

# Noldus

Information Technology

An abstract graphic featuring several overlapping circles in orange, yellow, green, purple, and blue. A horizontal band with a blurred, multi-colored background (orange, yellow, green, purple, blue) runs across the middle of the image, partially obscured by the circles.

## **The Observer XT**

**Computer-aided Usability Study  
RusCHI, Moscow**

**Maurits J. Lenting, M.Sc.  
Thursday, 02 November 2006**

# Overview

- **Introduction - Usability**
- **Why The Observer XT?**
- **How to use The Observer XT**
  - 1. Choose research/observation set-up**
  - 2. Prepare The Observer XT**
  - 3. Data Collection**
  - 4. Synchronize Data**
  - 5. Data Analysis and Output**
- **Live demonstration & applications**
- **Question time**

# **Company Profile Noldus**

- **Developer of professional software and instrumentation and services for behavioral research**
- **Founded in 1989 by Dr. L.P.J.J. Noldus**
- **Customers in >75 countries**
- **Installed at >3500 organizations**
- **80+ employees**

A world map illustrating the global distribution of Noldus offices and distributors. Blue squares represent Noldus offices, and red squares represent distributors. The map shows a high concentration of offices in North America and Europe, with distributors spread across Asia, Africa, and South America.

Location Type	Region	Count
Noldus office	North America	7
Noldus office	Europe	10
Distributor	South America	1
Distributor	Africa	1
Distributor	Asia	15
Distributor	Oceania	1
Distributor	Other	1

# Product Group

## *Automated Observation*

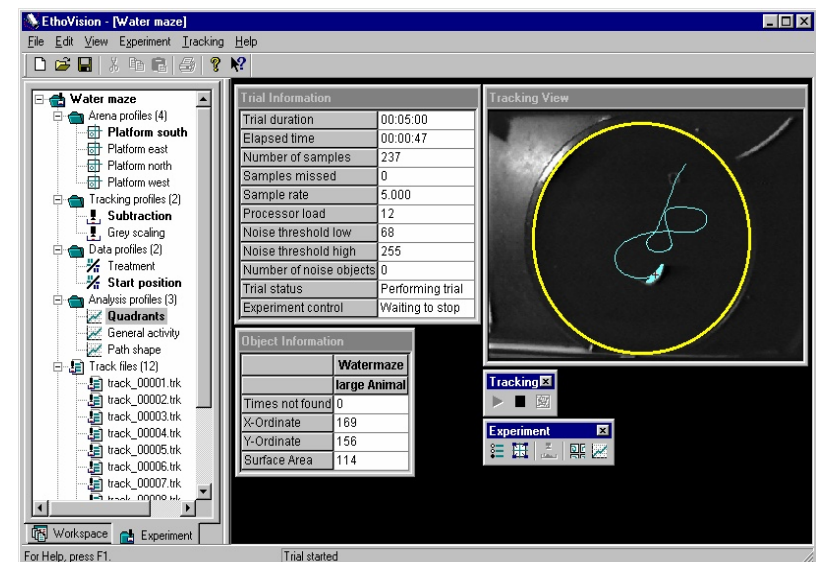
### Description

**Systems for movement tracking and complete automation of behavioral experiments**

**Based on digital image processing and pattern recognition technology**

### Products

**EthoVision Basic, Pro, Color-Pro and XT**



# Product Group *Direct Observation*

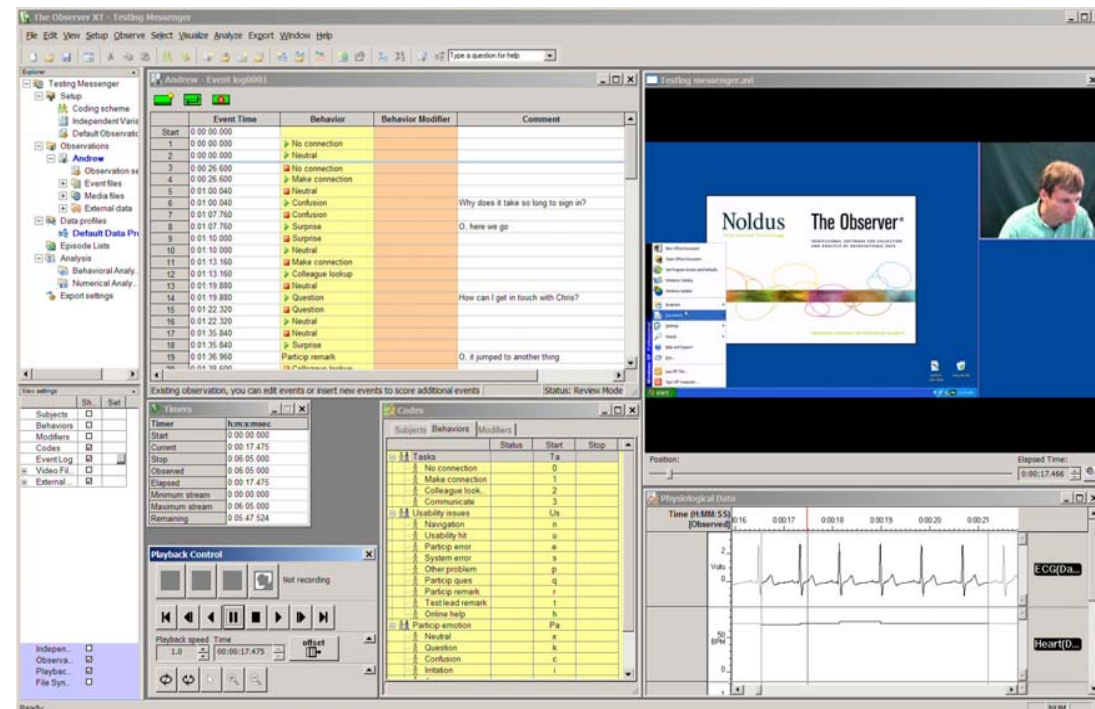
## Description

**Systems for computer-aided recording and analysis of human or animal behavior, based on manual data entry by a human observer**

## Products

**The Observer XT**

**Base, Mobile, Video,  
External Data Module,  
Screen Capture Module**





# Selected Clients

## Electronics

Hewlett-Packard  
Intel  
Philips  
Samsung  
Siemens

## Software

Ariba  
Symantec  
Oracle  
Microsoft  
PeopleSoft  
Symantec  
Huawei / Futurewei  
SAP  
Infosys

## Telecom

AT&T  
Bell Atlantic  
Deutsche Telekom  
Nokia  
Ericsson

## Automotive

BMW  
DaimlerChrysler  
Nissan  
Rover  
Toyota  
Volvo

## Aerospace

BAE Systems  
Boeing  
Eurocontrol  
Lockheed Martin  
Matra BAe Dynamics  
NASA  
Thales

## Transportation

Alstom  
KLM  
SNCF

## Consulting

American Management Systems  
Accenture  
TNO Human Factors  
Usercentric Design

## Information / Finance

America Online  
Barclays  
Dow Jones  
NatWest  
Rabobank  
Statistics Netherlands  
U.S. Bureau of Labor Statistics  
U.S. Bureau of the Census  
Yahoo!

## Consumer Products

Unilever  
Herman Miller  
MacDonalds

# Noldus

Information Technology

## The Observer XT

The NeXT generation of observation software

**Maurits J. Lenting, M.Sc.**

**Thursday, 02 November 2006**

**Usability**



# Usability Testing

**Usability testing** gives you the tools to improve the quality and user friendliness of your products

- interaction between a product (software) and a potential user
- objective data about your product
- Measuring effectiveness, efficiency, satisfaction in relation to well-defined tasks
  
- Productivity tools, office applications
  - *time is money*

# User experience research

**User Experience** testing gives you the tools to improve the quality and user friendliness of your products

- interaction between a product (software) and a potential user
- objective data about your product
- Measuring complete user experience, emotion, fun, excitement, trust
- Consumer products, games, learning systems
  - *fun* is money

# Usability Testing

**Usability / User experience testing has its bottlenecks and problems:**

- **Time-pressure -> labor-intensive**
- **Video and audio must be available quickly**
- **Tools are only used when they are easy to set up**
- **Tools need to shorten the analysis / reporting time & increase information availability**

# Overview

- **Introduction - Usability**
- **Why The Observer XT?**
- **How to use The Observer XT**
  - 1. Choose research/observation set-up**
  - 2. Prepare The Observer XT**
  - 3. Data Collection**
  - 4. Synchronize Data**
  - 5. Data Analysis and Output**
- **Live demonstration & hands-on**
- **Question time**

# Demonstration

**Traditional**  
**Pen and paper**

*versus*

**Automated**  
**The Observer**



**Usability ?**

# **Manual Observations: In the past**

- watching** the behavior of his subjects
- writes** his observations down on paper
- using a clock** to have time information.

## **Disadvantages:**

- **Subjective observations (no fixed coding scheme)**
- **When person is writing he cannot look at his subjects**
- **No ways to check if data was correct (no review)**
- **Very labor intensive (because data later needs to be transferred to computer, which takes time and can cause mistakes)**
- **No integration of physiological/external signals**

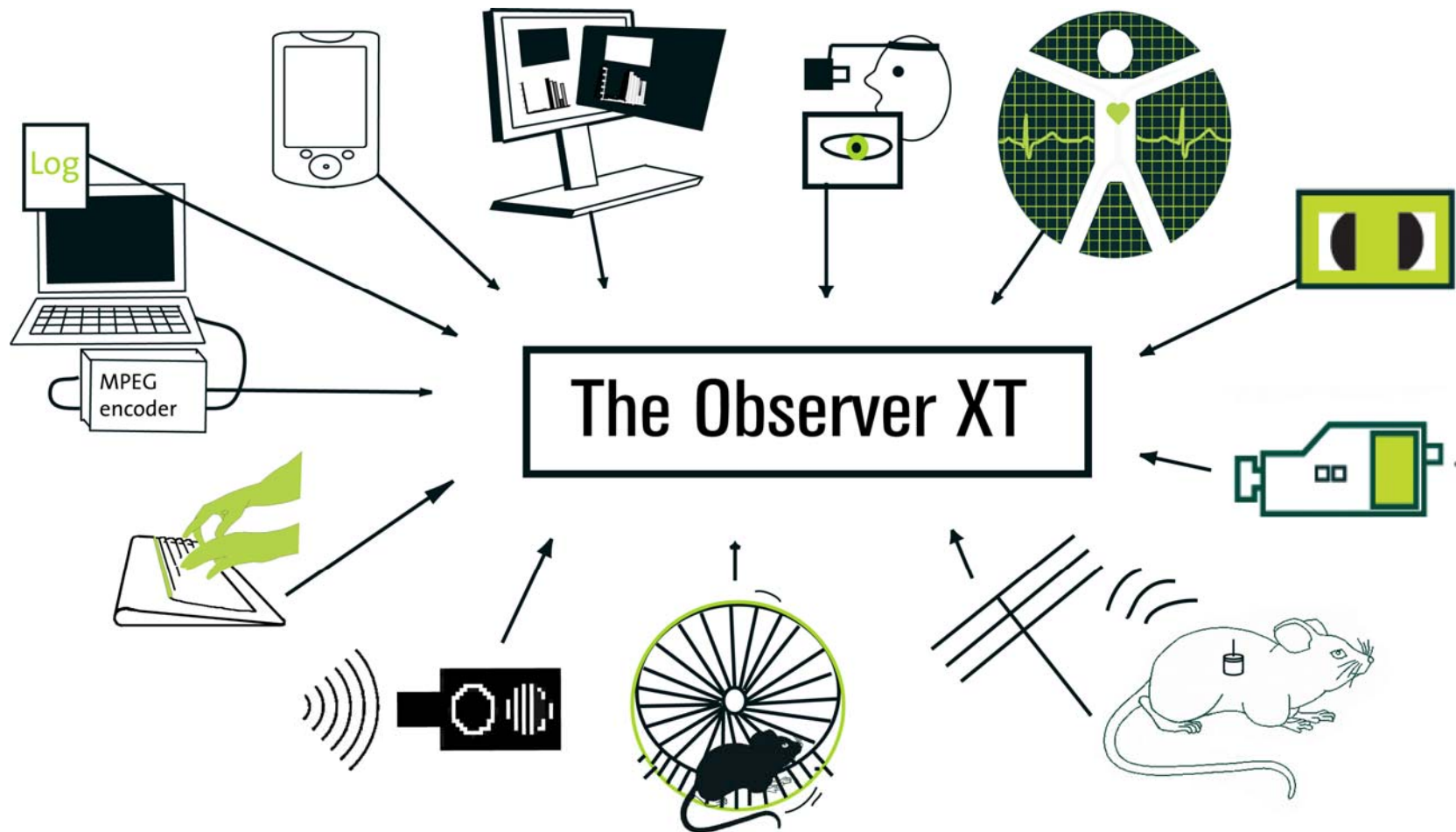


# **Solution: The Observer XT**

**A coding scheme is made in which behaviors are given a keyboard key. During observation, just press the keys corresponding to the behaviors.**

**-The Observer XT allows you to synchronize video files, physiological data and behavioral data, the only program in the world that can do this!**

# External data co-acquisition



**Synchronize all data !**

# **The Observer XT, 3 versions**

## **Base:**

**allows **live** scoring using a desktop computer or a notebook**

## **Mobile:**

**allows easy scoring of data **in the field** using a handheld computer (Palmtop or Psion Workabout Pro), **live** scoring only**

## **Video:**

**Data-files can be **linked to video**. For analyzing and re-analyzing multiple videos in detail, with **search functions** and **automatic video editing**.**

# **Why not an automatic system?**

**Progress is made, BUT we want **no mistakes** !**

**Some behaviors are too difficult to 'see' by an automatic system.**

**→ Thus a human observer is still necessary.**

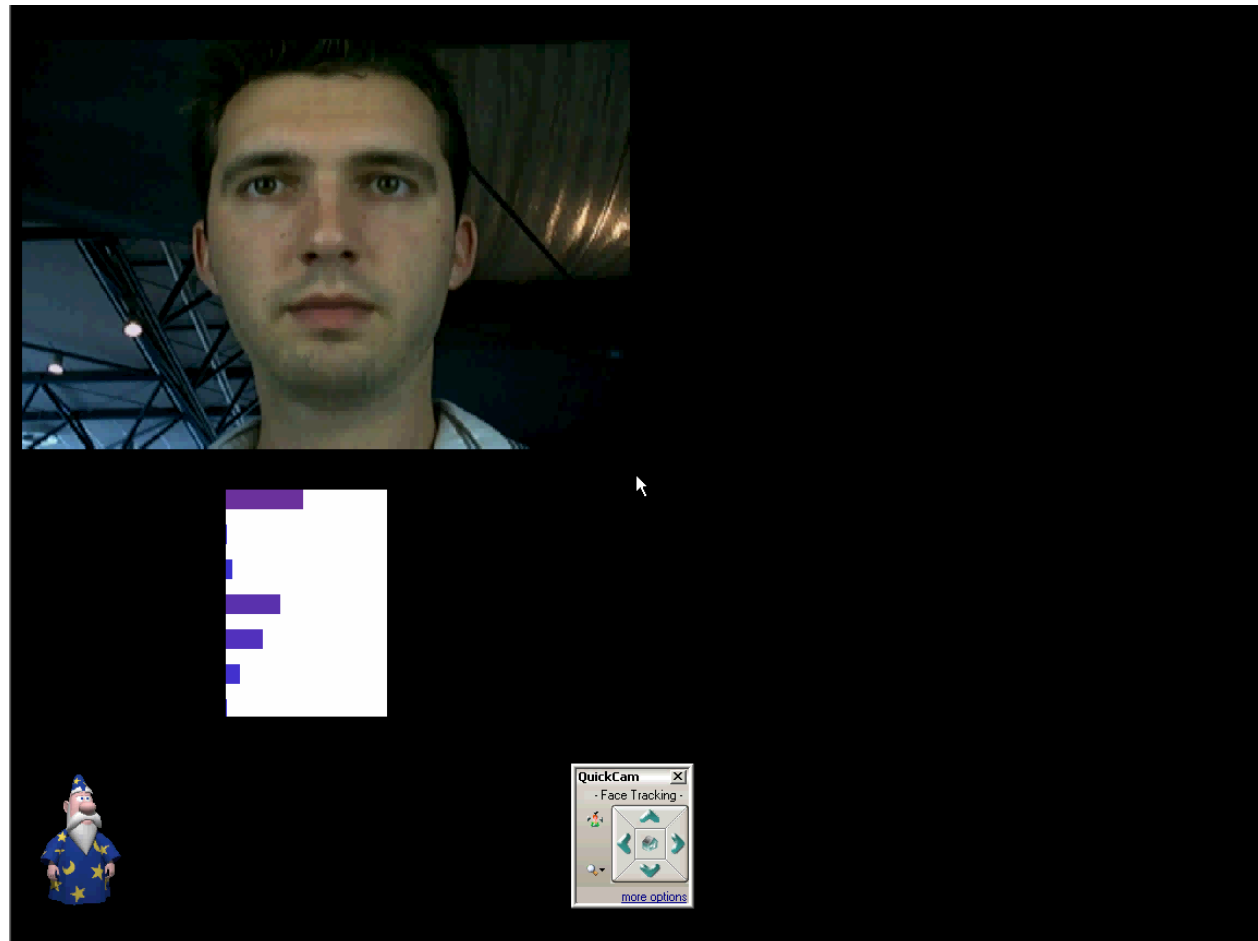
**Examples of these difficult behaviors:**

- **Mood of a person: happy or sad**
- **Meeting of two subjects: friendly or aggressive**
- **When performing a test: mistake made, yes or no**
- **Observations in a group: is every person participating?**

# Why not an automatic system?

## Example: New development: FACE READER

- **Mood of a person:  
happy or sad  
→ still difficult to  
calibrate cross-  
cultural faces and  
expressions**



# Overview

- **Introduction**
- **Why The Observer XT?**
- **How to use The Observer XT**
  - 1. Choose research/observation set-up**
  - 2. Prepare The Observer XT**
  - 3. Data Collection**
  - 4. Synchronize Data**
  - 5. Data Analysis and Output**
- **Live demonstration & applications**
- **Question time**



# How to use The Observer XT

## Five steps

**1**

**Choose  
Setup**

**2**

**Create  
Coding  
Scheme**



**3**

**Collect  
Data**

**4**

**Import  
external  
data**

**5**

**Select +  
Analyze  
Data**

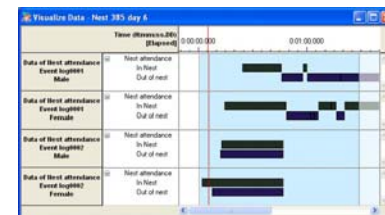


Support External Data

1. Select one or more data set rows and drag-and-drop to the Independent Variable List.  
4. For automatic synchronization check if synchronization data sets are automatically detected.  
5. For manual synchronization change the start time and/or stop time.  
2. Press Import to finish the processing of external data.

#	Data Set Name	Filename	Start Date/Time	Stop Date/Time	Type
1	Interact	Interact.MCF	2004-10-20 00:00:00	2004-10-20 00:00:00	multitrace
2	Drayage	Drayage.MCF	2004-10-20 00:00:00	2004-10-20 00:00:00	multitrace
3	Drayage	Drayage.MCF	2004-10-20 00:00:00	2004-10-20 00:00:00	multitrace
4	Abdomen	Abdomen.MCF	2004-10-20 00:00:00	2004-10-20 00:00:00	multitrace
5	Abdomen	Abdomen.MCF	2004-10-20 00:00:00	2004-10-20 00:00:00	multitrace
6	Chest	Chest.MCF	2004-10-20 00:00:00	2004-10-20 00:00:00	multitrace
7	Abdomen	Abdomen.MCF	2004-10-20 00:00:00	2004-10-20 00:00:00	multitrace
8	Paw	Paw.MCF	2004-10-20 00:00:00	2004-10-20 00:00:00	multitrace
9	Direction	Direction.MCF	2004-10-20 00:00:00	2004-10-20 00:00:00	multitrace
10	Swimming	Swimming.MCF	2004-10-20 00:00:00	2004-10-20 00:00:00	multitrace

Synchronization settings: Import Cancel



# How to use The Observer XT

## STEP 1 - Choose setup



**Observing live**

# How to use The Observer XT

## STEP 1 - Choose setup



**Observing with video  
signal**

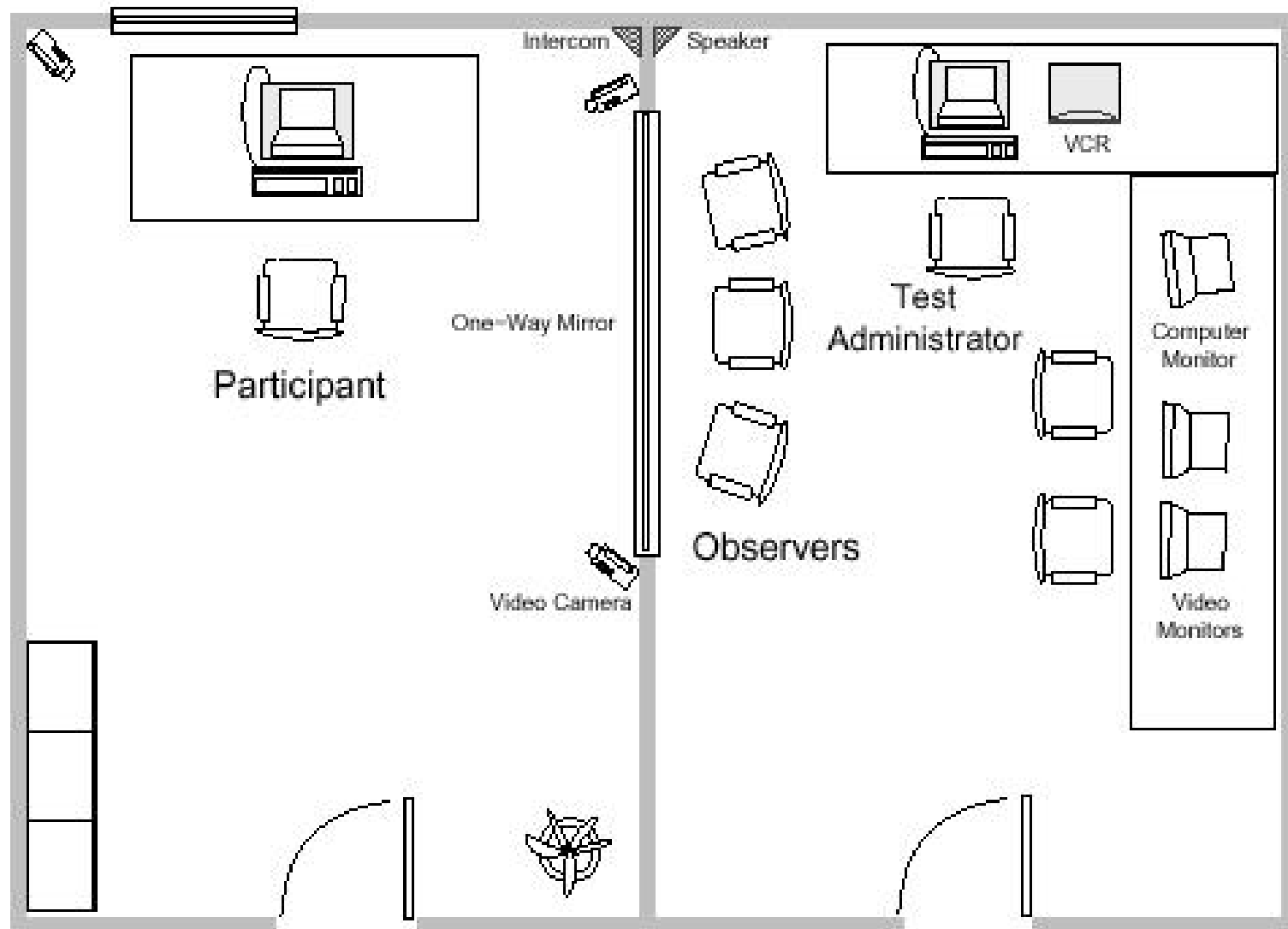
**Step 1**



**Connect video camera to PC**



# Usability lab (floor plan)





# Usability lab

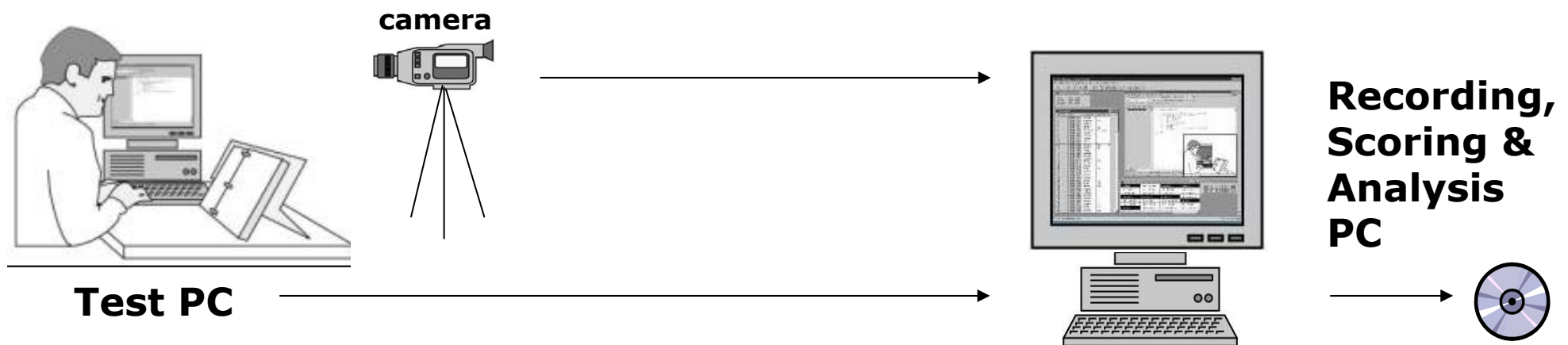


# Usability lab





# Digital Screen Capture



- High quality: read exactly what you've captured
- Integrate Facial expressions.
- Automatic synchronization with event log
- ***No software has to be installed on test PC!***

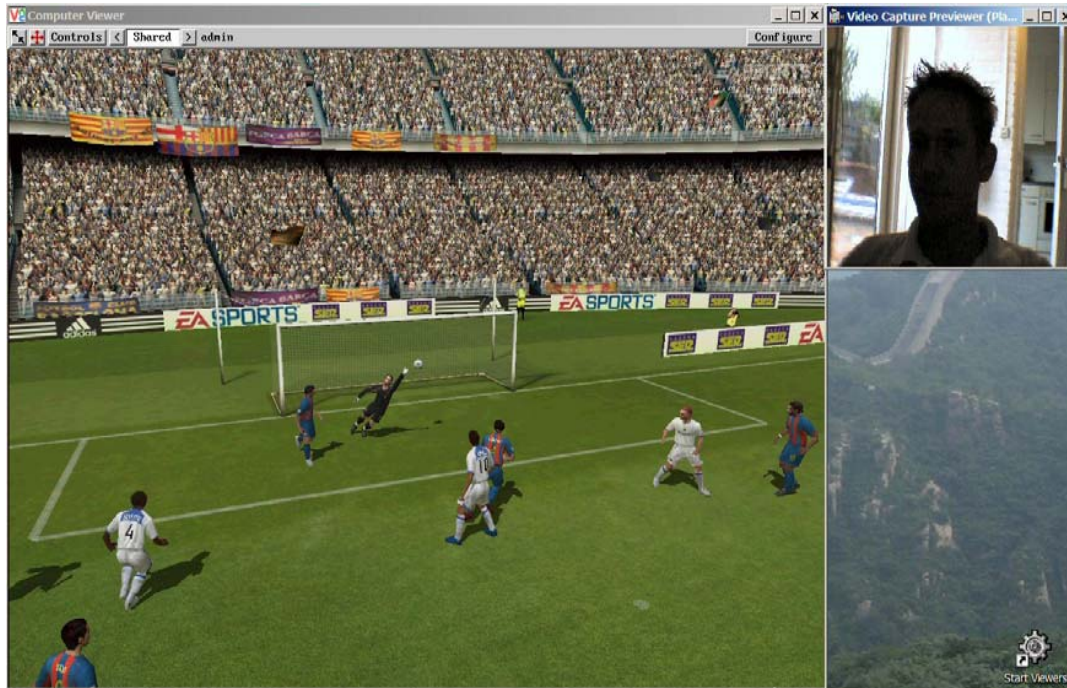
## Screen Capture Module



**Test-User Interface in high resolution!**

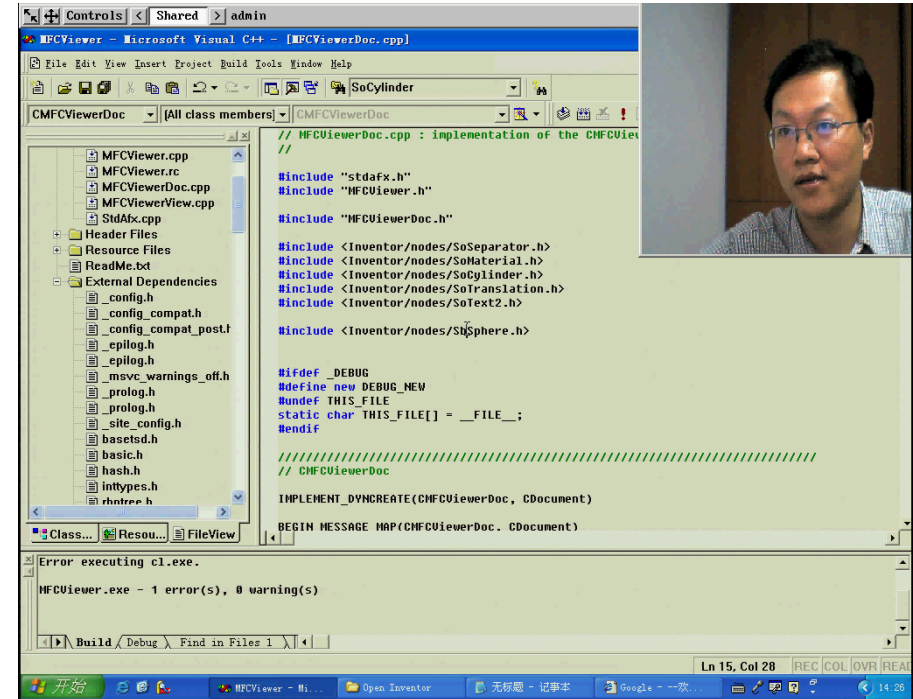


# SCM: Whatever UI you want



Fifa 2005

- Game play
- Developers' work



IEL, CAS

- Picture next to picture
- Picture-in-picture
- Multiple video
- Etc...

# Portable usability lab



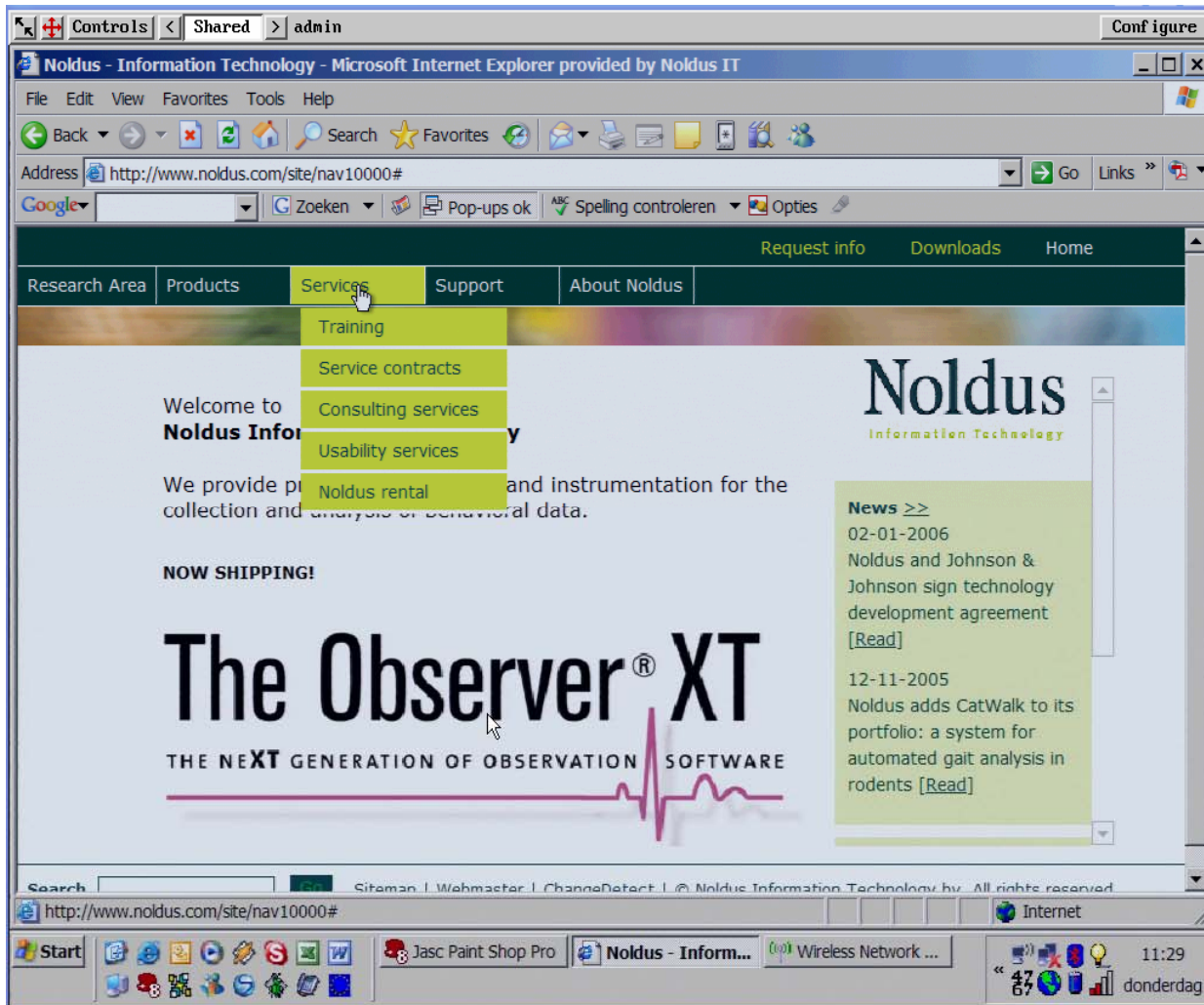


# Portable observation lab



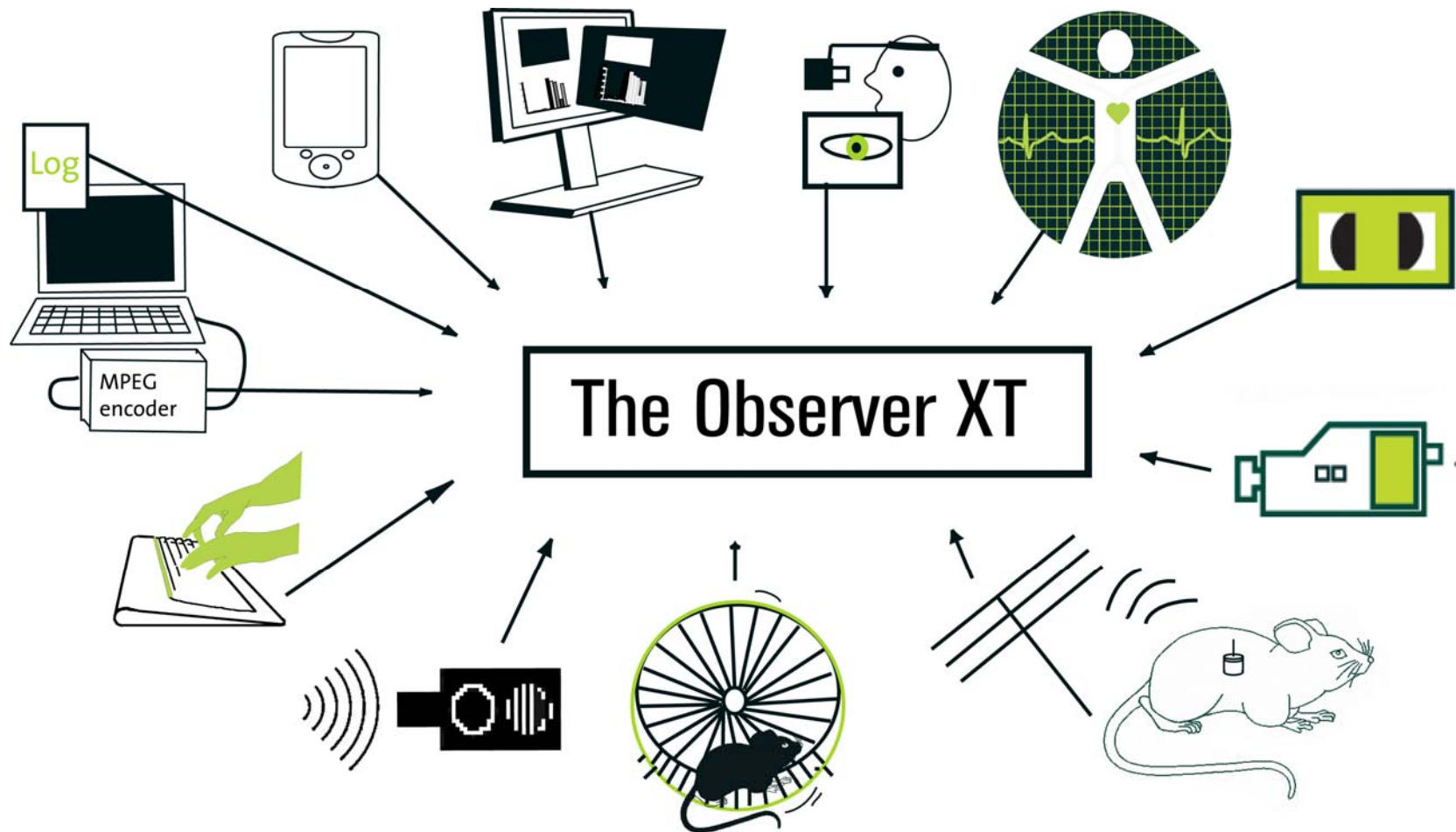
**Step 1**

# Screen Capture setup





# External data co-acquisition



# **External data co-acquisition**

**Choose, set up and prepare other acquisition systems like:**

- Physiological equipment (heart beat, transpiration, blood pressure, etc)**
- Eyetracker**
- Automatic user-action logger (mouse clicks, keystrokes)**
- Any other sensor with data-output, etc.**

# Overview

- **Introduction**
- **Why The Observer XT?**
- **How to use The Observer XT**
  - 1. Choose research/observation set-up**
  - 2. Prepare The Observer XT**
  - 3. Data Collection**
  - 4. Synchronize Data**
  - 5. Data Analysis and Output**
- **Live demonstration & applications**
- **Question time**

# **How to use The Observer XT**

## **STEP 2 - Prepare The Observer**

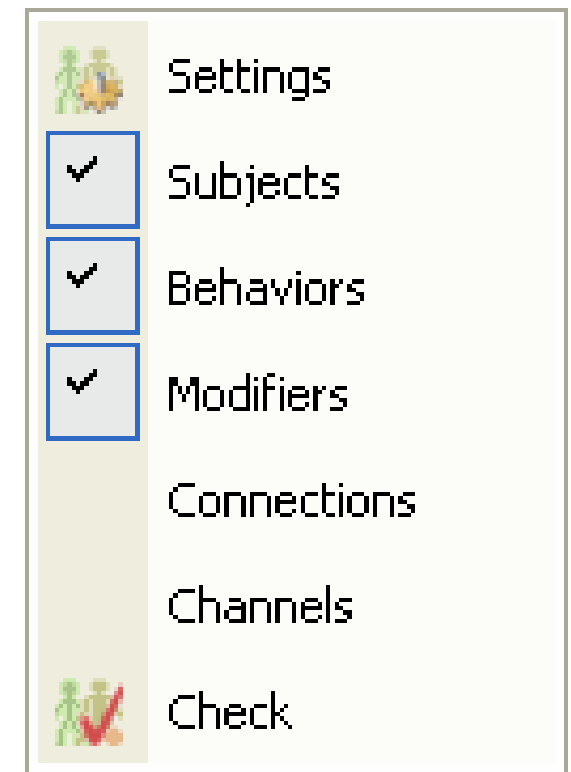
**Configure all settings according to your needs.**

**What are we going to score (coding scheme)?**



# Coding scheme

- Keys**
- **Subjects** (names of subjects)
  - **Behaviors** (actions that you want to observe)
  - **Modifiers** (specify subjects and behaviors more precisely)
  - **Check coding scheme**
  - **Connections**
  - **Independent variables**





# Subjects

**Subjects are individuals in a project that can initiate a behavior**

## Example

- Person performing the test
- Children at play
- Product/software giving 'response'

Subjects									
Subject Name	Description		Modifiers	Channels					
 Suzanne		s							
 Erin		e							
<a href="#">Click here to add new el...</a>									



# Behavioral Class

- To score behaviors that occur simultaneously, you must define two or more behavioral groups
- All state behaviors **in a behavioral class** must be mutually exclusive and exhaustive

## Behavioral Class

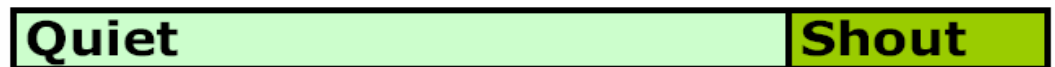
### Locomotion



### Facial expression



### Vocalization



Time (s)

# Modifiers

## Score Modifier to:

- specify a behavior more precisely
- limit the number of behaviors

## Examples:

- The part of the program the user is in
- The volume in which the person is talking

# Simple coding scheme

**Example: logging user remarks and problems encountered while working on a task**

<b>Task</b>	<b>Action</b>	<b>Communication</b>
<b>Task 1</b>	<b>Problem</b>	<b>Comment</b>
<b>Task 2</b>	<b>Error</b>	<b>Question</b>
<b>Task 3</b>	<b>Usability hit</b>	<b>Vocalization (sigh, etc.)</b>
<b>Task 4</b>		
<b>Task 5</b>		
<b>Task 6</b>		

# Complex coding scheme

## Task intention coding (partial)

(Dzida et al.)

### Prepare

**Object to be treated**

**Suitable tools**

**Goal to be defined**

### Opportunism

**Adapt result**

**Ad-hoc search**

**Prevent damage**

### System action

**Alert**

**Response**

### Execute

**Command**

**Data input**

### Feedback

**Offer interaction element**

**Visual guidance**

**Offer context**

**Present result**

**Prompt user**

### User evaluation

**Check result**

**Stop**

**Comment**

**Retry**

**Stress**

### Mood

**Positive**

**Negative**

**Neutral**

# Example of Coding scheme

## Usability test

### **Behavioral Class:**

#### **Action**

Scroll

Typing

Reading

Mouse click

Other Action

### **Modifier Class:**

#### **Location**

Main screen

Address bar

Help menu

### **Behavioral Class:**

#### **Facial expression**

Happy

Neutral

Confused

Other Facial

### **Behavioral Class:**

#### **Events**

Error

Usability hit

### **Modifier Class:**

#### **Mouse Location**

Back button

Close button

Undo Button

Other



# Independent Variable List

- Independent or user-defined variables (age, gender, tested product, IT-experience)
- Media files
- External data files
- System variables (Start Time, Stop Time, Duration)

Label	Description	Type	Format	Predefined Values	Scope	Value Update
Product tested		Text				
Participant name		Text				
Participant gender		Text		Male; Female		
Testing messenger.avi		File reference				
Event Log Data Set		Event Log Data Set				
Compulsory		Compulsory				

user defined variable	user defined variable	user defined variable	media file 1
Windows Messenger	Andrew	Male	...Testing messenger.avi

# Overview

- **Introduction**
- **Why The Observer XT?**
- **How to use The Observer XT**
  - 1. Choose research/observation set-up**
  - 2. Prepare The Observer XT**
  - 3. Data Collection**
  - 4. Synchronize Data**
  - 5. Data Analysis and Output**
- **Live demonstration & applications**
- **Question time**

# Score data and adjust the coding scheme

**1**  
**Choose Setup**

**2**  
**Define a Coding scheme**



**3**  
**Collect Data**

**4**  
**Import external data**

**5**  
**Data Analysis and Output**



Actions	c	c
Write	w	w
Phone	p	p
Other	o	o
Read	d	d
Type	t	t
Userstats	i	i
Problem	1	1
Error	f	f



Import External Data

1. Select one or more data set rows and drag-and-drop to the Independent Variable List.  
a. For automatic synchronization check if synchronization data sets are automatically detected.  
b. For manual synchronization change the start time and/or stop time.  
2. Press Import to finish the processing of external data.

#	Data Set Name	Filename	Start Date-Time	Stop Date-Time	Type
1	Microtest	Microtest.MOV	2004-10-20 00:00:00	2004-10-20 00:00:00	multimedia
2	Microtest	Microtest.MOV	2004-10-20 00:00:00	2004-10-20 00:00:00	multimedia
3	Microtest	Microtest.MOV	2004-10-20 00:00:00	2004-10-20 00:00:00	multimedia
4	Microtest	Microtest.MOV	2004-10-20 00:00:00	2004-10-20 00:00:00	multimedia
5	Microtest	Microtest.MOV	2004-10-20 00:00:00	2004-10-20 00:00:00	multimedia
6	Microtest	Microtest.MOV	2004-10-20 00:00:00	2004-10-20 00:00:00	multimedia
7	Microtest	Microtest.MOV	2004-10-20 00:00:00	2004-10-20 00:00:00	multimedia
8	Microtest	Microtest.MOV	2004-10-20 00:00:00	2004-10-20 00:00:00	multimedia
9	Microtest	Microtest.MOV	2004-10-20 00:00:00	2004-10-20 00:00:00	multimedia
10	Microtest	Microtest.MOV	2004-10-20 00:00:00	2004-10-20 00:00:00	multimedia

Import Cancel



**Step 3**

# How to use The Observer

## STEP 3 - Collect Data

- Collect video material
- Encode digital video
- **Create an Observation**
- **Watch video and score data**
- Adjust coding scheme





# Scoring Behaviors



Codes				
Subjects Behaviors Modifiers				
		Status	Start	Stop
[-] Verbal communication			m	m
[-] Remark			h	h
[-] Question			q	q
[-] Explanation			x	x
[-] Non-verbal communicati...			n	n
[-] Gesture			a	a
[-] Eye-contact			y	y
[-] Looking away			l	l

- Press **keys** on the keyboard for subjects, their behavior and modifiers
- Use the **mouse** to select codes from the Codes window



# Scoring from video

**Event Log  
window**

**Monitor  
Window  
UI test**

**Video  
Control**

**Monitor  
Window  
user**

**Codes  
window**

The screenshot displays the The Observer XT software interface with several windows open. The 'Event Log' window shows a list of events with columns for Event Time and Behavior. The 'Monitor Window UI test' window shows a web browser displaying a Tobii eye-tracking advertisement. The 'Video Control' window shows playback controls for a video file. The 'Monitor Window user' window shows a video of a user interacting with a website. The 'Codes' window shows a table of codes and their status.

Subjects	Behaviors	Modifiers	Status	Start	Stop
action1	Search box		s		
	Content		c		
	Google logo		g		
	Search box small		e		
	Sponsored links		p		
	Left hand results		l		
	Right hand sponsor...		r		

# Coding two participants

The screenshot displays the VOS - Hierarchical Coding Scheme software interface. The main window is titled 'VOS - Hierarchical Coding Scheme' and features a menu bar with options: File, Edit, View, Setup, Observe, Select, Visualize, Analyze, Export, Window, and Help. Below the menu bar is a toolbar with various icons. The interface is divided into several sections:

- Andrew:** A video feed of a participant named Andrew, with a small window showing the software interface.
- Grace:** A video feed of a participant named Grace, with a small window showing the software interface.
- Observation-0001 - Event log:** A table showing the event log for the observation. The table has columns: Event Time, Subject, Behavior, and Comment.
 

Event Time	Subject	Behavior	Comment
Start	2004-01-06 13:23:47		
1	00:01:23	Initiator	Make Connection
2	00:01:17	Initiator	Start application
3	00:04:47	Initiator	Start application
4	00:06:21	Initiator	Communicate
- Codes Window:** A table showing the codes for the observation. The table has columns: Subjects, Behaviors, Attributes, Status, Start, and Stop.
 

Subjects	Behaviors	Attributes	Status	Start	Stop
Make Connection				01	01
Start application				11	11
Log on				12	12
Communicate	Initiator			20	20
Lookup buddy				02	02
Click buddy list				211	211
Scroll to buddy				212	212
Click buddy				213	213
Invite Buddy				22	22
- Playback Control:** A section with playback controls, including buttons for Play, Stop, and a slider for Playback speed. The current time is 13:28:53.835.
- View control:** A section with checkboxes for various windows and streams, including Codes window, Event log, Video streams, C:\Documents and ..., Observation Control, and Playback Control.

The Observer XT

- Screen size becomes limiting factor
- Requires large screen or dual-display setup

The Observer XT - Testing Messenger

File Edit View Setup Observe Select Visualize Analyze Export Window Help

Testing Messenger Explorer

- Setup
  - Coding Scheme
  - Independent Variables
  - Default Observations
- Observations
  - Andrew
    - Observation Scheme
    - Event Files
    - Media Files
    - External Data
- Data Profiles
  - Default Data Profile
- Episode Selections
- Analysis
  - Behavior Analysis
  - Numerical Analysis

View settings

	Sh...	Set
Subjects	<input type="checkbox"/>	<input type="checkbox"/>
Behaviors	<input type="checkbox"/>	<input type="checkbox"/>
Modifiers	<input type="checkbox"/>	<input type="checkbox"/>
Codes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Event Log	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Video File...	<input checked="" type="checkbox"/>	<input type="checkbox"/>
External...	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Observa...	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Playbac...	<input checked="" type="checkbox"/>	<input type="checkbox"/>
File Syn...	<input type="checkbox"/>	<input type="checkbox"/>

Playback Control

Not recording

Playback speed: 1.0 Time: 00:04:17.440 offset

Timers

Timer	h:m:s:msec
Current	0:04:17.440
Start Event Log	0:00:00.000
Stop Event Log	0:06:05.000
Observed Event Log	0:06:05.000
Elapsed Event Log	0:04:17.440
Remaining Event Log	0:01:47.560
Observation Begin	0:00:00.000
Observation End	0:06:05.000

Codes

Subjects	Behaviors	Modifiers	Status	Start	Stop
Tasks					
No connection			0		
Make connection			1		
Colleague look...			2		
Communicate		"Subject"	3		
Usability issues					
Navigation			n		
Usability hit			u		
Particip error			e		
System error			s		
Other problem			p		
Particip ques			q		
Particip remark			r		
Test lead remark			t		
Online help			h		
Particip emotion			Pa		
Neutral			x		
Question			k		
Confusion			c		
Irritation			i		
Anger			a		
Despair			d		
Surprise			o		
Happiness			z		

Andrew - Event log0001

Event Time	Behavior	Behavior	Commer
34	0:02:28.520	Surprise	
35	0:02:31.360	Surprise	O, enter works!
36	0:02:31.360	Neutral	
37	0:02:38.760	Neutral	
38	0:02:38.760	Confusion	No response from Ch
39	0:02:53.240	Confusion	
40	0:02:53.240	Surprise	O, Chris is typing a n
41	0:02:56.280	Surprise	
42	0:02:56.280	Neutral	
43	0:03:08.840	Neutral	
44	0:03:08.840	Happiness	
45	0:03:12.760	Happiness	
46	0:03:12.760	Neutral	
47	0:03:41.280	Neutral	
48	0:03:41.280	Question	How can I get to the
49	0:03:42.200	Navigation	Trying to find the whi
50	0:03:53.200	Communicate	Chat
51	0:03:53.200	Communicate	Whiteboard
52	0:03:54.120	Question	
53	0:03:54.120	Neutral	
54	0:04:10.000	Neutral	
55	0:04:10.000	Surprise	Sharing session start
56	0:04:17.440	Surprise	
57	0:04:17.440	Confusion	It says waiting, but I
58	0:04:22.280	Confusion	
59	0:04:22.280	Surprise	O, that is not the inte
60	0:04:28.880	Surprise	
61	0:04:28.880	Confusion	
62	0:04:31.280	Confusion	
63	0:04:31.280	Surprise	O, here is the whiteb
64	0:04:36.240	Surprise	
65	0:04:36.240	Neutral	
66	0:04:39.600	Particip remark	Program is not very i
67	0:04:50.240	Neutral	
68	0:04:50.240	Confusion	Text appears on the v
69	0:05:10.760	Confusion	
70	0:05:10.760	Question	How do I send it?
71	0:05:18.080	Question	
72	0:05:18.080	Confusion	Text appears on the v
73	0:05:33.800	Confusion	
74	0:05:33.800	Happiness	Chris is reading my n
75	0:05:40.680	Happiness	
76	0:05:40.680	Neutral	
77	0:05:50.520	Particip error	Participant does not
78	0:05:56.400	Neutral	
79	0:05:56.400	Confusion	Selecting all does no

Testing messenger.avi

Position: Elapsed Time: 0:04:17.397

External Data

Time (H:mm:ss) [Elapsed]

ECG (1)...

Heart (1)...



# Overview

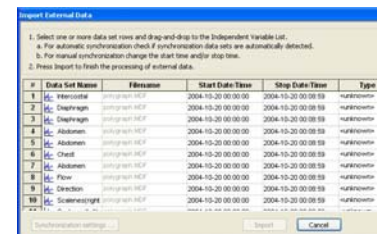
- **Introduction**
- **Why The Observer XT?**
- **How to use The Observer XT**
  - 1. Choose research/observation set-up**
  - 2. Prepare The Observer XT**
  - 3. Data Collection**
  - 4. Synchronize Data**
  - 5. Data Analysis and Output**
- **Live demonstration & applications**
- **Question time**

# Score data and adjust the coding scheme

*Import/Synchronization*



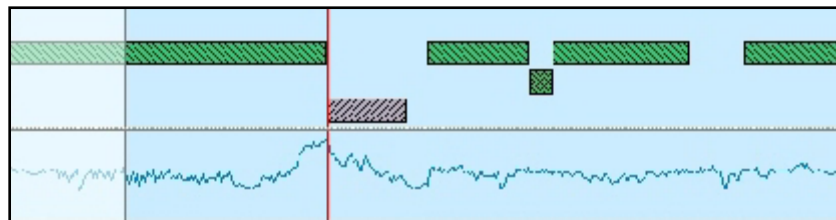
	Actions	c	c
	Write	w	w
	Phone	p	p
	Other	o	o
	Read	d	d
	Type	t	t
	Userstats	i	i
	Problem	1	1
	Error	f	f





# Why do I need synchronization?

- **Synchronization enables you to examine external (physiological) data in relation to the associated logged events and video**



What happens when heart rate increases?

# What can I do with external data?

- **Import** external data into The Observer XT
- **Synchronize** logged events and video with your external data
- **Visualize, select, calculate** and **export** logged events and external data



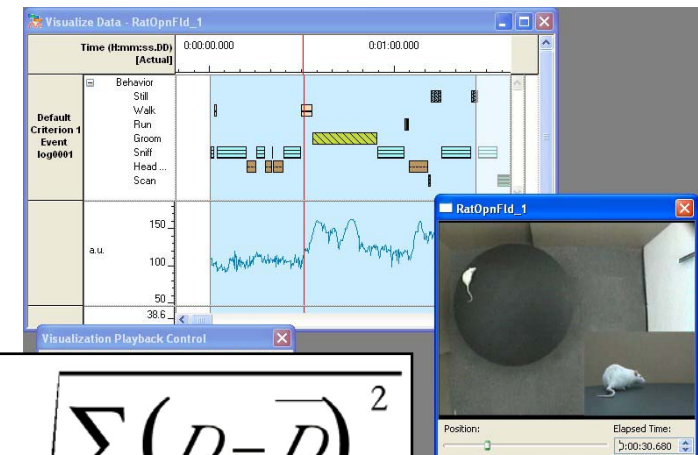
# Data Analysis and Output

## Data selection

- Choose the Data you want to analyze

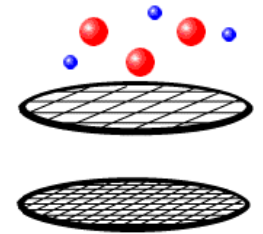
## Visualize and Analyze Data

- Visualize scored data
- Make a list of scored behaviors and durations
- Create highlights video
- Calculate statistics
- Export any of the above



$$s = \sqrt{\frac{\sum (D - \bar{D})^2}{N-1}}$$

# Why select data?



*You want to select data in two cases:*

## - Analyze some elements, not others

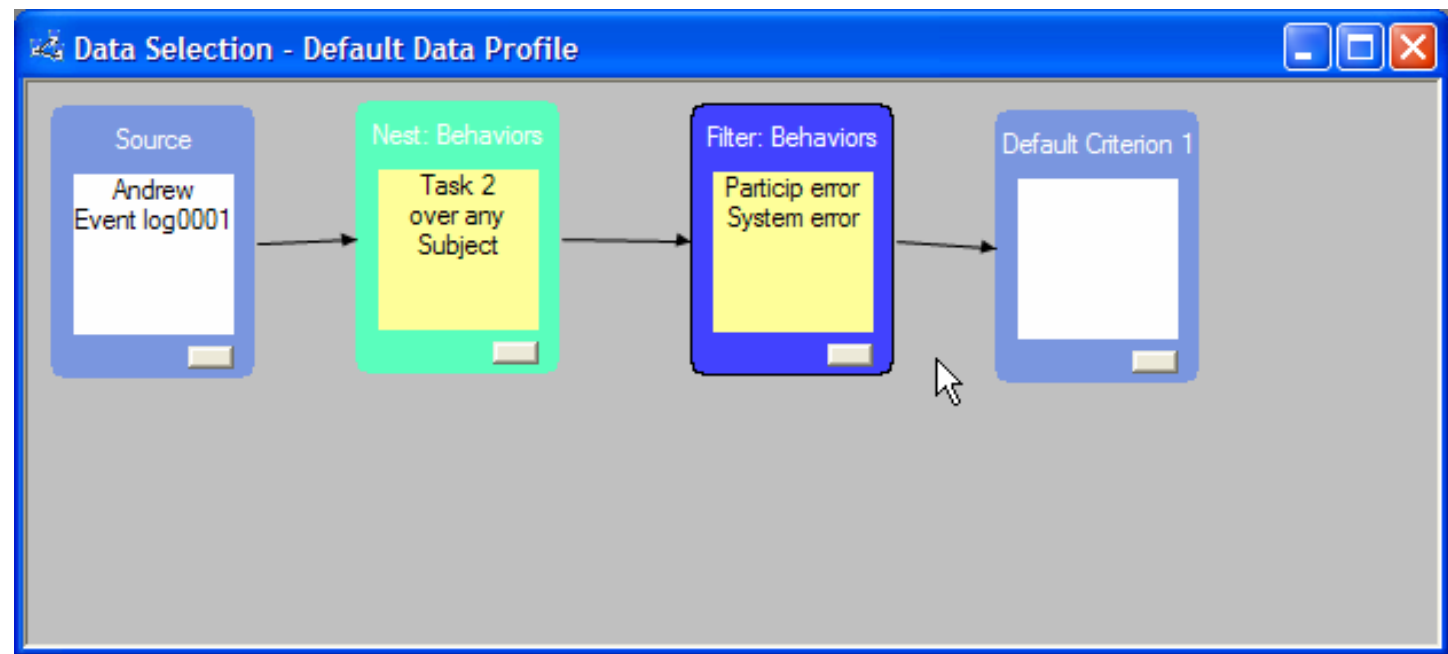
- Solution: **Filter** data
- **Example:** Calculate statistics of the behavior *Errors*, not *Smile*

## - Analyze events occurring when a condition is true

- Solution: **Nest over** data
- **Example:** calculate statistics of the behavior *User error* during *Task 2*

# Data selection

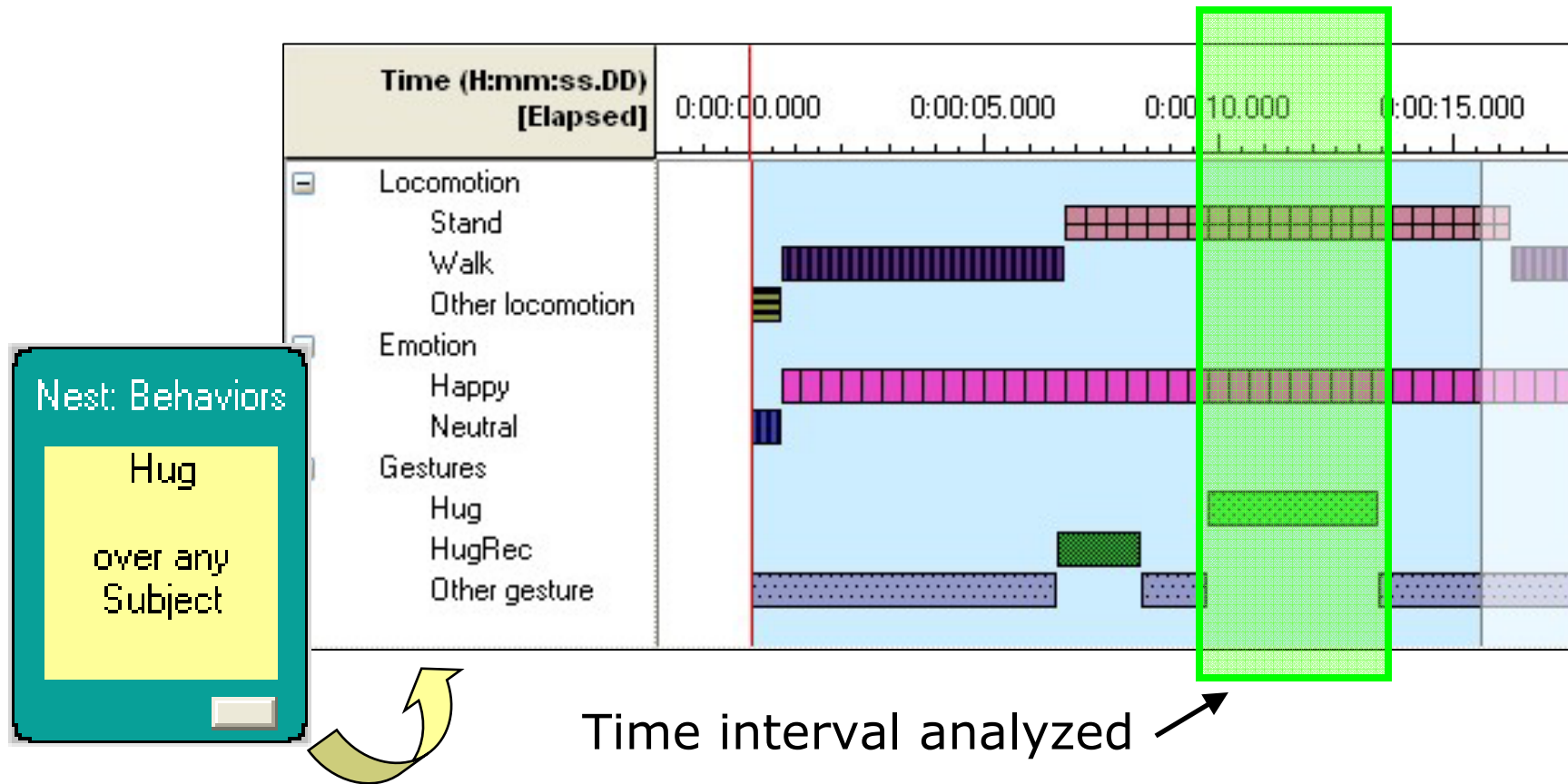
- Selection based on behaviors, subjects, modifiers, observations, independent variables
- **Filter** and **Nest**
- Any combination, AND/OR criteria
- One intuitive selection mechanism for all output



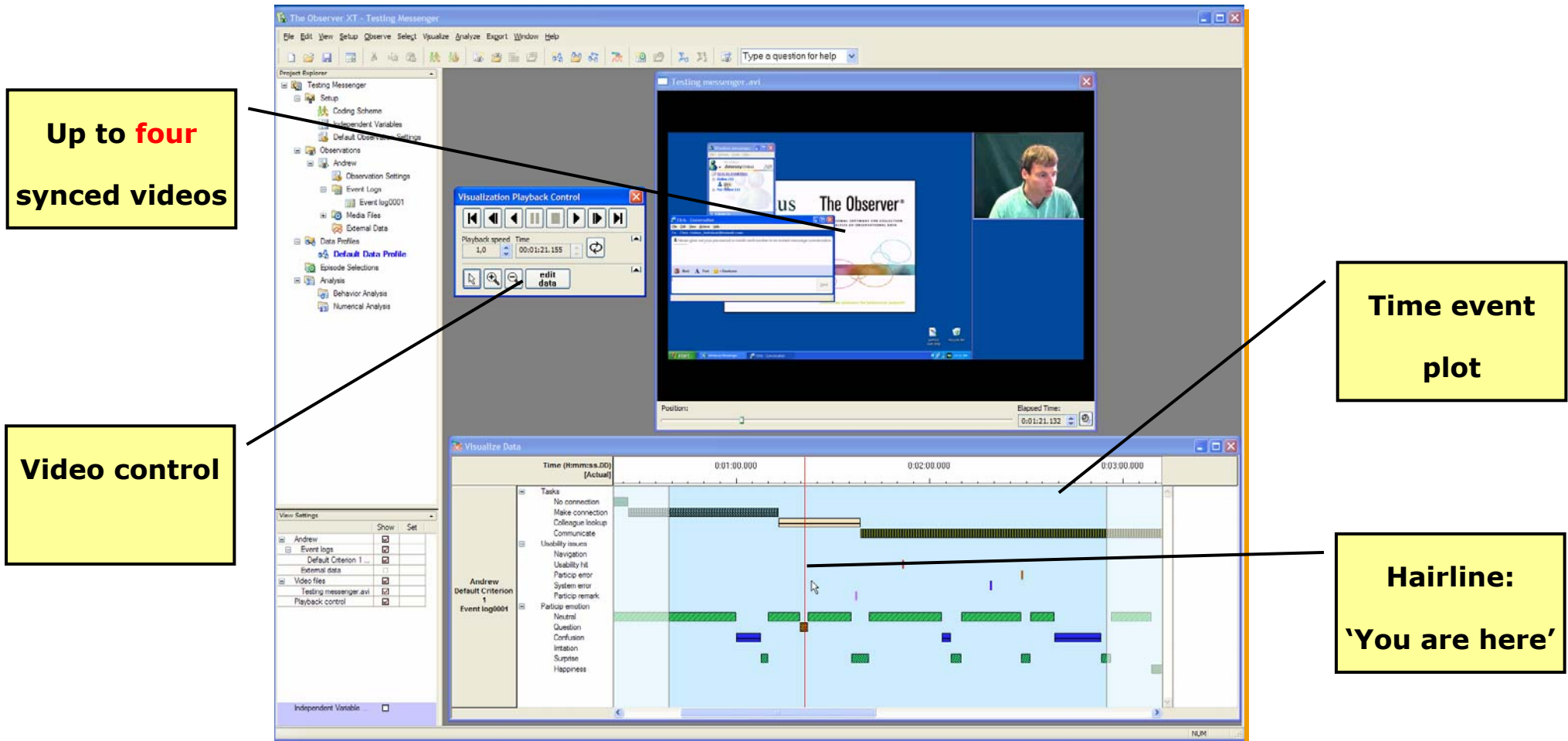


# Select Data - Nesting

The consequences of Nesting over data



# Visualization



**One overview of all data**

**Accurate and visual quality assessment**

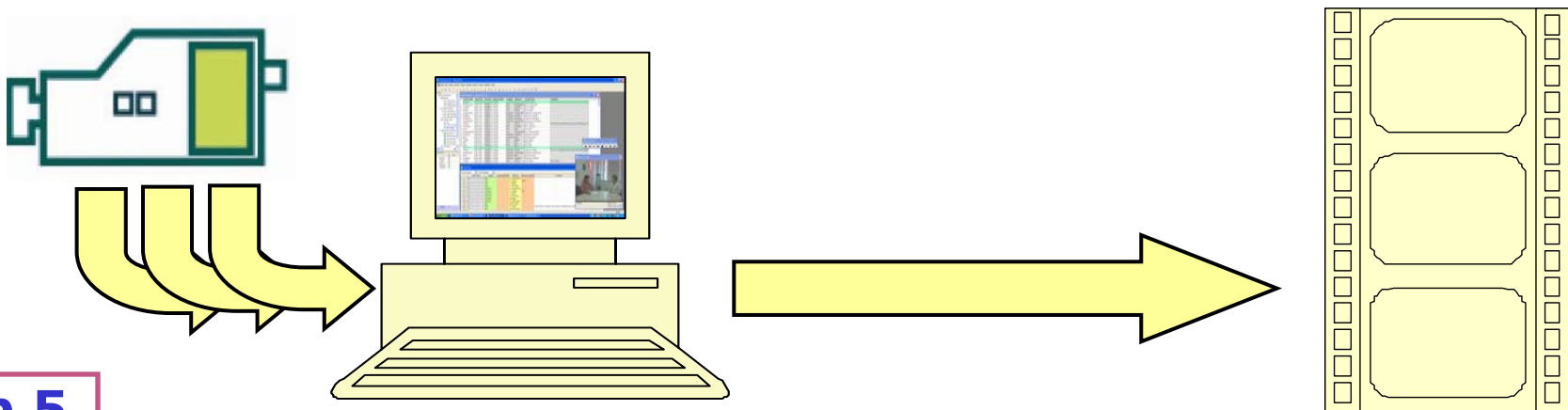
**Step 5**

# Video Highlights

**Make a media file with interesting episodes,  
based on the **Episode list****

**Create subtitles and transitions**

**One clip can be based on multiple  
observations and videos**



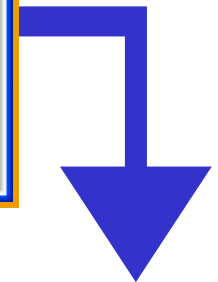
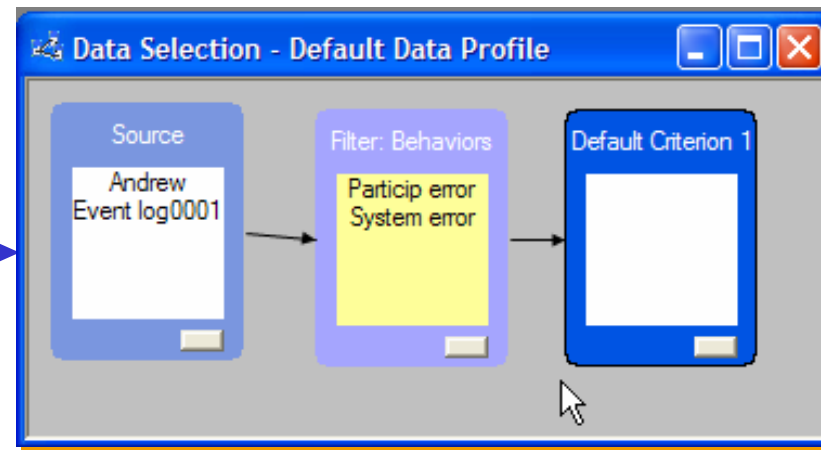
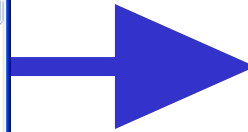
**Step 5**

# Visualize Data – Create an Episode Selection

Erin 3 years old - Event log0001

Event Time	Behavior	Behavior Modifier	Comment
0:01:06.120	Talk	Other child	chalking
0:01:16.319	Play	Type undeterm	
0:01:16.319	Play	Parallel	
0:01:20.359	Talk	Manipulative	I will not chalk on top of your
0:01:27.719	Talk	Other child	Purple
0:01:32.120	Talk	Self	we are allowed all chalks
0:01:46.640	Talk	Somebody else	I am also chalking here
0:01:50.359	Gaze object		

Status: Review Mode

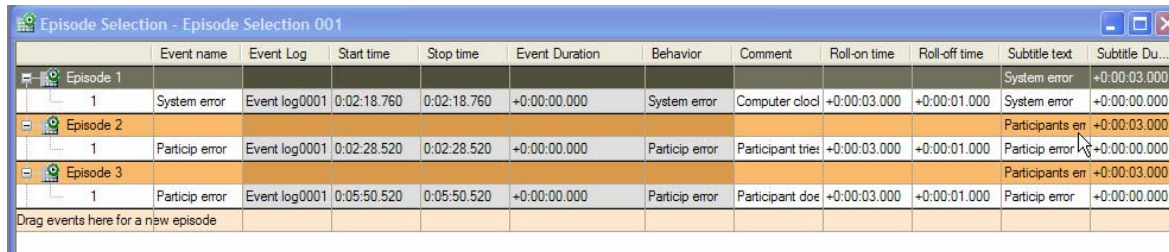


Episode Selection - Episode Selection 001

	Event name	Event Log	Start time	Stop time	Event Duration	Behavior	Comment	Roll-on time	Roll-off time	Subtitle text	Subtitle Du...
Episode 1										System error	+0:00:03.000
1	System error	Event log0001	0:02:18.760	0:02:18.760	+0:00:00.000	System error	Computer clod	+0:00:03.000	+0:00:01.000	System error	+0:00:00.000
Episode 2										Participants en	+0:00:03.000
1	Particip error	Event log0001	0:02:28.520	0:02:28.520	+0:00:00.000	Particip error	Participant tries	+0:00:03.000	+0:00:01.000	Particip error	+0:00:00.000
Episode 3										Participants en	+0:00:03.000
1	Particip error	Event log0001	0:05:50.520	0:05:50.520	+0:00:00.000	Particip error	Participant doe	+0:00:03.000	+0:00:01.000	Particip error	+0:00:00.000
Drag events here for a new episode											



# Create an Episode Selection



	Event name	Event Log	Start time	Stop time	Event Duration	Behavior	Comment	Roll-on time	Roll-off time	Subtitle text	Subtitle Du...
Episode 1											
1	System error	Event log0001	0:02:18.760	0:02:18.760	+0:00:00.000	System error	Computer clocl	+0:00:03.000	+0:00:01.000	System error	+0:00:00.000
Episode 2											
1	Particip error	Event log0001	0:02:28.520	0:02:28.520	+0:00:00.000	Particip error	Participant tries	+0:00:03.000	+0:00:01.000	Particip error	+0:00:00.000
Episode 3											
1	Particip error	Event log0001	0:05:50.520	0:05:50.520	+0:00:00.000	Particip error	Participant doe	+0:00:03.000	+0:00:01.000	Particip error	+0:00:00.000
Drag events here for a new episode											

**Generate mediafile with highlights:**

- in any codec
- incl subtitles
- For report and presentation etc.

**System error**



# Calculate Statistics

## Two Types of Analysis:



### Behavior Analysis

- **Example:** Calculate the total time on task for different types users

- **Numerical Modifier Analysis**

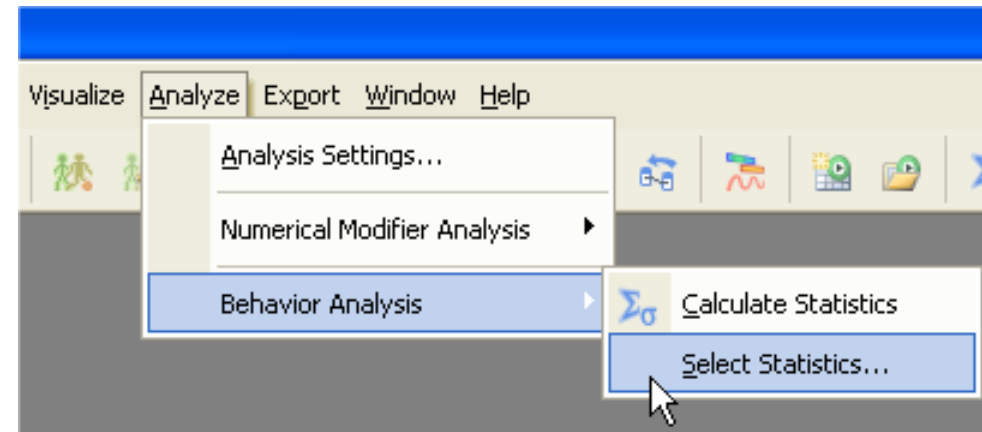


- **Example:** Calculate the average speed of the numerical modifier 'walking speed'

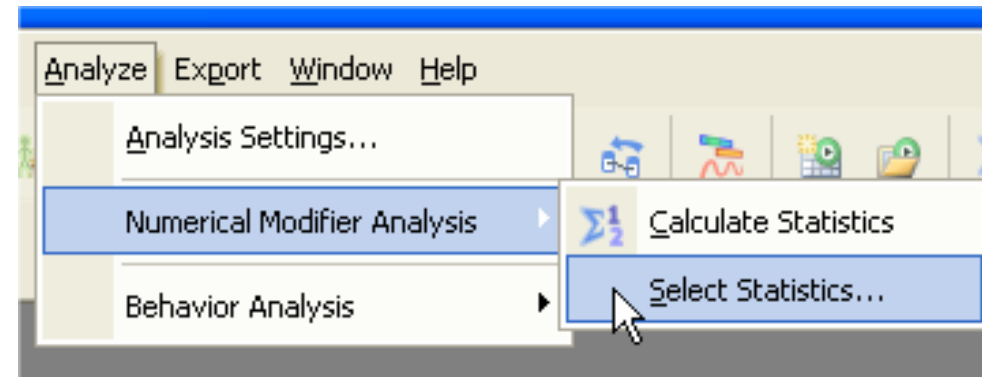
# Statistics available

## For Behavior Analysis:

- Minimum duration
- Maximum duration
- Total duration
- Total number
- Mean duration
- Standard deviation of duration
- Standard error of duration
- Rate per minute



# Statistics available



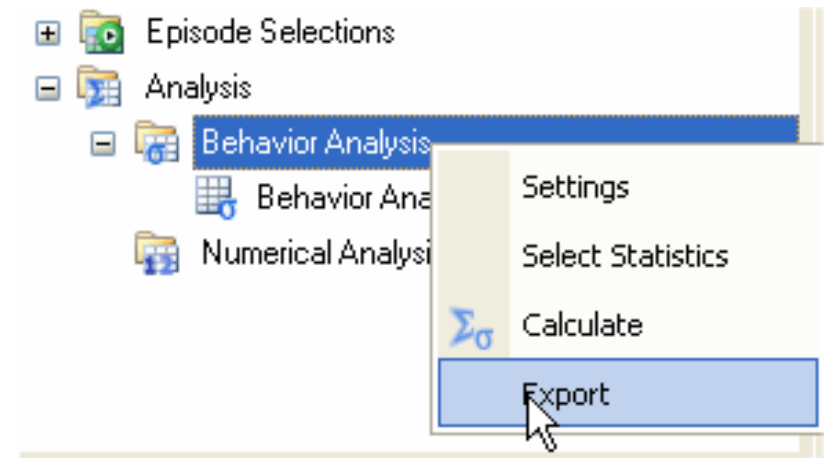
## For Numerical Modifiers Analysis:

- Minimum
- Maximum
- Mean
- Total duration
- Total value
- Mean (per minute)

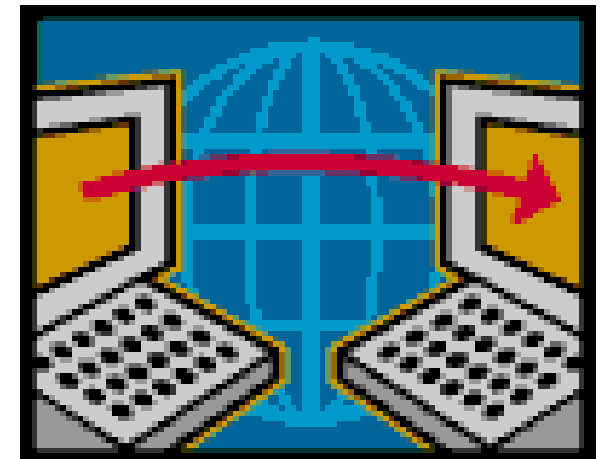
# Statistics Result

Behavior Analysis Results																		
	Criteria	Observations	Event Log Data	Statistics	Variables													
Subject																		
Modifier																		
Behavior						Particip emot	Neutral	Question	Confusion	Irritation	Anger	Despair	Surprise	Happiness	<Missing Beh	<Any Behavior		
Modifier																		
	Default Criterion 1	Andrew	Event log0001	Minimum		-	0:00:04,36	0:00:02,44	0:00:02,40	0:05:13,20	-	-	0:00:02,24	0:00:03,92	-	0:00:02,24		
				Maximum		-	0:00:51,80	0:00:12,84	0:00:20,52	0:05:13,20	-	-	0:00:07,44	0:00:06,88	-	0:05:13,20		
				Total Duration		-	0:03:34,76	0:00:22,60	0:01:12,88	0:05:13,20	-	-	0:00:35,72	0:00:10,80	-	0:17:14,96		
				Total number		-	12	3	8	1	-	-	8	2	-	46		
				Mean		-	0:00:17,90	0:00:07,53	0:00:09,11	0:05:13,20	-	-	0:00:04,46	0:00:05,40	-	0:00:22,50		
				Std. deviation		-	0:00:12,48	0:00:05,20	0:00:06,86	0:00:00,00	-	-	0:00:01,91	0:00:02,09	-	0:00:51,82		
				Standard error		-	0:00:03,60	0:00:03,00	0:00:02,43	0:00:00,00	-	-	0:00:00,68	0:00:01,48	-	0:00:07,64		
				Rate per minut		-	1,97	0,49	1,32	0,16	-	-	1,32	0,33	-	7,56		
					Start Time	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00
					Stop Time	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00	2004-12-30 00
					Duration	0:06:05,00	0:06:05,00	0:06:05,00	0:06:05,00	0:06:05,00	0:06:05,00	0:06:05,00	0:06:05,00	0:06:05,00	0:06:05,00	0:06:05,00	0:06:05,00	0:06:05,00
					Product tested	Windows Mes	Windows Mes	Windows Mes	Windows Mes	Windows Mes	Windows Mes	Windows Mes	Windows Mes	Windows Mes	Windows Mes	Windows Mes	Windows Mes	Windows Mes
					Participant na	Andrew	Andrew	Andrew	Andrew	Andrew	Andrew	Andrew	Andrew	Andrew	Andrew	Andrew	Andrew	Andrew
					Participant gen	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male
		Participant co	Advanced	Advanced	Advanced	Advanced	Advanced	Advanced	Advanced	Advanced	Advanced	Advanced	Advanced	Advanced	Advanced			
		Participant pro	0	0	0	0	0	0	0	0	0	0	0	0	0			
		Test leader	Tobias	Tobias	Tobias	Tobias	Tobias	Tobias	Tobias	Tobias	Tobias	Tobias	Tobias	Tobias	Tobias			

# Export the Analysis Results



**Use these files in Databases, Statistics packages, Graphics programs**





# **The Observer XT**

## **Concluding: main advantages**

- **Observing is quick, easy and in detail if you want**
- **Integration with externally acquired data (e.g. Data Acquisition systems)**
- **Follow coding scheme: so more objective and consequent data**
- **Analysis in the same software so easy comparison**
- **Support of various video-formats and handheld computers, so adaptable to any circumstance**

# Overview

- **Introduction**
- **Why The Observer XT?**
- **How to use The Observer XT**
  - 1. Choose research/observation set-up**
  - 2. Prepare The Observer XT**
  - 3. Data Collection**
  - 4. Synchronize Data**
  - 5. Data Analysis and Output**
- **Live demonstration & applications**
- **Question time**

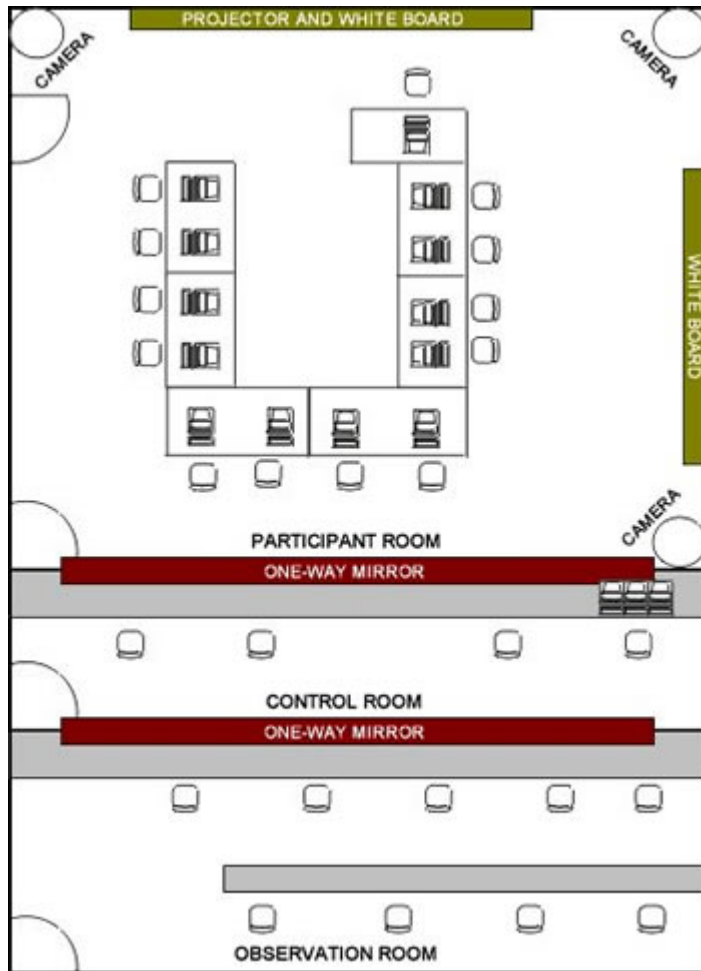
# **Applications; Integrated Solutions**

Tailor-made observational labs and systems

## **System configurations**

- Stationary Lab
- Portable Lab
- Pocket Observer
- Mobile device testing
- uLog
- Screen Capture Module
- Eye Trackers & alternatives
- External data, multi-modal research
- Automobile testing

# Usability lab



Peoplesoft Inc. U.S.A.

# Usability lab



EvaLab, Lille, France



# Usability lab



Cordys R&D, India

# Usability labs

University Leuven, Belgium



CURE, Vienna, Austria



LUTIN, Paris, France



ICT&S Center, University of Salzburg



## “Home lab”

### Usability testing of:

- TV and audio equipment
- Entertainment
- Games
- Appliances
- “Aware” applications



*Philips Research*



*Eindhoven University of Technology*



*TNO Human Factors*

# Portable lab

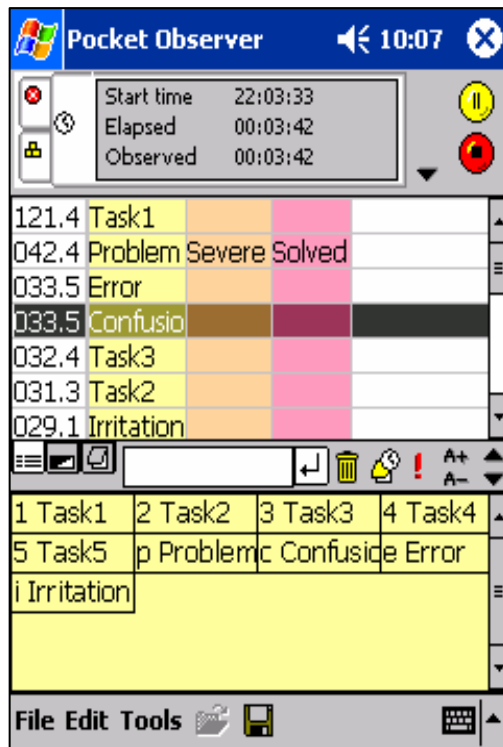


School of Computing, UNISA, South Africa

# Pocket PC event logger

## Coding observed events

- Tapping / writing/ soft keyboard
- Clip-on keyboard



## Options

- Rugged models available
- Auditory feedback:  
logging software speaks  
coded event into  
earphone





# Mobile Device Testing

Or via Bluetooth & Screen Capture...



# Mobile Device Camera

Wireless camera for usability testing of mobile devices and applications



## **uLog**

**Event logger for automatic logging of user activity**

### **Two versions**

- **Lite (standalone)**
- **Pro (with Observer XT)**

### **Three set-ups**

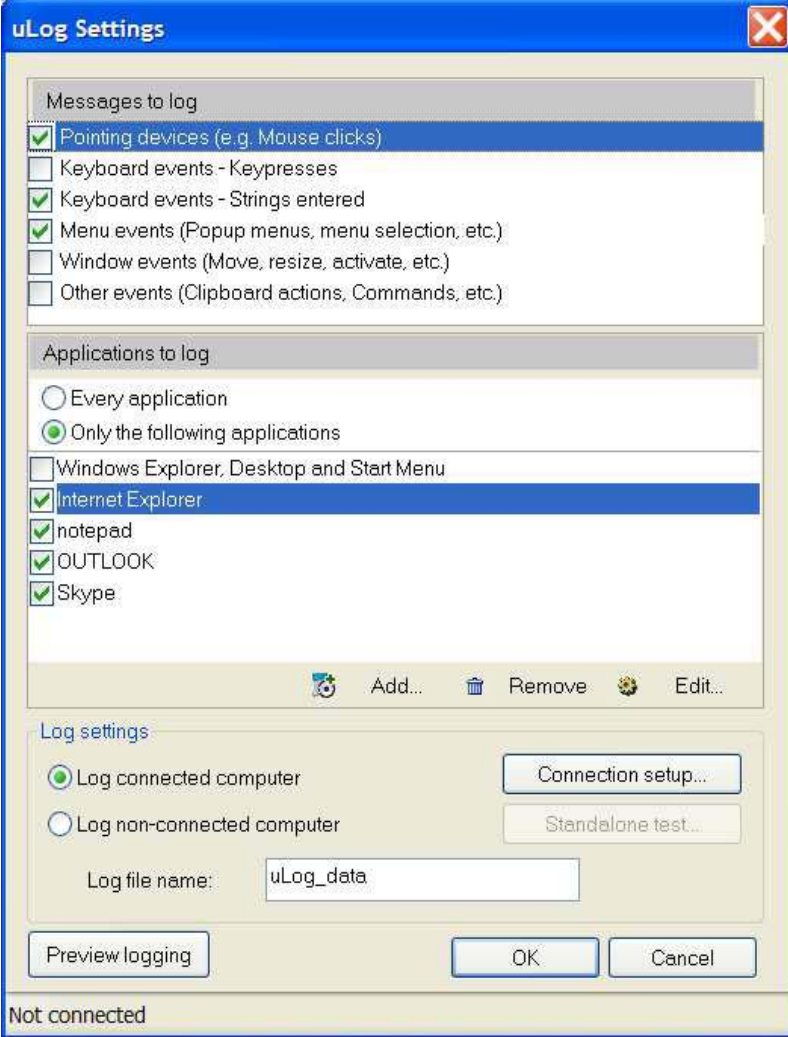
- **Lite: standalone**
- **Pro: connected**
- **Pro: visitor (standalone)**

## **What is uLog: Lite and Pro**

	<b>Lite</b>	<b>Pro</b>
Mouse	Clicks, double clicks, mouse wheel action	
Keyboard	Individual keystrokes	Individual keystrokes and strings
Menu events	No	Yes (application, standard menu, window, dialog, pop-up)
Windows events	No	Max/min/restore Window Move/Resize
Other actions	No	Scrolling; Cut/copy/paste Window titles (incl. pages loaded in web browsers) Calculate mouse distance
Data format	csv	Observer XT



# What is uLog Pro: configuration



The image shows the 'uLog Settings' dialog box, which is used to configure the logging settings for the Observer XT software. The dialog box is titled 'uLog Settings' and has a standard Windows-style title bar with a close button (X) in the top right corner.

The dialog box is divided into several sections:

- Messages to log:** This section contains a list of events that can be logged. The following events are checked:
  - ☒ Pointing devices (e.g. Mouse clicks)
  - ☐ Keyboard events - Keypresses
  - ☒ Keyboard events - Strings entered
  - ☒ Menu events (Popup menus, menu selection, etc.)
  - ☐ Window events (Move, resize, activate, etc.)
  - ☐ Other events (Clipboard actions, Commands, etc.)
- Applications to log:** This section contains a list of applications that can be logged. The following applications are checked:
  - ☐ Every application
  - ☒ Only the following applications
  - ☐ Windows Explorer, Desktop and Start Menu
  - ☒ Internet Explorer
  - ☒ notepad
  - ☒ OUTLOOK
  - ☒ Skype
- Log settings:** This section contains options for how the log is generated.
  - ☒ Log connected computer
  - ☐ Log non-connected computer
  - Log file name:
  - Buttons:
  - Buttons:

At the bottom of the dialog box, there is a status bar that reads 'Not connected'.



## What is uLog: set-ups

### Set-up 1: uLog Pro – connected computers



Test PC



Observer  
PC

### Set-up 2: uLog Pro – not connected ('visitor')



Test PC



Observer  
PC

### Set-up 3: uLog Lite – single computer (Test PC)

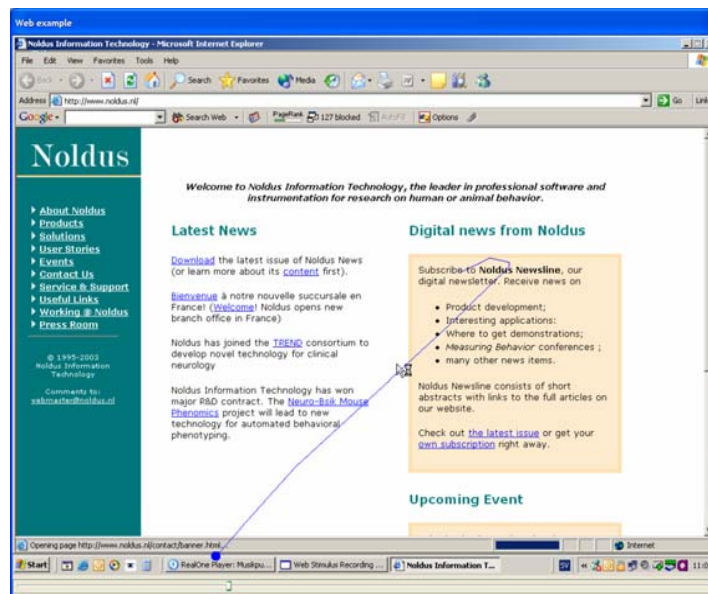
## **Test demonstration**

### **quick on-site usability test:**

- uLog & webcam**
- Screen Capture Module**

# Eye tracking & alternatives

- Infrared camera records eye movement - measure attention
- Head mounted, in computer screen, or stand alone
- Analysis: eye tracks, hotspots, fixations, areas of interest
- Costly, but high accuracy



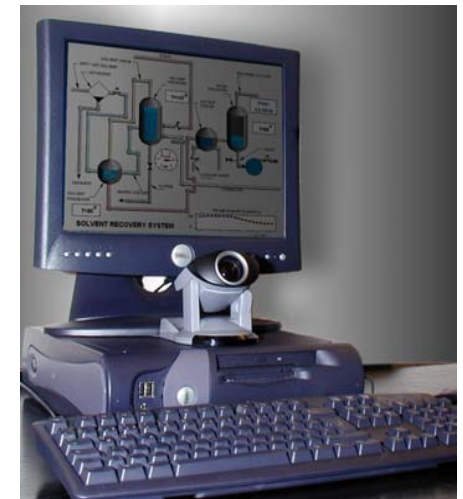
Tobii Technology

# Measuring eye gaze

- Tool: eye tracking system, head-mounted or contact-free
- Measures:
  - where the subject looks
  - how long and often they look at something
  - path the eyes follow between predefined areas of interest
  - pupil diameter (measure of cognitive load)
- Complement observational methods, e.g. find co-occurrence of “confusion” and “fixate”

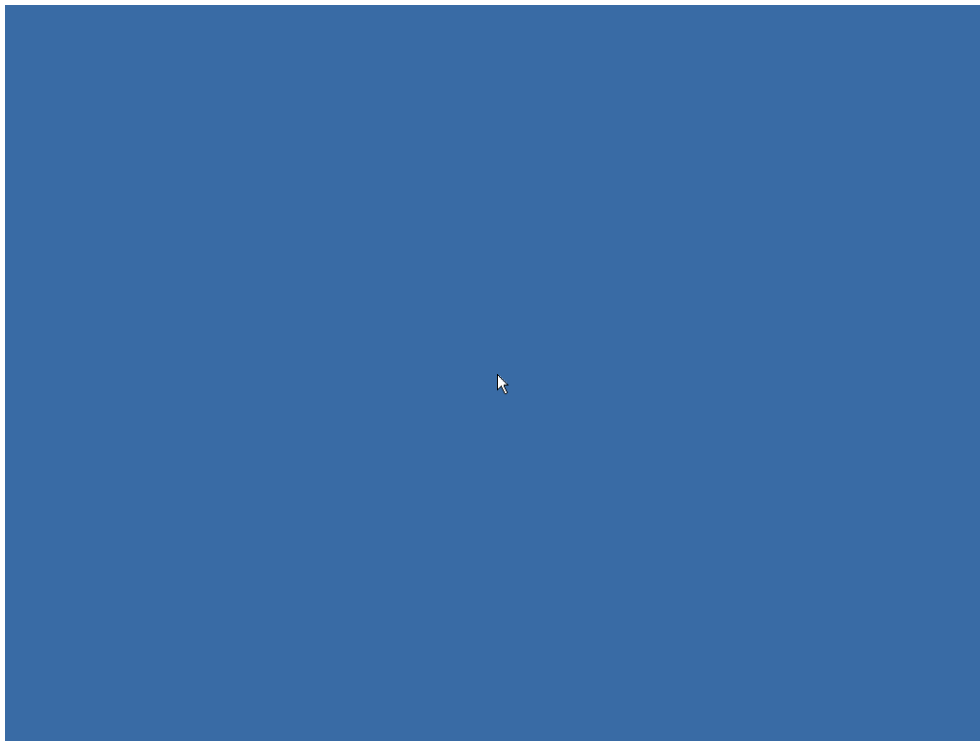


*Head-mounted system*



*Contact-free system*

# Measuring eye gaze



*Contact-free system*



*Head-mounted system*



A photograph of a young man with brown hair and black-rimmed glasses, wearing a dark brown long-sleeved shirt with white stripes on the sleeves. He is sitting in the driver's seat of a car, looking out the window towards the right. The background outside the car shows a brick building with several windows and a white car parked in front of it. The interior of the car is visible, including the dashboard and the side window frame.

The Observer - Observation Module (v1.0)

File Edit View Customize Data Tools Video Window Help

Elements Channels

Start 00:00:00.32  
Current 00:00:12.56  
Elapsed 00:00:12.24  
Observed  
Maximum  
Remaining  
Sample

Left hand - Hand behavior  
Not visible

Right hand - Hand behavior  
Steering wheel

Event Log

RECORD	TIME	SUBJECT	BEHAVIOR	MODIFIER
1	00:00:00.32	Ce	Moving	Forwards
2	00:00:00.32	Left hand	Steering wheel	
3	00:00:00.32	Right hand	Steering wheel	
4	00:00:12.72	Left hand	Steering wheel	
5	00:00:04.16	Ce	Still	
6	00:00:04.20	Right hand	Steering wheel	
7	00:00:04.20	Left hand	Steering wheel	
8	00:00:04.48	Right hand	Steering wheel	
9	00:00:07.12	Left hand	Empty	Not visible
10	00:00:04.48	Right hand	Empty	Steering wheel
11	00:00:12.56	Ce	Still	
12	00:00:12.56	Left hand	Empty	Forwards
13	00:00:19.68	Ce	Moving	
14	00:00:20.36	Right hand	Empty	
15	00:00:20.72	Left hand	Steering wheel	
16	00:00:21.12	Right hand	Steering wheel	
17	00:00:21.68	Left hand	Steering wheel	
18	00:00:23.52	Right hand	Steering wheel	
19	00:00:25.00	Ce	Still	
20	00:00:31.72	Left hand	Steering wheel	
21	00:00:34.80	Right hand	Steering wheel	
22	00:00:34.80	Right hand	Steering wheel	
23	00:00:34.80	Right hand	Steering wheel	

Video Control

Play Speed

Position

0 End

Pause/Still

Codes: Behavior

Left hand	Right hand
a = Still	a = Dashboard
b = Moving	b = Still
c = Not visible	c = Empty
d = Steering wheel	d = Not visible
e = Other	e = Other

Enter behavioral element code

Customization (1) Ce (1) pr

*Only gaze & head movement, not actual eyetracker !*

# Multimodal data collection

Measuring multiple modalities of user-system interaction

## **Behavioral**

- Task performance
- Keyboard activity
- Mouse activity
- Body posture
- Facial expression
- Eye movement
- Gestures
- Verbal comments

## **Physiological**

Emotional state

- Galvanic skin resistance

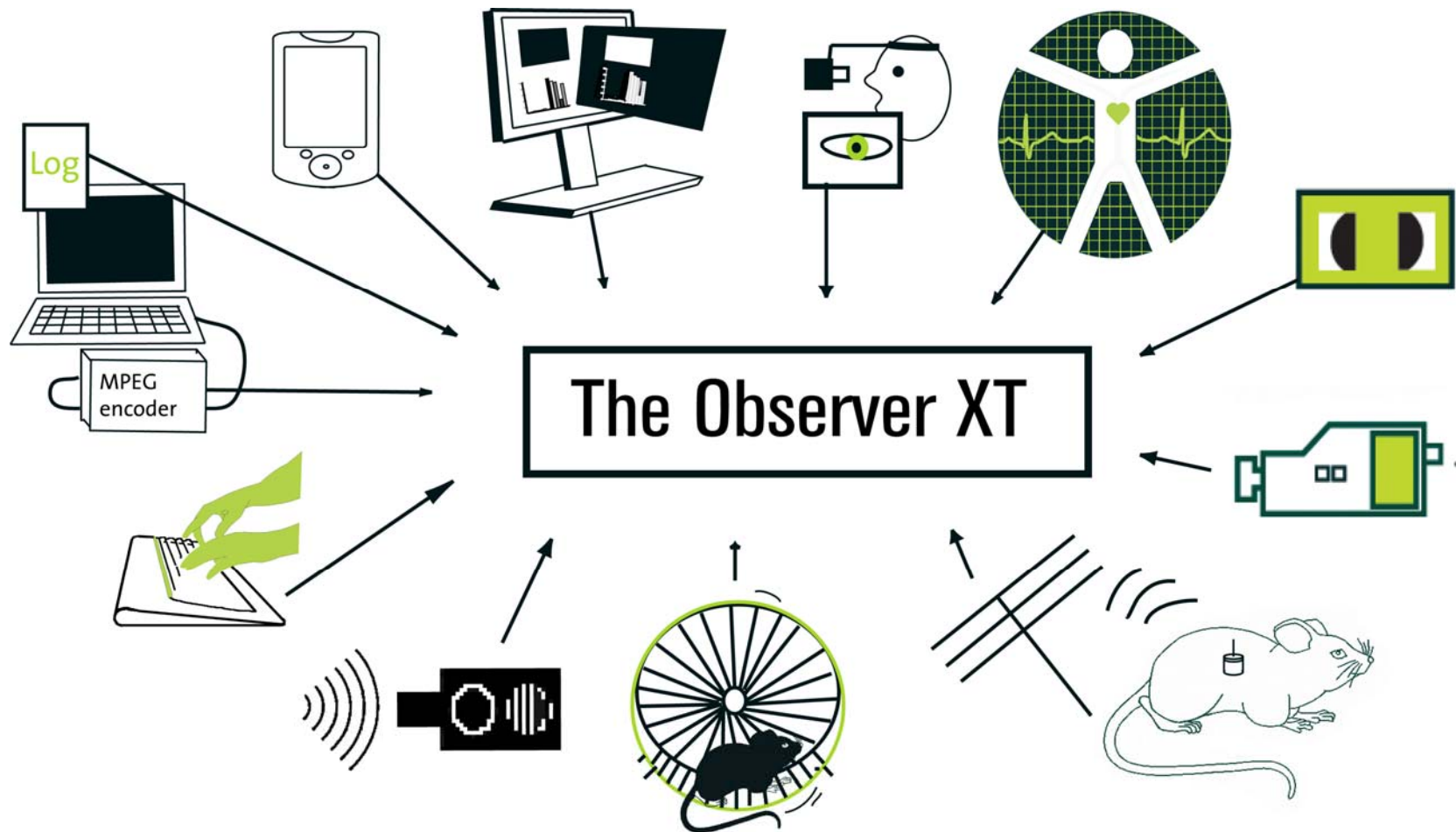
Mental load

- Pupil diameter
- Heart rate variability
- Respiration

Physical load

- Electromyogram
- Grip force

# External data co-acquisition





## “Lab on wheels”

### **Usability testing of:**

- Dashboard design
- Navigation systems
- Audio equipment

### **Integrate video recording with:**

- Speed, acceleration, turning
- Position (GPS)

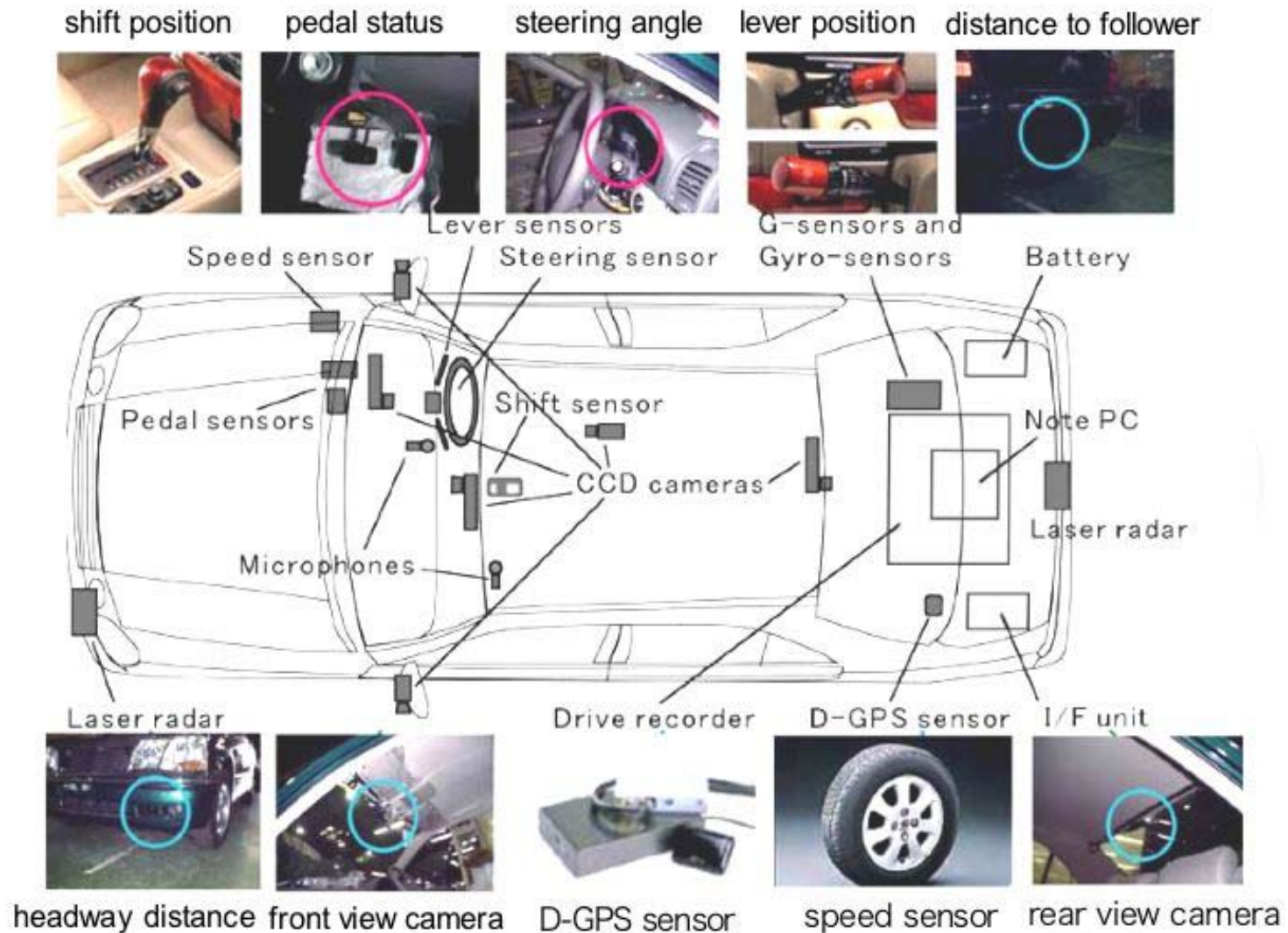


*SensoMotoric  
Instruments*



*AIST,  
Tsukuba,  
Japan*

# Instrumented car





# Noldus

Information Technology



## Questions ?

**Noldus Information Technology**

**<http://www.noldus.com>**

**Maurits@noldus.nl**