Use of Software COTS within C4ISR Systems: Contribution of Information Sharing to Enhanced Risk Management, the eCots Approach

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eCOTS

The acquisition, integration and maintenance of software COTS within military systems require extremely reliable and accurate knowledge about the products, the technologies and the actors of the software industry. Gathering and analysing the required information is a daunting task for single organizations. eCots initiative (http://www.ecots.org) proposes to build collaboratively a semi-structured online database dedicated to the description of the evolving software COTS industry. eCots ontologies that represent the gathered data can be seamlessly extended to address specific COTS families such as military ones. The eCots.org platform can be linked to private replicates that get periodically synchronized with the public repository and that complete public data with descriptions and schemas restricted to specific groups of users. A secure Internet eCots-NATO portal could be set up using the same mechanism, helping participants to share lessons learned in building military applications and to reduce risks inherent to the use of software COTS.

1.0   INTRODUCTION

The growing use of commercial off-the-shelf software components instead of in-house developments is followed by a non-negligible loss of control of the systems in which they are used, and increases dependency on COTS components' producers, particularly critical in the case of obsolescence. This loss of control and this dependency can be compensated only by extremely reliable, accurate and continuously updated knowledge of the software component market and its trends. It is a matter of factual data, not subjected to interpretation, both on the actors (producers, distributors and consulting companies) and the products in this market. This data must be processed on the technical, commercial, economical, financial and legal dimensions.

Most industrial groups try nowadays to organize the collection of COTS information in order to make it available in-house, but the effort is considerable due to the size and variability of the software component market and the difficulty to collect and update information. This assessment and selection phase is consequently a hard task for enterprises, particularly for SMEs, which cannot invest enough time or money into COTS management to gain qualified information.

Although specialized companies dedicated to technological analysis and market monitoring can bring help in the process of collecting software descriptions, the analysis they provide are often expensive and short-lived. In addition, this information market has not developed a standard for COTS description.

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Use of Software COTS within C4ISR Systems: Contribution of
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eCots proposes to build an open and collaborative online directory of COTS products and producers, to promote the development of COTS standard description models and to foster the use of COTS Based Software Systems. In some way, eCots aims at becoming the Wikipedia of software components.

2.0 PROMOTION OF COTS DESCRIPTION STANDARDS

Various cataloguing initiatives exist on the Internet. Open and collaborative portals such as Freshmeat, Linux Software Maps or technology-specific portals such as JdoCentral benefit from a large community of contributors producing a huge volume of data. However, these portals contain only brief descriptions of inventoried components. Proprietary catalogues such as KnowledgeStorm, CXP or online marketplaces such as ComponentSource provide visitors with more detailed data but each data provider uses its own description model and identification scheme. Apart from these formal catalogues, the Web contains also many software community portals such as TheServerSide containing abundant and accurate however unstructured information.

In order to give momentum to these various cataloguing efforts, eCots proposes to gather COTS communities of researchers, users and vendors to elaborate collaboratively a description framework for identifying and describing functional, technical and legal aspects of COTS products. Such a framework would then serve as the foundation for new types of software catalogues, usable by humans as well as by automatic selection tools.

3.0 ECOTS DESCRIPTION MODEL

eCots platform implements a model describing COTS products, versions and producers and the relations between these notions. Figure 2 gives an overview of current eCots model, which has been created as a prototype to build a first version of a COTS database and to serve as a starting point for discussion. Next step will consist in building collaboratively a robust widely accepted model. A working group has been set up on purpose on the portal.

This temporary model is to be available on the portal as a set of XML schemas and can easily be extended or modified, as can be the data instances.
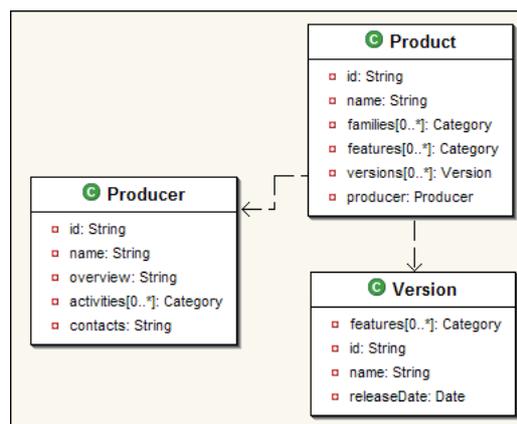

Figure 2 – eCots description model overview

A future version of the model might rely on an ontological scheme illustrated by figure 3. eCots model would then consist in a set of cross-domain ontologies covering topics such as interoperability, security, safety, upgrade support, etc. completed by specific domain ontologies describing software functional families.

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**Use of Software COTS within C4ISR Systems: Contribution of
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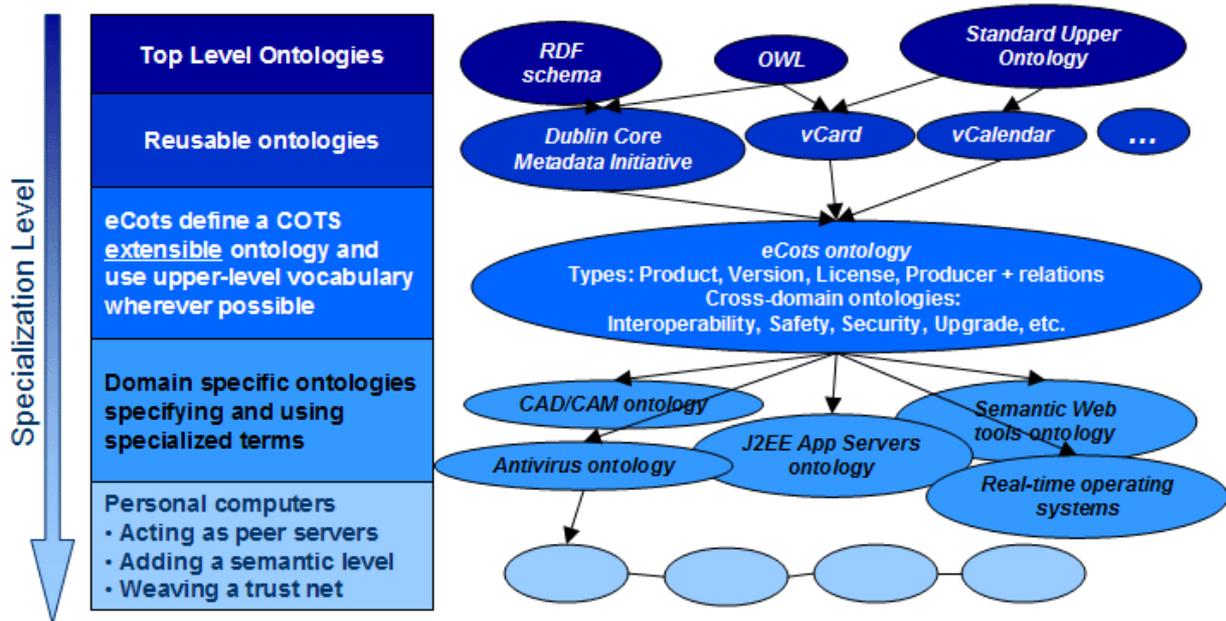
Figure 3 – eCots ontological stack view

4.0   ECOTS PLATFORM SERVICES

eCots platform relies on Jalios JCMS content management system.

4.1 Platform overview

eCots portal is comprised of several main areas: data consultation and search areas, content publication area and working groups areas. Publishing content to the platform requires opening an account (registration is free).

4.1.1 Navigation and search areas

eCots data can be consulted either by navigation per category or by explicit interrogation of the database.

Various types of requests are supported: full text, per content type, per category, per date, per author or per working group along with refinement by intersecting these criteria. The search module makes it possible to find COTS matching specific requirements (query example: "find all real-time operating systems with no identified vulnerability, licensed along GPL license"). Search results can be exported in XML.

Products' description cards contain links toward the producer and the parent product in case of a product's version, a toolbar indicating the author type (working group, editor or individual), the content license and buttons to request a content withdrawal, to print, edit, copy, bookmark or email the content, or to step back to a previous version of the content.

4.1.2 Publication area

Registered members can publish various types of structured information and can categorize resources along eCots taxonomy. Contributors are encouraged to leverage collaboration and reuse by using a set of open-content licenses inspired by Creative Commons initiative. Published content can be restricted to specific groups of users.

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4.1.3 Working groups

eCots standardization effort is supported by online working groups that cover either a specific COTS management topic or COTS functional families.

Current working groups topics include COTS classification, COTS assessment and COTS life-cycle management, NATO COTS specific issues. Software families working groups range from J2EE Application Servers to Real-Time Operating Systems, Web Content Management, Mail servers and others.

Dedicated areas are at working group members' disposal on the portal on which documents, Web links, glossaries and other resources can be shared. Members are also welcome to use forums and mailing lists.

4.2 Replication service

The replication service aims at allowing eCots Association members to use eCots platform on their intranet and to keep confidential information in a replicated database. Figure 4 illustrates the basic mechanism of the service, that is available under a variety of network protocols.

eCots platform has been installed within Thales intranet and is poised to be connected to Thales Business Units information systems. Web services will be developed on top of the platform to ease integration between eCots in-house database and internal applications such as the buyers' system.
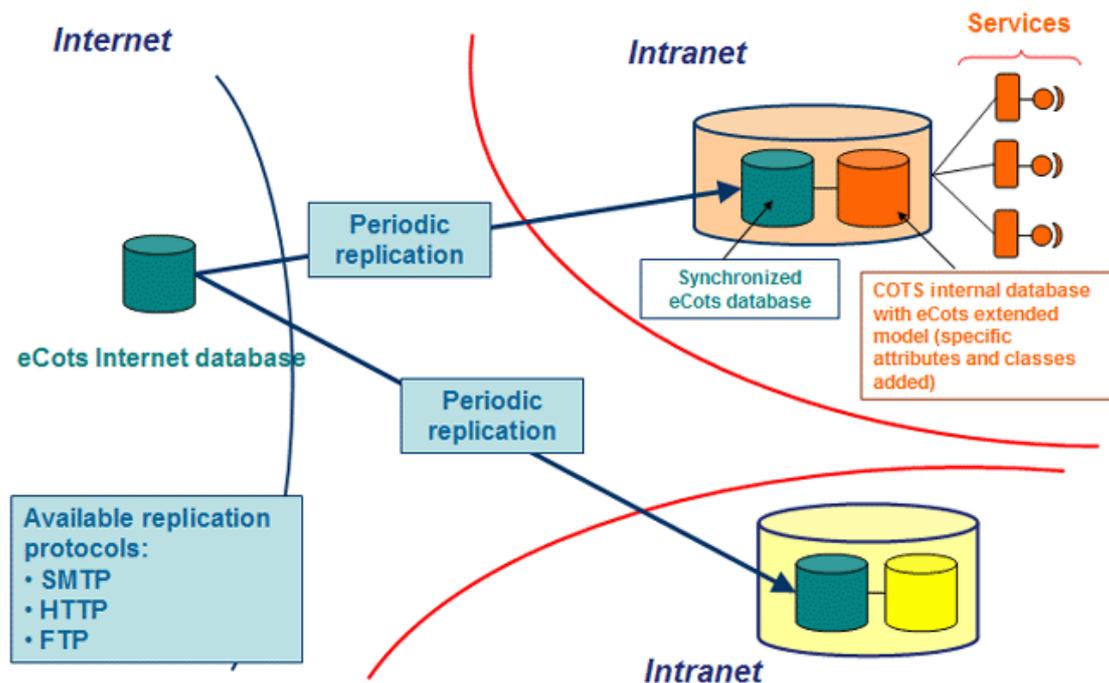

Figure 4 – eCots replication service

5.0   ECOTS.ORG DATA STATUS

eCots community counts for now around 200 registered members. 550 products have been referenced in more than 250 COTS families. Among these products, 300 have at least one version's detailed description. A large part of this data has been produced by MILOS EUCLID project [7]. Several working groups have also been setup on the portal.

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6.0 FUTURE WORK

eCots objectives for next years mainly consist in increasing considerably the volume of its database, in promoting the elaboration of a standard COTS product identification method and a standard COTS description model, in increasing eCots Association scope by recruiting new institutional members and in prototyping new COTS related services.

In the mid-term, eCots application aims at becoming a packaged software asset management application combining a set of COTS related services including a COTS selection service, a COTS life-cycle management service and a pool of connectors toward PDM and ERP tools. The idea is to provide a generic COTS information management platform that could be seamlessly extended by external plug-ins. Various tool-selection models could then be implemented on top of the platform, as well as many other services, either by research groups or by commercial vendors.

7.0 REFERENCES

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[3] Jingyue Li, Finn Olav Bjørnson, Reidar Conradi, "Empirical Study on COTS Components Classification", ICCBSS 2004

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[7] MILOS working group on eCots: http://www.ecots.org/display.jsp?cids=c_29937

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[10] Jean-Christophe Mielnik, Bernard Lang, Stéphane Laurière, Jean-Georges Schlosser, Vincent Bouthors: "eCots Platform: An Inter-industrial Initiative for COTS-Related Information Sharing". ICCBSS 2003

[11] Jalios JCMS http://www.jalios.com

[12] Component Source http://www.componentsource.com

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[13]   Freshmeat http://www.freshmeat.net

[14] KnowledgeStorm http://www.knowledgestorm.com

[15] CXP http://www.cxp.fr

[16] Reusable Asset Specification http://www.rational.com/ras/

BUILDING COALITION CAPABILITIES

AND C4ISR ARCHITECTURES

Use of software COTS within C4ISR systems: contribution of information sharing to enhanced risk management, the eCots approach

www.ecots.org

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eCots software components open directory project

Software COTS awareness

Who has to know about Software COTS ?

- Program managers (costs and risks analysis)
- System engineering managers (system analysis)
- Experts (safety, ...)
- Software department managers (compatibility with the technical policy, capitalization of the evaluations, validation of the estimations)
- Developers (pre-selection, estimations)
- Logistic support (maintenance requirements analysis, obsolescence management)
- Purchases (qualification of the supplier, compatibility with the purchasing policy, estimations)
- Legal experts (licences analysis)
- Quality management (process, COTS qualification)

How to know: internal mutualisation
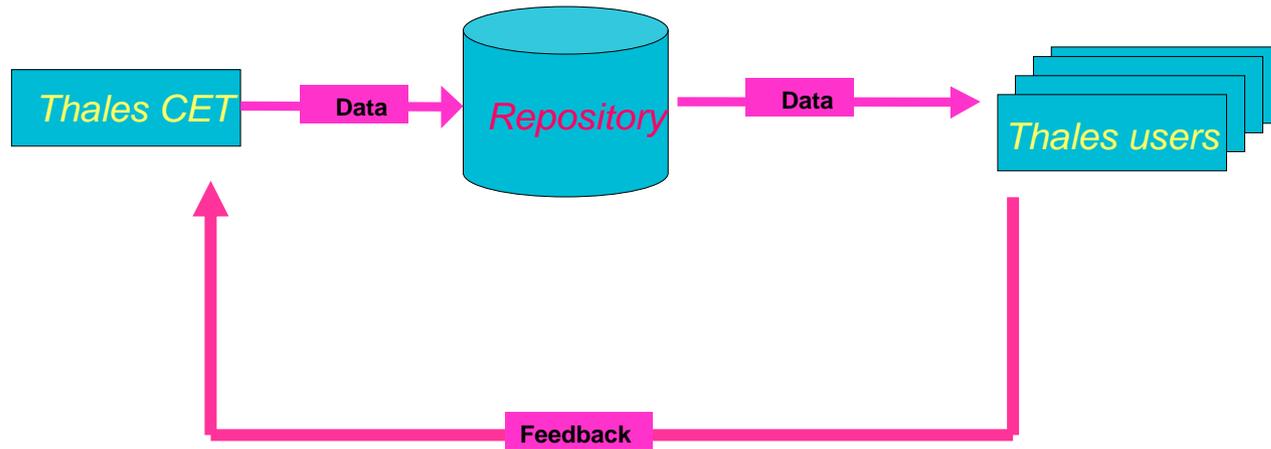
Source:

◆Experts

How to know: adding editors inputs

Requests for Information (RFIs)

Editors

Data

Repository

Qualified data

Thales users

Qualification

Thales CET

Feedback

Source:
- ◆ Experts
- ◆ Vendors
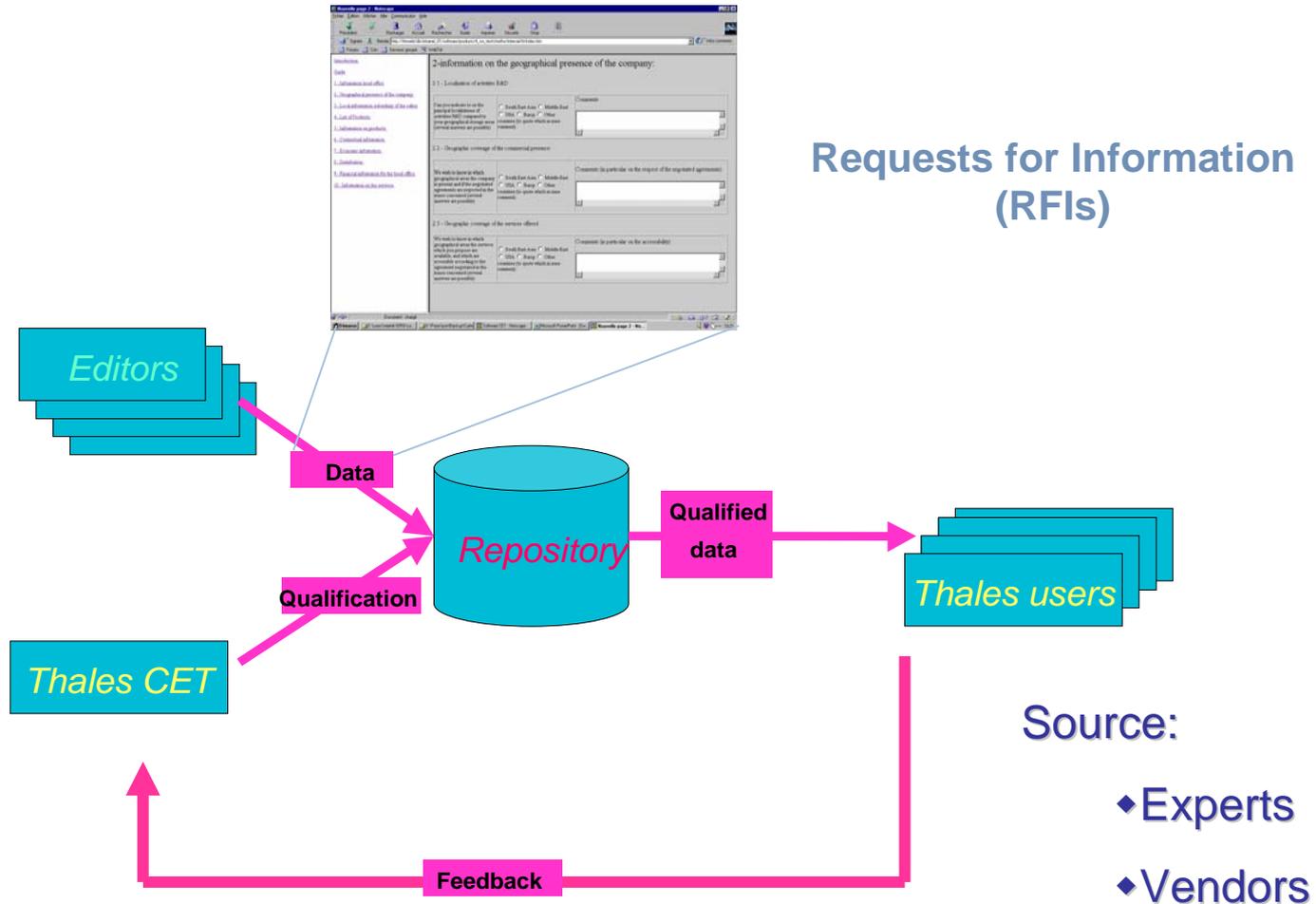
How to know: open contents dynamics

Source:

- ◆Experts
- ◆Vendors
- ◆Users communities
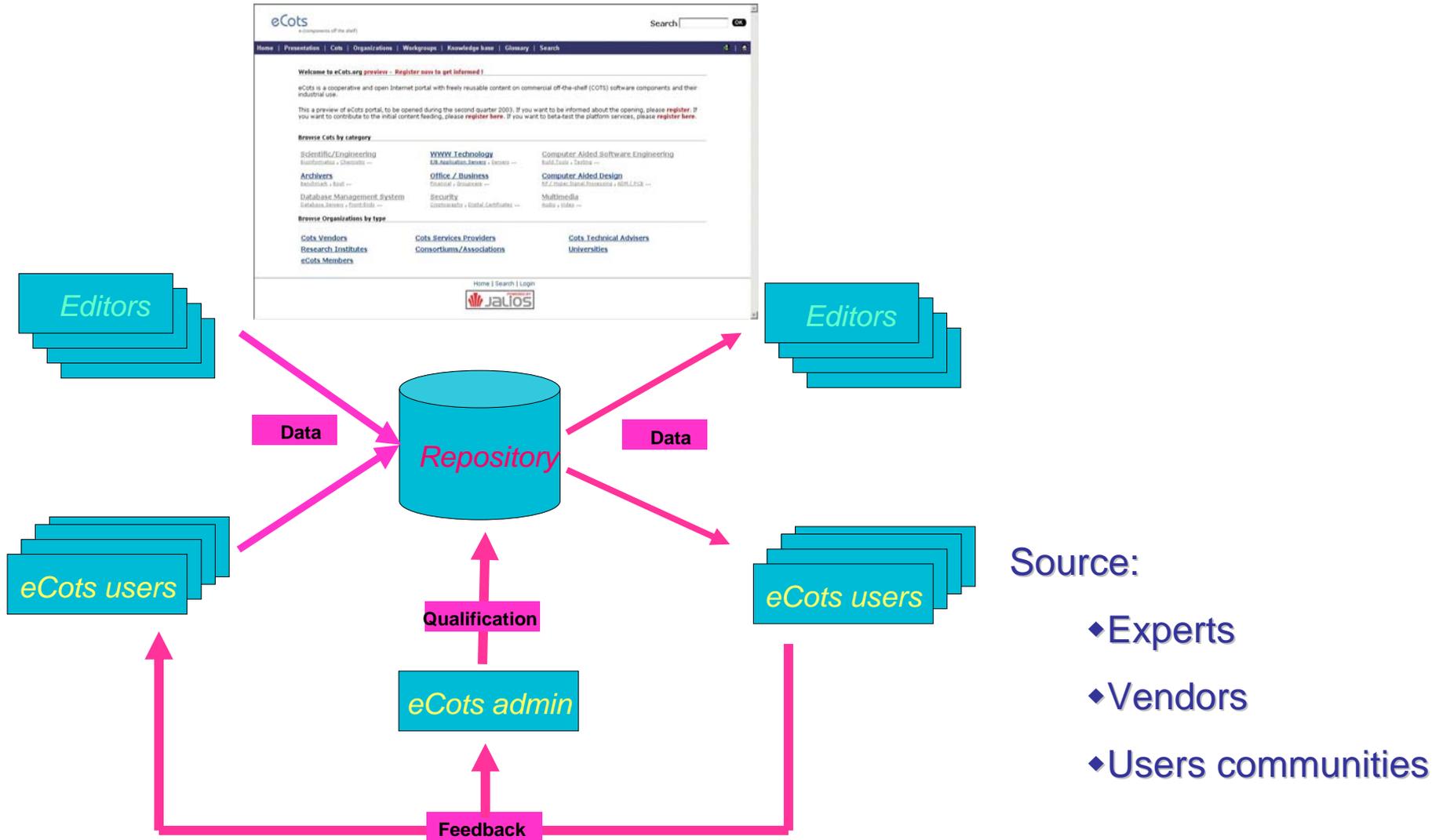
How to know: eCots approach

- **Sharing within a community**
  - Intra-enterprise users -> inter-enterprises users
  - Vendors as writers -> vendors as writers and readers
  - National dimension -> international dimension
- **Sharing based on standards**
  - Sharing means standards
  - XML-based dialects for generic level information and for each category of COTS
  - Certification
- **Sharing open contents**
  - From open source to open contents
  - The societal issue (bootstrap)
  - The legal issue

The Genesis Of eCots Project

- Many companies lead COTS assessment campaigns on a regular basis
  - Technical and purchasing experts elaborate detailed description of COTS
  - Collected data and complementary experiments result in company's recommendations
  - This data is used in commercial negotiations and technical proposals
- Drawbacks of this process
  - Assesment campaigns are not frequent enough when organized by a single actor
  - Producers benefiting from a monopoly are reluctant to comply with the framework that any single industrial group can propose
  - Collected data becomes obsolescent after few months, to maintain it is highly expensive
- Improvement: to freely share part of information on COTS, in order to
  - Invite the growing community of COTS users to participate more directly with a view to contribute to the definition, qualification and maintenance of this information
  - Motivate COTS vendors to participate as well
  - Taking benefit of the open content dynamics
  - INRIA and Thales joined by EDF and Bull, supported by RNTL (Ministry of industry)

eCots association and eCots portal

eCots: an association and a portal

- eCots is an inter-industrial association founded in January 2004 by Thales, EDF R&D, and Bull, based in Soissons Informatique Libre + a portal: www.eCots.org (opened end 2003)
- Objectives
  - Share the various efforts to characterize SW COTS
  - Bring together Web communities, academic groups and industrials to build an Open Directory / Wikipedia of SW COTS descriptions on eCots.org
  - Propose a common description model for COTS SW (see OASIS-OPEN association, ebXML, UBL, WSDL, DOAP)
  - Propose an identification scheme for COTS products, versions, articles

- Association membership annual fee: 5000€ for large corporations, with possibility to get a private platform synchronized with the public data in-house ("replication service"), 3000€ for SMEs, free for Universities / associations

10

eCots today

- 220 registered users on the portal: 10% COTS editors, 40% industrials (EDF, BULL, Volvo…), 20% researchers
- 4 paying members
- 650 referenced products in + 200 families
- 300 products having detailed descriptions, 250 having at least one version described
- + 1000 Web links on COTS related topics: COTS evaluation, lifecycle management
- Working groups: both general COTS WG and specific families WG
  - COTS lifecycle management
  - COTS taxonomy and classification
  - NATO COTS WG ("NOTS")
  - ICCBSS 2005 WG
  - XML Databases WG
  - Strategic and Steering Committees

Main Portal Areas

eCots Directories: products and organizations

Content Publishing Area
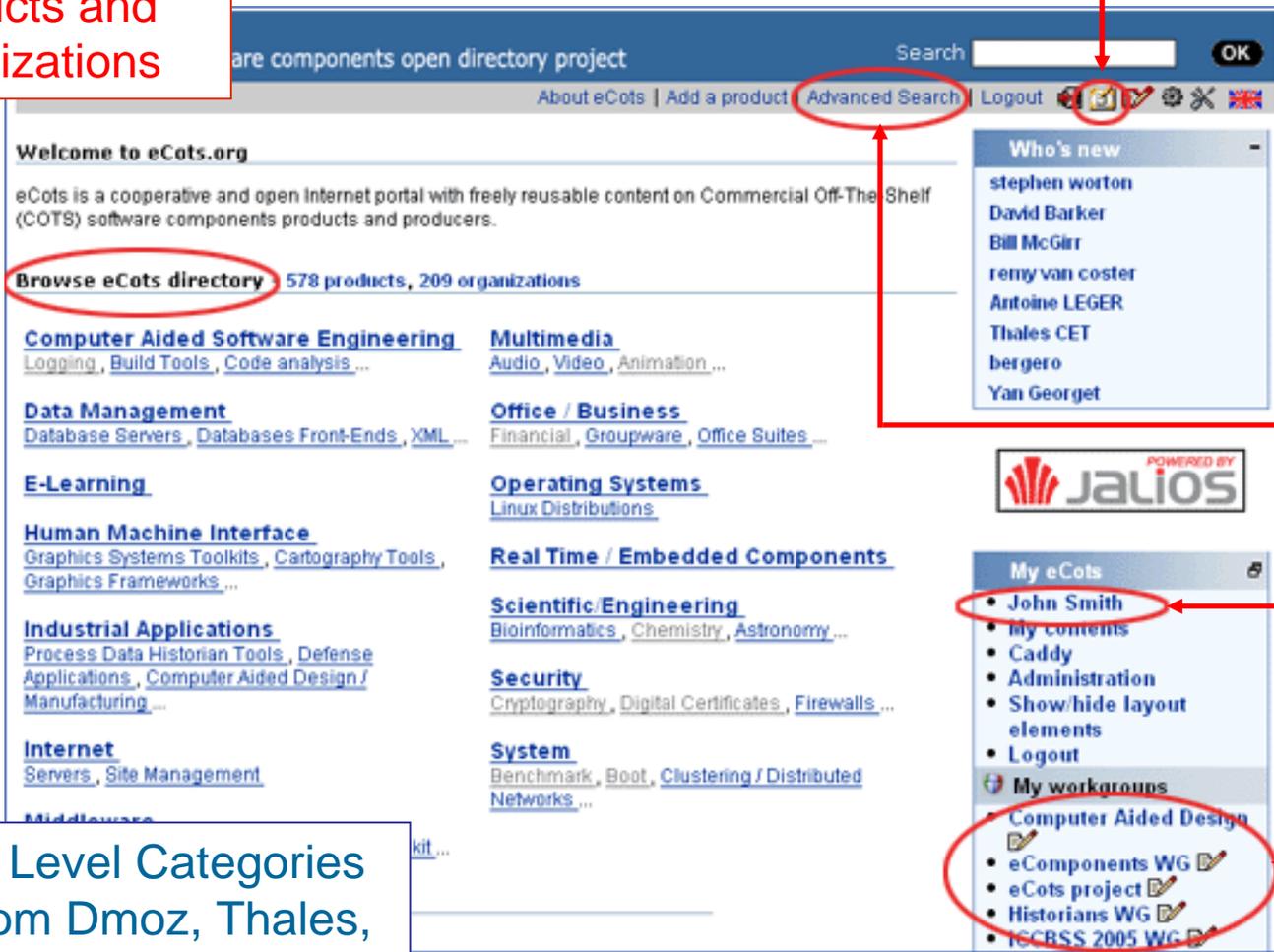
Search

My eCots area

Working groups area

14 Top Level Categories (built from Dmoz, Thales, EDF, Milos taxonomies)

Browsing A COTS Family

Navigation bar

Top : Cots Families : Data Management : Database Servers (41)

- ODBMS (4)
- RDBMS (10)
- Native XML databases (22)
- Embedded databases (4)

Sub-Families

POWERED BY
JALIOS

Display: Products (9) | Producers (6) | WebLinks (2) | Documents (0) | Events (0) | All contents (17)

Type filtering bar

Sort by: Date | Rating | Title | Author | #Review - View XML -

Berkeley DB XML
http://www.sleepycat.com/products/xml.shtml
Berkeley DB XML is an application-specific native XML data manager built on Berkeley DB, the world's most widely deployed data management engine. Berkeley DB XML provides fast, reliable, scalable and cost-effective storage and retrieval for native XML data and semi-structured data.
Producer : Sleepycat Software
Categories : Java , C++ , Native XML databases
John Smith - November 30, 2003

Berkley DB
http://www.sleepycat.com/
It's not a relational database.
Producer : Sleepycat Software
Versions : Berkley 4.1.24
Categories : Embedded databases , Milos WG
Milos - August 12, 2003

My eCots
- John Smith
- My contents
- Caddy
- Administration
- Show/hide layout elements
- Logout

My workgroups
- Computer Aided Design
- eComponents WG
- UML Case Tools WG
- Web CMS WG
- View all workgroups

Products' overviews
Direct access to editors' or versions' cards

Results can be exported in XML

COTS Product Description. Ex: JBoss

COTS Families

**COTS Name
COTS Versions
COTS Producer**

**Supported OS,
Proposed
Licenses
COTS features
(ex: JSP support,
EJB support etc.)**

**Author
Creation date
Modification date
Related contents**

**Member
reviews and
discussions**

Toolbar

Author type:
- **Individual**
- **Organization**
- **Workgroup**

Content withdrawal request

Reuse license type

Editing the content

Printing the content

Mailing the content

Top : Cots Families : Internet : Servers : Application Servers : J2EE Application Servers

JBoss

Versions JBoss 2.4.4 | JBoss 3.0.0

Producer : JBoss Group

Overview | Documentation and Support | Openness | Complementary data

Overview ▲

| Overview | JBoss is a free, Open Source, J2EE based application server implemented in 100% Pure Java. It integrates and develops these services for a full J2EE-based implementation. JBoss provides JBossServer, the basic EJB container and JMX infrastructure. JBossMQ, for JMS messaging (see 2.5), JBossMX, for mail, JBossTX, for JTA/JTS transactions, JBossSX for JAAS based security, JBossCX for JCA connectivity and JBossCMP for CMP persistence. JBoss enables you to mix and match these components through JMX by replacing ANY component you wish with a JMX compliant implementation for the same APIs. JBoss doesn't even impose the JBoss components, that is modularity. JBoss' goal is to provide the |

or/and users	• TogetherJ • CocoBase • Jbuilder • See also open source projects below. • More than 150000 downloads per month from SourceForge's website from april/2001 to september/2002.
Existing customers accepting to be cited	
Existence of relationships with other projects	EJB on JBoss is integrated with: • CastorJDO (http://castor.exolab.org/index.html), see 13.2.2 • Tomcat (http://jakarta.apache.org/tomcat/)

Author	Milos
Created	8/12/03 1:59 PM
Modified	12/11/03 5:24 PM
Related	

Member reviews

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Member discussions

Click here to start a forum about this publication.

eCots software components open directory project

Describing COTS Versions Features

Cots Version Editor

Content | Publication license | Read Rights | Update Rights | Workflow

* Name

Overview | Documentation | Features | Commercial information

Features overview

B I BI F BF

Functional Features

📁 Functional and Technical Features
- ☐ Adapter Tools
- ☐ Communication Protocols Support
- ☐ Configuration Management Tools
- ☐ Database Support
- ☐ Database
- ☐ J2EE Support
  - ☐ EJB
    - ☐ EJB 1.0
    - ☐ EJB 1.1
    - ☐ EJB 2.0
    - ☐ EJB 2.1
    - ☐ CMP
  - ☐ J2EE
    - ☐ J2EE 1.3
    - ☐ J2EE 1.4
  - ☐ JCA
    - ☐ JCA 1.0
    - ☐ JCA 1.5
  - ☐ JDBC
    - ☐ JDBC 2.0
    - ☐ JDBC 1.2
    - ☐ JDBC 1.3
    - ☐ JDBC 2.1
    - ☐ JDBC 3.0
    - ☐ JDBC Rowset 1.0

Example: J2EE Support Category
- EJB support: EJB spec versions
- JMS
- JCA
- JDBC
etc…

Functional Features

📁 Cots Features
- ☐ Adapter Tools
- ☐ Cartography Tools
- ☐ Communication Protocols Support
- ☐ Configuration Management Tools
- ☐ Database Support
  - ☑ <Any JDBC enabled database>
  - ☐ Access
  - ☐ Adabas
  - ☐ Empress
  - ☐ FilePro
  - ☐ Firebird
  - ☐ FrontBase
  - ☐ IBM DB2
  - ☐ Informix
  - ☐ Ingres
  - ☐ Instant DB
  - ☐ InterBase

Category <Any JDBC enabled database> - Comment

JBoss supports any database with a JDBC driver. Pure java drivers (type 3 or type 4) are recommended. It

Ok

Possibility to add textual comment on any checked category

Searching For A COTS
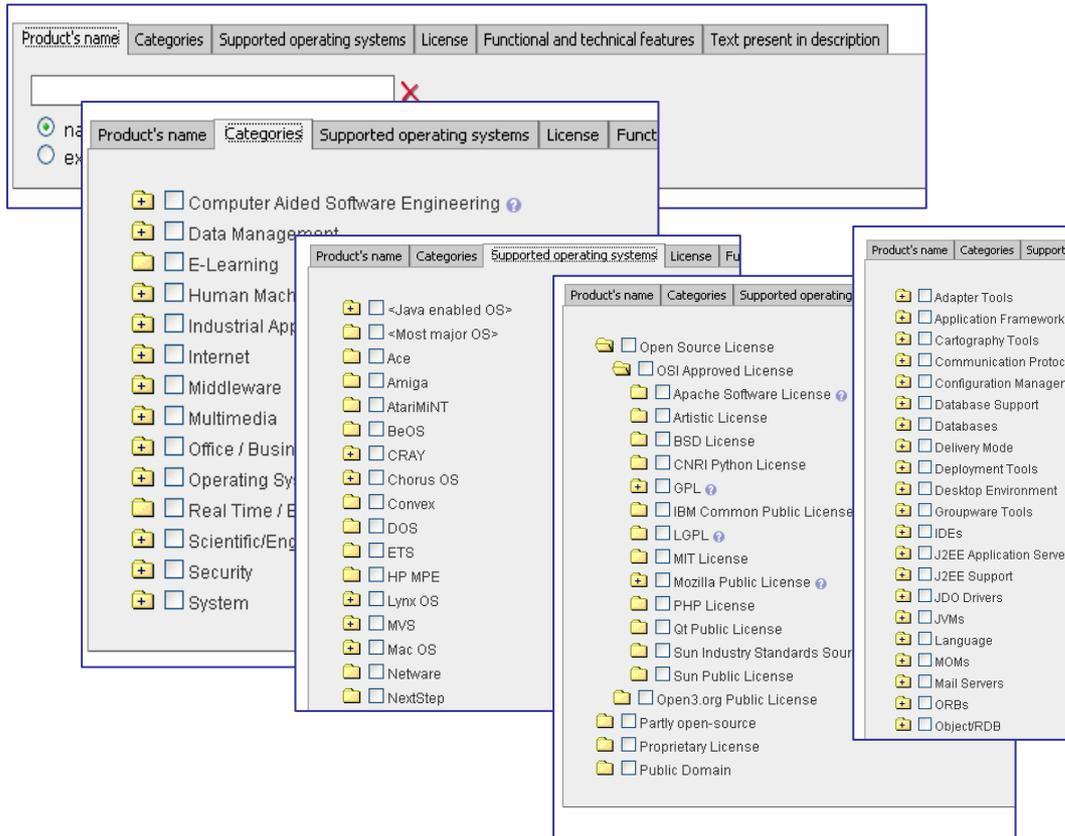
Search Criteria
- **Name**
- **Categories**
- **Supported Operating Systems**
- **Proposed license(s)**
- **Technical and functional features**

Query examples:
- **Search all UML modelers edited along GPL license, written in C++, supporting XMI1.1**
- **Search all COTS that have a confirmed obsolescence alert and that are used within Thales Communication**

eCots Working Groups

Two types of working groups:
- Family specific WG, eg XML databases, RTOS etc.
- Cross-domain WG: COTS life-cycle, COTS identification, …

- WG related to one COTS family define a schema describing technical and functional features of the family
- Schemas are expressed in XML, in a format close to XML schemas
- Schemas are based on a common model
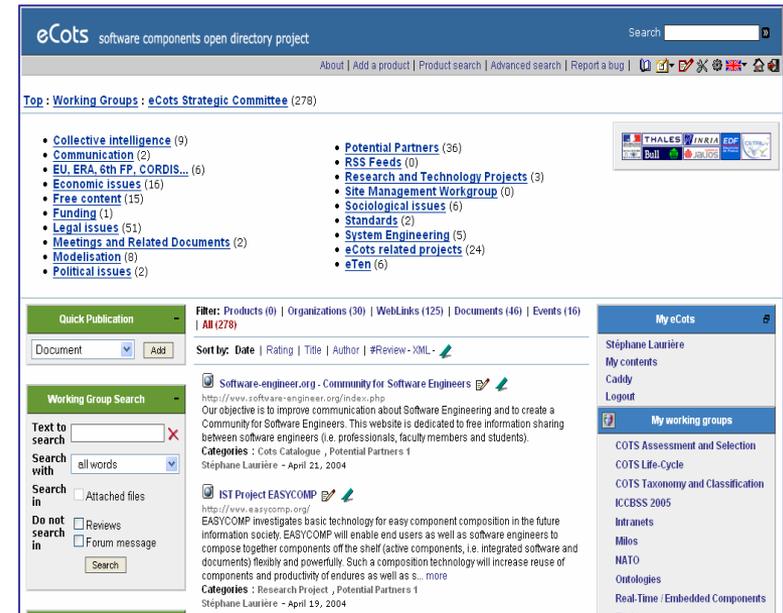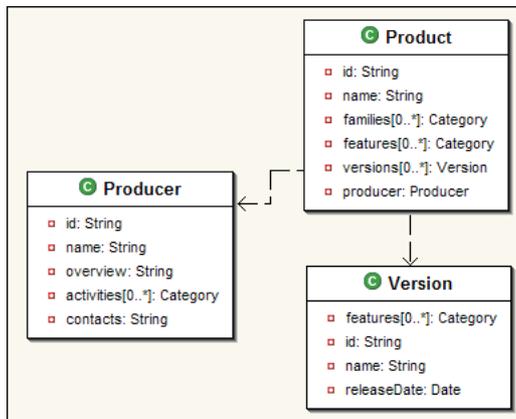
eCots collaborative tooling
- Online workspaces to share documents and bookmarks
- Read/update rights management
- Forums
- Email notifications
- Publication area

Populating eCots database
Direct publication + RSS and DOAP feeds decreasing the publication and diffusion costs
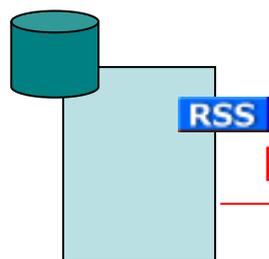
Vendor's sites
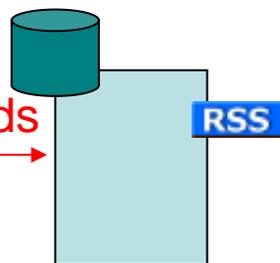
eCots

Other COTS portals

RSS / DOAP feeds
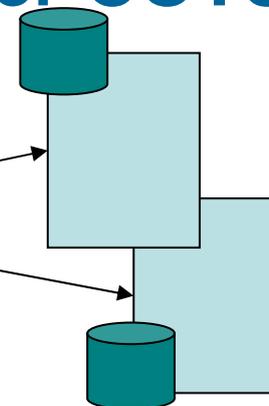
Editors publish information in RSS or DOAP format on their Web site

New versions or products are published / updated on eCots Users/Editors choose among a set of templates

• Data published on eCots is available as RSS feeds
• Several cataloguing iniatives can take advantage of the process
• Bolsters the emergence of standards through usage

▪DOAP: Description Of A Project http://usefulinc.com/doap/

« DOAP is a project to create an XML/RDF vocabulary to describe open source projects. In addition to developing an RDF schema and examples, the DOAP project aims to provide tool support in all the popular programming languages. »

▪RDF schema comprised of: description, language, license, categories, maintainers, documentation, testers etc.

COTS Identification

- Need for an ISBN of SW COTS easing the selection, maintenance, integration, update of COTS

- Which kind of ID? Arbitrary number? MD5? URI?

- Inspiration sources and possible partners
    - European Telecommunications Standards Institute 800 members from more than 55 countries inside and outside Europe
    - ECCMA open technical dictionary http://eccma.org/eotd/ "60,000 Standard Item Names and over 30,000 Standard Attribute Names, with definitions, multilingual translations and classification tables to the UNSPSC, CPV, eClass, FSC and HTS classifications"
    - UNSPSC http://www.unspsc.org/ "The United Nations Standard Products and Services Code® (UNSPSC®) provides an open, global multi-sector standard for efficient, accurate classification of products and services."
    - Taxonomy working group initiated by Marco Torchiano at ICCBSS 2004
    - Industrial initiatives like TCIS (Thales Components Information System)
    - http://www.isbn.org

eCots generic replication service

Internet

Intranet

Services

Periodic replication

Synchronized eCots database

COTS internal database with eCots extended model (specific attributes and classes added)

eCots Internet database

Periodic replication

Available replication protocols:
- **SMTP**
- **HTTP**
- **FTP**

Intranet

20
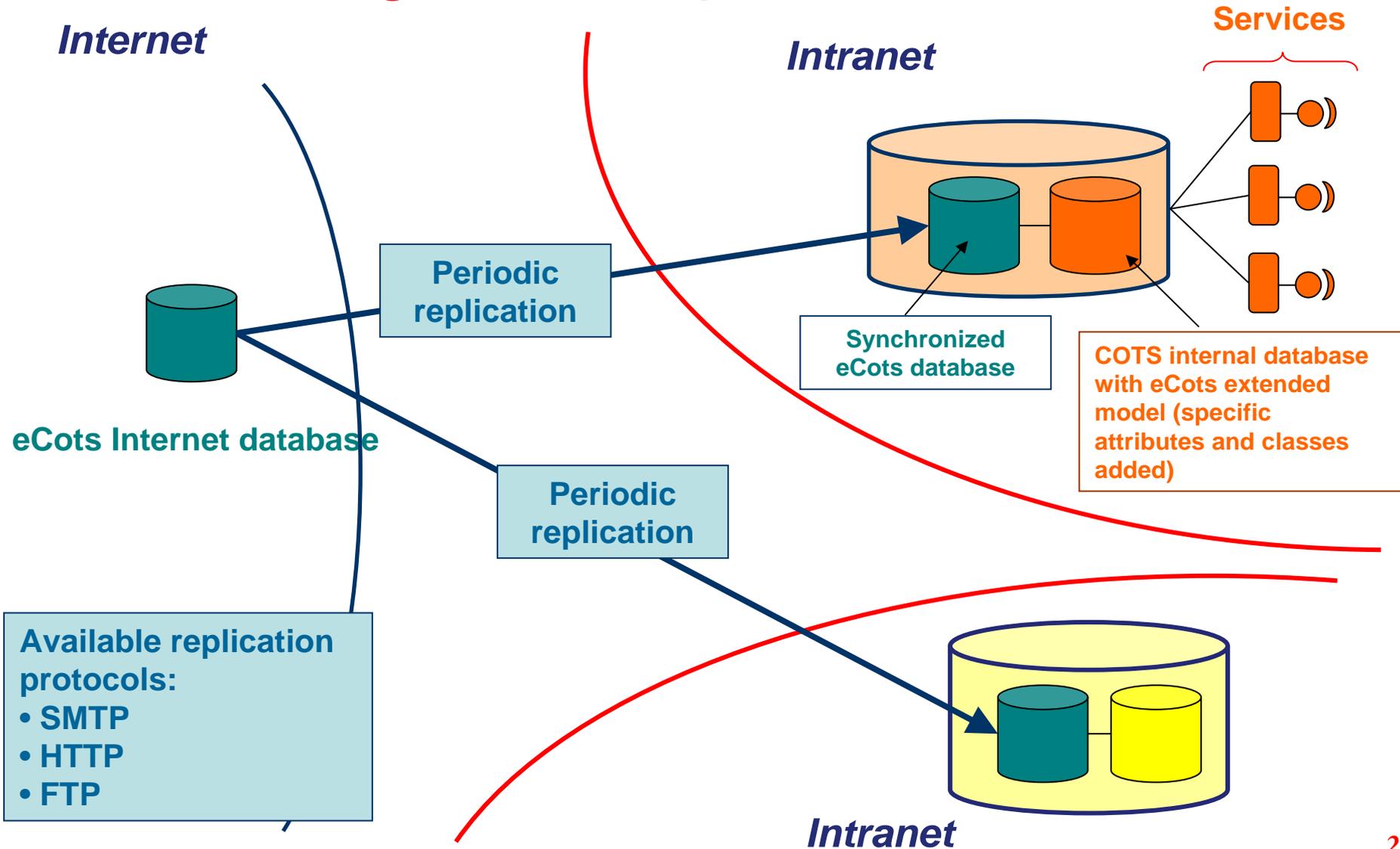
Possible www.eCots.mil replicated server

Internet

NATO Specific Services

www.eCots.mil server

Periodic replication

eCots Internet database

Synchronized eCots database

NATO database with eCots extended model: specific attributes and classes added matching NATO description model

Available protocols:

- **SMTP**
- **HTTP**
- **FTP**
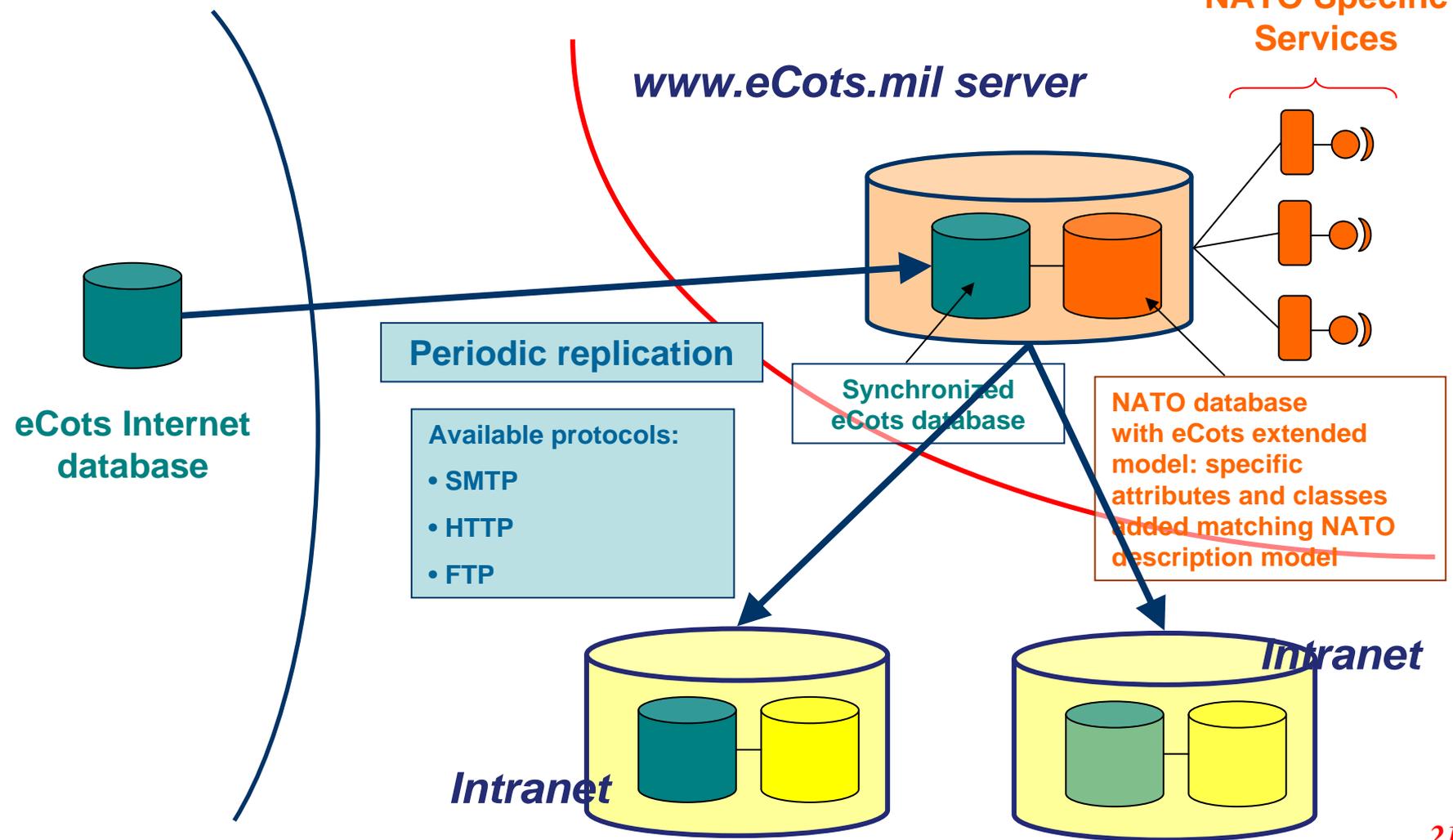
Intranet

Intranet

eCots replicated platforms
Empowering Asset Based Software Management

- Get a replicate of eCots platform and of eCots public database within your intranet
    - Replication service supports HTTP, HTTPS, FTP, SMTP
    - LDAP authentication
    - Develop specific services on top of eCots Java open API
- Link eCots private data with your internal information system and build a unified IS dedicated to COTS management
    - Buyers get detailed features and price lists
    - Users share their knowledge and evaluate tools
    - Process and methodology engineers get better tracability about tools lifecycle within the organisation
    - Providers can respond to RFI (secure extranet solutions are possible)
    - Jurists get an intellectual property projection of the assets (sw licenses)
- Evaluate risks with accuracy and make better decisions
- Decrease maintenance and obsolescence costs
- Get access to software industry barometers completed by your data
- Competitors
    - LogicLibrary.com (Logidex Registry)
    - Flashline.com and ComponentSource.com (Flashline Marketplace)

eCots future

- Main goals: increase the size of the database and of the community, promote the acceptance of a vocabulary
- Host domain-specific communities producing ontologies
- Provide interoperability with other tools: plugin architecture
- Future services
  - Obsolescence Management Service
  - Recommender System
  - Tools comparison
  - Identification Service
  - Customized Print View
- Several paths are investigated
  - Portals: one central repository of descriptions or several domain specific portals using the same description model
  - Technology: application supporting the platform: either cutting-edge content-management system or basic Wiki, or both (choice up to organizations interested in an in-house platform)
  - Create a COTS management application. See RAS specification
  - COTS identification

Help build the largest open software directory of the Web!

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