

# Zentity 1.0:

## *Microsoft Research & the Scholarly Information Ecosystem*

**Alex D. Wade**

*Director, Scholarly Communication*

Microsoft External Research

Microsoft Corporation

Microsoft  
**Research**



# Microsoft External Research

- Organization within Microsoft Research that engages in strong **partnerships** with academia, industry and government to advance computer science, education, and research in fields that rely heavily upon advanced computing
- Initiatives that focus on the **research process** and its role in the innovation ecosystem, including support for open access, open tools, open technology, and interoperability
- Developers of **advanced technologies** and services to support every stage of the research process



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# Mission

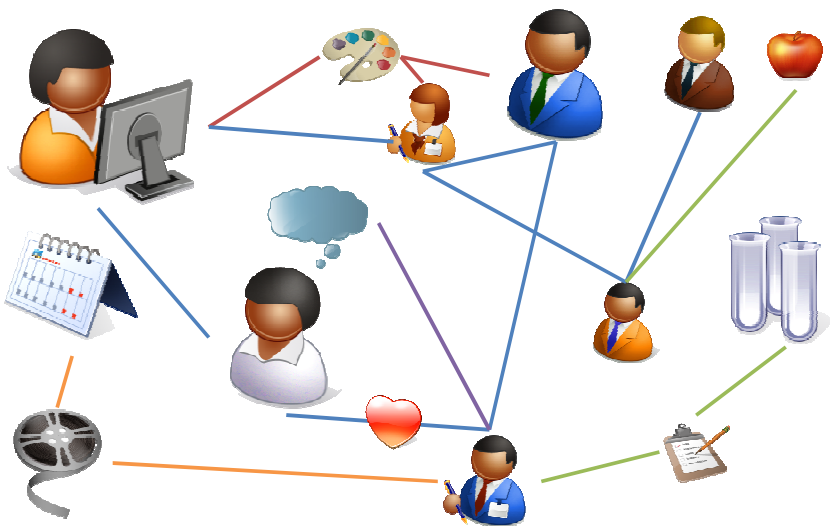
**Optimize and extend  
Microsoft software to meet  
the specific needs of the  
academic community**

**Our approach:**

*Conduct applied projects to  
enhance academic  
productivity by evolving  
Microsoft's scholarly  
communication offerings*

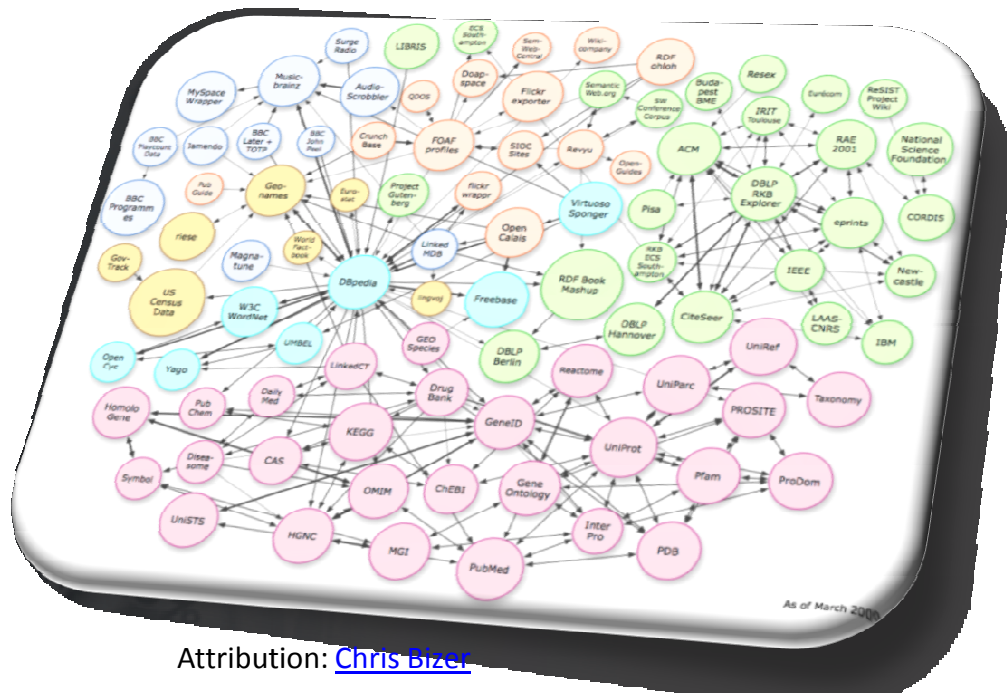
Microsoft External Research  
is uniquely positioned to  
drive this initiative across  
Microsoft

# A world where all data is linked ...



- Data/information is interconnected through machine-interpretable information (e.g. **paper X is about star Y**)
- Social networks are a special case of 'data meshes'

- A knowledge ecosystem:
  - A rich user experience
  - An ecosystem of services
  - Semantic storage
  - Open, Collaborative, Interoperable, and Automatic



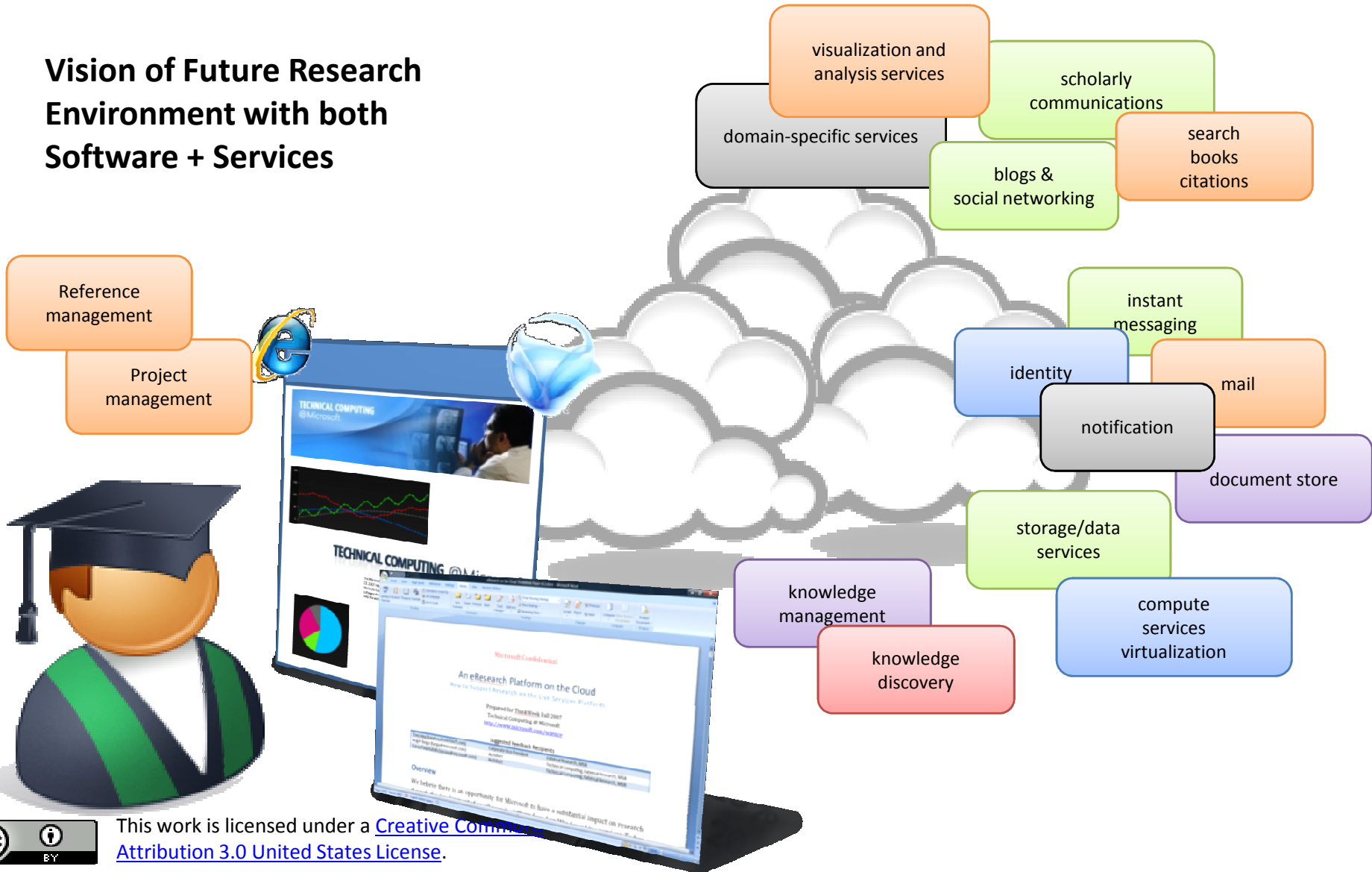
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Attribution: [Chris Bizer](#)



# ...and stored/processed/analyzed in the Cloud

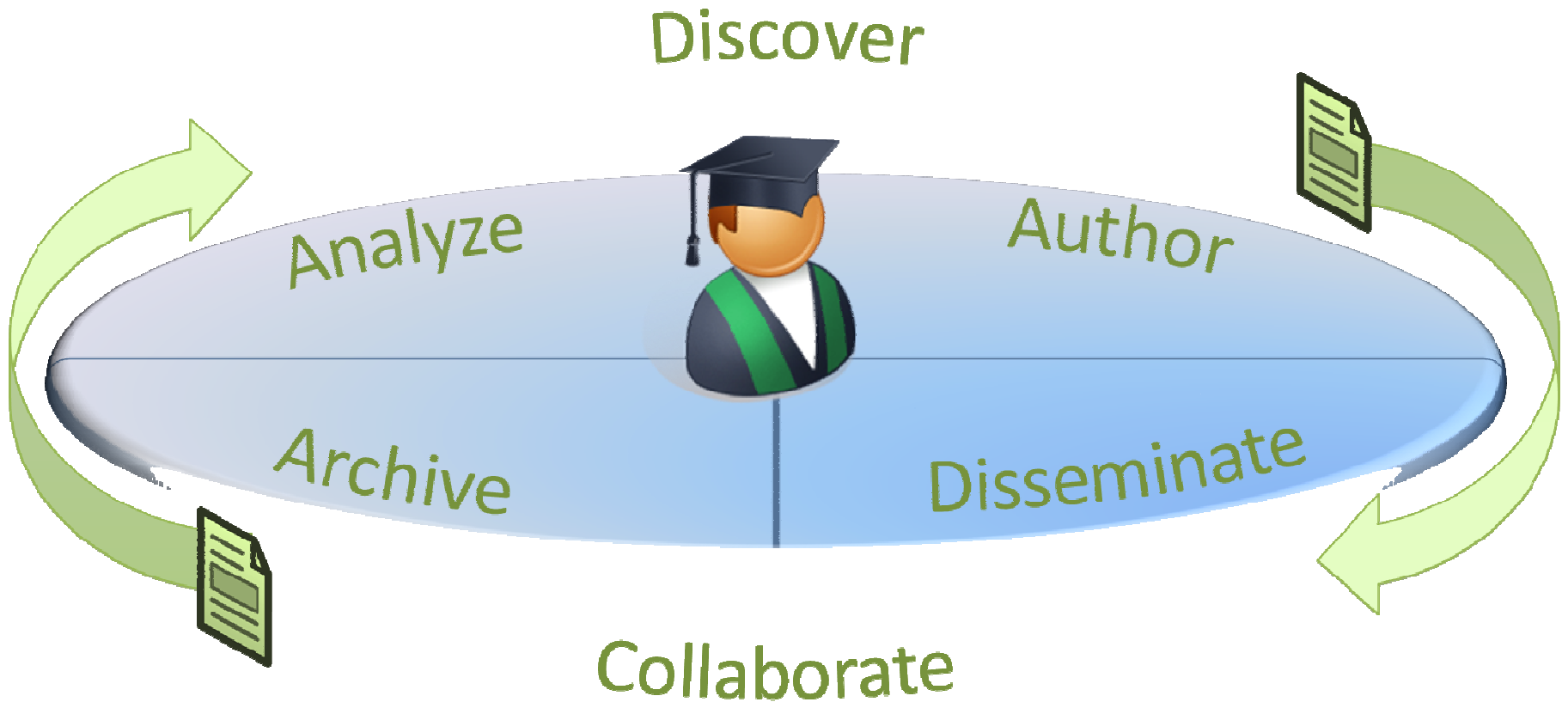
## Vision of Future Research Environment with both Software + Services



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# The Scholarly Communication Lifecycle



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# Our Goals

- **For Microsoft end-users**, making it easier to use our software for all aspects of their research process
  - **For Microsoft developers**, demonstrating the toolset and showing how our platform can be extended
- 
- **For non-Microsoft end-users**, working to ensure the ability to interoperate with our software across all phases of the research process, as necessary
  - **For non-Microsoft developers**, enabling transparency to our efforts in this space and encouraging a dialogue



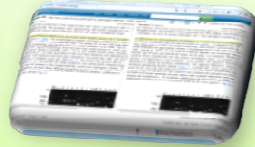
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## Ecosystem of Tool/Services



Peer-Review



Translation



Conversion

- Visualization
- Discovery
- Entity Extraction
- etc.

## Repositories



## Rich User Experience



Authoring



Collaboration/VREs

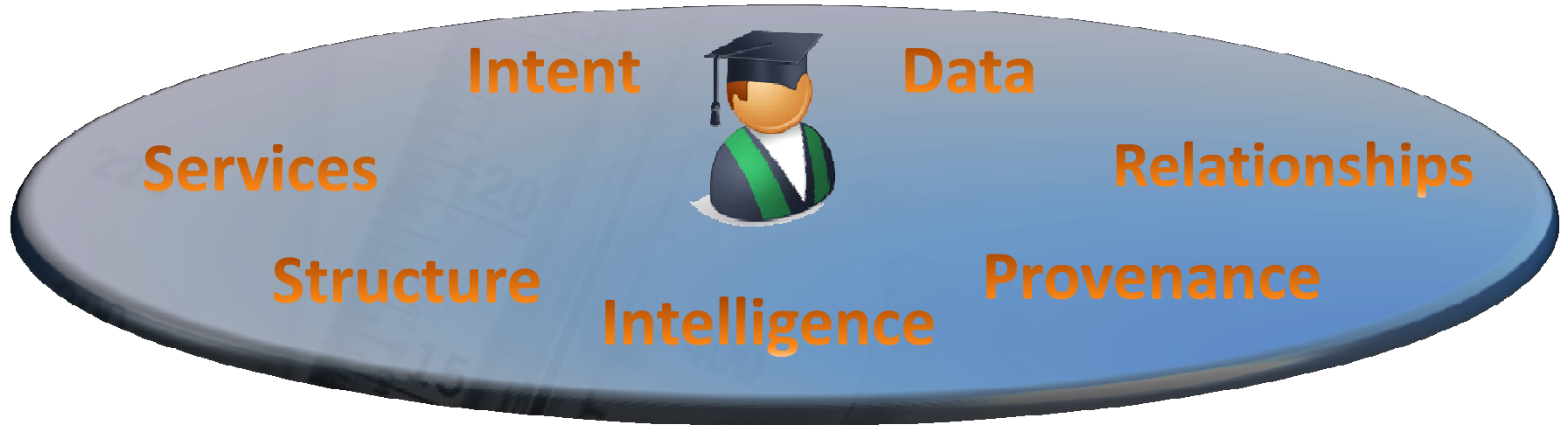
- Search
- Desktop Tools
- ELNs
- etc.

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# Rich User Experience



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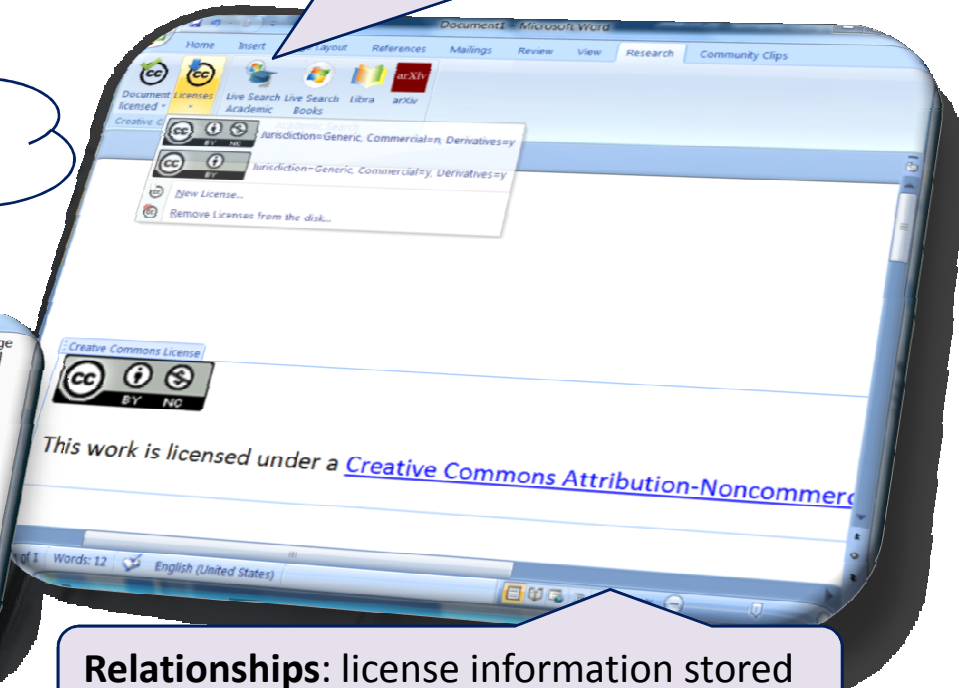
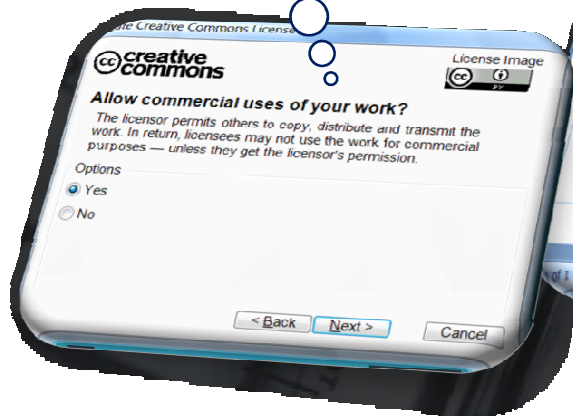


# Creative Commons Add-in for Office 2007



**Intent:** Insert Creative Commons licenses from within Office 2007

**Services:** Integrates with Creative Commons Web API to create new licenses



**Relationships:** license information stored as RDF XML within the document OOXML

Source code and binary:

<http://ccaddin2007.codeplex.com>

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# Ontology Add-in for Word 2007



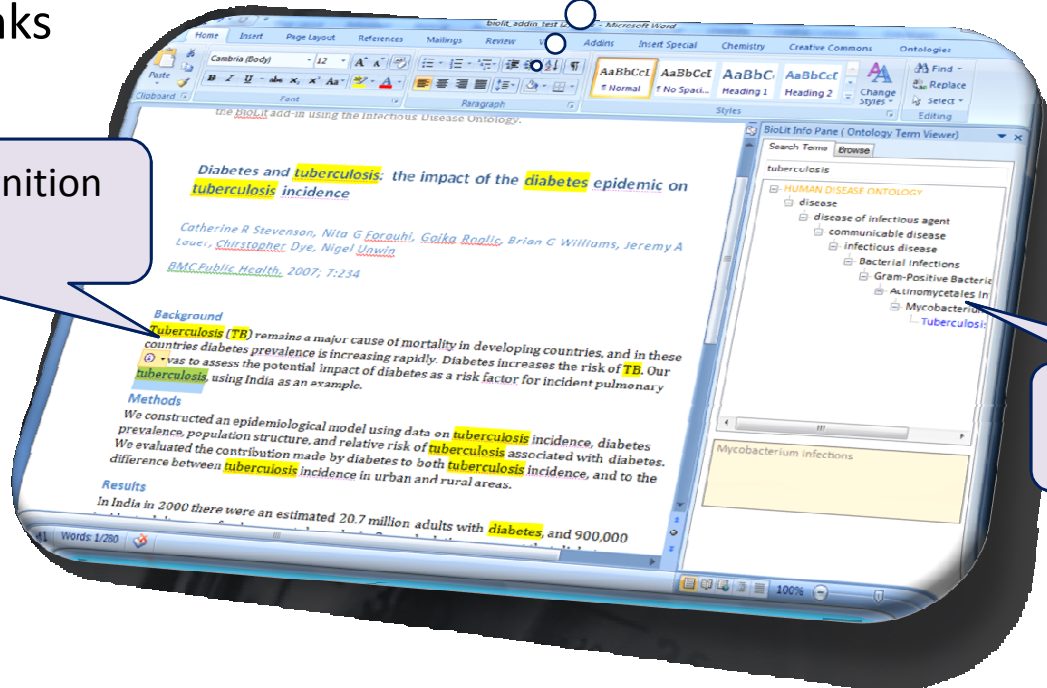
• John Wilbanks

Services: Ontology  
download web service



- Phil Bourne
- Lynn Fink

Intent: Term recognition  
& disambiguation



Relationships:  
Ontology browser

Source code and binary:

<http://research.microsoft.com/ontology/>

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# Chem4Word - Chemistry Drawing in Word



- Peter Murray-Rust
- Joe Townsend
- Jim Downing

Author/edit 1D and 2D chemistry.  
Change chemical layout styles.

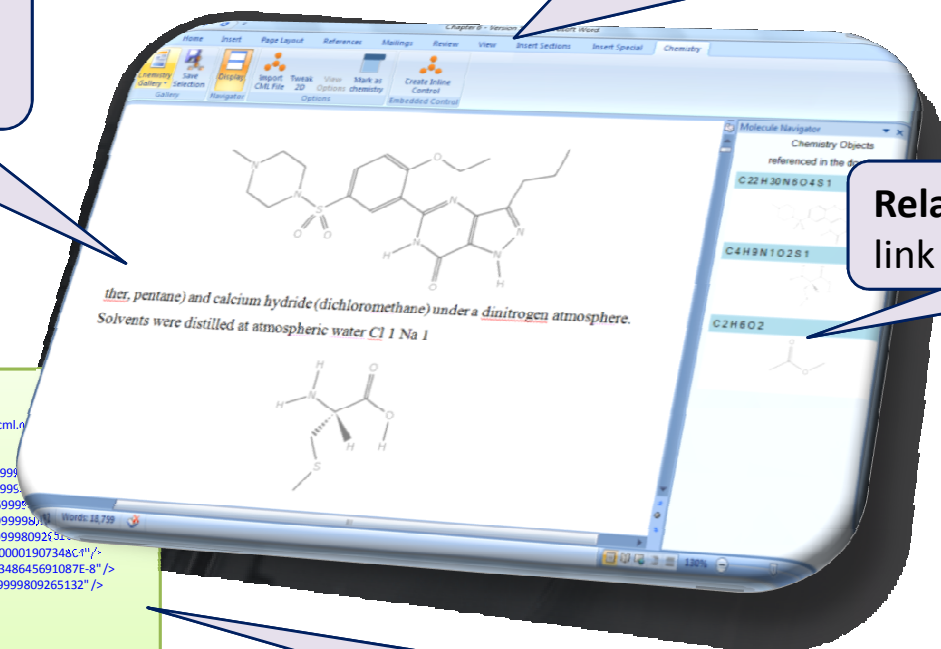
**Intent:** Recognizes  
chemical dictionary  
and ontology terms

**Data:** Semantics  
stored in Chemistry  
Markup Language

```
<?xml version="1.0" ?>  
<cm1 version="3" convention="org-synth-report" xmlns="http://www.xml-cml.org/chem4word">  
<molecule id="m1">  
<atomArray>  
<atom id="a1" elementType="C" x2="-2.9149999618530273" y2="0.7699999618530273" />  
<atom id="a2" elementType="C" x2="-1.5813208400249916" y2="1.5399999618530273" />  
<atom id="a3" elementType="O" x2="-0.24764171819695613" y2="0.7699999618530273" />  
<atom id="a4" elementType="O" x2="-1.5813208400249916" y2="3.0799999618530273" />  
<atom id="a5" elementType="H" x2="-4.248679083681063" y2="1.5399999618530273" />  
<atom id="a6" elementType="H" x2="-2.9149999618530273" y2="-0.7700000190734841" />  
<atom id="a7" elementType="H" x2="-4.248679083681063" y2="-1.907348645691087E-8" />  
<atom id="a8" elementType="H" x2="1.0860374036310796" y2="1.5399999618530273" />  
</atomArray>  
<bondArray>  
<bond atomRefs2="a1 a2" order="1" />  
<bond atomRefs2="a2 a3" order="1" />  
<bond atomRefs2="a2 a4" order="2" />  
<bond atomRefs2="a1 a5" order="1" />  
<bond atomRefs2="a1 a6" order="1" />  
<bond atomRefs2="a1 a7" order="1" />  
<bond atomRefs2="a3 a8" order="1" />  
</bondArray>  
</molecule>  
</cm1>
```

**Relationships:** Navigate and  
link referenced chemistry

**Intelligence:** Verifies validity  
of authored chemistry



Available soon:

<http://research.microsoft.com/chem4word/>

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# Article Authoring Add-in for Word 2007



Services: repository deposit via SWORD



arXiv.org

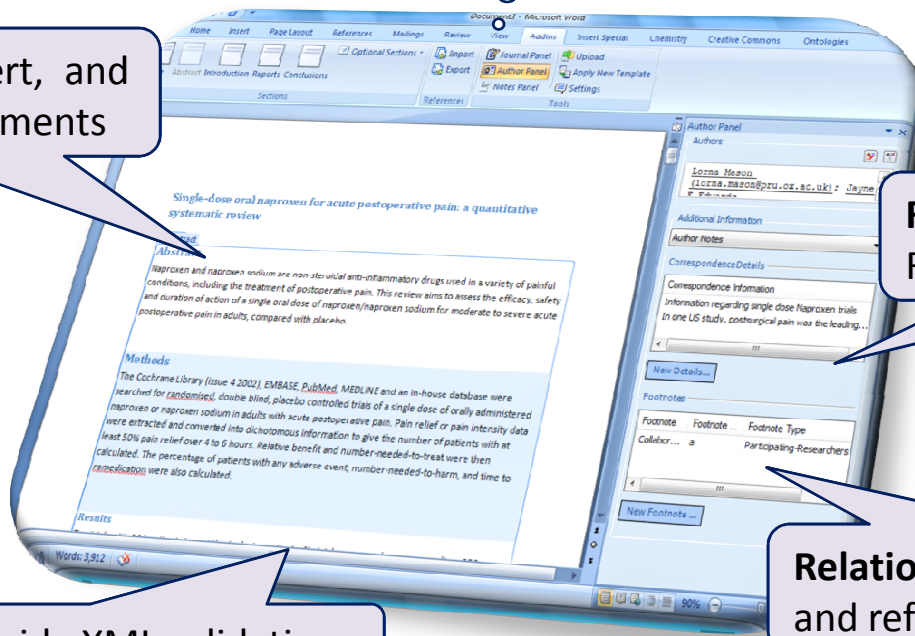
Fedora Commons

eprints

Zenity

DSpace

Structure: Read, convert, and author NLM XML documents



Relationships: ORE Resource Map creation

Relationships: Citation lookup and reference management

Structure: Client-side XML validation

Binary (version 2.0):

<http://research.microsoft.com/authoring/>



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# Research Information Centre



Personal site for each researcher and project site for each project

Collaborative environment for researchers



Federated search, co-search, annotations, tags, ratings, etc.

Project site navigation and tool based on project lifecycle

Social networking, real-time communication, blogs, wikis

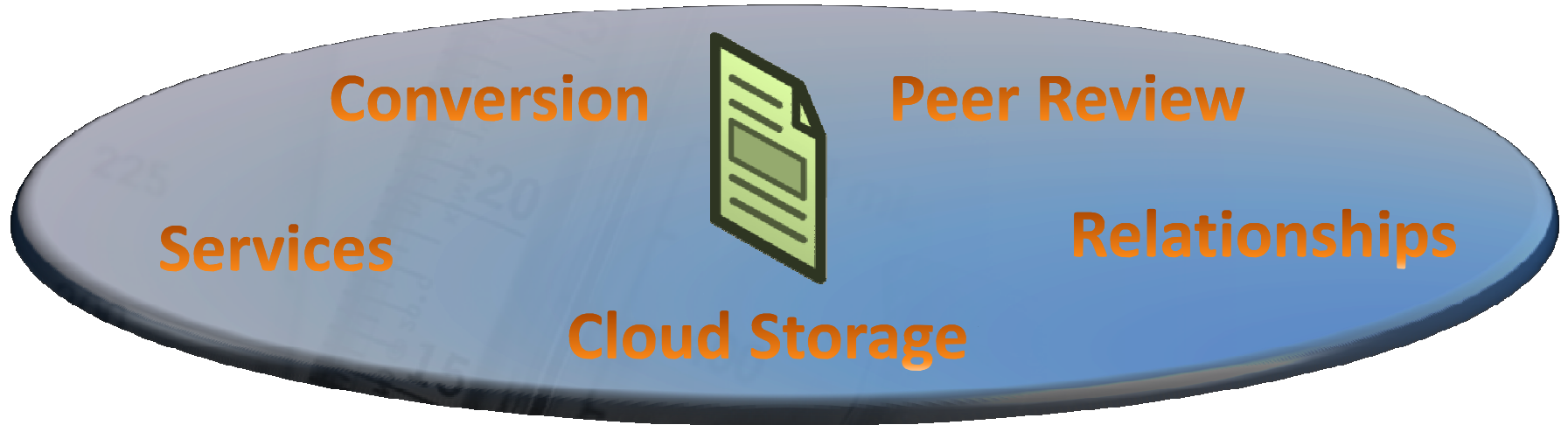
Available soon:

<http://research.microsoft.com/ric/>

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# Semantic Storage



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# Zentity – a Research Output Repository Platform

Default web UI with CSS support and custom ASP.Net controls

Native support for RSS, OAI-PMH, OAI-ORE, AtomPub and SWORD



A semantic computing platform to store and expose relationships between digital assets

Flexible data model enables many scenarios and can be easily extended over time

Binary (version 1.0):

<http://research.microsoft.com/zentity/>

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# Zentity – Goals

## Quick

- Easy to install
- ‘Scholarly Works’ data model
  - Authors, Papers, Data, Videos, Code, Lectures, Books, etc.
- Default Web UI

## Extensible

- UI Toolkit
- Intuitive programming experience
- Extensible Data Model (entities, relationships)
- RDFs for new data models

## Interoperable

- BibTeX Import
- RSS/Atom Syndication
- METS support
- OAI-PMH Provider
- OAI-ORE
- Simple Search API
- Atom Publishing Protocol
- SWORD

## Free & Open

- Freely available
- Based on open standards
- SQL Server and Developer tools available via Dreamspark

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# System Requirements

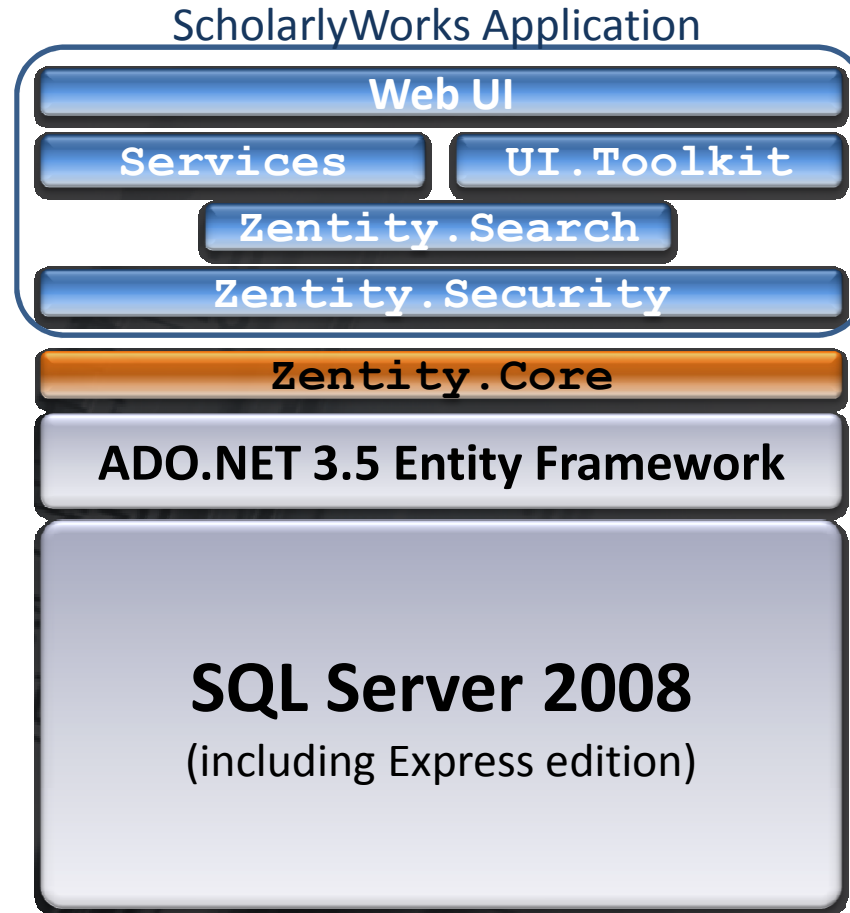
- **Supported Processor Architectures**
  - x86 and x64.
- **Supported Operating Systems**
  - Microsoft Windows Server 2008 (x86 and x64)
  - Microsoft Windows Vista SP1 (x86 and x64)
- **Installation Requirements**
  - Microsoft .Net Framework 3.5
  - Supported Microsoft SQL Server
    - Microsoft SQL Server 2008 Enterprise Edition
    - Microsoft SQL Express 2008 **with Advanced Services**
- **User and Configuration Requirements**
  - Site Admin privileges are granted to the user installing Zentity
  - The selected Microsoft SQL Server instance must have “Windows Authentication” enabled.
  - User running the installer must have ‘database creation’ permissions on the Microsoft SQL Server instance.



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# Application Stack



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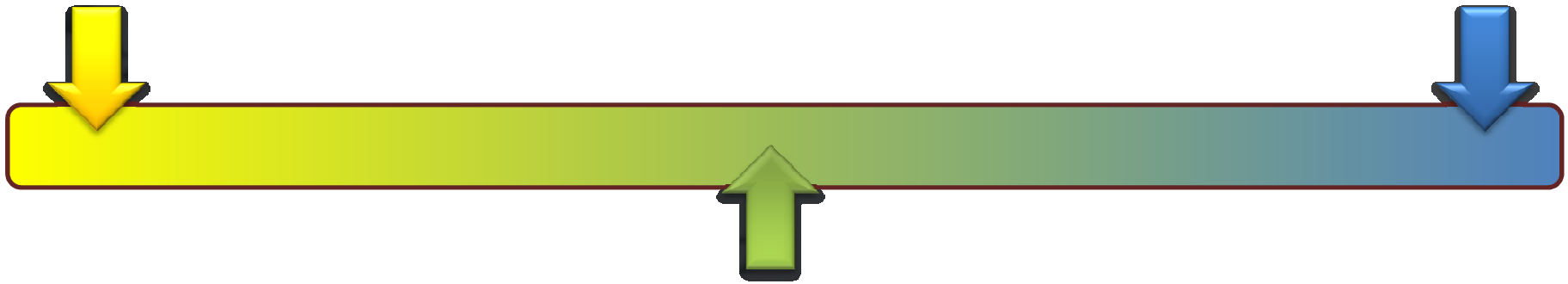
# Zentity - Store

## Triple stores

- Evolution friendly
- Poor performance
- No need to model everything in advance
- Semantic interpretation at the application level

## Relational schema

- Evolution not so easy
- Great opportunities for optimization
- Model everything in advance



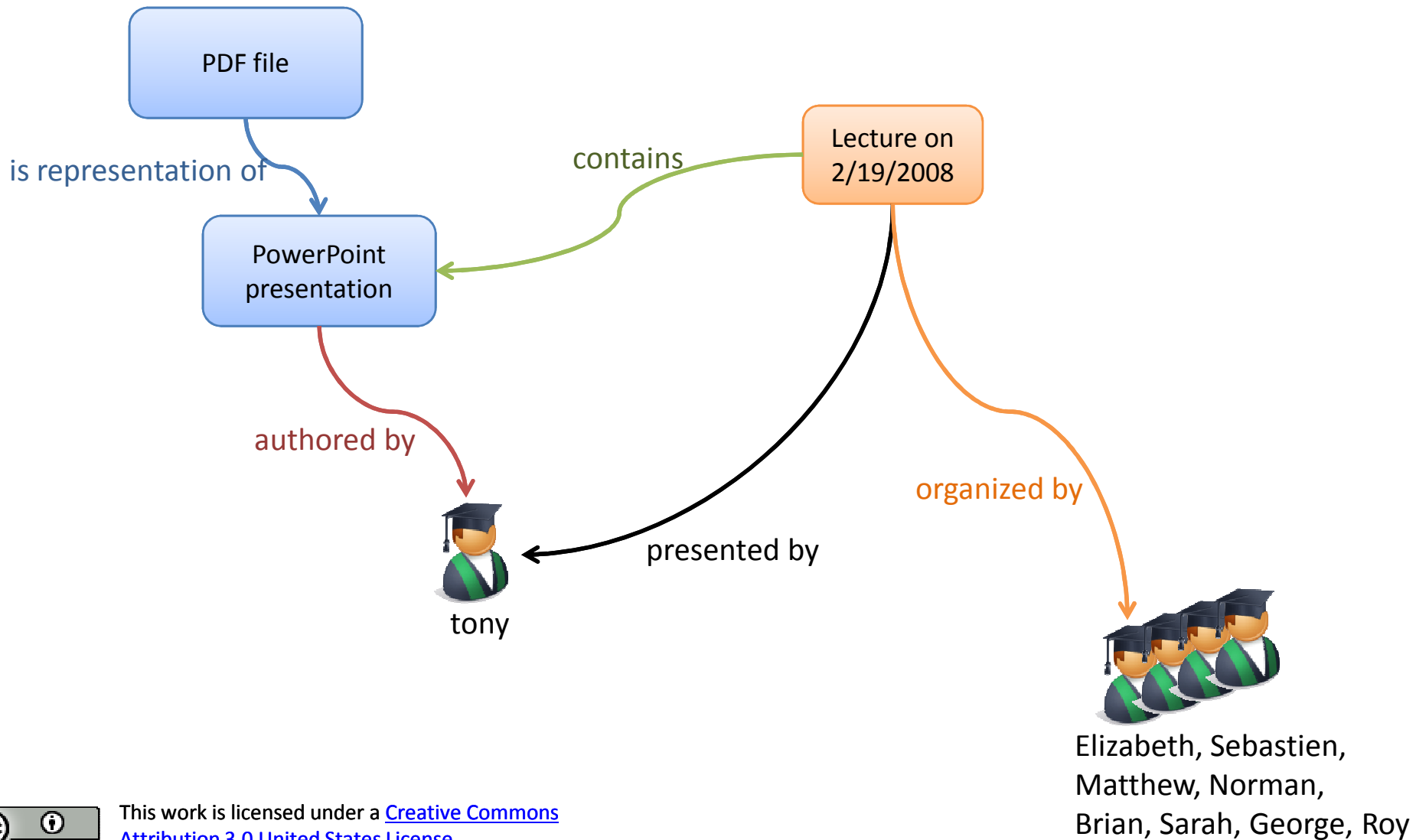
## Zentity Store

- Maintain a balance
- Try to model the frequently used entities in our app domain
- Try to capture the frequently used relationships
- Allow for extensibility (Relationships, Properties)

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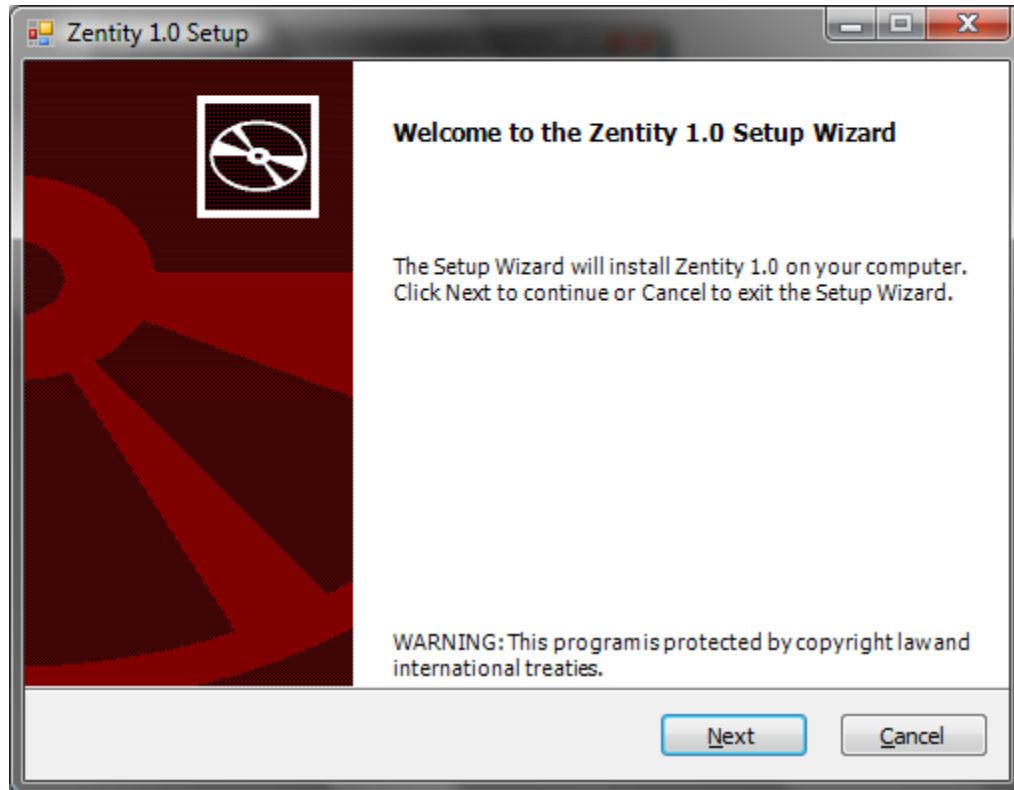
# Research Output Repository Platform



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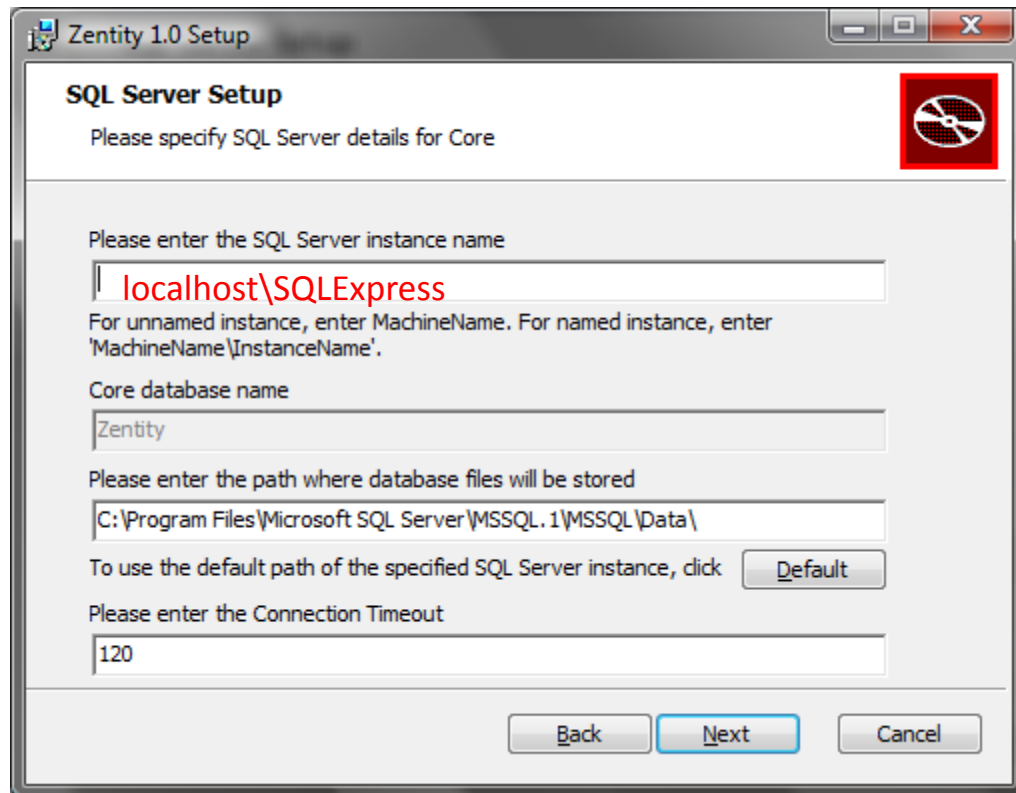


# Installation



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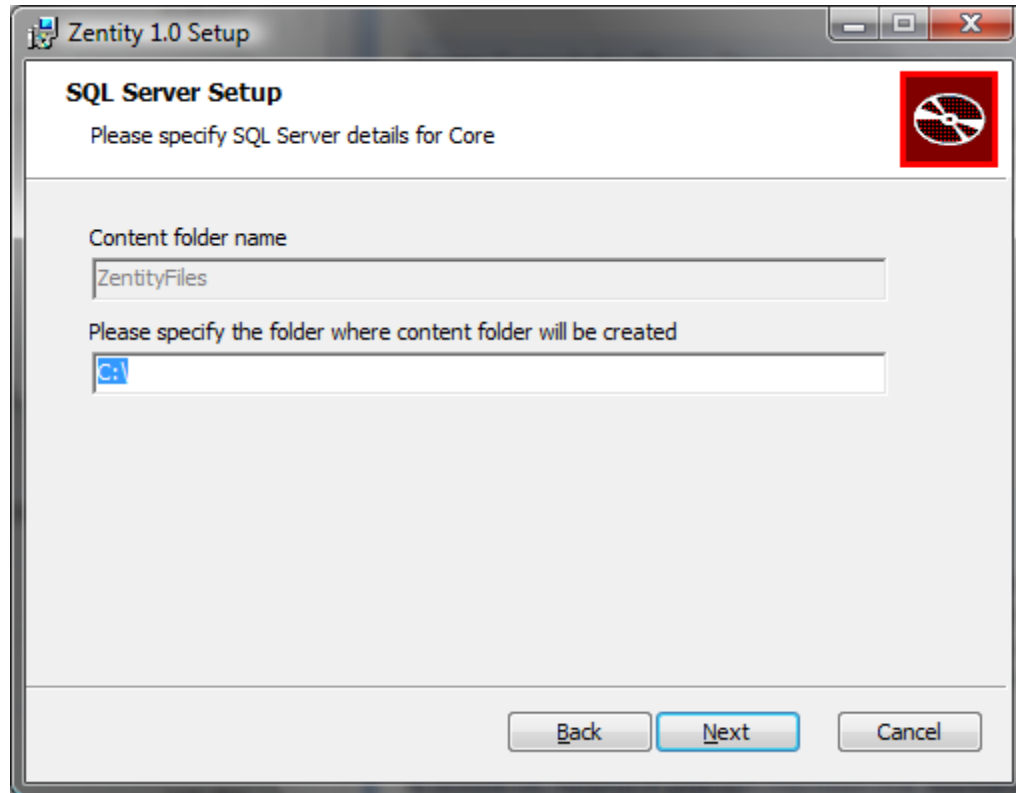




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# FILESTREAM File Location

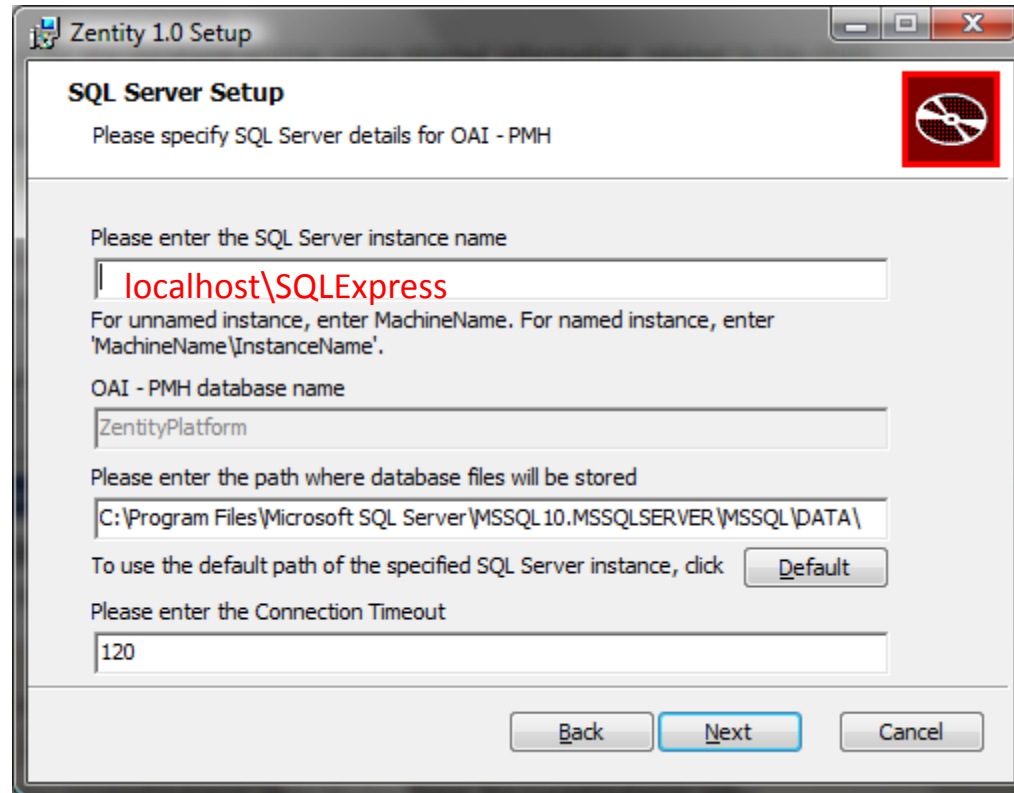


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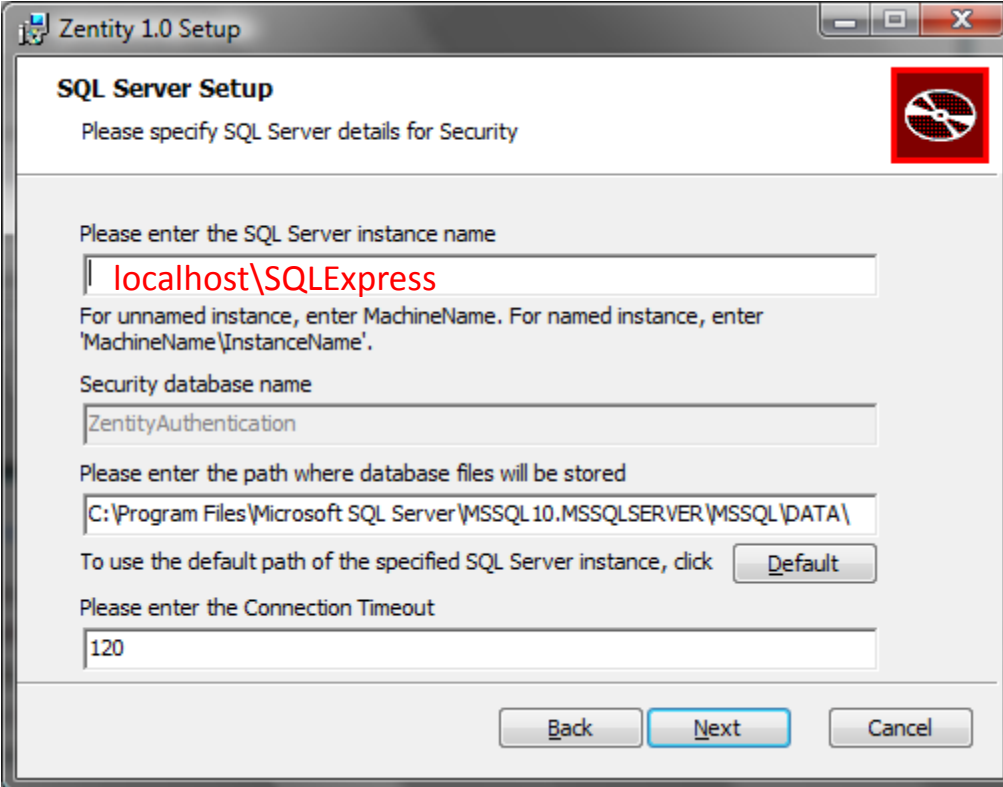
# OAI-PMH database



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# Users/Groups Database



**Zentity 1.0 Setup**

### SQL Server Setup

Please specify SQL Server details for Security

Please enter the SQL Server instance name

For unnamed instance, enter MachineName. For named instance, enter 'MachineName\InstanceName'.

Security database name

Please enter the path where database files will be stored

To use the default path of the specified SQL Server instance, click

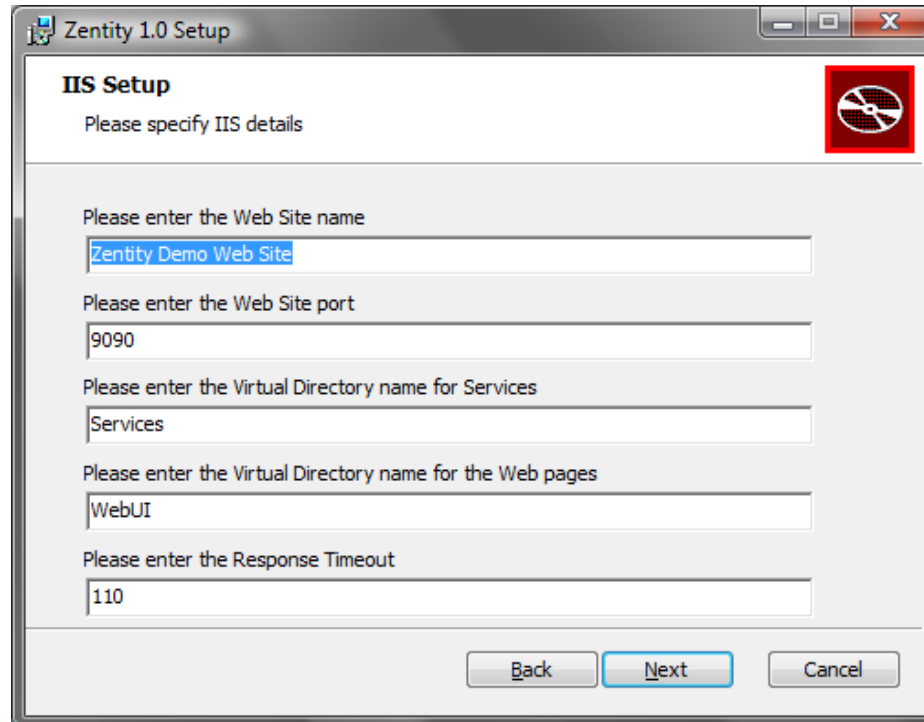
Please enter the Connection Timeout



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# Configure IIS



The screenshot shows a Windows-style dialog box titled "Zentity 1.0 Setup" with a sub-header "IIS Setup". The main instruction is "Please specify IIS details". There are five input fields with the following values: "Zentity Demo Web Site", "9090", "Services", "WebUI", and "110". At the bottom, there are three buttons: "Back", "Next", and "Cancel". A red square icon with a white circle and a diagonal slash is located in the top right corner of the dialog box.

**Zentity 1.0 Setup**

**IIS Setup**

Please specify IIS details

Please enter the Web Site name  
Zentity Demo Web Site

Please enter the Web Site port  
9090

Please enter the Virtual Directory name for Services  
Services

Please enter the Virtual Directory name for the Web pages  
WebUI

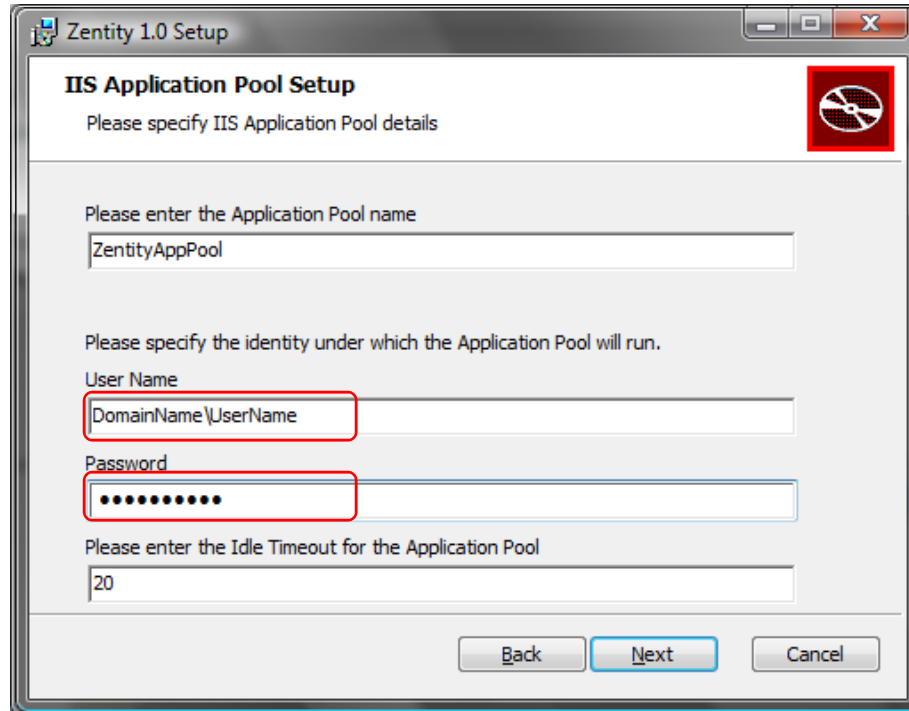
Please enter the Response Timeout  
110

Back Next Cancel

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# IIS App Pool



The screenshot shows a Windows-style dialog box titled "Zenty 1.0 Setup" with a sub-header "IIS Application Pool Setup". The main instruction is "Please specify IIS Application Pool details". There are four input fields: "Application Pool name" (containing "ZentyAppPool"), "User Name" (containing "DomainName\UserName"), "Password" (masked with dots), and "Idle Timeout" (containing "20"). At the bottom are "Back", "Next", and "Cancel" buttons. A red box highlights the "User Name" and "Password" fields.

**Zenty 1.0 Setup**

**IIS Application Pool Setup**

Please specify IIS Application Pool details

Please enter the Application Pool name

ZentyAppPool

Please specify the identity under which the Application Pool will run.

User Name

DomainName\UserName

Password

.....

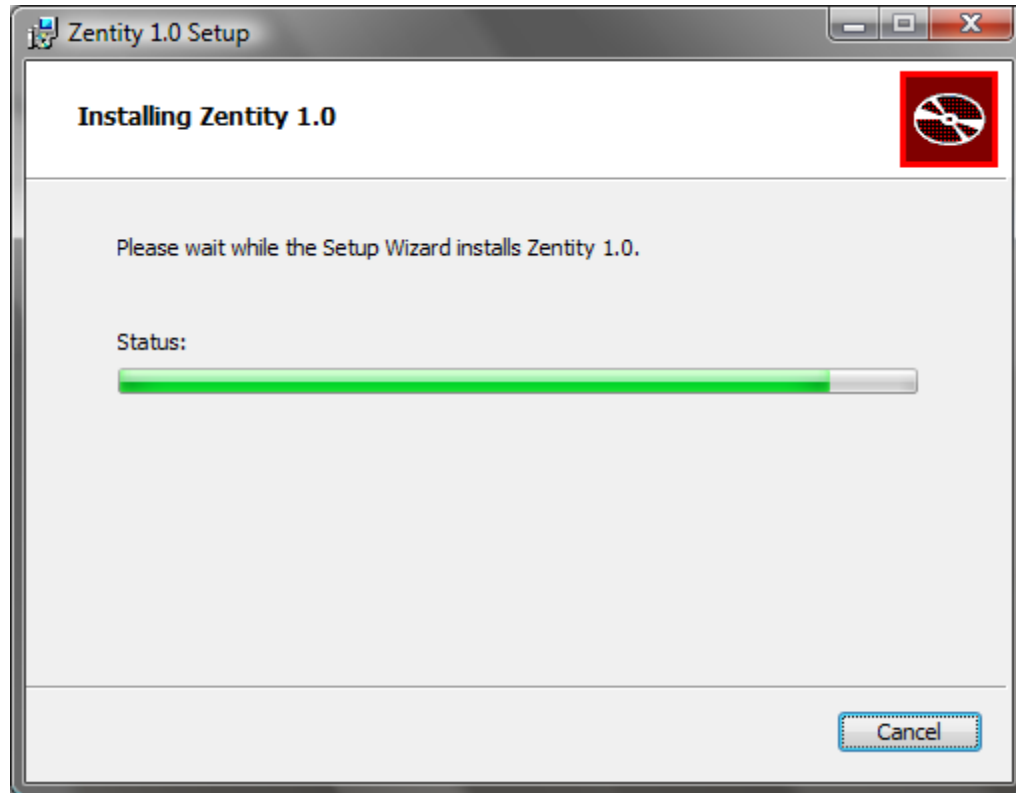
Please enter the Idle Timeout for the Application Pool

20

Back Next Cancel

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## Browse

Browse the repository with pre-defined views. These views provide basic filter criteria to navigate through resources.

- By Year
- By Categories
- By Type
- By Author
- Recently Added Resources
- Top Authors



## Search

Search the resources in the repository. You can search using Structured Query Syntax.

e.g. "Quantum Universe" Author:Tony

## Help

Use this help to learn about Zenity's many features and developer samples.

- How-to Guides
- Add-ins
- Developer References
- Zenity Forums
- About Zenity

## Manage

Add, Edit, and Delete resources from the Zenity repository.

- Resources
- Users and Roles
- Permissions
- Database Configurations

\*Administrator privileges are required



## Services

Use the Open Standards compliant services provided by Zenity to access data directly in the repository database.

- RSS
- OAI-PMH
- SWORD
- AtomPub
- OAI-ORE
- RDFS

## Tags

audience **audio** become **blogs**  
**biology** century chapter **computer** culture  
**earth** external  
dialog dissemination **internet** mass media molecules  
floral form geometric **papers** people personal plato **press** print public  
radio **research** science  
sphere technology television today understand **wade** video



Home

Search

E.g. Quantum Universe  
Author: Tony

Browse

By Year

Year  
2009

By Category

By Resource Type

By Author

Recently Added Resources

Top Authors

Manage

Add Resource

Add Tag

Edit/ Delete Resources

Edit/ Delete Tags

Manage Categories

Filters

Categories

Department

Department

Physics

**Chemistry**

Mathematics

Resource Types

ScholarlyWork

Lecture

ScholarlyWorkContain...

Experiment

Publication

Tutoria

PersonalCommunication

ElectronicSource

Media

Authors

A-E | F-J | K-O | P-T | U-Z | Others

david

David Nichols(David A  
David Arthur(David A  
David Arthur(David A  
David Johnson(David  
David Shmoys(David  
David Wilson(David E  
David Barber(David E  
David Bargeron(Davi  
David Bargeron(Davi

Prev

Next

SortBy : [Title](#) / [Date Added](#)

**Title:** [A brief report of the SIGPLAN/...](#)  
(JournalArticle)

**Date Added:** 5/11/2009 5:56:23 PM

**Authors:** [Michael Schroeder](#)

**Files:**

**Description:** The goal of this meeting was to bring together researchers from the area of programming languages with those from the area of operating systems for the purpose of developing insight into the relations...

**Title:** [Exploiting Semantic Query Cont...](#)  
(Proceedings)

**Date Added:** 5/11/2009 5:48:57 PM

**Authors:** [S. Cucerzan](#), [Z. Zhuang](#)

**Files:**

**Description:** One challenge for relevance ranking in Web search is underspecified queries. For such queries, top-ranked documents may contain information irrelevant to the search goal of the user; some newly-create...

**Title:** [Evaluating fuzzy clustering fo... \(Proceedings\)](#)

**Date Added:** 5/11/2009 5:47:47 PM

**Authors:** [M.E.S. Mendes](#), [L. Sacks](#)

**Files:**

**Description:**

**Title:** [Essential Pages \(TechnicalReport\)](#)

**Date Added:** 5/11/2009 5:47:30 PM

**Authors:** [Darko Kirovski](#), [Cherian Mathew](#), ...

**Files:** [Essential Pages](#)

**Description:** Results to Web search queries are ranked using heuristics that typically analyze the global link topology



# Search

- Basic Search
- Search Filters
- Advanced Query Syntax (AQS)
  - Field Support
- Advanced Search



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# Syndication

- [http://localhost:9090/Syndication/Syndication.ashx?resourcetype:bookauthor:\(tony hey\)](http://localhost:9090/Syndication/Syndication.ashx?resourcetype:bookauthor:(tonyhey))
- Any search or browse view can also be exposed as RSS feed

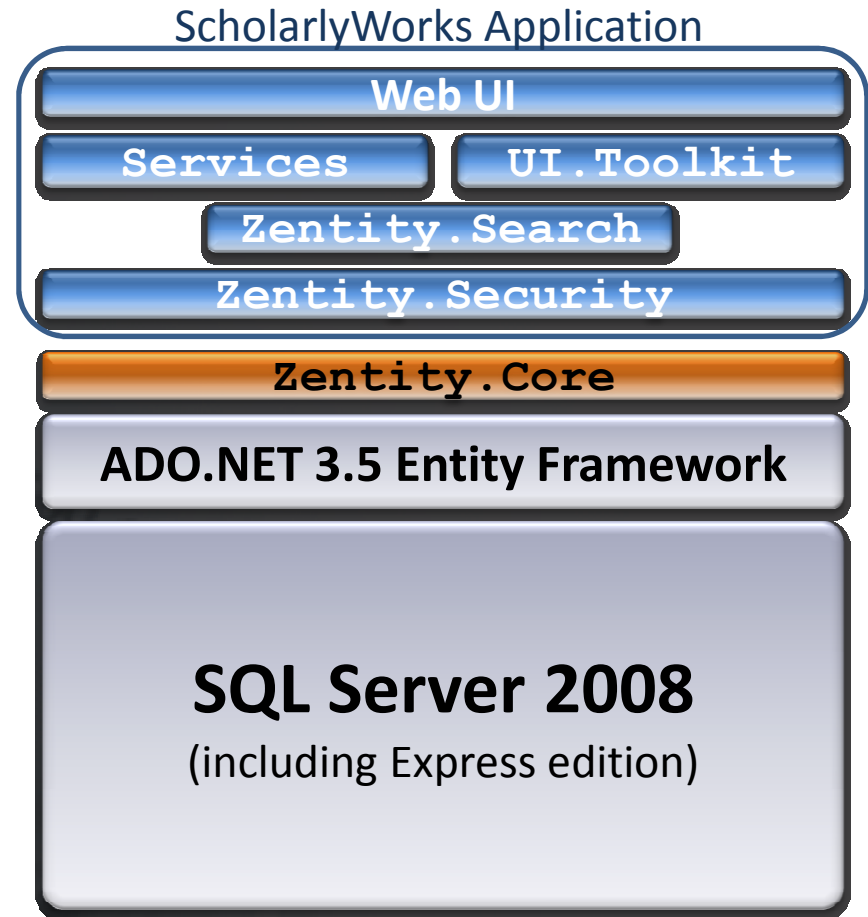


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# Extensibility

- Web UI & UI Toolkit
  - CSS
  - ASP.NET Controls
- Services
- Search
- Security
- Data Model



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# Museum Scenario (Zentity.Core)

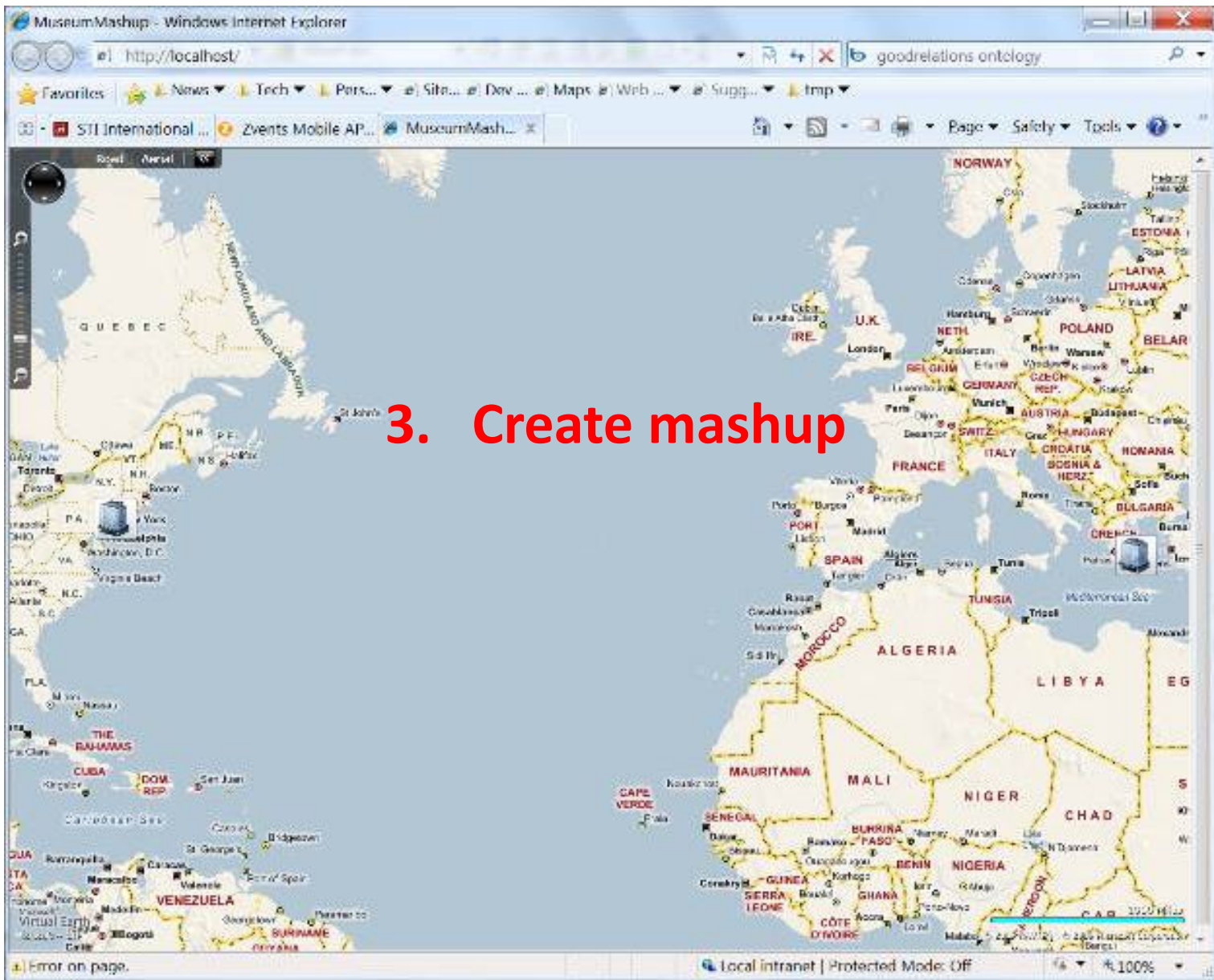
```
<?xml version="1.0" ?>
<!DOCTYPE rdf:RDF (View Source for full doctype...)>
- <rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:m="http://museum.example.org" xml:base="http://museum.example.org">
  <!-- Museum -->
  <rdfs:Class rdf:about="Museum" />
+ <rdf:Property rdf:about="Longitude">
+ <rdf:Property rdf:about="Latitude">
+ <rdf:Property rdf:about="Name">
+ <rdf:Property rdf:about="City">
+ <rdf:Property rdf:about="Exhibitions">
+ <rdf:Property rdf:about="Collections">
+ <rdf:Property rdf:about="CollectionsOnLoan">
  <!-- Exhibition -->
  <rdfs:Class rdf:about="Exhibition" />
+ <rdf:Property rdf:about="Title">
+ <rdf:Property rdf:about="FromDate">
+ <rdf:Property rdf:about="ToDate">
+ <rdf:Property rdf:about="ShowCollections">
  <!-- Collection -->
  <rdfs:Class rdf:about="Collection" />
+ <rdf:Property rdf:about="Title">
+ <rdf:Property rdf:about="Artifacts">
  <!-- Artifact -->
  <rdfs:Class rdf:about="Artifact" />
+ <rdf:Property rdf:about="Title">
+ <rdf:Property rdf:about="Year">
+ <rdf:Property rdf:about="Image">
+ <rdf:Property rdf:about="Creator">
  <!-- Artist -->
  <rdfs:Class rdf:about="Artist" />
+ <rdf:Property rdf:about="FirstName">
+ <rdf:Property rdf:about="LastName">
+ <rdf:Property rdf:about="Born">
+ <rdf:Property rdf:about="Died">
```

## 1. Define domain schema in RDFS

# Museum Scenario (Zentity.Core)

```
<?xml version="1.0" encoding="utf-8" ?>
- <Data>
- <Museum>
  <Name>Athens National Museum</Name>
  <City>Athens</City>
  <Longitude>23.71673</Longitude>
  <Latitude>37.98236</Latitude>
  <Exhibition>The treasures of Greece</Exhibition>
  <Collection>Ancient Greece</Collection>
  <CollectionOnLoan />
</Museum>
- <Museum>
  <Name>Museum of Modern Art</Name>
  <City>New York City</City>
  <Longitude>-73.97764</Longitude>
  <Latitude>40.76132</Latitude>
  <Exhibition />
  <Collection />
  <CollectionOnLoan />
</Museum>
- <Collection>
  <Title>Ancient Greece</Title>
- <Artifact>
  <Title>Statue of Dias</Title>
  <Year>2000 BC</Year>
  <Artist />
  <Image />
  <Artist>1</Artist>
</Artifact>
- <Artifact>
  <Title>Statue of Artemis</Title>
  <Year>1000 BC</Year>
  <Artist>1</Artist>
```

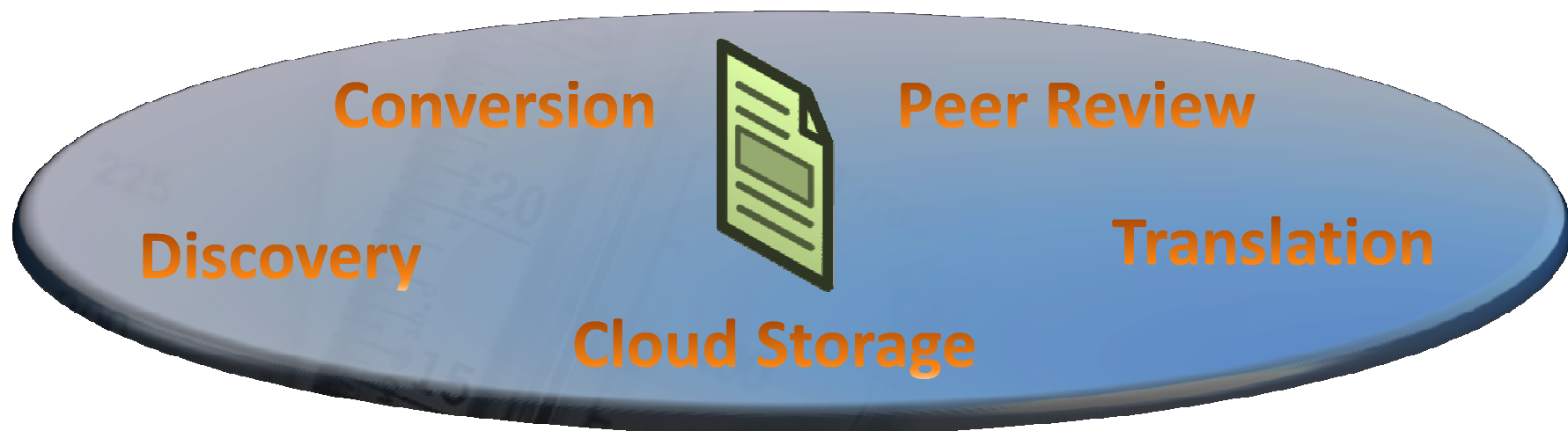
## 2. Import data



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# An Ecosystem of Services



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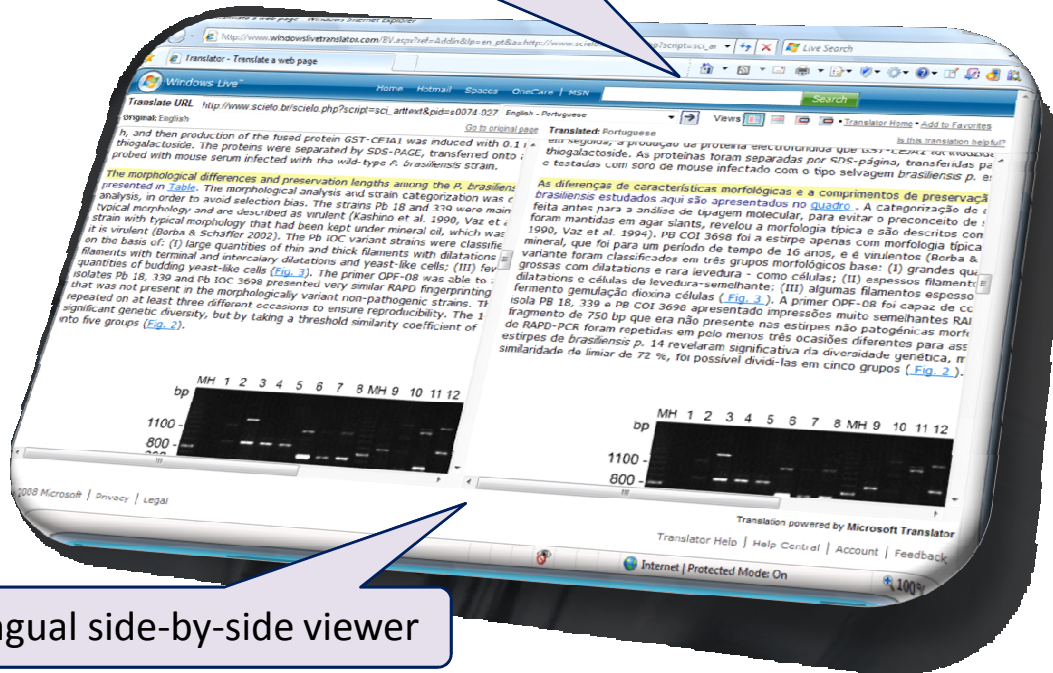
# Microsoft Translator

# Microsoft® Translator

SciELO Brazil

JAIRO  
Japanese Institutional Repositories Online

Query-time translation



Bilingual side-by-side viewer

Embeddable widget

Your viewers will see this

Translate this page

ترجمة هذه الصفحة

翻译此页

翻译此网页

Deze pagina vertalen

Traduire cette page

Diese Seite übersetzen

Traduci questa pagina

このページを翻訳します

번역 보기

Przetłumacz tę stronę

Traduzir esta página

Перевести эту страницу

Traducir esta página

<http://www.microsofttranslator.com/AddIn.aspx>

<http://www.microsofttranslator.com/dev/ajax/>

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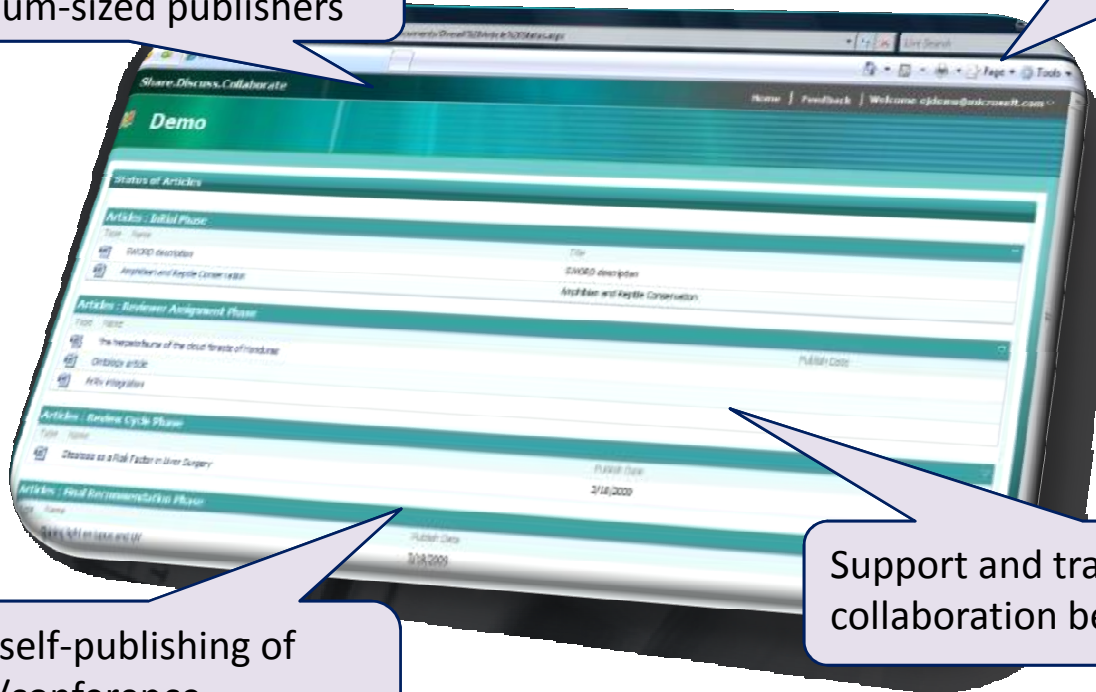


# Microsoft Electronic Journals Service

## A Hosted Offering for the Scholarly Community

Targeted at scholarly societies and small to medium-sized publishers

Hosted editorial and peer review management tool



Simplifies self-publishing of workshop/conference proceedings and small journals

Support and tracks online collaboration between authors

Alpha version available at:

<http://research.microsoft.com/ejournal/>



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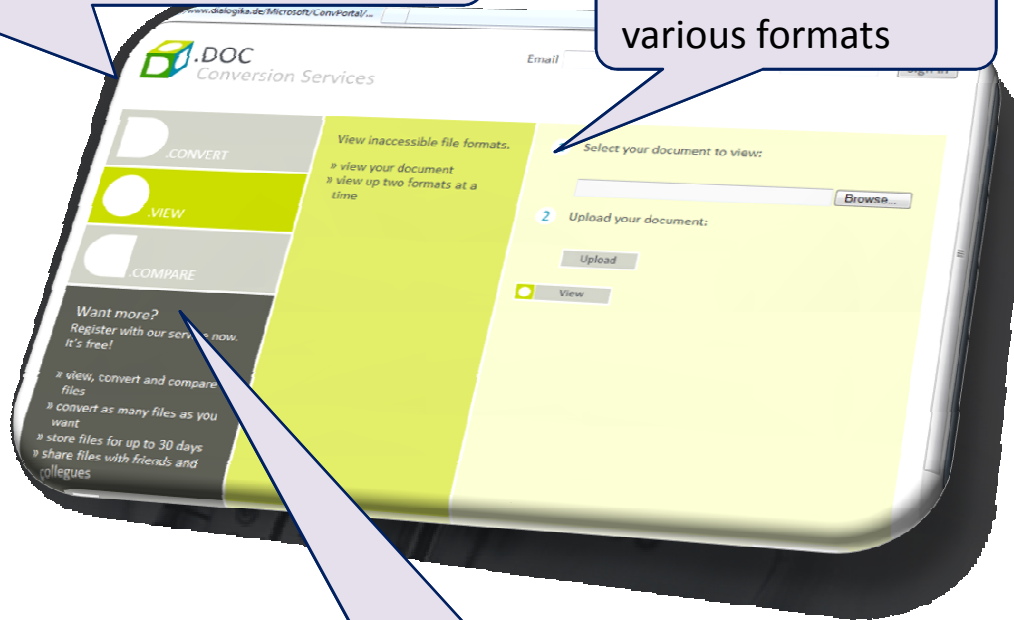


# Document Conversion Service

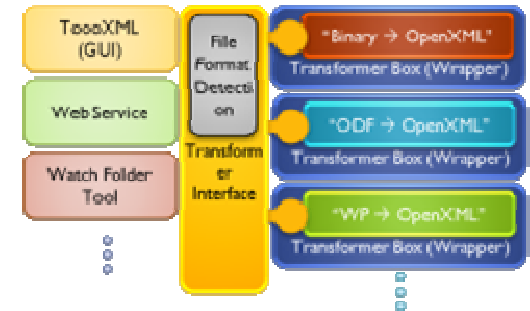


Convert to and from Word, ODF, Word Perfect, RichText, and UOF

View documents in various formats



Compare original and converted documents



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<http://odf-converter.sourceforge.net/>



# Open Document Standards

May 18th announcement



- New project seeks to eliminate Open XML confusion and build interoperability
  - Microsoft working with the Fraunhofer Institute for Open Communication Systems FOKUS in Berlin
  - Building a document format test library and validation tool
  - Tools will ease the effective exchange of data and improve the long-term benefits for data archiving
- At the [Document Interoperability Initiative](#) (DII) global forum in London, release of a number of products to support interoperable files:
    - [Open XML Document Viewer v1.0](#), a plug-in for the [Opera](#) browser to help users access documents via the web or across mobile devices
    - The [Apache POI 3.5 software development kit](#), includes a Java API to access information in the Open XML Format.
    - The [Open XML-ODF translator](#), has support for .XLS and .PPT file formats, improved ability to translate between ODF and Open XML formats.



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# oreChem – The Chemical Semantic Web



- Lee Giles
- Karl Mueller
- Prasenjit Mitra

INDIANA UNIVERSITY

- Geoffrey Fox



Cornell University

- Carl Lagoze

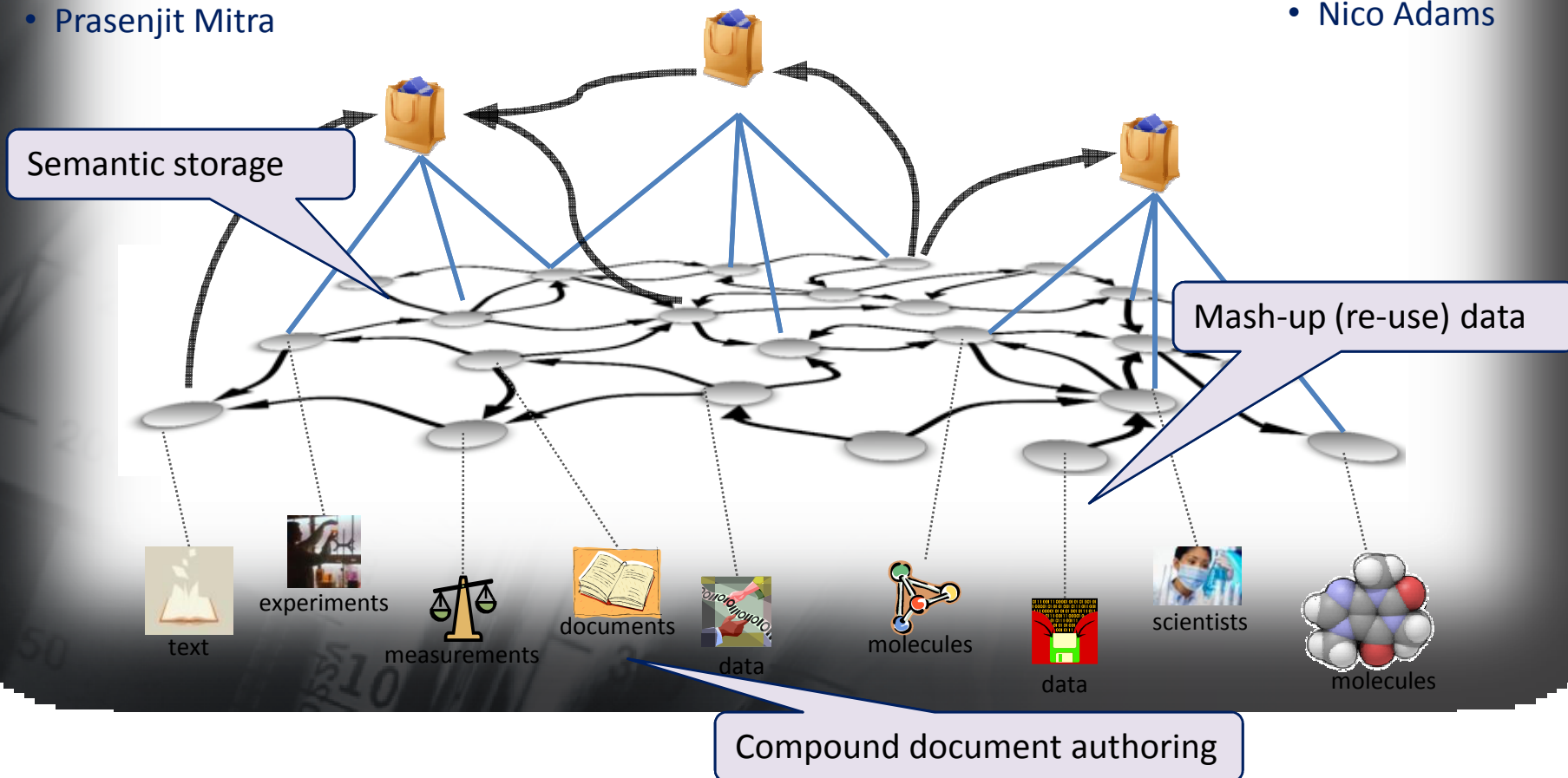
UNIVERSITY OF  
Southampton  
School of Chemistry

- Jeremy Frey
- Simon Coles



UNIVERSITY OF  
CAMBRIDGE

- Peter Murray-Rust
- Jim Downing
- Nico Adams



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# Further Information and Resources

<http://research.microsoft.com>

- The site contains access and downloads of relevant tools and resources for the worldwide academic research community. A small set of examples include:

- **Research Output Repository:** building blocks, tools, and services for developers who are tasked with creating and maintaining an organization's repository ecosystem.

<http://research.microsoft.com/zenity>

- **Tools and Services for Research Collaboration:**

<http://www.microsoft.com/scholarlycomm/>

Home Our Research Collaboration Careers  
Our News Regional Programs Tools and Services Opportunities

Collaboration

Empowering researchers and academics with technologies and services throughout the research lifecycle

We are building partnerships worldwide among academia, industry, and government to advance the research process and its role in innovation. We support efforts in open tools, open technology, and interoperability. About Microsoft External Research collaborative research institutes...

Resources for the Research Lifecycle

Tools and Services for Advancing the Research Platform  
Open, flexible tools and data-sharing services for accelerating time to insight

Opportunities for Collaborating with Microsoft Research  
Fellowships and innovative research and teaching programs worldwide

Our Focus — Collaboration Projects

Computer Science  
Fostering innovative research to advance social and human potential  
See: [Dryad: Programming the Datacenter](#)

Earth, Energy, and Environment  
Accelerating scientific insight into global environmental systems  
See: [WorldWide Telescope Academic Program](#)

Education and Scholarly Communication  
Empowering researchers through knowledge dissemination  
See: [Research-Output Repository Platform Beta 1 \(Project "Famulus"\)](#)

Health and Wellbeing  
Advancing computer technology to improve health and save lives  
See: [Peter Kuhn's work at the Scripps Institute](#) (video)

Regional Programs — Collaboration around the Globe

About Microsoft Research regional programs...

WHAT'S NEW ?

- Carole Goble Receives First Jim Gray eScience Award
- Trident Workflow Workbench Architecture and Background

OUR COLLABORATORS' STORIES

- India Digital Heritage Project Creates 2D and 3D Visualizations
- MPI.NET 1.0 from Indiana University - Messaging Passing for Windows HPC Server
- Webcasts on the Research Channel

CONFERENCES AND WORKSHOPS

- International Science Technology Events at Indianapolis
- Microsoft eScience Workshop 2008
- Microsoft Research Faculty Summit in Asia

TONY HEY ON RESEARCH DIRECTIONS

- "We're providing tools so scientists can focus on research..."
- "How External Research Works with a New Breed of Scientist..."

CONVERSATIONS IN THE RESEARCH COMMUNITY

- "I feel like Daniel in the neuroengineer's den" - Workshop on Neural Engineering
- "It's good to see how the vision of the OpenXML document formats is being more fully realized...with tools from the Document Interoperability Initiative" - Dan Fay's blog

FEEDBACK

- Please give us your comments and queries



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