
003	Spousitium

Below the search results, there is a section for "Patient Information System" and "Patient Data (Fred, Statistika Nikolaos). Visit searching based on actions of visit". This section contains a table with columns for "Date", "Practitioner", and "Cause". Below the table, there are several input fields for "Adminstr.", "Ref. Insp.", "Comments on admin.", and "General comments". There are also buttons for "Retrieve Query" and "Cancel".

Arrows point from the text on the left to the corresponding parts of the interface: "search using diagnosis" points to the search bar, "search clinical" points to the search results, and "search based on recommended actions" points to the patient data section.

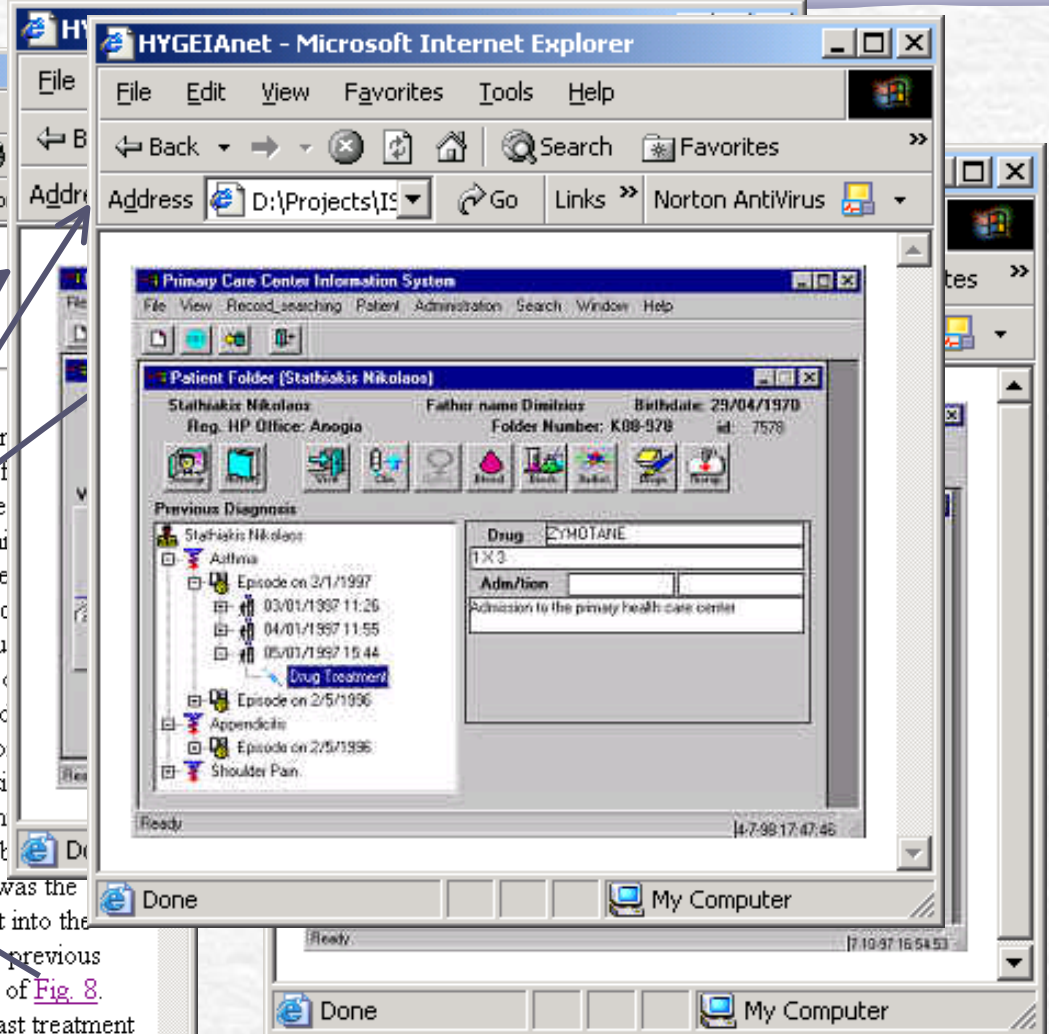
Following last night's notification to HYGEIAnet Electronic University Hospital of Heraklion, demographic data about the night into the hospital. Dr Fred entered demographic data and health system responds to the request (see Fig. 1 and Fig. 2) regarding demographics. Dr Fred decides to query further the electronic patient clinical history of the patient. He therefore issues exams (see Fig. 3), diagnosis (see Fig. 4) and related diagnosis (see Fig. 5). The system responds to the request (see Fig. 6) and related diagnosis (see Fig. 7). Dr Fred was informed that the patient suffers from asthma because of his recent admission to the hospital. To obtain an insight into the patient's past treatment, Dr Fred requests to review the patient's previous drug treatment for asthma. The system responds with the screen of Fig. 8. Having obtained a sufficient insight about the patient's history, past treatment and current conditions, Dr Fred decides to visit the patient in the clinic.

HYGEIAnet (Cont.)



HYGEIAnet Scenario

Following last night's notification by the Local service Center, Dr Fred goes on to HYGEIAnet Electronic Patient Records service from his office at the University Hospital of Heraklion. Dr Fred asks the system to present demographic data about the patient N. Stathiakis, who was admitted last night into the hospital. Dr Fred wishes to have an overview of the demographic data and health condition before visiting him in the clinic. The system responds to the request and presents two screens in sequence (see Fig. 1 and Fig. 2) regarding demographics. Having reviewed the data, Dr Fred decides to query further the electronic patient system to find out the clinical history of the patient. He therefore issues queries based on symptoms (see Fig. 3), diagnosis (see Fig. 4) and recommended actions (see Fig. 5). The system responds to the request presenting the patient's demographic data (see Fig. 6) and related diagnosis (see Fig. 7). From last night's treatment, Dr Fred was informed that the patient suffers from asthma and this was the cause of his recent admission to the hospital. To obtain an insight into the patient's past treatment, Dr Fred requests to review the patient's previous drug treatment for asthma. The system responds with the screen of Fig. 8. Having obtained a sufficient insight about the patient's history, past treatment and current conditions, Dr Fred decides to visit the patient in the clinic.



HYGEIAnet - Microsoft Internet Explorer

Address: D:\Projects\IS4ALL\Web\Scenarios\HY

Primary Care Center Information System

Patient Folder (Stathiakis Nikolaos)

Stathiakis Nikolaos
Reg. HP Office: Anogia
Father name Dimitrios
Birthdate: 29/04/1978
Folder Number: K08-978
id: 7578

Previous Diagnosis

- Stathiakis Nikolaos
 - Asthma
 - Episode on 3/1/1997
 - 03/01/1997 11:26
 - 04/01/1997 11:55
 - 05/01/1997 15:44
 - Episode on 2/5/1996
 - Appendicitis
 - Episode on 2/5/1996
 - Shoulder Pain

Drug Treatment

Drug: ZYMOTANE
1 X 3
Admission: Admission to the primary health care center

Ready | 14:29:17:47:46

Conclusion-Generating scenarios

- Scenarios need to be carefully drafted so as to provide
 - Accurate descriptions of computer-mediated human activities (e.g., what users **actually** do, rather than what they should do)
 - Reference resource for identifying explicit, but most importantly the implicit, assumptions underpinning a system
 - A common vocabulary between end users and designers

Conclusion-Working with scenarios

- ☞ Drafting a designated set of reference scenarios is only the starting point
- ☞ What happens next?
 - What is to be done, once a scenario is agreed upon?
 - How does one inject “universal access thinking” into the scenario crafting process?
 - ...

The above are a few of the process-oriented questions that IS4ALL seeks to provide guidance

Non-functional Requirements Analysis

Functional versus Non-functional requirements

Adaptability, Scalability, Individualization, Platform
independence

Requirements for universal access

- ☞ Two types of requirements
 - Functional (i.e., what s system should do in terms of functions or services that support user goals, tasks or activities)
 - Non-functional (i.e. global quality constraints that must be satisfied by the software) – known as quality attributes
- ☞ Non-functional requirements (NFRs) are more complex to deal with

Examples of NFRs

From IEEE/ANSI 830-1993

- Portability
- Performance
- Scalability
- Flexibility
- Usability
- Quality
- Robustness
- Modifiability,
- Security and safety, etc.

**Frequently classified
into process &
product attributes**

Difficulties with NFRs

- Abstract formulation
- Typically stated informally
- Rarely supported by tools, methodologies or languages
- Verification is a non-trivial task
- Conflicting, making a step-by-step approach impossible
- Typically intended for environment builders rather than application programmers

Universal access & NFRs

- Some NFRs are critical for universal access
 - Adaptability is defined as "...attributes of software that bear on the opportunity for its adaptation to different specified environments without applying other actions or means than those provided for this purpose for the software considered

Or

- Adaptability refers to the capability of an interactive system to tolerate changes in its target execution context without external intervention.

Adaptability and universal access

- A system, which supports adaptability, is capable of undertaking context-sensitive processing to *recognize* the need for change, *determine* the plausible alternatives that satisfy the change and *effect* the optimal option in order to generate new behaviour
- Thus adaptability is relevant to universal access to the extent that it allows a system to cope with variation in:
 - ... the target users
 - ... the various interaction platforms / environments
 - ... the different contexts of use

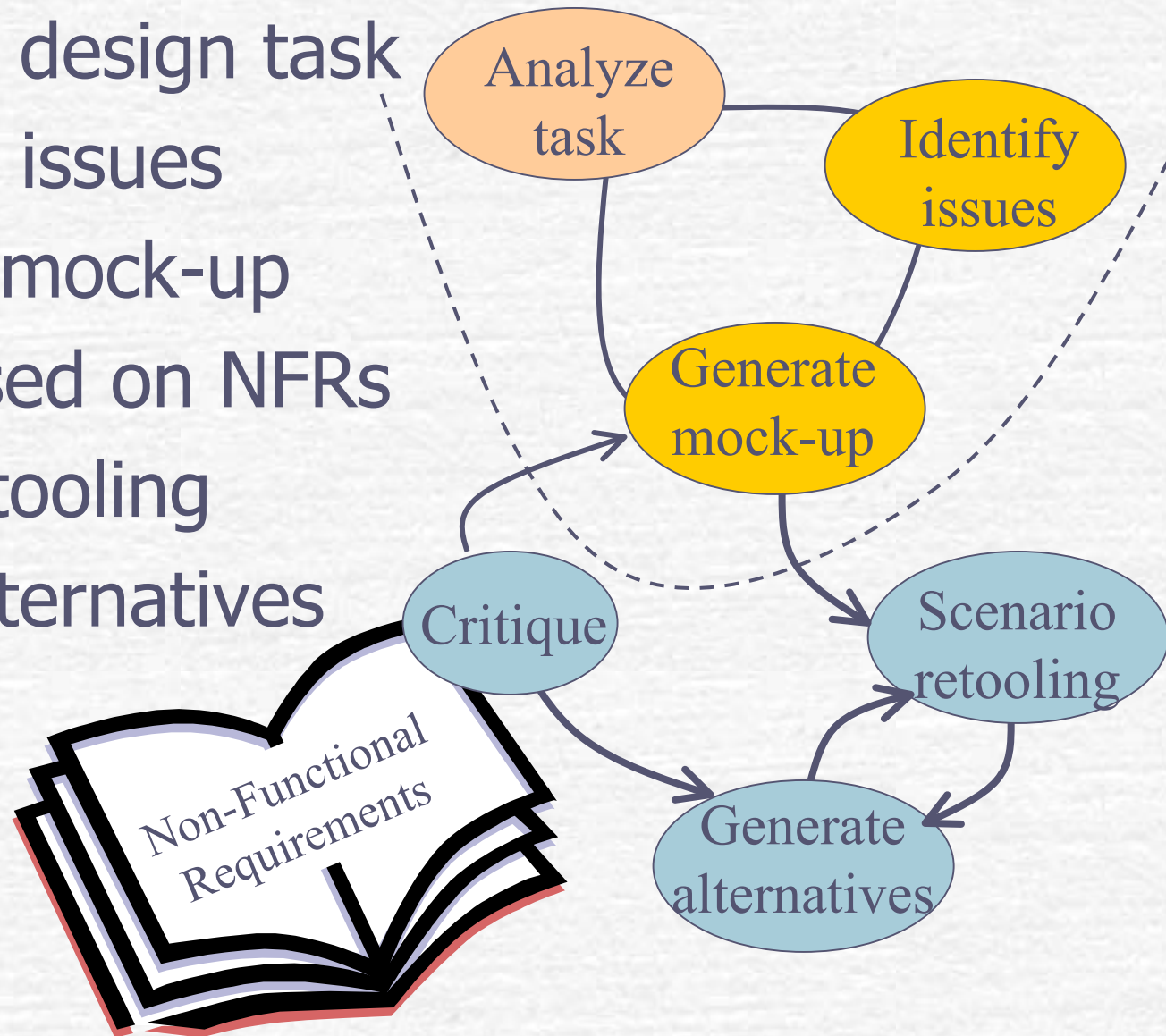
Intertwining NFRs

- “... Requests for accessing the on-line pharmacy store arrive in a rate of x number of messages per second. The on-line pharmacy store must respond to a request within a specified time interval. The system’s response should be manifested on the user’s interactive terminal to allow him/her to initiate an operation effectively and efficiently from the current location...”

... x number of messages per second...	10 messages /second	100 messages / second	<i>System throughput</i>	Scalability
... manifested on the user’s interactive terminal...	Desktop PC	iPAQ	<i>Interaction platform</i>	Platform independence
... to initiate an operation effectively and efficiently...	General practitioner	Patient at home	<i>System’s target user</i>	Individualization
... from current location...	Office environment	Residential environment	<i>System’s context of use</i>	Ubiquity

Phases in NFRs analysis

- ☛ Analyze the design task
- ☛ Identify the issues
- ☛ Generate a mock-up
- ☛ Critique based on NFRs
- ☛ Scenario retooling
- ☛ Generate alternatives



An example scenario

- ☛ A user has just completed an order for several pharmaceuticals items. The on-line pharmacy store requests the user to specify payment details to process the transaction.
- ☛ No available system
- ☛ Commitment to universal access

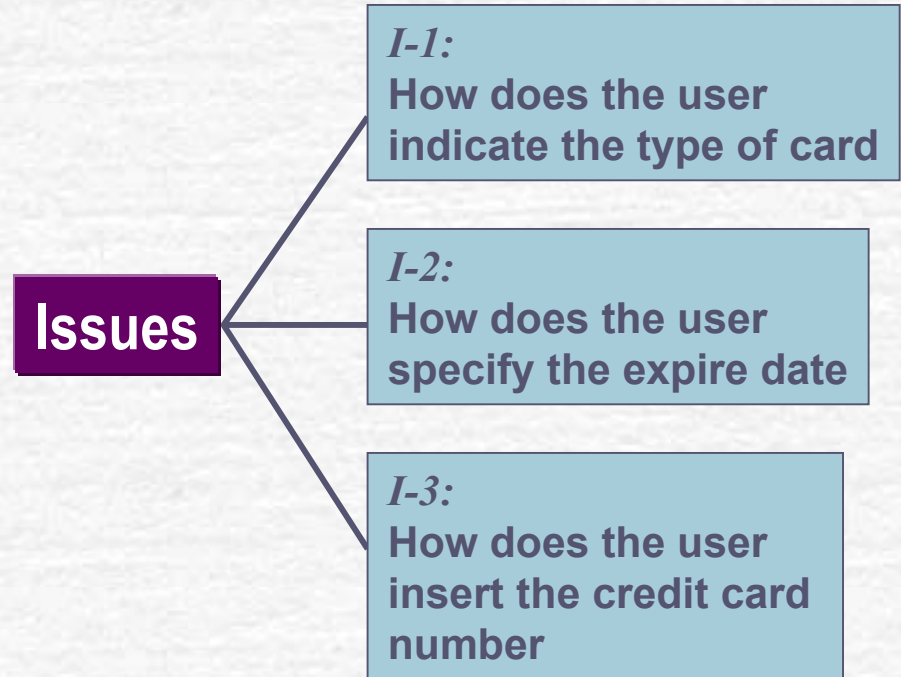
The design task

- ☞ Design the dialogue through which a user can enter information about his/her credit card
- ☞ Information to be entered includes:
 - Type of card
 - Card number
 - Expire data
 - User's name as printed on the card
 - Billing address information
 - etc

Identifying the issues

Issues raised:

- How does the user indicate the type of card?
- How does the user specify the expire data?
- How does the user insert his/her credit card number?



Generating a paper mock-up

Issues

I-1:
How does the user indicate the type of card

I-2:
How does the user specify the expire date

I-3:
How does the user insert the credit card number

Payment method

Name of card | ▾

Card number

9999999

Expire date

Selection of month | ▾

Selection of year | ▾

Card holder's name

XXXXXXXX

Command

Example of the artefact

Payment method:

Credit card number:

Expiration date:

Cardholder's name:
(as it appears on the card)

[continue](#)

Tentative design



For convenient ordering, enter your full credit card information. (This is completely safe--[here's why](#).) If you would rather call us with your credit card number, enter only the last five digits in the form below. After you place your order, call us at 1-800-drugstore (1-800-378-4786).

Payment method:	MasterCard	
Credit card number:	MasterCard Visa American Express Discover Diners Club	<input type="text"/>
Expiration date:		2001
Cardholder's name: (as it appears on the card)		<input type="text"/>

Billing Address Information:

Name:	<input type="text"/>
Address line 1:	<input type="text"/>
Address line 2: (optional)	<input type="text"/>
City:	<input type="text"/>
State:	Alabama
ZIP code:	<input type="text"/>
Phone:	<input type="text"/>

continue

Critique based on NFRs

- ✓ Ability to initiate movement on demand
- ✓ Ability to pull target
- ✓ Fine spatial control
- ✓ Eye-hand coordination

- ✓ Availability of fingertips as reliable contact site
- ✓ Competence in using keyboard

Size of VDU

The screenshot shows a credit card payment form with several annotations. A large blue oval encircles the 'Payment method' dropdown menu, which is currently open to show options: MasterCard, Visa, American Express, Discover (highlighted), and Diners Club. A smaller blue oval encircles the 'State' dropdown menu, which is currently set to 'Alabama'. A blue box on the left contains a list of NFRs, with lines pointing to the 'Payment method' and 'State' dropdowns. Another blue box below it contains 'Size of VDU' with a line pointing to the overall form area. At the top of the form are logos for VISA, MasterCard, Fraud Protection Guaranteed, AMERICAN EXPRESS, DISCOVER NOWUS, and Diners Club International. The text reads: 'For convenient ordering, enter your full credit card information. (This is completely safe--[here's why](#).) If you would rather call us with your credit card number, enter only the last five digits in the form below. After you place your order, call us at 1-800-drugstore (1-800-378-4786).' The form fields include: Payment method (dropdown), Credit card number (input), Expiration date (dropdown for year, currently 2001), Cardholder's name (input, with '(as it appears on the card)' below), Billing Address Information (Name, Address line 1, Address line 2 (optional), City, State (dropdown), ZIP code, and Phone), and a 'continue' button.

VISA MasterCard Fraud Protection Guaranteed AMERICAN EXPRESS DISCOVER NOWUS Diners Club International

For convenient ordering, enter your full credit card information. (This is completely safe--[here's why](#).) If you would rather call us with your credit card number, enter only the last five digits in the form below. After you place your order, call us at 1-800-drugstore (1-800-378-4786).

Payment method: MasterCard

Credit card number:

Expiration date: 2001

Cardholder's name:
(as it appears on the card)

Billing Address Information:

Name:

Address line 1:

Address line 2:
(optional)

City:

State: Alabama

ZIP code:

Phone:

continue

Scenario retooling

☞ Reformulate implicit assumptions

- How can the task be carried out with an alternative pointing device (e.g. a stylus of a palmtop computer) ?
- How can the task be performed in a public kiosk?
- How can the task be performed by a user with gross-temporal control familiar with switch-based interaction ?

☞ Retool scenario to suit NFRs

- Scenario addressing one or more NFRs

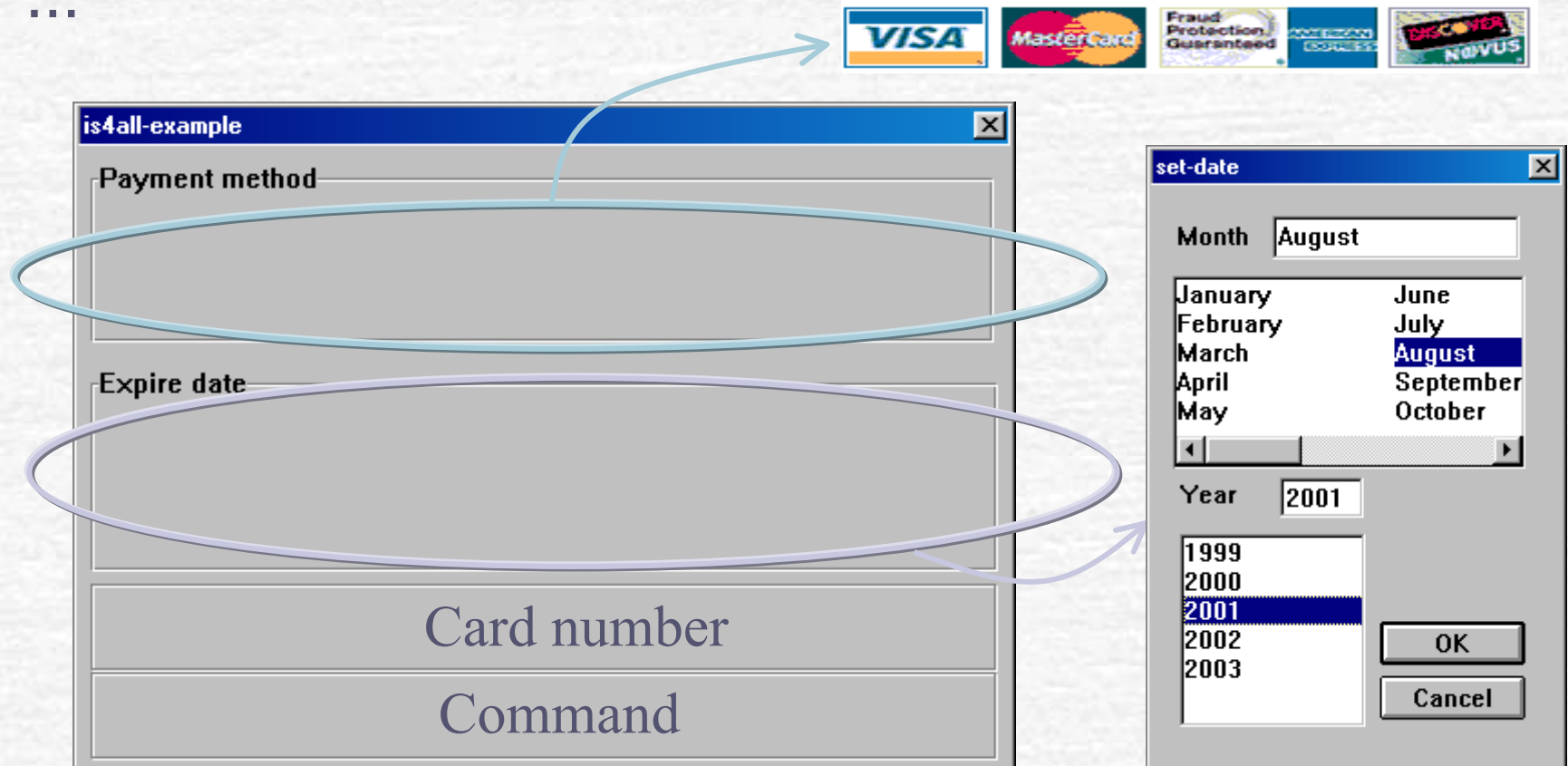
Scenario Retooling Matrix

- The system tasks should satisfy the following global constraints

Constraint	State		System Quality	Non-functional Requirement
	Initial	Desired		
... number of transactions per second...	10 tran/tions /second	10 ⁴ tran/tions / second	<i>System throughput</i>	Scalability
... manifested on the user's interactive terminal...	Desktop PC	iPAQ	<i>Interaction platform</i>	Platform independence
... to initiate an operation effectively and efficiently...	General practitioner	Patient at home	<i>System's target user</i>	Individualization
... from current location...	Office environment	Residential environment	<i>System's context of use</i>	Ubiquity

Generate alternatives

- Four logical groups
- Smaller display requirements
- ...



Option 1

Selection by pointing

set-date-2

Payment method

VISA **MASTERCARD** AMERICAN EXPRESS DISCOVER

Expire date

Month	September	January	April	July	October
		February	May	August	November
		March	June	September	December

Year


2001	1999	2000	2001	2002	200
------	------	------	-------------	------	-----

Card number

>> Continue Back

Option 1 (Cont.)

- Editing by selecting from a panel



The screenshot shows a dialog box titled "set-date-2" with a close button (X) in the top right corner. The dialog is divided into several sections:

- Payment method:** A group box containing four radio buttons: VISA, MASTERCARD, AMERICAN EXPRESS, and DISCOVER. None are selected.
- Expire date:** A section with two rows of input fields. The first row is labeled "Month" and contains a dropdown menu showing "September". To its right is a panel with a grid of month names: January, April, February, May, March, and June. The second row is labeled "Year" and contains a dropdown menu showing "2001". To its right is a panel with a grid of years: 1999, 2000, and 2001.
- Card number:** A text input field containing "0128" and a button with a right-pointing arrow (>>).
- Buttons:** A "Back" button is located at the bottom right of the dialog.

A red arrow points from the ">>" button to a small numeric keypad that is open over the year selection panel. The keypad has a grid of numbers from 0 to 9, with the number 8 highlighted in blue.

Alternative for motor-impaired

- Scanning is an option
- Group elements can be selected via manual or auto scanning

The screenshot shows a dialog box titled "set-date-2" with a blue title bar and a close button. It contains several sections:

- Payment method:** Four radio buttons for VISA, MASTERCARD, AMERICAN EXPRESS, and DISCOVER.
- Expire date:** A grid of month and year options. The month "September" is selected in a dropdown. A scanning overlay (a brown-bordered rectangle) highlights the month and year options. The year "2001" is selected in a dropdown.
- Card number:** A text field containing "0128" with a right arrow button to its right.
- Buttons:** "Continue" and "Back" buttons.

An orange arrow points from the "Continue" button in the dialog box to the "Continue" button in the keyboard overlay below.



NFRs implications

- NFRs imply design of alternative styles
- Styles should be implemented and made available to the run-time system to facilitate the designated NFRs
 - For each style develop suitable argumentation
 - Why does it exist ?
 - What issue does it support ?
 - When should it be initiated ?
 - Where is it implemented ?
 - How does it compare against competing styles ?
 - The above will determine
 - the conditions for initiating a style
 - the relationship between styles

Universal Access Assessment Workshop (UA²W)

Overview

Description of technique

Example on the WWW

Overview

- ☛ It is a process-oriented technique
- ☛ It assumes the availability of a tentative scenario such as those formulated in IS4ALL
- ☛ It combines several instruments for documenting design deliberations and outcomes

Problem being addressed

- The technique seeks to bring together early in the design phase as many stakeholders as possible to identify the type and scope of universal access requirements for a particular product or service

Device / technique used

- Two techniques used in combination or in sequence
 - Scenario screening
 - Growth scenarios

Outcomes

- ✓ Prime outcomes include
 - Universal access filters
 - The Universal Access Assessment Form (UA²F)
 - A designated set of growth scenarios
 - For each entry in the UA²F, the design team develop a corresponding "growth" scenario
 - The Universal Access Quality Matrix (UAQM)
 - All growth scenarios are finally consolidated and documented in a more abstract template referred to as the Universal Access Quality Matrix (UAQM).

Outcomes - The UA²F

☛ The form comprises two main parts

Task/artifact				<i>Properties of existing system</i>
Context of use				
Style				
Objective				
Functional description of prototype				<i>Properties of envisioned system</i>
Universal Access Issues	Id	Issue description	Growth Scenario	

Outcomes - The UAQM

Design Target	Quality attribute	Parameter	Argumentation
Filter 1	Attribute 1.1	Parameter 1.1.1	Narrative
		Parameter 1.1.2	
	Attribute 1.2		
	Attribute 1.n		
Filter n	Attribute n.1	Parameter n.1.1	
		Parameter n.1.j	
	Attribute n.i		

An example scenario

Microsoft FrontPage

File Edit View Insert Format Tools Table Frames Window Help

Normal (default font) Normal **B** *I*

Views

- Page
- Folders
- Reports
- Navigation
- Hyperlinks

D:\Projects\IS4ALL\Miscellaneous\IS4ALL Seminars\...

WARD-IN-HAND Reference scenario

Dr Fred is preparing for his morning patients in the ward of the hospital. To make use of his iPAQ to access the WARD-IN-HAND service, which was recently installed in the hospital. As part of the login procedure, Dr Fred selects the preferred language and then specifies the user name and password. For this purpose the system displays an on-screen keyboard which allows Dr Fred to type in text by selecting characters from a selection panel.

Normal HTML Preview 0 seconds over 28.8

New Page 1 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address D:\Pr Go Links Norton AntiVirus

Internet Explorer 15.15

Login:

En It De Es

Username:

Password:

Login Reset

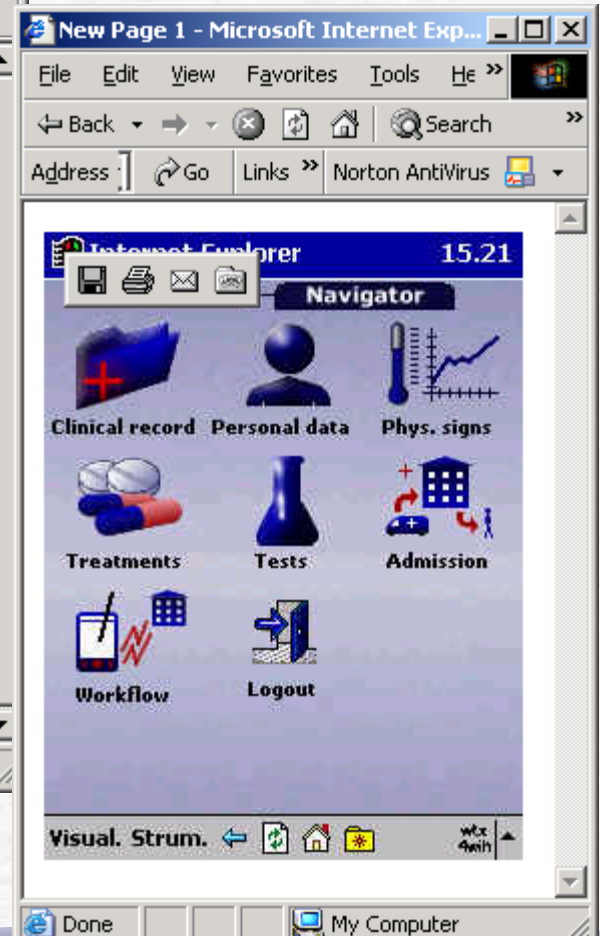
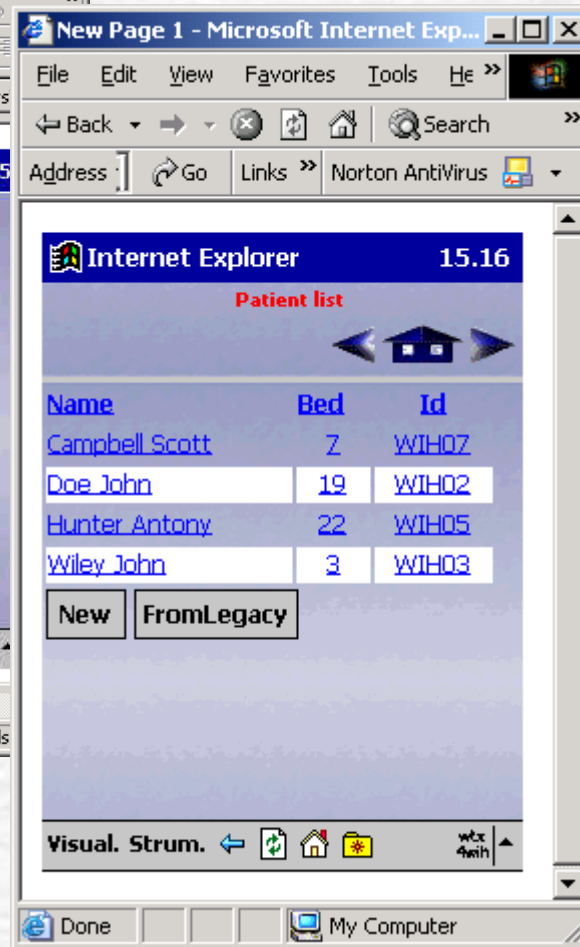
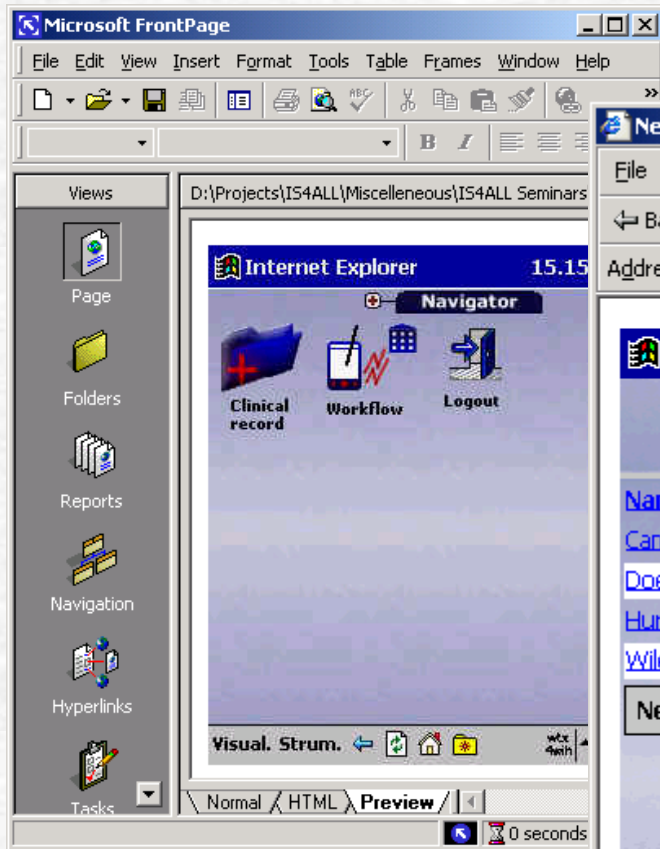
New Page 1 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address Go Links Norton AntiVirus

123	q	w	e	r	t	y	u	i	o	p	←
Tab	a	s	d	f	g	h	j	k	l	*	
Shift	z	x	c	v	b	n	m	;	'	←	
Ctrl	á	ú	@	&				,	.	!	?


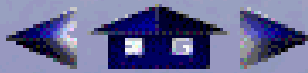
WARD-IN-HAND (Cont.)



Scenario screening

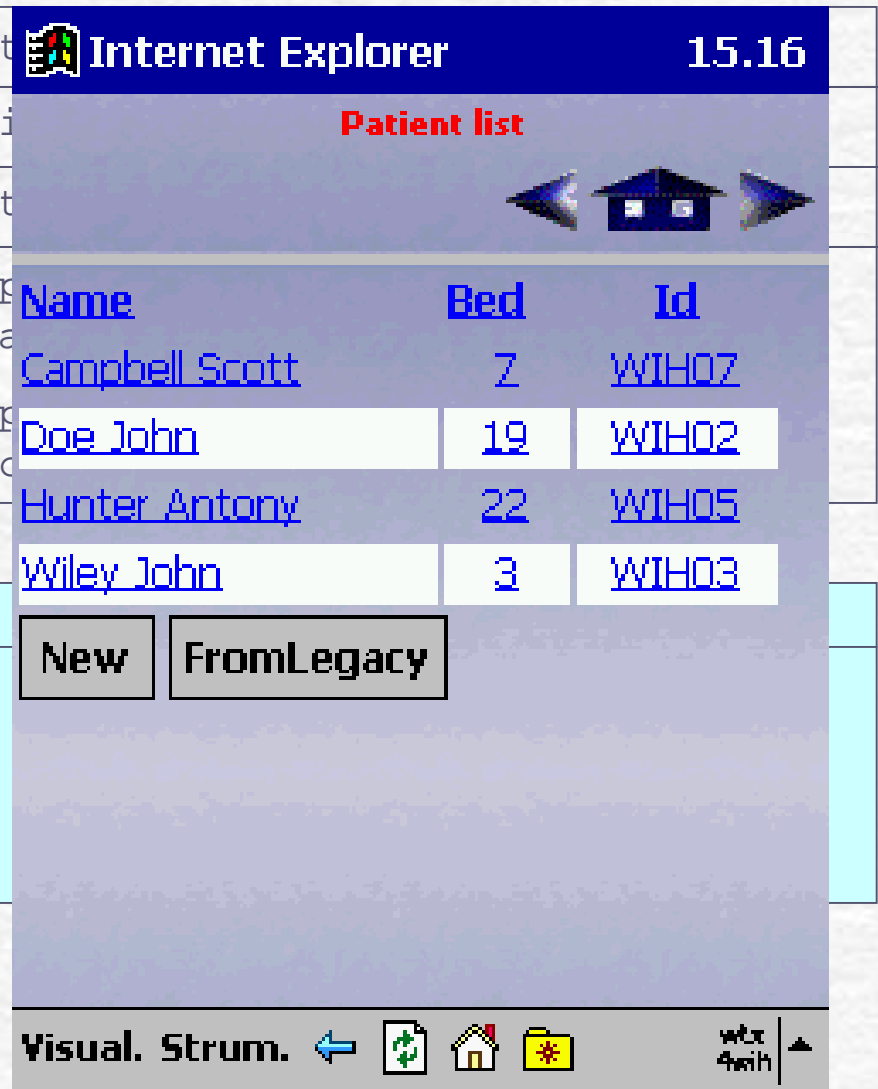
- ☛ Participants were asked to screen through the prototype to address the following questions (filters)
 - How can (relevant parts of) the system be accessed from outside the ward?
 - How can (relevant parts of) the system be refined to offer the service over another platform?
 - How can (relevant parts of) the system be accessed by a motor-impaired patient from his/her residence environment?

Completing the UA²F

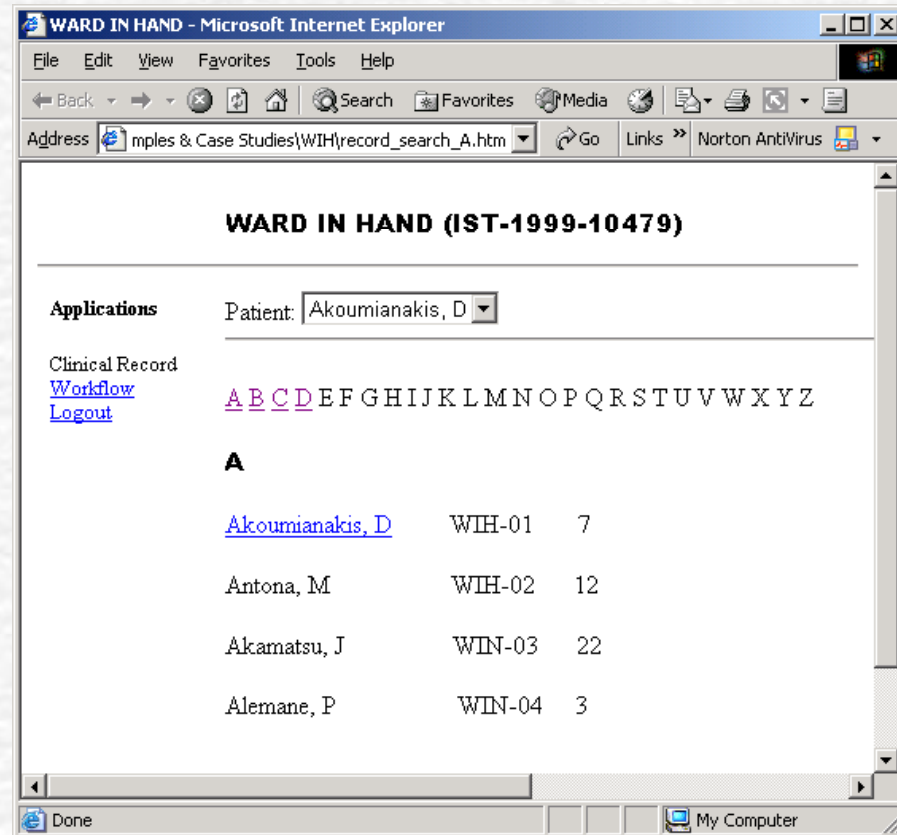
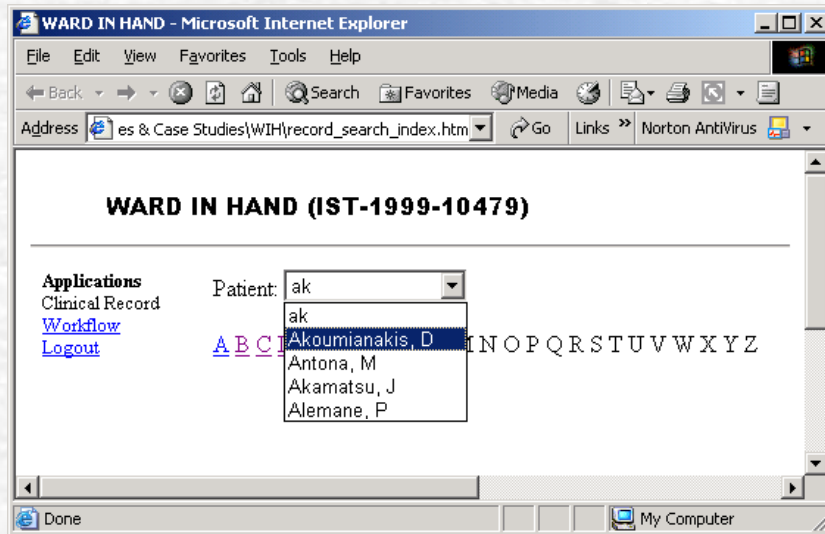
Task/artifact	Mock-up of search t	 Internet Explorer	15.16															
Context of use	The ward of a clini	Patient list																
Style	Current implementat																	
Objective	How can (relevant p from outside the wa	<table border="1"> <thead> <tr> <th><u>Name</u></th> <th><u>Bed</u></th> <th><u>Id</u></th> </tr> </thead> <tbody> <tr> <td><u>Campbell Scott</u></td> <td>7</td> <td><u>WIH07</u></td> </tr> <tr> <td><u>Doe John</u></td> <td>19</td> <td><u>WIH02</u></td> </tr> <tr> <td><u>Hunter Antony</u></td> <td>22</td> <td><u>WIH05</u></td> </tr> <tr> <td><u>Wiley John</u></td> <td>3</td> <td><u>WIH03</u></td> </tr> </tbody> </table>		<u>Name</u>	<u>Bed</u>	<u>Id</u>	<u>Campbell Scott</u>	7	<u>WIH07</u>	<u>Doe John</u>	19	<u>WIH02</u>	<u>Hunter Antony</u>	22	<u>WIH05</u>	<u>Wiley John</u>	3	<u>WIH03</u>
<u>Name</u>	<u>Bed</u>	<u>Id</u>																
<u>Campbell Scott</u>	7	<u>WIH07</u>																
<u>Doe John</u>	19	<u>WIH02</u>																
<u>Hunter Antony</u>	22	<u>WIH05</u>																
<u>Wiley John</u>	3	<u>WIH03</u>																
	How can (relevant p to offer the servic	<input type="button" value="New"/> <input type="button" value="FromLegacy"/>																

Universal Access Issues

Id	Issue description
<u>1</u>	Scalability to different platforms (GS 1)



GS 1 – HTML style



Screening

Task/artifact	Mock-up of entering medical data
Context of use	The patient's home
Style	Current implementation not available

Objective

How can (relevant parts of) the system be accessed from outside the ward?

How can (relevant parts of) the system be refined to offer the service over another platform?

How can (relevant parts of) the system be accessed by a motor-impaired patient from his/her residence environment?

Universal Access Issues

Id	Issue description	Priority	Constraint
1	Scalability to different platforms (GS 1)	High	WWW
2	Adaptability to different user groups (GS 2)	High	Motor-impaired
3	Context-sensitive (GS 2)	High	Ubiquitous access

GS 2 – Scanning HTML

The screenshot shows the AVANTI Browser window titled "WARD IN HAND". The browser's address bar is empty. The main content area displays a page titled "Akoumianakis, D. - Body temperature". The page includes a "Temperature:" label followed by a text input field containing "36.06". Below this, there is a "Date of measurement:" label followed by three input fields: the first is empty and highlighted with a red box, the second contains "01", and the third contains "2002".

On the left side of the browser, there is a "Links" panel with a tree view containing the following items:

- WARD IN HAND
- Pulse rate
- Blood pressure
- Body weight
- Glycemia
- Diuresis
- Stool volume
- Menses
- Back to index

Below the "Links" panel, there is a vertical list of blue underlined links: "Applications", "Pulse rate", "Blood pressure", "Body weight", "Glycemia", "Diuresis", "Stool volume", "Menses", and "Back to index".

Overlaid on the bottom right of the browser window is a virtual keyboard. The keyboard has a dark red background and includes a numeric keypad, a QWERTY layout, and function keys. The number "6" on the numeric keypad is highlighted with a green box. Navigation arrows (left, down, up, right) and a checkmark are visible above the keyboard.

At the bottom of the browser window, the status bar displays "© ICS-FORTH 1998" on the left and "Documento corrente: WARD IN HAND" in the center.

The UA²F - WIH prototype

Artefact:		Mock-up listing all the tests ordered for the patient	
Functional Unit:		Ward of the clinic	
Style: Currently the system runs on an iPAQ			
The style is depicted in the mock up shown in the following figure			
Objectives:			
We would like to make the service accessible over the Web for authorised users.			
Functional Description Overview:			
No change			
Universal Access Issues:			
Issue Id.	Issue Description	Priority (H/M/L)	Constraint
1	Adaptability to different user groups	H	Blind, motor impaired and able-bodied users
2	Scalability to different platforms	H	Desktop, PDAs and Kiosks
3	Context-sensitive	H	Ubiquitous
Claims:			
<u>Growth scenario 1</u>	How can the task be performed over the Web		
<u>Growth scenario 2</u>	How can the task be performed using an alternative interaction technique such as scanning, suitable for users with motor impairments		
<u>Growth scenario 3</u>	How can the task be performed through an auditory input modality		
Constraints / Dependencies:			
Not known yet			
Functional / Operational Assessment: Not yet available			

The UAQM

Design Target	Quality attribute	Parameter	Argumentation
Adaptation	... to users (individualization)	Doctors	
		Paramedics	
		Patients (with disabilities)	
	... to platforms (platform independence)	... desktop	How can (relevant parts of) the system be accessed from outside the ward?
... palm top		How can (relevant parts of) the system be refined to offer the service over another platform?	

Lessons learnt

- ☞ The UA²W requires planning and commitment
 - One UA²W is typically devoted to screening
 - One UA²W is devoted to compiling growth scenarios
- ☞ Success is subject to
 - Organizer's preparation
 - Choice of reference scenario
 - Participants familiarization with the instruments
- ☞ Tangible benefits

WCAG Audit: The case of D4ALLnet

Application of the method during
the development process

WCAG By Example

- W3C-WAI Compliance: The problem to be addressed
- Development considerations
- Web development process
- Overview
- Accessibility features into the D4ALLnet portal

W3C-WAI Compliance

- 2 sets of standards for accessibility compliance:
 - Web Content Accessibility Guidelines 1.0 from the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C)
 - Section 508
 - De facto standards are compatible but not identical
- Increased number of portals claiming compliance with W3C – WAI Level A
 - Do not meet many priority 2 & 3 checkpoints



Development Considerations

Time and cost considerations

- compliance to WAI-AAA should not add significantly to development cost
- accessibility depends on a variety of factors
 - complexity of design
 - use of tables
 - separation of content from presentation
- Proper use of templates, and cascading style sheets

Implications on the web development process

- limitations of authoring tools, conflicts between usability and accessibility, training of developers and funding
- proper and accessible HTML is not always developed

Different “interpretations” of WAI guidelines

- “Translation” of WAI general guidelines into web development teams

Web development process

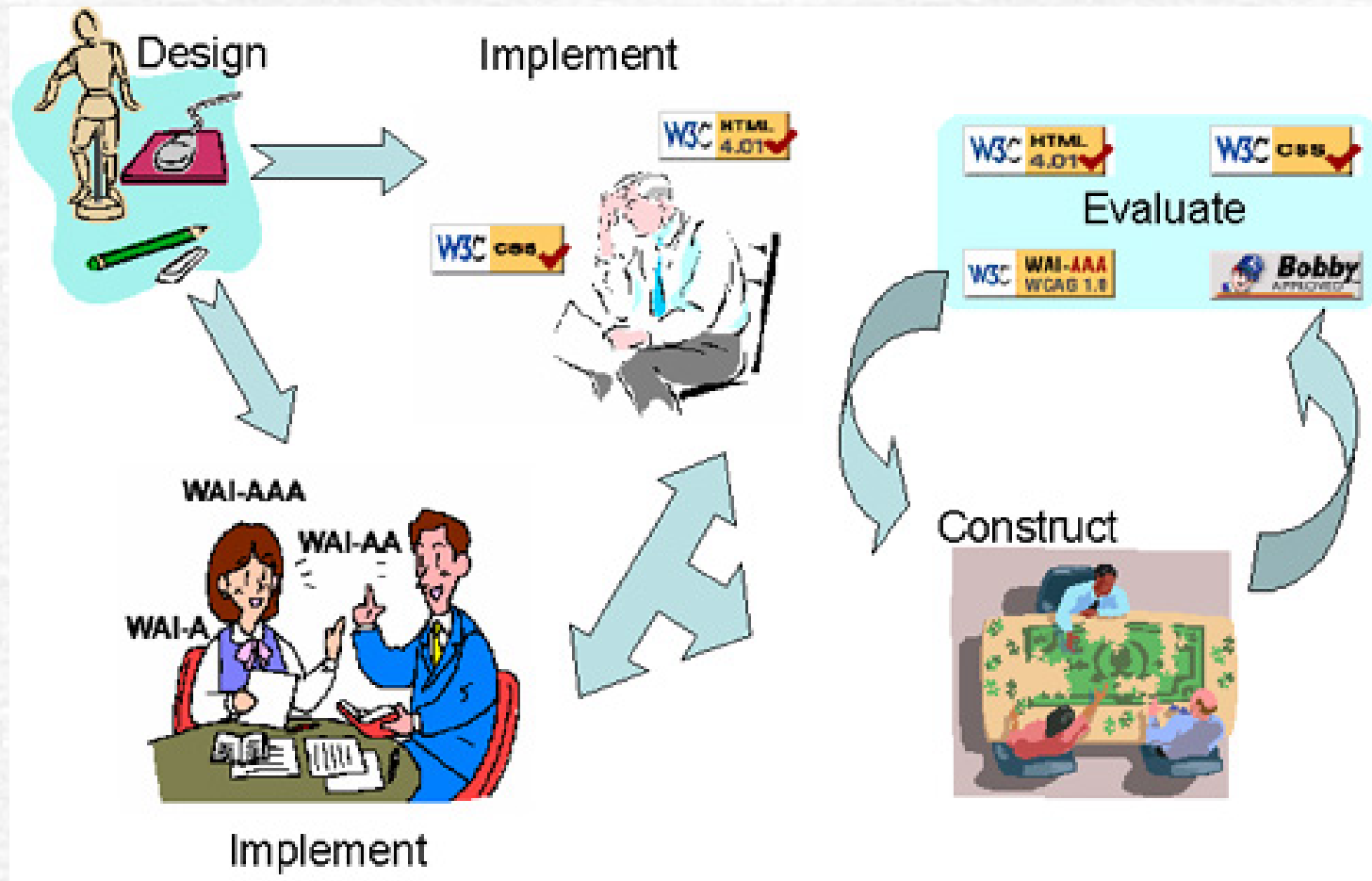
- Portal design
- Template development with respect to accessibility
- Navigation Issues
- Separate content from presentation
- Check the template's accessibility

Overview

- ☞ Through the D4ALLnet portal, the knowledge resources are available to all actors involved
- ☞ Interaction through a common platform
 - provision of fully integrated applications
 - customizable Web-based interface
 - role-based access to information
- ☞ Implementation
 - Special Interest Groups (SIGs)
 - accessible to disabled users, following the principles of Design for All (DfA)
- ☞ Personalization features

Accessibility in D4ALLnet (1/4)

- The process that matters!



Accessibility in D4ALLnet (2/4)

Compliance

- Standard version: W3C – WAI, Support Level: A
- “More accessible version”: W3C – WAI, Support Level: AAA

Supported features

- Quick access links
- Tab navigation
- Manual update of chat window
- Printer friendly version where necessary

Accessibility in D4ALLnet (3/4)

- Seeking to achieve WAI-AAA compliance?
- Provide a reflection on how the guidelines can be realised within a web development process through suitable constructs and specification facilities

1.1 Provide a text equivalent for every non-text element (e.g., via "alt", "longdesc", or in element content).

The screenshot shows the D4ALLnet website. At the top is a blue header with the logo 'D4ALLnet' and a text box containing 'D4ALLnet (Design for All Network)'. Below the header is a navigation menu with links: Home, About, What's new, myProfile, Sign Out. The main content area displays a list of messages with columns for 'Subject', 'Status', and 'Alt text on every image'. The 'Status' column contains icons: a minus sign, a minus sign, a green checkmark, and a green checkmark. The 'Alt text on every image' column contains a 'read' button. Red arrows point from the text 'Alt text on every image' to the logo and the 'read' button.

Subject	Status	Alt text on every image
<input type="checkbox"/> Examples of policy activi...	-	
<input type="checkbox"/> Public Procurement Policy	-	
<input type="checkbox"/> New idea for the introduc...	✓	
<input type="checkbox"/> CoE policy plans needed	✓	

Viewing messages: 1 - 4 (Total 4)

read

Accessibility in D4ALLnet (4/4)

Templates evaluation in every step

- **Evaluation Tools**

- www.w3.org/WAI/ER/existingtools.html#Evaluation

- Can spot a large number of errors at early stages of development
 - Provide accessibility report

- **Combination of manual and automatic checks**

- <http://validator.w3.org/>