ECMA

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

USER INTERFACE TAXONOMY

ECMA TR/61

June 1992

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Brief History

ECMA/TC35 was set-up in 1990 to develop an architectural reference model for the user system interface. The main purpose was to use the developed model to identify the standards required for this interface and also to improve the communication on user interfaces in generally providing a common framework and terminology.

Work started by examining the currently available user system interfaces and the relevant work already in progress in other standardisation bodies. A number of meetings were dedicated to the consideration of user interfaces either commercially available or under development, and liaison was maintained with other standardisation bodies, in particular with ISO/IEC JTC1/SC18 WG9 and is ISO/TC159/SC4 WG5.

In addition to the ECMA user interface reference model, this ECMA Technical Report contains a set of forms (see annex A), permitting the classification of a user interface according to the ECMA taxonomy. This annex contains examples of completed forms.

The work of NIST was considered, and annex B describes the relationship between the interface in this Technical Report and the one described in FIPS 158.

Annex C describes a set of input, output and input/output devices.

Work on this ECMA Technical Report was completed in February 1992.

Adopted as an ECMA Technical Report by the ECMA General Assembly of June 1992.

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1 Scope

User interface design is an area where research and standardization are still in progress. Therefore, this technical report cannot be exhaustive.

Most existing work on user interface models has focussed on the technical aspects, with particular emphasis on implementation issues. By contrast, this report attempts to concentrate on conceptual aspects. For this reason, it is not always easy to relate the model described in this technical report to those proposed by others.

This ECMA Technical Report describes user interface elements and concepts and their relationships and dependencies. It should support the description of existing user interfaces and the specification of future ones in terms of these elements and concepts and their structure.

It is not the purpose of this ECMA Technical Report to give value judgement on the choices for specific user interfaces.

This ECMA Technical Report should assist in improving communication on user interfaces in general by providing a common framework and terminology. It might also assist:

- the designer/implementor of user interfaces and of user interface management systems;
- the vendor when describing user interfaces of software products;
- the procurer/buyer when defining user interface requirements;
- standardisation groups.

2 References

ISO 9241 Ergonomic requirements for office work with visual display terminals (VDTs) - Multi-part Standard

FIPS 158 The user interface component of the application portability profile (NIST - 1991)

3 Definitions

For the purpose of this ECMA Technical Report the following definitions apply.

3.1 Dialogue

A two-way communication between a user and a system to achieve a particular goal.

3.2 Dialogue control function

A function supporting the user progressing through a dialogue.

3.3 Dialogue technique

A specific method to implement a dialogue.

3.4 Presentation of information

The coding and formatting methods used to support the user progressing through a dialogue.

3.5 Coding

The use of a code which assigns meanings to a variety of sensory signals to convey information between system and user.

3.6 Formatting

The arranging and structuring of coded information to assist the user in encoding input signals and decoding output signals.

3.7 Input/Output device

A physical mediator between the user and the system.

3.8 Guidance function

Information or capabilities that guide the user's interaction with the system.

3.9 Metaphor

Abstraction of familiar everyday objects or actions to be applied to user interface objects or actions by analogy.

NOTE 1:
The usual definition of metaphor (see e.g. Collins dictionary) reads: "A figure of speech in which a word or phrase is applied to an object or action that it does not literally denote in order to imply a resemblance."

4 Acronyms

CAD	Computer Aided Design
CASE	Computer Aided Software Engineering
CSCW	Computer Supported Cooperative Work
DTP	Desktop Publishing
I/O	Input/Output
UIRA	User Interface Reference Architecture
WYSIWYG	What You See Is What You Get

5 User interface structure

Classification of user interfaces is made easier by the identification of commonalities, like engineering and ergonomic principles.

Another dimension of viewing user interfaces results from their domains of applicability. It divides into three categories: the application area itself (e.g. office, control rooms), the user characteristics (e.g. expert, novice, casual), and the constraints (e.g. technology, economics).

5.1 Integrated approach

With this approach the user views the interaction as one homogeneous integrated dialogue with the system where the individual components are not exposed. However, from a system point of view, these individual components are identifiable. Logically, six main components can be identified as shown in figure 1.

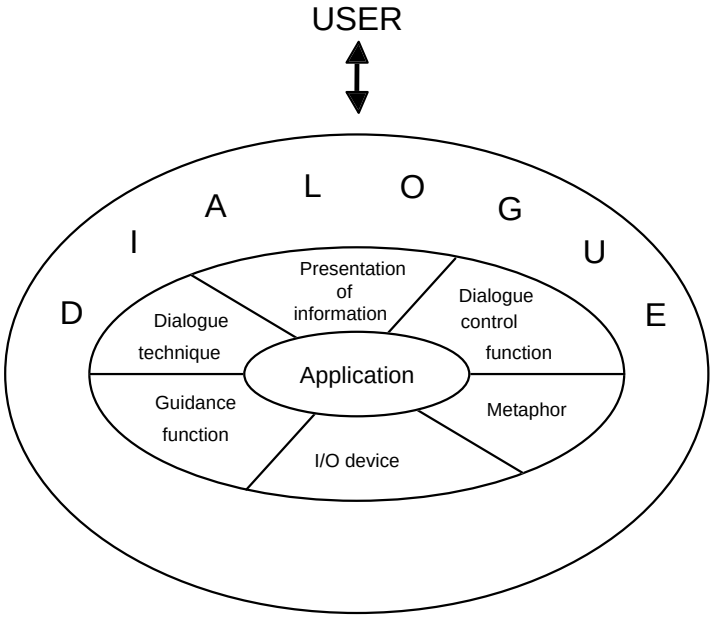

Figure 1 - User interface overview

5.2 Structure of components

5.2.1 Metaphor

Metaphors are built for environments, objects and actions. Typical environmental metaphors that are commonly found in current user interfaces include:

- the desktop metaphor;
- the workbench metaphor;
- the control panel metaphor.

There are other existing or possible metaphors, for example various games are built on metaphors. Metaphors for objects and actions may be either specific to certain environments or may be generic, like 'cut and paste' or 'drag and drop'. User interfaces may use one or more metaphors.

Similarity between the metaphors and the user interface objects or actions improves acceptance and reduces the risk of misinterpretation.

5.2.1.1 The desktop metaphor

The desktop metaphor represents objects and actions traditionally associated with a desk and the surrounding office environment.

Typical metaphorical objects include:

- folders, notebooks and documents;
- filing cabinets;
- calculators;
- printers, fax machines, scanners;
- in-baskets and out-baskets for mail;
- a waste basket for disposing of unwanted documents;
- alarm clocks and diaries;
- card files.

Actions associated with the desktop metaphor often involve "direct manipulation" using a pointing device. These include:

- filing;
- printing;
- mailing;
- copying.

5.2.1.2 The workbench metaphor

The workbench metaphor represents an environment which contains the tools and other work items organised to do work in a particular task area. Workbenches are usually specialised for the generation of particular products, such as:

- software (CASE);
- engineering drawings (CAD);
- publications (DTP).

5.2.1.3 The control panel metaphor

The control panel metaphor represents a physical panel containing an array of instruments for controlling a machine.

Typical objects include dials and gauges (both analogue and digital), sliders, buttons and knobs.

Typical application areas include:

- process control;
- patient monitoring;
- simulation.

5.2.2 Dialogue technique

5.2.2.1 Menus

A set of options presented by the dialogue system to the user. The user selects one or more options from the set and the system provides the desired response (or another menu in the case of a hierarchical choice structure). Menu options may be textual, symbolic or spoken.

5.2.2.2 Languages

- **Natural language**
  The technique by which users communicate with the dialogue system in language originally used for human to human communication. The language itself is normally restricted with regard to the vocabulary and phrases allowed.

- **Command language**
  A specified set of user inputs which, when processed by the dialogue system, result in associate actions. Users enter (rather than select) complete or abbreviated command(s) and the dialogue system performs the activities specified by the command(s). Command utilized in a given application are usually referred to as a command language. Command languages include both natural-like languages and specialised languages.

- **Questions and answers**
  A dialogue technique by which the user responds to questions asked by the dialogue system (e.g. system-initiated dialogue). Questions are typically asked one at a time and may vary depending on the previous answer. In most applications of this dialogue technique, answers can be qualitative (yes/no) or quantitative (a number).

5.2.2.3 Direct manipulation

- **Object based**
  A form of dialogue in which the user directly acts upon the objects to be manipulated by pointing at them, moving and/or changing their physical characteristics (or values) via the use of an input device. In its purest form, a direct manipulation dialogue allows users to perform all available interaction operation by acting on displayed objects in ways analogous to manipulating physical entities. Such objects are typically concrete, often graphical, representations of abstract software structures or capabilities, displayed within a simulated two or three-dimensional environment.

- **Control panel based**
  This dialogue technique is defined by the closed loop consisting of machines and human operators controlling the machines using control actuators, which are represented by objects that are used to perform an action.
  The specifics of this dialogue technique are:
  - variety of types of control actuators;
  - input in digital or analogue form in normally fixed sequences;
  - strong time constraints (real time);
  - complexity of system control.

5.2.2.4 Form filling

A dialogue technique that requires the user to fill in, complete or modify fields (typically labelled) on a form displayed by the system. This dialogue technique allows multiple user inputs in a single transaction and provides contextual information concerning the nature of the required inputs.

5.2.3 Guidance function

This Technical Report only considers guidance functions which are explicitly provided to the user on request or automatically by the dialogue system.

Implicit user guidance which is integrated into the user-computer interaction is not considered here, because it does not represent an user interface structural aspect.

Guidance functions can be divided into:
- guidance in non-error situations and error prevention;
- guidance in error situations and error management.

The guidance function is intended to promote efficient use of the dialogue system (quick and accurate use of full capabilities), minimise the memory load on the user, decrease the time required to learn how to use the dialogue system, provide support for users of different skill levels and help the user to escape from error situations.

5.2.3.1 Guidance in non-error situations and error prevention

Guidance in non-error situations helps the user to access the functionality that the dialogue system was defined to provide. In addition it minimises the probability of user errors.

Typically it includes:

- **Comprehension and task-oriented feedback** is any unsolicited information given to the user in support of efficient task completion. This feedback could be in the form of conceptual overviews. Where the feedback can be directly related to the task context, it may include feedback on how the task may be completed, on the dialogue system state, and on valid user input for the current task state. It also contains dialogue system messages enhancing the perception of user control.

- **On-line help** explains at the user's request "what" can be done, and "where", "when" and "how" it can be done. This help may be specific to the current dialogue situation or may provide more general guidance. Options include:
  . instructions for executing a command or accessing and using given dialogue system capabilities;
  . explanations of concepts associated with a task or interface component;
  . explanations of a special syntax.

- **Navigation** is that type of guidance which supports the user in finding the most efficient dialogue path to complete the task.
  Prompts provide guidance where particular sequences of actions are required by the dialogue system.
  Cues provide guidance where no particular action is necessary but which aid users in navigation, e.g. indication of current mode.

- **Warnings** are any information given to the user regarding possibly undesirable consequences of executing certain actions, e.g. the action is not reversible or may cause an unstable state to be reached.

5.2.3.2 Guidance in error situations and error management

In case of error situations, an error handling process may be offered to the user explaining the error and supporting correction of it.

These error handling processes may provide:
- system information enabling the user to judge whether an error has occurred;
- information about those portions of system actions which have been already executed successfully;
- for unintended system actions in progress, a mean to allow the user to end these actions to the user's satisfaction;
- for error management, a mean to allow the user to decide on termination or continuation of the dialogue.

5.2.4 Dialogue control function

5.2.4.1 System environment

The environment within which the dialogue system operates often provides general control functions. These include:

- **Windowing**
  The division of a display area to provide one or more graphical contexts.
  The windowing system will normally support concepts such as input focus and provide mechanisms to allow the user to arrange the windows as desired.

- **I/O equivalence**
  To support the different requirements and preferences of users, the dialogue system may support different user interactions as equivalent. Such equivalences are used to provide accelerators or to support disabled users, for example keyboard equivalents for mouse actions, flashing versus beeping.

- **Global storage facilities**
  To support the interchange of data between applications or to act as a temporary repository, the dialogue system will often provide one or more globally accessible storage facilities, often referred to as clipboards.

5.2.4.2 Dialogue flow

Dialogue flow functions allow control of the temporal progress of the dialogue. These include:

- start;
- suspend;
- resume;
- end;
- changes in the direction of the flow, e.g. to recover from errors by reverting to a previous dialogue state.

5.2.4.3 Object management

Object management functions allow control of the existence, state and position of objects used in the dialogue. These include:

- create;
- delete;
- select;
- deselect;
- copy;
- move.

5.2.4.4 Filtering

Filtering functions are used to reduce the volume of information exchanged during the dialogue. The purpose of these functions include:

- implementation of security and privacy restrictions (e.g. by means of passwords);
- implementation of user's capabilities and preferences (e.g. by means of user profiles);
- removal or modification of options inappropriate in the current mode (e.g. by greying menu items or removing them completely).

5.2.5 Presentation of information

5.2.5.1 Visual presentation

The use of visual appearance to categorize or identify objects and concepts.

The kinds of visual presentation include:

- **Enhancement**
  The altering of the visual appearance of selected parts of information on the display to attract attention and provide feedback.
  The ways in which the visual appearance can be altered include:
  . size;
  . shape;
  . texture;

. colour;
. contrast;
. brightness.

- **Alphanumeric**
  The use of letters or symbols with rules for their association. Used for reasons of brevity and security.
  . Arbitrary: use of unique entities formed by letters or numbers that have little or no significance to the user and which bear no direct relationship to what they represent.
  . Mnemonic: use of entities formed by letters or numbers that convey information that is meaningful to the user and have some association with the words they represent (e.g. abbreviations, acronyms).

- **Graphical**
  The use of graphical information that can be interpreted by the user as concepts or objects.
  . Abstract symbols: those which attempt to visualise a concept somehow apart from the concrete image.
  . Representational symbols: those which attempt to visualise a concept related to a concrete image.

5.2.5.2 Auditory presentation

The use of sound ranging from simple tones to sequences of tones to full speech capabilities.

5.2.5.3 Tactile presentation

The use of touch to convey information (e.g. touch screen, mouse clicking).

5.2.5.4 Temporal presentation

The use of variations in time to convey information (e.g. blinking, double clicking).

5.2.5.5 Spatial presentation

The use of positions in space to convey information.

5.2.6 Input/Output devices

Input/output devices can be divided into input devices, output devices and input/output devices. The last category is not treated separately, but is included in both the input and output devices taxonomy.

Compound devices are considered to be combinations of I/O devices and hence do not require separate definitions here.

5.2.6.1 Input device taxonomy

The following list shows the fundamental types of interaction tasks and which input devices are suitable to be used for each type.

- **Selection**
  . Definition: Choosing from a set of alternatives
  . Suitable devices: Mouse, tablet, light pen, pen, touch panel, touch screen, joystick, trackball, keyboard, microphone, glove, gesture suit.

- **Position**
  . Definition: Indicating a location
  . Suitable devices: Mouse, tablet, light pen, pen, touch panel, touch screen, joystick, trackball, keyboard, eye tracker, wheel, glove, gesture suit.

- **Orientation**
  . Definition: The orientation of an entity in a two-dimensional or three-dimensional space
  . Suitable devices: Joystick, keyboard, glove, gesture suit.

- **Path**
  . Definition: Generating a series of positions or orientations over time
  . Suitable devices: Mouse, tablet, light pen, touch panel, touch screen, joystick, trackball, keyboard, eye tracker, wheel, glove, gesture suit.

- **Quantify**
  . Definition: Specifying a value to quantify a measure.
  . Suitable devices: Switches, keyboard, mouse, wheel, microphone.

- **Text capture**
  . Definition: Entering text directly, e.g. for annotating a drawing.
  . Suitable devices: Keyboard, microphone.

- **Image capture**
  . Definition: Entering an image directly.
  . Suitable devices: Video, scanner.

Note 2:
The above types of interaction tasks have been derived from the following article: "The human factors of computer graphics interaction technique" by J.D. Foley, V.L. Wallace and P. Chan, 1984, IEEE Computer Graphics &Application

5.2.6.2 Output device taxonomy

At the highest level, output devices can be divided into those that provide output of a static and permanent nature and those that provide dynamic, temporary output.

- **Static output**
  . Definition: providing an image on a permanent directly readable medium (e.g. paper).
  . Suitable devices: Printers, plotters

- **Dynamic output**
  . Definition: providing variable information on a non-permanent medium.
  . Suitable devices: Screen, head mounted displays, loudspeakers, light.

6 Engineering and ergonomic principles

The following general principles may be useful when classifying user interfaces.

6.1 Action/object order

Some systems are based upon actions being invoked on objects. Whether the action or the object is selected first varies from system to system.

6.2 Complexity of function set

Some systems provide a rich set of complex functions while others provide a small set of elementary functions which can achieve the same effect by being used in combination.

6.3 Complexity of objects

Some systems have a simple set of objects with limited possibilities for combining them to form more complex ones. Other systems allow objects to be combined in various ways such as nesting, embedding, grouping, linking etc.

6.4 WYSIWYG

A user interface methodology where the representation on the screen is judged by the user to have a close relationship to that which would be produced on a static output device (e.g. paper).

Note 3:
The "close" relationship may range from similar to identical, e.g. because of software or hardware limitations.

6.5 Physical principles

Certain aspects of the user interface should be modelled closely on human perception and behaviour. For example:

- font styles and sizes and the use of colour should be appropriate to human vision capability;
- keyboard layout and required key combinations should be appropriate to human manual dexterity;
- use of sound should be appropriate to human auditory characteristics.

6.6 Dialogue principles

Dialogue principles include the following:

- **Suitability for the task**
  A dialogue is suitable for a task to the extent that it supports the user in the effective and efficient completion of the task.

- **Self-descriptiveness**
  A dialogue is self-descriptive to the extent that each dialogue step is immediately comprehensible through feedback from the system or is explained to the user on his or her requesting the relevant information.

- **Controllability**
  A dialogue is controllable to the extent, that the user is able to maintain direction over the whole course of the interaction until the point at which the goal has been met.

- **Conformity with user expectations**
  A dialogue conforms with user expectations to the extent, that it corresponds to the user's task knowledge, education, experience, and to commonly held conventions.

- **Error tolerance**
  A dialogue is error tolerant to the extent, if despite evident errors in input, the intended result may be achieved with either no or minimal corrective action having to be taken.

- **Suitability for individualisation**
  A dialogue is suitable for individualisation to the extent, that the dialogue system is constructed to allow for modification to the user's individual needs and skills for a given task.

- **Suitability for learning**
  A dialogue is suitable for learning to the extent, that it provides means, guidance, and stimulation to the user during the learning phases.

6.7 Drivability

The extent to which user interfaces permit users to easily transfer from one application to another with minimal interference, error, confusion, re-learning and re-training.

6.8 Look and Feel

The extent to which a user interface complies with a particular style guide.

6.9 Internationalisation

Systems vary in the extent to which they support the needs of different cultural and language groups. These include translation of messages, formats, sorting/collating sequences, paper sizes, alphabets, text direction.

7 Applicability domains

Applicability domains include:

User domain

Within the user domain the following characteristics are relevant:
- individual characteristics (e.g. skill level, preferences);
- work group characteristics (e.g. open plan vs closed office, CSCW);
- organisational characteristics (e.g. company policies).

Application domain

Typical application domains include:
- office;

- public information systems;
- education;
- home;
- control rooms;
- factory floor.

8 Environmental constraints

Environmental constraints include:

- implementation dependencies (e.g. portability);
- system environment constraints (e.g. technology, non-graphic screens);
- economic constraints (e.g. cost of use, training).

9 UIRA realisation

Resulting from the definitions and considerations above, the ECMA model of an UIRA realisation has been defined and is presented in figure 2.

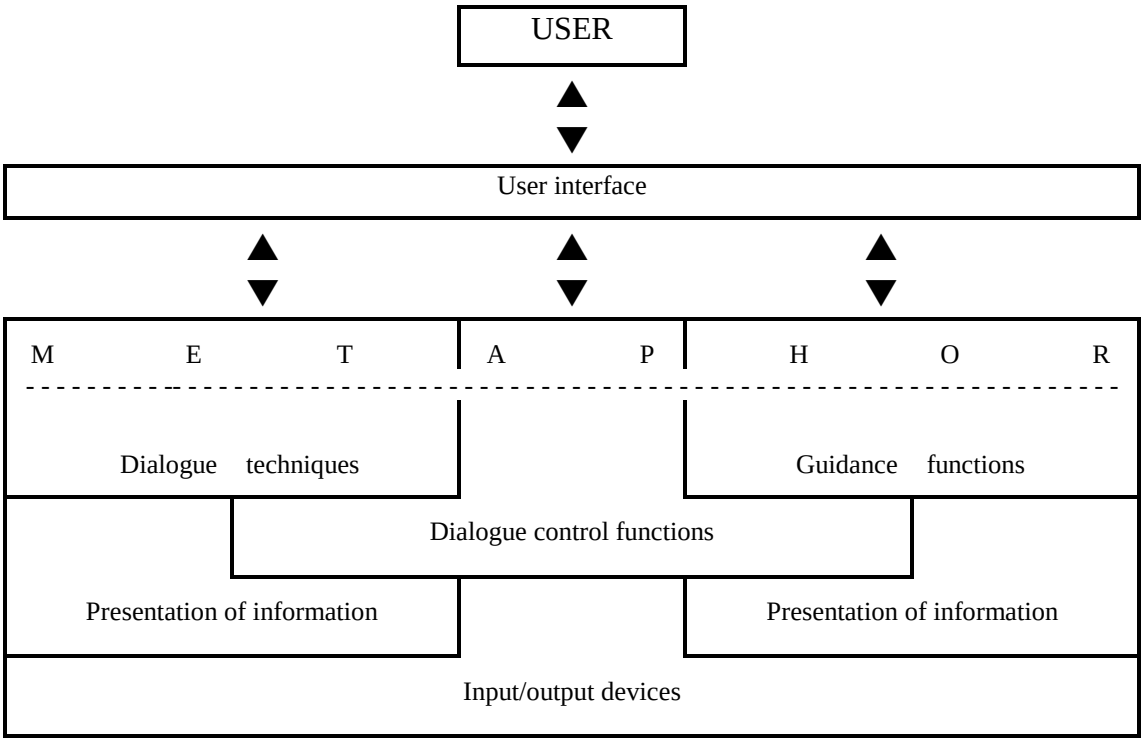

Figure 2 - ECMA user interface reference model

Reduced models, where not all the functions are implemented, can be derived from the above one.

To allow comparison with other modelling techniques, annex B presents the correspondence between the FIPS model and the ECMA one.

ANNEXES

Annex A

User interface classification methodology

This annex gives a set of headings and response boxes, permitting the classification of a user interface according to the ECMA taxonomy.

	Yes/No	Comments
Metaphor		
Dialogue technique		
Menus		
Languages		
Direct manipulation		
Form filling		
Other		
Guidance function		
Guidance in non-error situations and error prevention		
Guidance in error situations and error management		
Other		
Dialogue control function		
System environment		
Dialogue flow		
Object management		
Filtering		
Other		
Presentation of information		
Visual presentation		
Auditory presentation		
Tactile presentation		
Temporal presentation		
Spatial presentation		
Other		
Input/Output devices		
Input device		
Output device		
Other		

	Yes/No	Comments
Engineering and ergonomic principles		
Action/object order		
Complexity of function set		
Complexity of objects		
WYSIWYG		
Physical principles		
Dialogue principles		
Drivability		
Look and Feel		
Internationalisation		
Other		
Applicability domains		
User domain		
Application domain		
Other		
Environmental constraints		
Other		
Other		
General comments		

Example of the description of a user interface: CAD application

	Yes/No	Comments
Metaphor	Y	Workbench
Dialogue technique		
Menus	Y	
Languages		
Direct manipulation	Y	
Form filling	Y	
Other		
Guidance function		
Guidance in non-error situations and error prevention	Y	On-line help; warnings
Guidance in error situations and error management		
Other		
Dialogue control function		
System environment	Y	I/O equivalence; global storage
Dialogue flow	Y	
Object management	Y	
Filtering	Y	
Other		
Presentation of information		
Visual presentation	Y	
Auditory presentation		
Tactile presentation		
Temporal presentation		
Spatial presentation		
Other		
Input/Output devices		
Input devices	Y	Interaction task: selection; position; path; quantify; text capture. Devices: keyboard; tablet; mouse; switches; wheels.
Output devices	Y	Type: static; dynamic. Devices: plotter; printer; screen.
Other		

	Yes/No	Comments
Engineering and ergonomic principles		
Action/object order	Y	Object/action
Complexity of function set	Y	
Complexity of objects	Y	
WYSIWYG		
Physical principles		
Dialogue principles	Y	Task suitability; Controllability; Error tolerance
Drivability		
Look and Feel		
Internationalisation		
Other		
Applicability domains		
User domain	Y	Specialists, Design engineers, Closed office, Graphic design and Construction
Application domain	Y	Office
Other		
Environmental constraints		
Other		
General comments		

Annex B

The NIST interface model

The Federal Information Processing Standards Publication 158 (FIPS PUB158) defines an Application Portability Profile for the X Window System. This publication contains a model consisting of 7 layers, as follows:

Layer 0 Data Stream Encoding, defining the format and sequencing of byte streams passed between client and server.

Layer 1 Data Stream Interface, defining a function call interface to build the messages defined in Data Stream Encoding Layer.

Layer 2 Subroutine Foundation, uses features of the Data Stream Interface to provide means to build components of window interfaces (such as a scroll bar).

Layer 3 Toolkit, defining components such as menus, push buttons and others to build an application interface.

Layer 4 Presentation, determining the appearance of the user interface, including aspects such as size, style and colour.

Layer 5 Dialogue, coordinating the interaction between the computer system and the user.

Layer 6 Application, implementing the functions required by the user.

The differences between the NIST model and the ECMA one can be summarised as follows:

NIST	ECMA
6 Application	No equivalent
5 Dialogue	Dialogue technique Dialogue control function
4 Presentation	Presentation of information
3 Toolkit	Presentation of information
2 Subroutine Foundation	Dialogue control function Presentation of information
1 Data Stream Interface	Presentation of information
0 Data Stream Encoding	Input/output devices
No equivalent	Guidance function Metaphor

Annex C

Description of input and output devices

C.1 Input devices

C.1.1 Eye tracker

A device providing information by following the eye position.

C.1.2 Keyboard

A device consisting of a set of keys. The movement of a key causes one or more code(s) to be sent to the system.

C.1.3 Light pen

A device in the form of a stylus connected to the system. The selection is made by pointing to an area of the screen and activating an entry key, or by pushing the pen against the screen.

C.1.4 Microphone

A device accepting acoustic information.

C.1.5 Pen

A device used with a tablet, a touch screen or a touch panel, to provide free-style input information to the system. Also referred to as pencil or stylus.

C.1.6 Switches

A device in the form of a set of multi-position devices.

C.1.7 Tablet

A device consisting of a flat pad providing a position in space and possibly pressure information to the system.

C.1.8 Touch panel

A device consisting of a panel providing a position in space and possibly pressure information to the system.

C.1.9 Video

A device communicating information in the form of video images.

C.1.10 Wheel

A device providing a continuous range of values.

C.1.11 Pointing devices

Mouse A device roughly of the size and shape of a deck of cards. The direction and speed of the mouse movement determines the relative direction and speed of the cursor. Action on selected targets on the screen is made via one or more entry key(s), generally located on the mouse.

Joystick A device in the form of a lever set into a work surface. Moving (or pressing on) the lever causes the cursor to move on the screen. The direction and speed of the cursor is determined by the direction and speed of the lever movement (or the direction and force of the pressure on the lever). Action on selected targets on the screen is made via one or more entry key(s).

Trackball A device in the form of a mechanical rolling ball within a fixed housing and connected to the terminal. Rotating the ball (with the palm or fingers) causes the cursor to move on the screen. The direction and speed of the cursor is determined by the direction and speed of the ball rotation. Action on selected targets on the screen is made via one or more entry key(s) or through z-plane movement of the ball.

C.1.11 Scanner

A device transforming images into coded information for the system.

C.2 Output devices

C.2.1 Head mounted display

A device worn on the user's head which projects information onto a transparent screen some distance ahead of the operator. It often covers the full field of vision of the operator and can be used to simulate an alternative reality.

C.2.2 Light

A device providing visual coded information.

C.2.3 Loudspeaker

A device, generating acoustic coded information.

C.2.4 Plotter

A device, in which an image is created by one or more pens on an output medium surface.

C.2.5 Printer

A device that provides a hardcopy image.

C.2.6 Screen

A device presenting a dynamic image to the user.

C.3 Input/Output devices

C.3.1 Touch screen

A device consisting of a display device that has been made sensitive to touch.

C.3.2 Gloves

A device, transforming the movements of the hands into coded signals, and that may provide some form of output information e.g. via pressure or heat.

C.3.3 Gesture suits

An extension of the gloves entry device using the full body or part of it.

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A description of this Standard can be found on the ECMA Web site, www.ecma.ch. From there, files T061-DOC.EXE (MSWord, self-expanding) and T061-PDF.PDF (Acrobat PDF) can be freely downloaded.

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