COLDEX

Collaborative Learning and Distributed Experimentation

Information Society Technologies Programme
Project number: IST-2001-32327

Functional Documentation

Deliverable Number:	D7.2.2
Contractual Date of Delivery:	M25
Actual Date of Delivery:	M30
Version:	Ver 2: M32
Work-Package:	WP7
Lead Partner:	UDUI
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1 General

This deliverable represents the functional documentation for the Open User Scheme within COLDEX. The purpose of this deliverable is to provide an "advance organiser" for potential OUS users. Therefore it contains the description of the OUS approach as well as concrete information, links etc. to start a COLDEX OUS event. The audience of the Open User Scheme is to be composed of teacher communities, teacher education, schools and classes.

The general OUS approach is described in the next section. The combination of physical and virtual components within several scenarios is the core of the challenge based learning. This pedagogical concept is meant to be used in the Open User Scheme approach. The section about community support and the usage of the common learning object repository (LOR) explains the specific social aspects and the artefact-based communication. Finally the tools and materials are shown which are essential for the practical usage.

Within the COLDEX portal *www.coldex.info > ous* the scenario components are published and available, e.g. software, learning material and OUS guides.

2 The OUS approach

The approach of the Open User Scheme (OUS) is related to COLDEX' origin in the European-Latin American Eurolat-IS thematic network (www.ffii.nova.es/eurolatis). The OUS allows for associating new user sites, particularly from Latin America. The Open User Scheme is a continuous dissemination activity; growing interconnections enable weaving a net of learning groups, clustered by similar interests in scientific questions.

First OUS workshop

The first Open User Scheme workshop took place in May 2004 in Buenos Aires, Argentina. About 25 participants, many of them working in teacher education, one acting as organiser of the national maths olympics in Paraguay, representing nine different institutions in six Latin American countries (Venzuela, Colombia, Brazil, Paraguay, Argentina and Chile) met COLDEX project partners to initiate the OUS community in South America. They learned about the COLDEX project, its scenarios and pedagogical ideas. During an extensive and detailed hands-on session (half a day) the workshop participants were able to apply four scenarios, namely lunar cartography (calculation of lunar heights, i.e. heights of

moon craters by loading moon images, model a calculation net and measure distances as input for this net), maze (construct mazes and rule sets which enable a robot escaping the maze), system dynamics (a physical modelling technology) and stochastics (mathematical experiments of the probability domain). After a short introduction in groups of about eight members and a period of time for working on their own in the four different scenario groups, the participants were already able to present not only their (self-selected) scenario, but also their group results to the whole workshop audience.

Call for Project Proposals

The call for project proposals invites not only European users, but also the Latin American target group to make use of the provided scenarios and DEXTs and to formulate and propose cooperation projects. COLDEX builds the base on which culturally heterogenous communities can share their learning objects (LOs), i.e. local learning communities exchange their ideas, results and problems in an international network, established by the Open User Scheme. The Call can be found in the appendix.

Challenge-based learning

In COLDEX, and therefore in the Open User Scheme, the main pedagogical idea is "challenge-based learning" which covers non-standard challenges, i.e. from the space domain. Challenge-based learning is a specific form of problem-based learning that capitalises on a specific class of problems (challenges) charcterised by being attractive, curiosity stimulating, non-standard, a rich source of experience and open-ended. Thus, from a motivational point of view, there should be a clearly „visible“ benefit in using the broader learning community as a learning resource. For example, if the explanation of an experiment is standard content of textbooks it is quite unlikely that learners would engage in time consuming communications with people around the world to discuss such standard topics. On the other hand, if the problems dealt with are non-standard and of really open-ended and exploratory nature, there is an obvious incentive to engage in such an exchange. This is the basic argument for concentrating on what we call challenge-based learning as an educational approach. The technical platform for the community support is the LOR.

3 Community support and LOR

To implement the OUS and hence OUS learning communities, learning materials, e.g. tutorials and software, are available, most of them in English. However, on demand translations can be provided, e.g. to facilitate the exchange with the Latin American parnters. Some material is also available in Spanish. Institutional contacts serve as the key to the user groups. Several schools have already started to work with COLDEX scenarios.

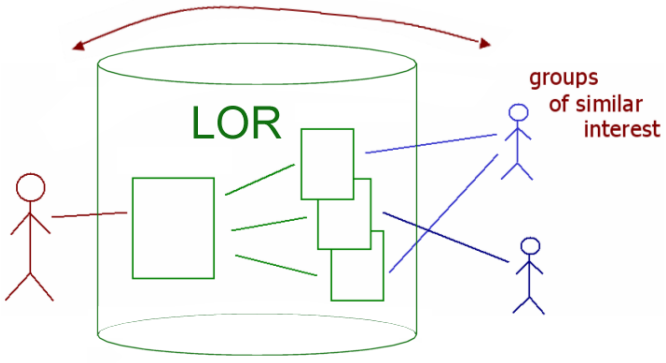


Figure 1 Connect groups of similar interest

Their working results, e.g. artefacts created within the Cool Modes modelling environment, serve as a bridge between users with similar interests.

LOR – Learning Object Repository

The LOR web portal is the user interface which supports the users in saving, sharing and retrieving learning objects. The underlying LOR is the repository where all information – may it concern user data, projects, groups or represented as learning material like models, experimental data, all kind of learning objects – is stored and managed. For the Open User Scheme the portal is the centralised virtual meeting point in which peers can get in touch with each other, on the meta level of their activities and interests. This platform enables the asynchronous exchange of elaborated work within the COLDEX scenarios. Furthermore the retrieval functionality supports the users by getting new ideas for their models and thus by enhancing their learning products. This approach fosters both, learning of domain knowledge and getting used to scientific methods like research and finding clusters of related information.

One goal is to find a minimum consensus for a learning object metadata set within the scope of the COLDEX Project. This set is aimed to constitute a common ground for

annotation and so, making it possible to search for learning objects within the Learning Object Repository.

The LOR will distinguish different learning object types. Each of this types is characterised by a metadata collection, which includes the common set but adds some more to fit the object needs. So, every COLDEX learning object will incorporate the whole common metadata set as well as the type-specific metadata. Therefore, every tool producing COLDEX LOs complies with this metadata specification.

4 Tools and materials

Survey of tools

Tools and scenarios of the COLDEX project are available for OUS users. The above mentioned first OUS workshop fosters the usage of the tools and scenarios for teacher educators, teachers, and thus learning groups of students. Organisers of workshops with users of the target group are called to give feedback for enhancing the scenarios.

The following tools are available (in the download area of the COLDEX portal, see link list in the appendix):

Several scenarios: Cool Modes

Cool Modes (COllaborative Open Learning and MODEling System) [Pinkwart 2003] is a collaborative tool framework designed to support discussions and synchronous cooperative modelling in various domains. Cool Modes supports synchronous cooperation by a shared workspace environment with coupled objects. In Cool Modes, these objects can be defined externally, which offers the option to develop domain dependent plug-ins. There are several scenario relevant plug-ins for COLDEX (described in the section "list of themes" below). Cool Modes is used within four scenarios: astronomy scenario, maze, system dynamics and stochastics.

Biodiversity scenario: BeLifeSimple – Jardineiro

Jardineiro is a Java game; the objective of the game is to get the best growing results for some seedbeds. Several parameters can be adjusted, e.g. light intensity, CO_2 level, temperature. The Jardineiro game is part of the BeLife setting within the biodiversity scenario. It includes an autonomous agent (the "gardener") which can act alone according to his (programmed) personality.

OUS materials

The tutorials (mainly in English) for the scenarios are published at the COLDEX portal (see appendix). For this material translation on demand is possible, but will not be provided without need.

Tutorials:

- Maze scenario: maze HowTo (English)
- Astronomy scenario: lunar heights tutorial (English)
- Stochastics (English):
    - Birthday problem
    - Lottery games
- System Dynamics (English):
    - Usage
    - Example: ecology
- Chemistry scenario (Spanish): instructions

List of themes

The following list shows the needed tools and plug-ins to run a workshop or apply a scenario:

Astronomy scenario, namely lunar cartography

- Lunar pictures (not provided by COLDEX)
- Cool Modes with the following plug-ins
    - Moon plug-in
    - "Graphical calculator for products and sums" plug-in

Maze scenario

- Lego Mindstorms robot (Construction manual available in the COLDEX portal) including USB tower (hardware not provided by COLDEX)
- Wooden maze (construction manual within the HowTo)
- Cool Modes with the following plug-ins
    - Maze Designer plug-in
    - RuleSet Discussion plug-in

Basics: System Dynamics

- Cool Modes with the following plug-in
    - System Dynamics plug-in

Basics: Stochastics

- Cool Modes with the following plug-in
    - "Zufallsexperimente" plug-in

5 Coldex system functionality and metadata definition

The goal of this proposal is to find a minimum consensus for a Learning Object metadata set within the scope of the Coldex Project. This set is aimed to constitute a common ground for annotation and so, making it possible to search for learning objects within the Learning Object Repository (LOR).

Before arriving to this draft set, we have received the partners proposals, which we have had to adapt in order to reach a collection of metadata suitable for all partners. We have used the Learning Object Metadata v1.0 [IEEE 2002] as a reference to guide this effort.

Furthermore, each partner could find necessary to extend this set to fit their own purposes. This is, of course, possible and, for allowing it, the LOR will distinguish different Learning Object types. Each of this types is characterised by a metadata collection, which includes the common set but adds some more to fit the object needs. So, every Coldex Learning Object will incorporate the whole common metadata set as well as the type-specific metadata. Therefore, every tool producing Coldex LOs is supposed to comply with this metadata specification.

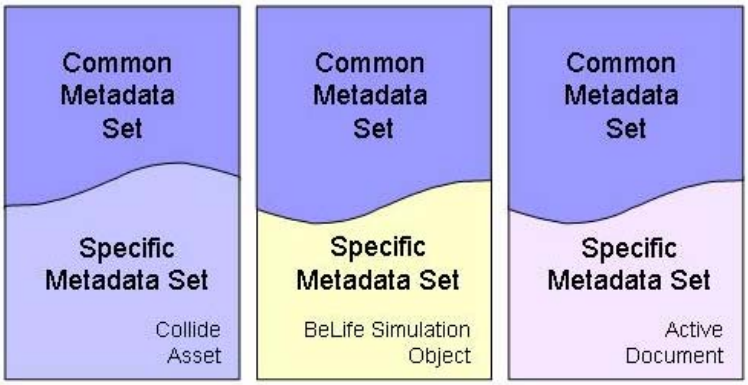


Figure 2 Assembling Metadata Sets

Figure 2 shows how the common and specific metadata sets join to build a Learning Object annotation record for a particular Learning Object Type.

Learning Object Packaging Model

Most of the knowledge which allows annotating Learning Objects (LOs, for short) comes from the tools. Therefore, a part of the metadata is to be supplied along with the LO so that

the LOR is able to extract this information and add it, automatically, to the LO metadata record.

This requirement motivated the definition of a packaging model for LOs. This model describes accurately the way and structure for storing LOs. According to this definition, a Learning Object is packaged into a zip file, which includes both the LO contents and a file called manifest.xml. This file contains the LO meta-information.

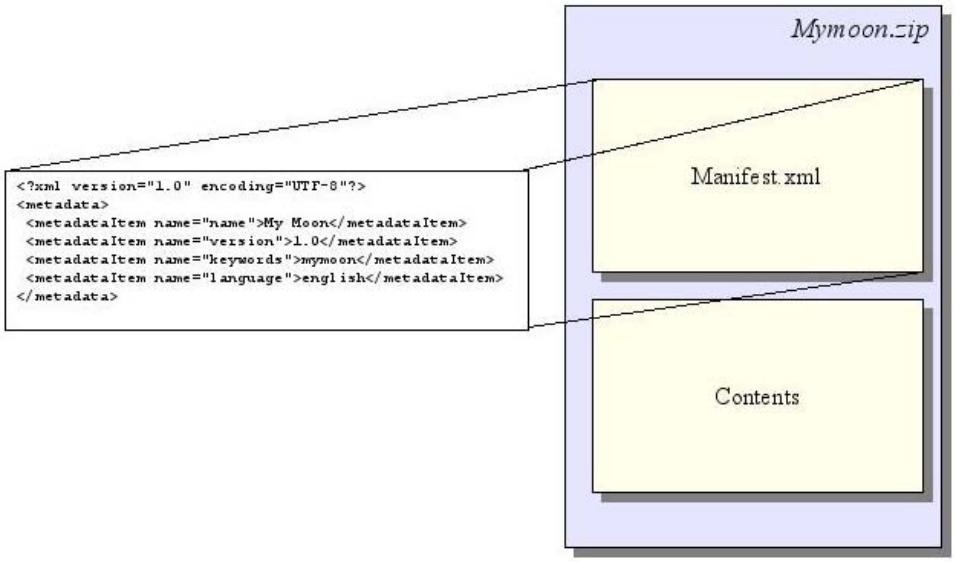


Figure 3 LO Packaging model

This solution is not compulsory for Coldex LOs. Nevertheless, complying with this model, the LO author could take advantage of the LOR's auto-filling capabilities, which would result in an easier annotation process. Otherwise, a LO can be represented by any file structure or type (PDF, DOC, TEX, DVI, or any MIME type). Nevertheless, is highly advisable for all Coldex partners to adapt or develop their tools to comply with this packaging model.

Manifest structure

The manifest.xml file is an XML descriptor containing all the tool-supplied meta-information for the described LO. It is made of a collection of metadata items, any of which, in turn is composed of a name and a value (corresponding to the metadata represented by this item). Whenever a metadata item allow multiple values, the

manifest.xml file should have an entry for each of these values having the same name (see, for instance, the keywords and palettes entries in figure 4).

Metadata items are not mandatory. Missing items won't cause malfunction: only the auto-filling process will not take advantage of them. Figure 3 shows an example of manifest.xml file. Metadata items in Common set have been typed in boldface.

```
<?xml version="1.0" encoding="UTF-8"?>
<metadata>
       <metadataItem name="name">My Moon</metadataItem>
       <metadataItem name="version">1.0</metadataItem>
       <metadataItem name="keyword">coolmodes</metadataItem>
       <metadataItem name="keyword">mymoon</metadataItem>
       <metadataItem name="date">2004/04/16 14:26:53</metadataItem>
       <metadataItem name="language">english</metadataItem>
       <metadataItem name="editors"/>
       <metadataItem name="palettes">Moon</metadataItem>
       <metadataItem name="palettes">Graphical Calculator</metadataItem>
       <metadataItem name="palettes">DrawPalette</metadataItem>
       <metadataItem name="project"/>
       <metadataItem name="activity"/>
</metadata>
```

Figure 4 Example manifest.xml file (for the object mymoon.zip)

Auto-filling

The LOR is able to extract automatically some information from the context to fill in the LO's final metadata record. For doing so, the LOR architecture incorporates a number of software *spy agents*, which are in charge of inspecting the context and gather some useful meta-information. We distinguish different context types depending on the nature of the information that can be extracted from them:

- *Resource*, which corresponds to the manifest information
- *Social Context*, which provides the social information, such as user, group or community data
- *Workspace*, which contains the information related to the tasks, activities and projects in which the user is involved
- *System*, which supplies all the system information, such as file size, current date or file name

Screenshots

The meta-documentation process starts after the auto-filling process, which supplies initial data for partially populating a form that the user is to validate and complete.

Users can define their own Learning Object Types. For doing so, they must provide the LO type specific metadata, which are to extend the common metadata set. When a LO is to be

annotated, the system will present the author with a form including the common as well as the type-specific metadata. Figure 5 shows a metadata annotation form.

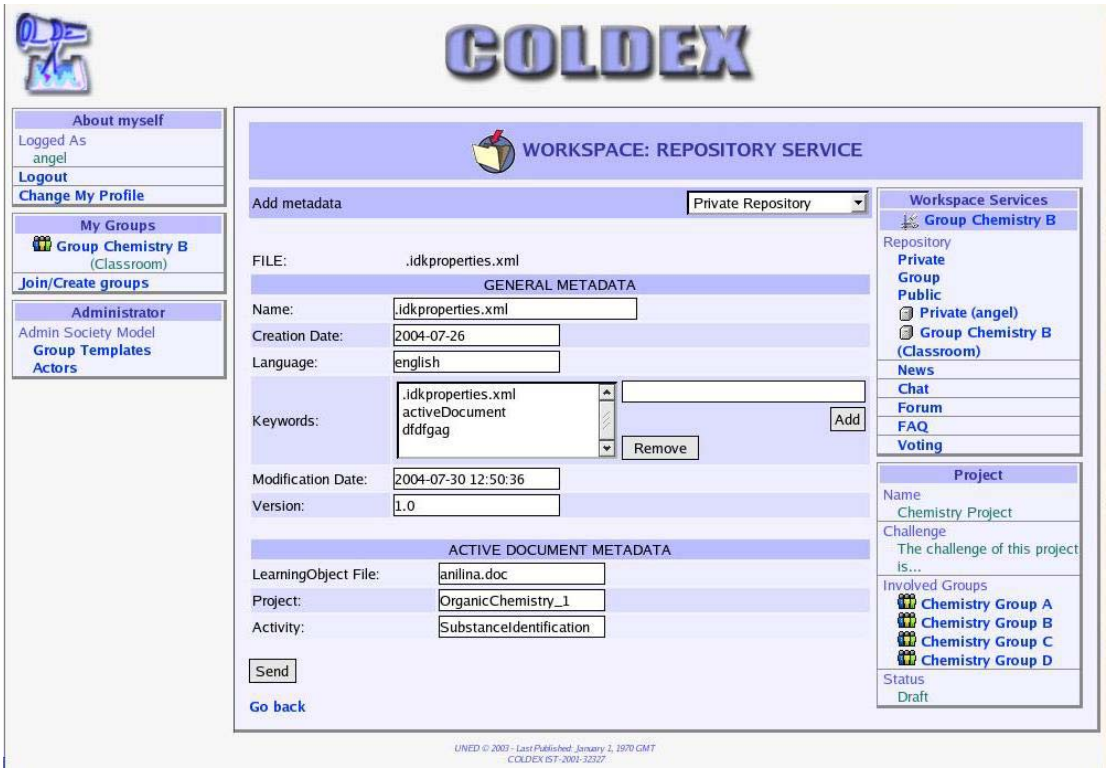


Figure 5 Sample Metadata Annotation Form

Common Coldex Metadata Set

Metadata Set Description

The following elements are given for each metadata item bellow:

- *Metadata*: which is the metadata item identifier (or label)
- *Multiple valued*: it specifies whether the metadata item can accept more than one value
- *Type*: the expected data type for filling in this item. Allowed types are either strings or numbers
- *Vocabulary*: it collects the allowed values for this field (either by listing them or by referring to a standard definition)
- *Required*: it informs of the compulsory character of this metadata item for the described LO
- *Description*: a text defining the item semantics
- *Auto-filling*: the context from which the information for filling in this metadata item can be collected
- *LOM reference*: a reference to the corresponding IEEE LTSC LOM v1.0 metadata field when applicable

Metadata Set Definition

Metadata	**Name**
Multiple Valued	No
Type	String
Vocabulary	LO Identifier
Required	Yes
Description	This Name identifies the LO within the repository. It must be unique for each LO within each repository.
Auto filling	Resource
LOM reference	1.1.2 Entry

Metadata	**Language**
Multiple Valued	No
Type	String
Vocabulary	ISO 639-2 [ISO]
Required	No
Description	The LO language (i.e., the language in which the LO contents are written)
Auto filling	-
LOM reference	1.3 Language

Metadata	**Description**
Multiple Valued	No
Type	String
Vocabulary	-
Required	No
Description	LO Description (an informative text about the LO and its purposes)
Auto filling	-
LOM reference	1.4 Description

Metadata	**Keyword**
Multiple Valued	Yes
Type	String
Vocabulary	-
Required	No
Description	These keywords (which are not constrained by any given vocabulary) would allow looking for the LO
Auto filling	-
LOM reference	1.5 Keyword

Metadata	Version
Multiple Valued	No
Type	String
Vocabulary	Version Number
Required	No
Description	Version Number (its semantics are given by the author)
Auto filling	Resource
LOM reference	2.1 Version

Metadata	Date
Multiple Valued	No
Type	String
Vocabulary	yyyy/mm/dd hh:mm:ss
Required	No
Description	The LO creation date
Auto filling	System
LOM reference	2.3.3 Date

Metadata	Type
Multiple Valued	No
Type	String
Vocabulary	CollideAsset ActiveDocument BeLifeSimulationObject …
Required	Yes
Description	It represents a LO type
Auto filling	-
LOM reference	-

Metadata	Mode
Multiple Valued	No
Type	String
Vocabulary	Collaborative Individual
Required	Yes
Description	The LO development mode (i.e., whether it's been done collaboratively or not)
Auto filling	Default (Individual)
LOM reference	-

Metadata	Format
Multiple Valued	No
Type	String
Vocabulary	MIME (see RFC2045 [IEEE 2002], RFC2046 [Freed 1996a])
Required	No
Description	MIME type of the LO contents
Auto filling	System
LOM reference	4.1 Format

Metadata	Size
Multiple Valued	No
Type	Number
Vocabulary	-
Required	No
Description	The size, in bytes, of the LO contents
Auto filling	System
LOM reference	4.2 Size

Metadata	Parent
Multiple Valued	No
Type	String
Vocabulary	LO Identifier
Required	No
Description	It identifies the LO from which this one derives
Auto filling	-
LOM reference	-

Metadata	Relation
Multiple Valued	Yes
Type	String
Vocabulary	LO Identifier
Required	No
Description	By now, it is the name of another LO within the same repository, which holds a relationship with this one (further work: inter-repository relations)
Auto filling	-
LOM reference	7.2.1.2 Relation

Metadata	Group
Multiple Valued	No
Type	String
Vocabulary	-
Required	No
Description	The group to which the Actor responsible for the LO creation belongs
Auto filling	-
LOM reference	-

Metadata	Actor
Multiple Valued	No
Type	String
Vocabulary	The actors declared in the system (Student, Teacher, …)
Required	No
Description	The user stereotype played by the user within the group when adding the LO
Auto filling	Social Context
LOM reference	-

Metadata	Author
Multiple Valued	No
Type	String
Vocabulary	User Identifier
Required	No
Description	The LO's author's name
Auto filling	Social Context
LOM reference	-

Metadata	Editor
Multiple Valued	Yes
Type	String
Vocabulary	User Identifier
Required	No
Description	The name of each of the LO's editors
Auto filling	Social Context
LOM reference	-

Metadata	Contributor
Multiple Valued	No
Type	String
Vocabulary	User Identifier
Required	No
Description	The name of each of the LO's contributors, i.e, persons who help authoring the LO
Auto filling	Social Context
LOM reference	-

Metadata	Modifier
Multiple Valued	No
Type	String
Vocabulary	User Identifier
Required	No
Description	The name of each of the LO's modifiers, i.e., persons who change the LO after its creation
Auto filling	Social Context
LOM reference	-

Metadata	Reviewer
Multiple Valued	No
Type	String
Vocabulary	User Identifier
Required	No
Description	The name of each of the LO's reviewers
Auto filling	Social Context
LOM reference	-

Metadata	Corrector
Multiple Valued	No
Type	String
Vocabulary	User Identifier
Required	No
Description	The name of each of the LO's correctors (i.e., persons which are in charge of amending any possible errors in the LO contents)
Auto filling	Social Context
LOM reference	-

Metadata	Marker
Multiple Valued	No
Type	String
Vocabulary	User Identifier
Required	No
Description	The name of the user who grades or assesses the LO
Auto filling	Social Context
LOM reference	-

Metadata	Project
Multiple Valued	No
Type	String
Vocabulary	-
Required	No
Description	The project where this LO is used
Auto filling	Workspace
LOM reference	-

Metadata	Activity
Multiple Valued	Yes
Type	String
Vocabulary	-
Required	No
Description	The activity where this LO is used
Auto filling	Workspace
LOM reference	-

Metadata	Task
Multiple Valued	Yes
Type	String
Vocabulary	-
Required	No
Description	The task where this LO is used
Auto filling	Workspace
LOM reference	-

Metadata	Goal
Multiple Valued	Yes
Type	String
Vocabulary	-
Required	No
Description	A goal which is reached within the instructional process when creating this LO
Auto filling	Workspace
LOM reference	-

Metadata	Topic
Multiple Valued	No
Type	String
Vocabulary	-
Required	No
Description	The domain topic or concept to which this LO is related
Auto filling	Workspace
LOM reference	-

Metadata	Repository
Multiple Valued	No
Type	String
Vocabulary	Repository Identifier
Required	No
Description	This metadata identifies the LO repository uniquely
Auto filling	Workspace
LOM reference	-

An Annotation Example

This section describes an annotation example. The object, named EveningplanWithQOC is a CollideAsset, so it entails both common metadata and Collide-specific metadata.

Common Metadata Record for the *EveningplanWithQOC* object

Metadata	*Value*
Name	EveningplanWithQOC
Language	En
Description	For the workshop evening, July 2004, the planning for the night can be easily seen from the model. The question what to do is answered for several options regarding the criteria. Although the hint is very useful
Keywords	Question
Keywords	Option
Keywords	Criterion
Keywords	Weighting
Keywords	decision documentation
Version	1.1
Date	2004/07/16 10:19:59
Type	CollideAsset
Mode	Individual
Format	application/zip
Size	101376
Parent	-
Relation	-
Group	CollideGroup
Actor	Teacher
Author	Maria
Editor	Maria
Contributor	Bamaria
Modifier	-
Reviewer	-
Dropper	-
Corrector	-
Marker	-
Goal	-
Activity	Workshop
Project	-
Task	-
Topic	Design methods
Repository	de.udui.collide.maria

Specific Metadata Record for the *EveningplanWithQOC* object

Metadata	Value
Plugin	QocReferenceFrame
Plugin	Logic
Plugin	DrawPalette
Update	2004-07-27 10:21:33.06
Read-only	False
Version	1.1
Location (city)	Duisburg
Location (country)	Germany
Size (KB)	99 KB
ToolType	Cool Modes

6 References

[Pinkwart 2003] Pinkwart, N. (2003). *A Plug-In Architecture for Graph Based Collaborative Modeling Systems*. In U. Hoppe, F. Verdejo & J. Kay (eds.): Shaping the Future of Learning through Intelligent Technologies. Proceedings of the 11th Conference on Artificial Intelligence in Education, pp. 535-536. Amsterdam, IOS Press.

[IEEE 2002] IEEE Standard for Learning Object Metadata *v6.1 to Final Draft Standard IEEE 1484.12.1-2002 1484.12.1* Learning Technology Standards Committee of the IEEE (http://ltsc.ieee.org)

[Freed 1996a] *Freed, N.; Borenstein, N.* Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies *RFC 2045, November 1996*

[Freed 1996b] *Freed, N.; Borenstein, N.* Multipurpose Internet Mail Extensions (MIME) Part One: Media Types *RFC 2046, November 1996*

[ISO] *International Standard Organization* Codes for the Representation of Names of Languages *ISO 639-2 http://www.loc.gov/standards/iso639-2/langcodes.html*

7 Appendix

Call for Proposals

COLDEX Open User Scheme

Call for Cooperation Project Proposals

COLDEX (Collaborative Learning and Distributed Experimentation) is a European project which aims at developing novel forms of IT support for learning with open-ended, authentic problems in science and technology. To refresh your knowledge of COLDEX we recommend a visit to the project home page

http://www.coldex.info

which contains descriptions and materials in different languages (English, Spanish, German).

In a specific activity called the „Open User Scheme“ (OUS), the COLDEX developments are to be applied and tested in cooperation with different user sites, extending from Europe to Latin America. A first workshop with potential partners from Latin America was held in May 2004 in Buenos Aires, Argentina.

As a next step, we invite users in Europe and in Latin America to formulate and propose cooperation projects. These should take up COLDEX themes (scenarios) and make use of COLDEX tools and infrastructure. Each such cooperation project proposal or CPP should comprise one specific practical application, e.g., a course module in a school or in teacher education. Cooperation projects can be proposed by educational institutions – academic, teacher training or on a secondary school level – which are either public or, if private, do not limit the access to education within the institution to priviliged minorities through high inscription fees. In the following, we will suggest the general structure of such a proposal. First drafts in Spanish or English should be sent to cpp@coldex.info before September 5, 2004. The COLDEX staff will react to these and make suggestions for further action within 2-3 weeks. Scenario experts will then contact the selected proposers.

For approved proposals, COLDEX will provide the following benefits:

- free use of the COLDEX tools (particularly the multi-functional Cool Modes modelling environment);
- free acces to COLDEX archives and the repository of learning objects;
- after successful completion and documentation of the envisaged practical activity, at least one member of the partner institution will be invited to present the experience during a second COLDEX OUS workshop in early 2005, to be held probably in Spain.

Suggested structure of a CPP

1. Proposing institution
   (name, type, characteristics, number of teaching staff/students, statement about how the contact to COLDEX was established)

2. Related COLDEX scenarios and tools
   (select and elaborate one of the following scenarios)
   - „robot in a maze“
   - astronomy (moon observation)
   - probability (using a specific Cool Modes microworld)
   - biodiversity / „planting in space“
   - environmental studies (using System Dynamics)

3. Description of the practical application
   (target group, curricular/institutional context, duration, equipment in place)

4. Envisaged results
   (results in terms of empirical data and/or curriculum material and/or concrete products)

5. Schedule
   (time plan for preparation, actual activity, evaluation, documentation)

6. Local responsibles – „the team“
   (names of responsible teachers/researchers/administrators with their respective responsibilities)

The CPP should cover not more than 5 pages.

To dig for concrete ideas, visit www.coldex.info > ous > downloads.

Note: This page is password protected >>>

User name: **partner**
Password: **ous-cpp**

This information is to be used exclusively by the recipients of this message (and within the institution). Other persons or institutions should contact us to get access: >>>

cpp@coldex.info

COLDEX Esquema Abierto al Usuario

Convocatoria para Propuestas de Proyectos de Cooperación

COLDEX (Aprendizaje Colaborativo y Experimentación Distribuida) es un proyecto Europeo, cuyo objetivo es desarrollar nuevas formas de TIC para el apoyo al aprendizaje en ciencias y tecnología usando problemas auténticos de tipo no estandarizado. Para refrescar su información acerca de COLDEX le recomendamos visitar nuestra página

http://www.coldex.info

que contiene descripciones y materiales en diferentes idiomas (español, inglés, alemán).

La actividad específica del Esquema Abierto al Usuario (OUS) está dedicada a aplicar y probar los desarrollos de COLDEX en cooperación con diferentes usuarios extendidos desde Europa hacia América Latina. El primer taller con socios potenciales en América Latina tuvo lugar en el mes de mayo del 2004 en Buenos Aires, Argentina.

A continuación queremos invitar a usuarios en Europa y América Latina a formular y proponer proyectos de cooperación. Estos proyectos se tendrán que relacionar con los temas de COLDEX (escenarios) y hacer uso de sus herramientas de trabajo (como por ejemplo el software de modelado “Cool Modes”) así como su infraestructura. Cada propuesta de proyecto de cooperación o CPP debería definir una aplicación práctica, por ejemplo como parte de un curso con alumnos de secundaria o en formación de profesores. Los proyectos de cooperación pueden ser propuestos por instituciones educativas – acádemicas o de formación de profesores o entidades de educación secundaria. Se considerarán instituciones públicas, o en el caso de ser privadas, es importante que el acceso a la educación en dichas instituciones no se limite a minorías privilegiadas a traves de altas cuotas de inscripción. A continuación queremos sugerir la estructura general para la elaboración de una propuesta. Las propuestas deberán estar formuladas en inglés o español y ser enviadas antes del 5 de septiembre del 2004 a cpp@coldex.info. Miembros del equipo COLDEX se manifestarán en el transcurso de 2-3 semanas al respecto y contactarán a los proyectos elegidos.

Para las propuestas aprobadas, COLDEX ofrece los siguiente beneficios

- Libre uso de las herramientas COLDEX (particularlmente el ambiente de modelado multi-funcional Cool Modes);
- Libre acceso a los archivos de COLDEX y su repositorio de objectos aprendizaje (“learning object repository”);
- Finalmente, después del cumplimiento y documentación exitosa de la actividad práctica por lo menos un miembro de cada proyecto/institución será invitado a presentar su experiencia en el segundo taller de COLDEX OUS a comienzos del año 2005, que tedrá lugar probablemente en España.

Sugerencias para la estrucura de un CPP

7. Institución que propone
   (nombre, tipo, características, número de profesores/directivos, estudiantes, una pequeña exposición acerca de cómo se estableció el contacto con COLDEX)
8. Escenarios y herramientas COLDEX relacionados
   (seleccionar y elaborar /explicar el uso de uno de los siguientes escenarios)
   - „robot en un laberinto“
   - astronomía (observaciones lunares)
   - probabilidad (uso específico de Cool Modes microworld)
   - biodiversidad / “plantación en el espacio“
   - estudio de medio ambiente (usando sistemas dinámicos)
9. Descripción de una aplicación práctica
   (grupo meta, contexto del /en el programa institucional de estudios, duración, dotación/equipamiento del lugar)
10. Resultados anticipados
    (resultados en terminos de datos empíricos y/o material/programa de estudios y/o productos concretos)
11. Planeación
    (planeación del tiempo con fases/actividades de preparación, actividad de curso, evaluación, documentación)
12. Responsables locales - „el equipo“
    (nombres de los profesores/investigadores/administradores con sus respectivas responsabilidades)

Un CPP no debería exceder de 5 páginas.

Para „pescar“ ideas concretas y probar las herramientas:
>>> Visite www.coldex.info > ous > downloads.

Nota: Esta página está protegida con una clave >>>

User name: **socio**
Password: **ous-cpp**

Está información es para el uso exclusivo por parte de los destinatarios de este mensaje electrónico (a nivel de la institución). Otras personas/instituciones nos deberían contactar para obtener acceso: >>> cpp@coldex.info

"Guías" – Colombian guidelines

The following 13 pages contain guidelines for the astronomy scenario, namely the moon part of it (lunar cartography) in Spanish.

UPN – U. DUISBURG – ESSEN **Rodrigo Lara Bonilla** Cool Modes	***CALCULO DE ALTURAS LUNARES***	GUÍA Nº **1**
HABILIDADES	***PROYECTOS TECNOLÓGICOS***	Tiempo estimado para su desarrollo **4 Horas**
Colaborativas		
Tecnológicas		

ALTURAS LUNARES

¿QUÉ ES UNA ALTURA LUNAR?

Se define por altura lunar, la profundidad que tienen los diferentes cráteres con respecto a la superficie lunar.

¿PARA QUÉ APRENDER A MEDIR ALTURAS LUNARES?

Se plantea un modelo matemático basado en la igualación de triángulos rectángulos como aplicación específica del dominio de conocimiento de la trigonometría. En este sentido, se pueden realizar mediciones directamente en fotografías para obtener dimensiones con un alto grado de precisión, y de está forma le permite a los estudiantes hacerse una representación estructurada de las magnitudes y las diferentes relaciones que se pueden establecer entre diámetros, radios, sombras y alturas de cráteres, entre otras.

¿QUÉ DIMENSIONES SE TIENEN EN CUENTA PARA HALLAR ALTURAS LUNARES?

- D = Diámetro de la luna
- R = Radio de la luna.
- S = Sombra del cráter.
- L = Distancia del borde externo del cráter a la línea de centro de la luna (ver figura No 1).

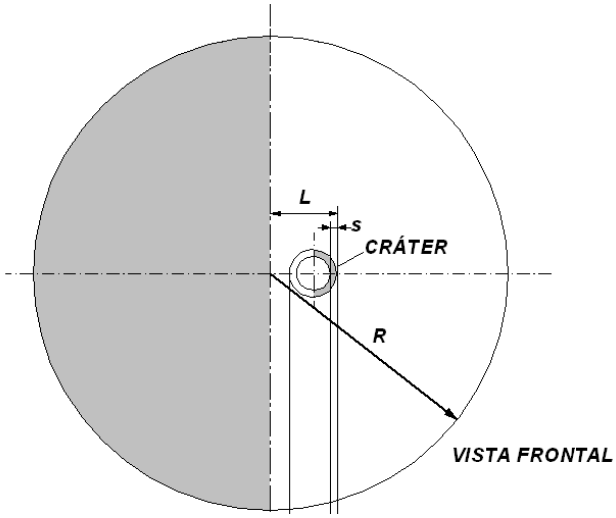
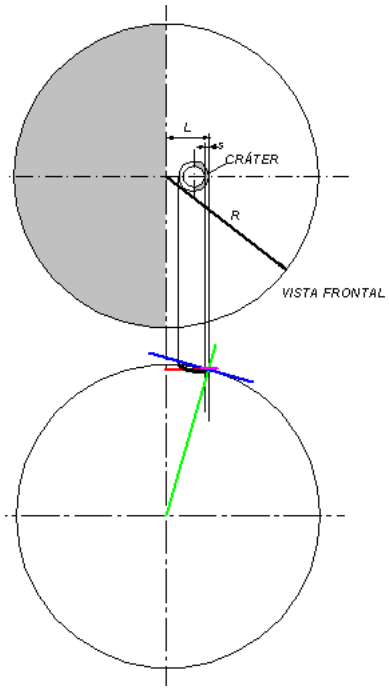


Figura no 1. Relaciones dimensiónales para un cráter.

MODELO MATEMÁTICO A SEGUIR



Para realizar la demostración se tienen en cuenta dos vistas de la luna. Una corresponde a la vista frontal y la otra, a una vista de la luna girada un ángulo de 90 grados.

Para la demostración se toma un cráter de la luna, representado por una circunferencia (teóricamente). De igual forma, se representa la sombra que se genera, con otra circunferencia de menor magnitud. (Ver figura No 2)

Sombra del cráter

Figura No 2. Representación de La luna.

El borde del cráter desde donde se inicia la sombra esta separado del eje de simetría de la luna por una distancia “L” y la sombra que se genera en el cráter por acción de los rayos solares tiene una magnitud de “S”

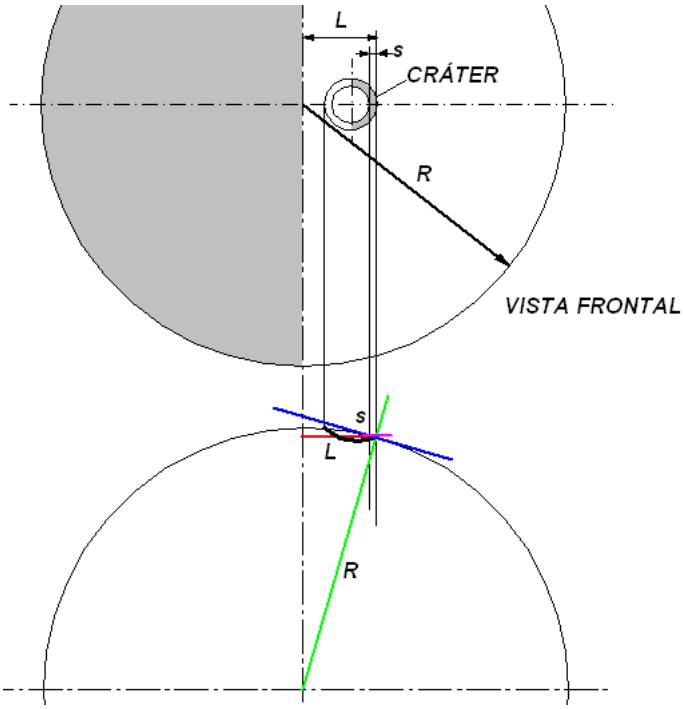
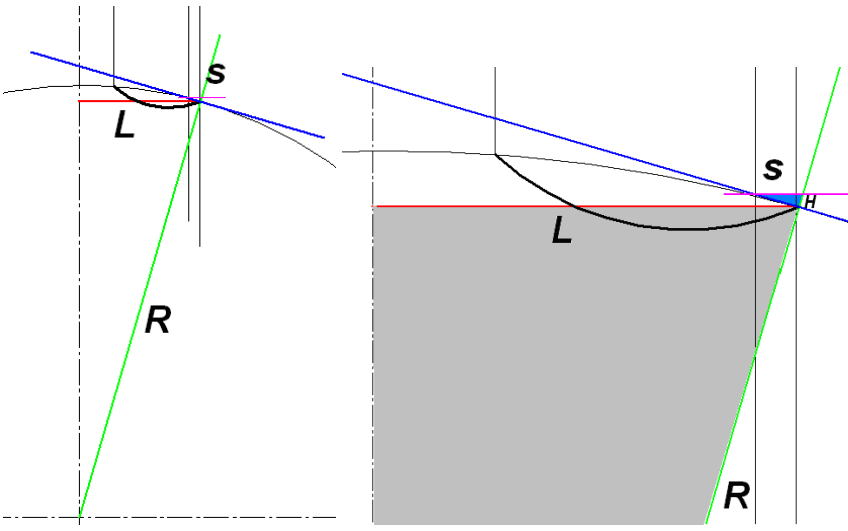


Figura No 3. Traslación de magnitudes

En la figura No 3, (vista frontal) se trasladan con líneas las dimensiones del cráter S, L y R, en la vista de la luna que ha sido girada 90°, con sus respectivos puntos de corte para obtener las relaciones matemáticas que se desprenden en esta nueva representación, de tal forma, que se observa un triángulo rectángulo con hipotenusa "R" y cateto "L".
El cráter en está vista, se ubica en la parte superior de la luna.

A continuación se presenta una parte ampliada varias veces de la figura No 3, donde se muestran los triángulos que se forman al unir las diferentes líneas proyectadas desde el cráter inicial. El objetivo es mostrar las relaciones que se dan a partir de los diferentes triángulos formados para poder determinar con un alto grado de precisión la profundidad de un cráter a partir de mediciones directas en una fotografía.



De la figura se puede observar, que se forman dos triángulos rectángulos semejantes, los cuales tienen un lado en común (línea "R"). De tal manera que se puede establecer la siguiente relación:

$$\frac{H}{L} = \frac{S}{R}$$

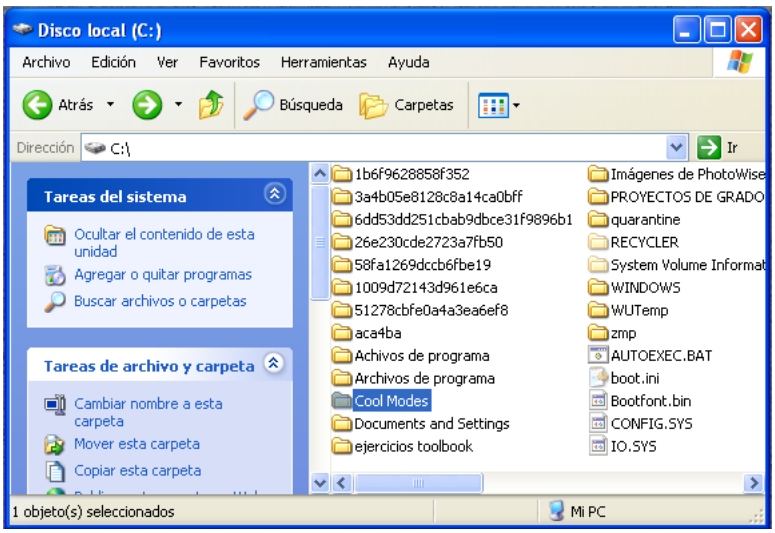
Donde H es la altura del cráter.

TRABAJO INDIVIDUAL

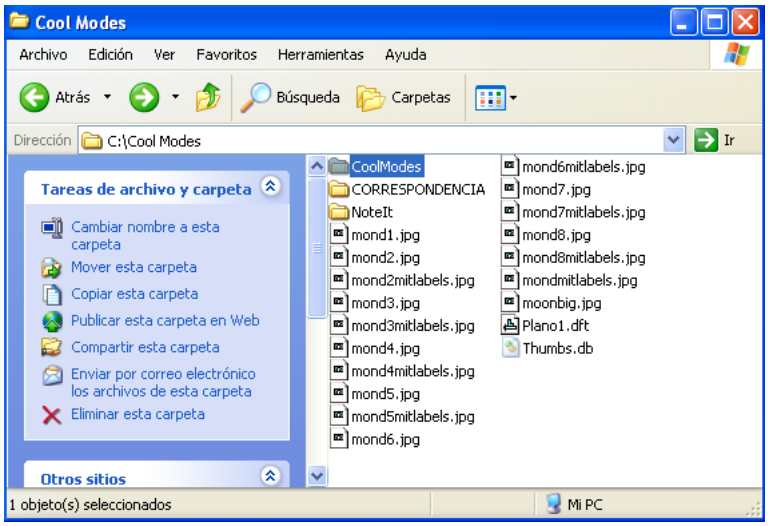
A continuación se presenta una guía que orienta paso a paso al usuario en el uso del programa Cool Modes para hallar las alturas lunares.

Procedimiento

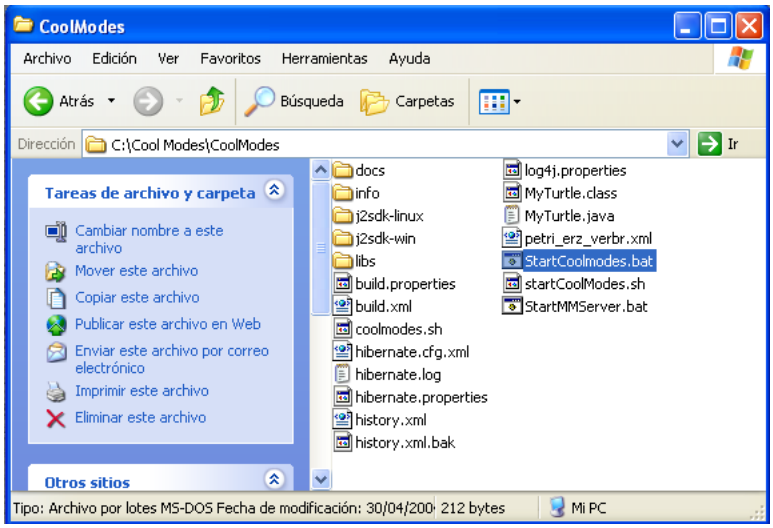
1. **Abrir carpeta Cool Modes:** Busque la carpeta Cool Modes en la unidad de disco (C:).



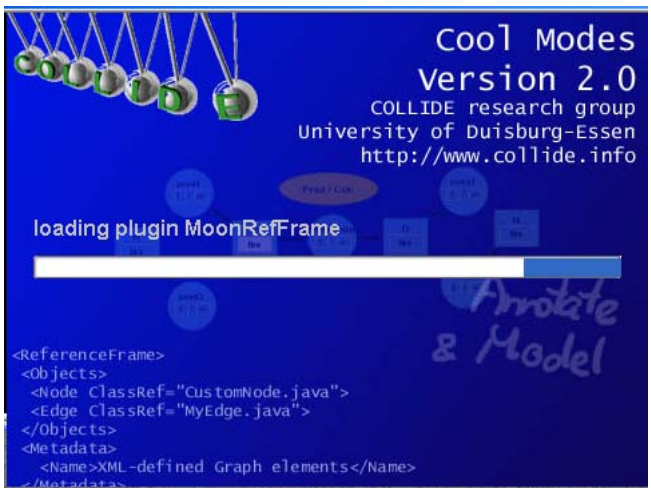
Abra la sub-carpeta ***CoolModes*** que está ubicada dentro de la carpeta (Cool Modes).



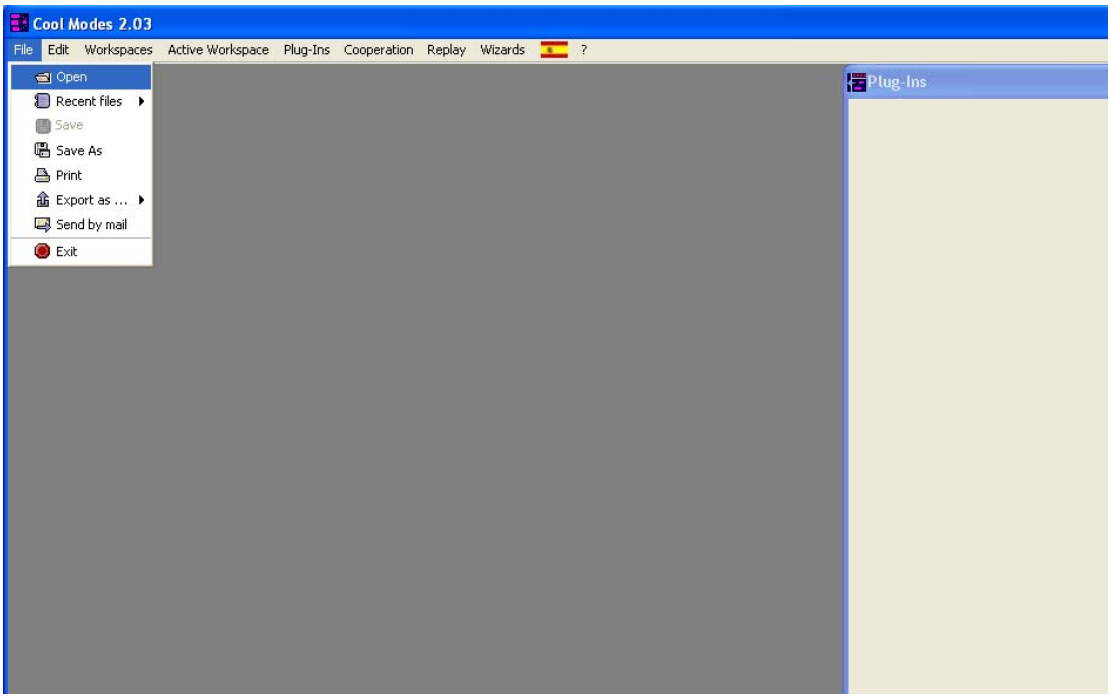
Inicie el programa haciendo dobleclick en el archivo ejecutable ***StartCoolmodes.bat*** *que está ubicado dentro de la* sub-carpeta ***CoolModes.***



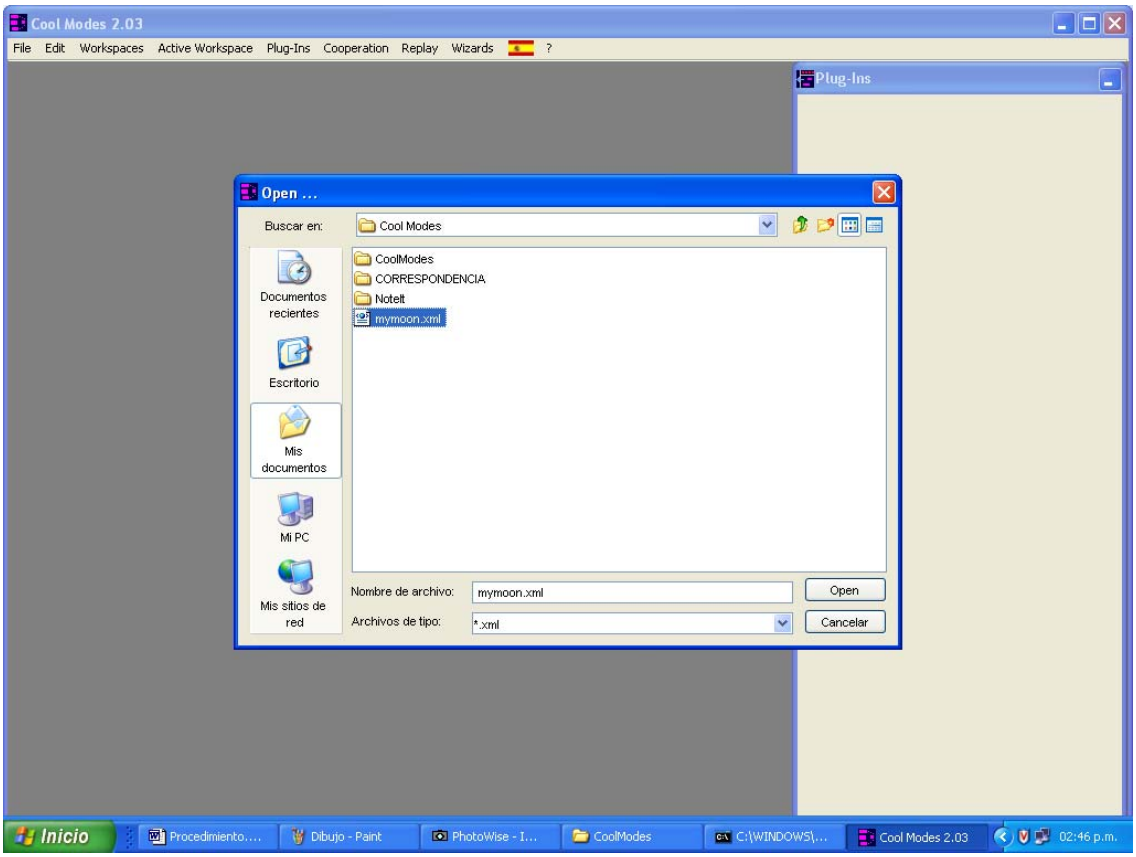
Tan pronto carga el programa se muestra en pantalla la siguiente ventana de presentación que corresponde a la interfaz del usuario:



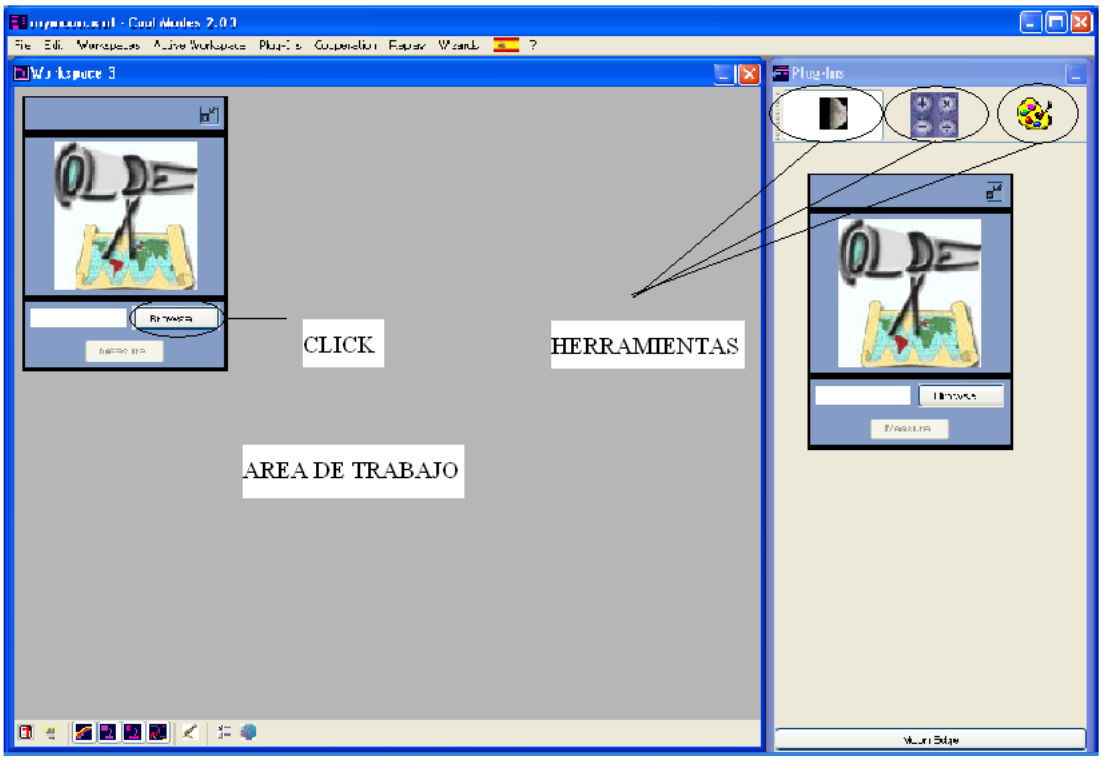
2. **Interfaz de usuario:** Muestra el entorno gráfico del programa Cool Modes, ésta permite determinar las alturas lunares, para ello realice los siguientes pasos:
   - Haga clic en el menú ***File,*** *luego* seleccione la opción ***Open***



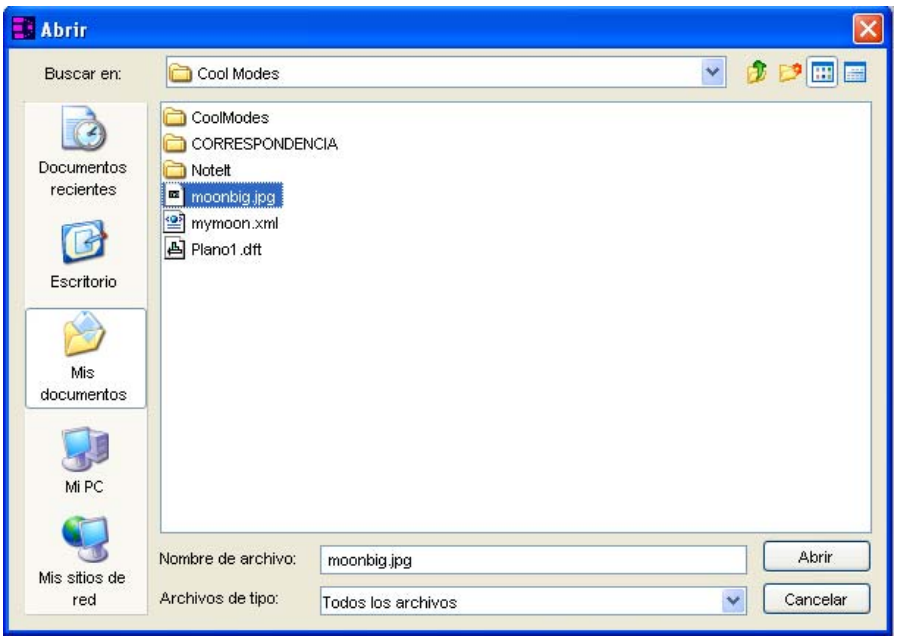
Ahora abra la carpeta ***Mymoom.xlm*** ubicada en la unidad (C:) dentro de la carpeta ***Cool Modes.***



Se muestra la siguiente pantalla, en la cual se identifica el área de trabajo y los iconos de herramientas. Haga click en el botón **Browse…**

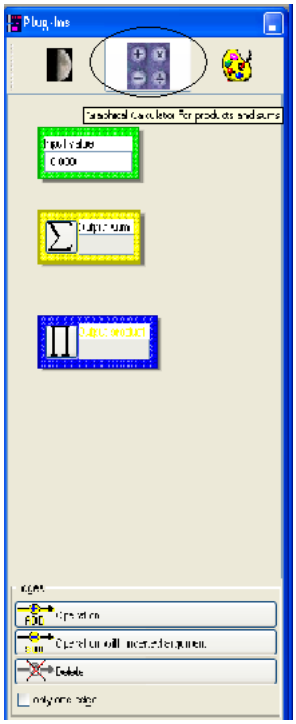


Abra la sub – carpeta ***moonbig.jpg*** *u*bicado en la carpeta ***Cool Modes*** *y* ubique una fotografía de la luna.



Se muestra la siguiente imagen de la luna, con base en esta imagen, se realice todo el proceso para determinar la altura de los cráteres lunares.

Observe que en la parte derecha de la pantalla se ubican las herramientas para realizar las diferentes operaciones matemáticas. Haga click en el icono: ***Graphical Calculador for products and sums.***

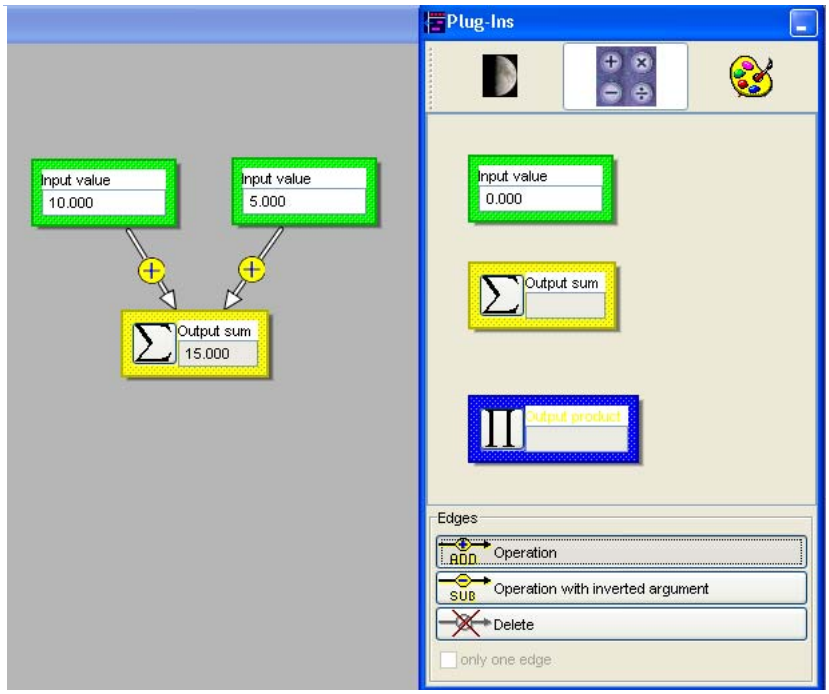


Se muestran tres iconos: uno de color verde para la entrada de datos por parte del usuario, otro de color amarillo para efectuar suma o resta de datos y el otro azul para realizar productos o divisiones de datos.

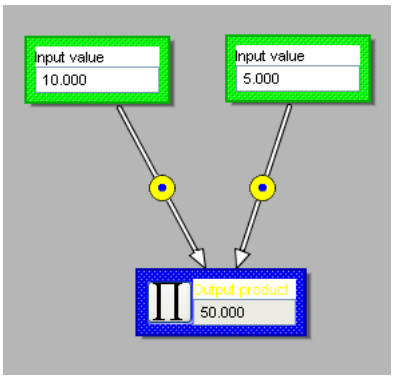
Para realizar operaciones con los datos de entrada, simplemente haga clic sobre el icono pertinente y arrástrelo hasta el área de trabajo el número de veces que sea necesario tal como se indica en la siguiente gráfica.

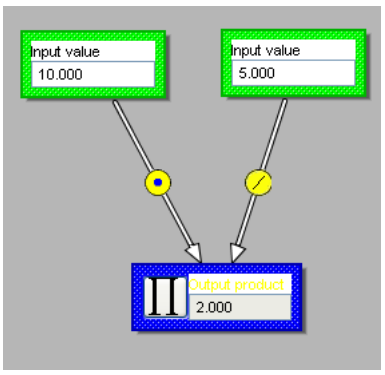
Para sumar dos números, arrastre dos veces el incono "Verde" hasta el área de trabajo, Haga clic sobre ellos y digite los datos. Ahora arrastre el icono "amarillo" al área de trabajo.

Ahora haga click en el botón ***Operación*** identificado en la parte inferior de la paleta de herramientas. Una los iconos verdes con el icono amarillo haciendo clic en el icono verde y arrastrando hasta el amarillo. Se muestra inmediatamente una flecha de relación con el respectivo signo (+).



Para cambiar el signo (+) haga dobleclick sobre éste y se mostrará el signo (-).





Para hallar productos y divisiones se toma el icono de color "azul" se hace click en el botón ***Operatión*** se unen los iconos respectivos al icono producto. Se muestran fechas con el signo correspondiente (*). Por ejemplo el producto 10 * 5 = 50.

Para realizar la operación inversa, es decir, la división se hace doble click sobre el signo (*) e inmediatamente se muestra el signo opuesto.

Por ejemplo, la división de 10/5=2. De esta forma se pueden realizar las operaciones aritméticas que se deseen parea obtener diferentes relaciones matemáticas.

Determínese la altura de un cráter en la luna, utilizando las herramientas del software Cool-Modes. Estas magnitudes se toman directamente del gráfico y se realizan las respectivas operaciones para obtener la profundidad de un cráter lunar. Tome como Radio de la luna = 1738 Km.
Las mediciones sobre la figura son dadas en píxeles, téngalas en cuenta para la respectiva conversión de unidades.

Después de realizar las respectivas mediciones con sus correspondientes operaciones aritméticas, responda las siguientes preguntas:

- La altura del cráter H es: _____Píxeles; _____ Kilómetros.
- El diámetro del cráter es: _____Píxeles; _____Kilómetros.
- La relación Diámetro cráter/ Altura del cráter es: $\frac{D}{H}$ _____.
- La relación Diámetro luna/diámetro cráter es: $\frac{D}{d}$ _____.
- La sombra del cráter es: _____Píxeles; _____Kilómetros.
- La relación Altura del cráter/sombra del cráter es: $\frac{H}{S}$ _____.
- Enuncie otro tipo de relaciones que usted puede encontrar con las diferentes magnitudes utilizadas con el software.

Relación	valores

CONCLUSIONES DEL TRABAJO INDIVIDUAL:

1. Con sus propias palabras explique que aprendió a través de la interacción con el software Cool-Modes en la medición de alturas lunares.

_____
_____
_____
_____
_____
_____
_____

2. Que conocimientos necesitó para hallar las alturas lunares? _____

3. Considera necesario consultar otras fuentes de información distintas a las presentadas en la guía de trabajo para hallar alturas lunares? SI _____ NO _____

Justifique su respuesta:

4. La determinación de diferentes magnitudes a través de la relación de triángulos rectángulos permite hallar distancias aproximadas de objetos por medio de fotografías.

Si_____No_____

Justifique su respuesta:

5. En qué otro tipo de aplicaciones puede utilizar el software.

6. Cómo le pareció el trabajo llevado a cabo con esta herramienta?

TRABAJO COLABORATIVO

El trabajo colaborativo consiste en conformar equipos de tres estudiantes para comparar las respuestas obtenidas. En esta parte del proceso ustedes deben compartir las experiencias y conocimientos adquiridos a nivel individual con el propósito de construir y consolidar el conocimiento adquirido en el proceso de hallar alturas y así presentar un trabajo mas elaborado ante sus compañeros y profesores del curso.

A nivel de equipo de trabajo, escojan un nuevo cráter lunar de la fotografía "*mond2.jpg*" y entre los tres realicen el mismo proceso que llevaron a cabo durante el trabajo individual para hallar alturas lunares.

Después de realizar las respectivas mediciones, responda las siguientes preguntas:

- La altura del cráter H es: _____Píxeles; _____ Kilómetros.
- El diámetro del cráter es: _____Píxeles; _____Kilómetros.
- La relación Diámetro cráter/ Altura del cráter es: $\frac{D}{H}$ _____.
- La relación Diámetro luna/diámetro cráter es: $\frac{D}{d}$ _____.
- La sombra del cráter es: _____Píxeles; _____Kilómetros.
- La relación Altura del cráter/sombra del cráter es: $\frac{H}{S}$ _____.
- Enuncie otro tipo de relaciones que usted puede encontrar con las diferentes magnitudes utilizadas con el software.

Relación	valores

CONCLUSIONES DEL TRABAJO COLABORATIVO:

7. Con sus propias palabras expliquen si hay un nuevo conocimiento aprendió a través de la interacción con el software Cool-Modes en equipo.

_____
_____
_____
_____
_____
_____
_____

8. Qué clase de conocimientos compartieron con sus compañeros de trabajo?

_____
_____
_____
_____
_____
_____

9. El trabajo en equipo le permitió fortalecer los conceptos sobre trigonometría?

SI _____ NO _____

Justifique su respuesta:

_____
_____
_____
_____
_____
_____

10. En qué otro tipo de aplicaciones pueden utilizar el software.

_____
_____
_____
_____
_____
_____

11. Cómo les pareció el trabajo llevado a cabo con esta herramienta?

_____
_____
_____
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_____
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Useful links

www.coldex.info

OUS area: Choose the *ous* link at the top

The download area is open to registered users, registration is open to everyone who wants to become an OUS user; (for registered users, but open to every OUS organiser)

Downloads of Learning Material "downloads" link in the left menu of the ous area

LOR: http://ltcs.lsi.uned.es:8080/coldex/

Open to registered users