

DOE2000
Electronic Notebook Project

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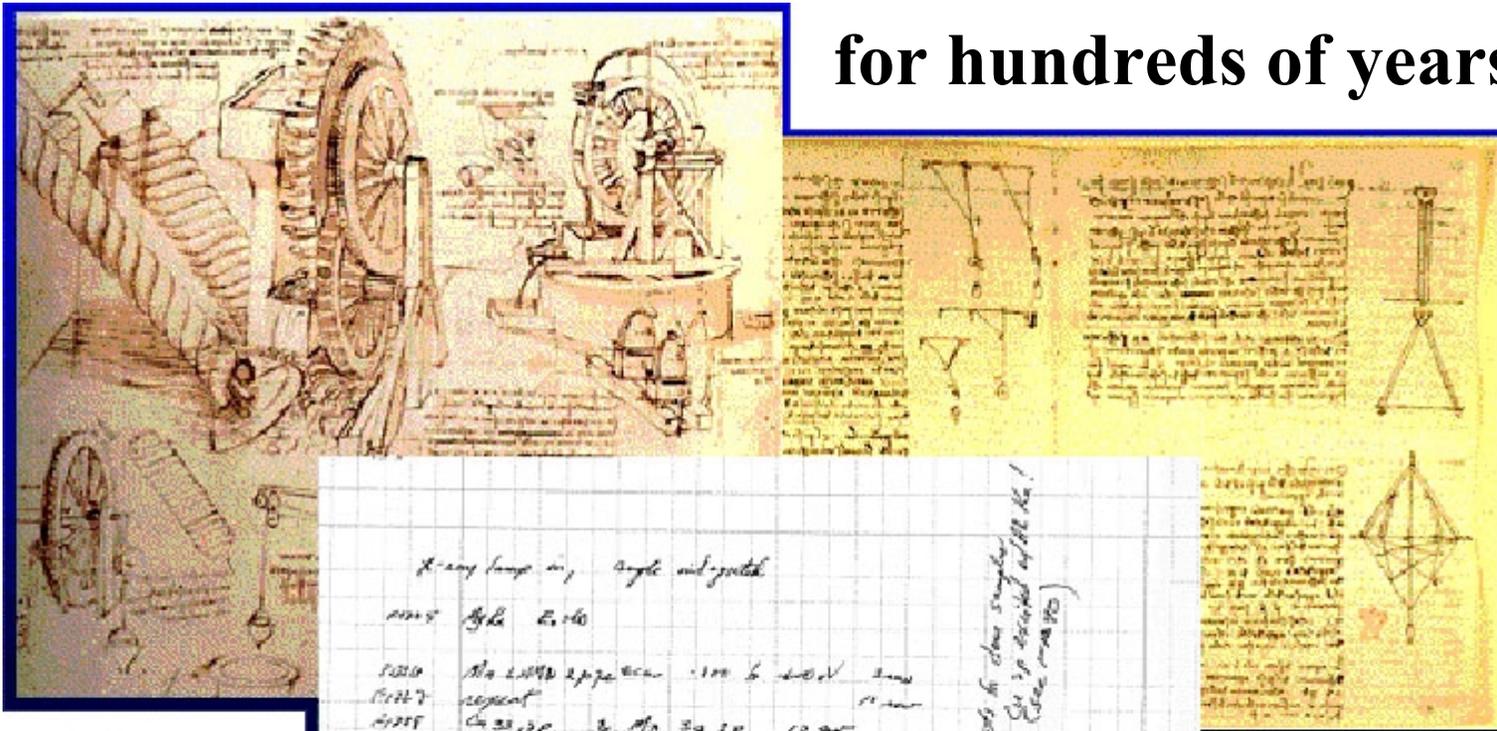
Sonia Sachs (*LBNL*)

ANS 1998 Winter Meeting

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Laboratory Notebooks: the Heart of Scientific Research

for hundreds of years



Experiment log book
Record keeping
Regulations

Personal notebook
Instrument log book
Design notebook

Motivation

Many advantages of using Electronic Notebook

- can be shared by remote collaborators (WWW access)
- always available for input or reading (can't be "lost")
- can contain rich media types (text, images, files, 3D structures, voice, animations, video, ...)
- can take input directly from computers (instrument or editors)
- easy transfer of information from one notebook to another
- simplified notarization process (over the Web)
- allows querying/ searching (complex query possible)
- can include hyperlinks to other data and references

See the electronic notebooks in use at RSIC

Collaboration Tools Taxonomy

Persistent Information

- Email
- News group
- Papers
- Mail
- **Electronic Notebook**



Legal and
Records
requirements

Real Time Information Exchange

- Telephone
- Video Conference
- Chat/White board
- Shared authoring & applications
- Shared VR space
- Instrument control

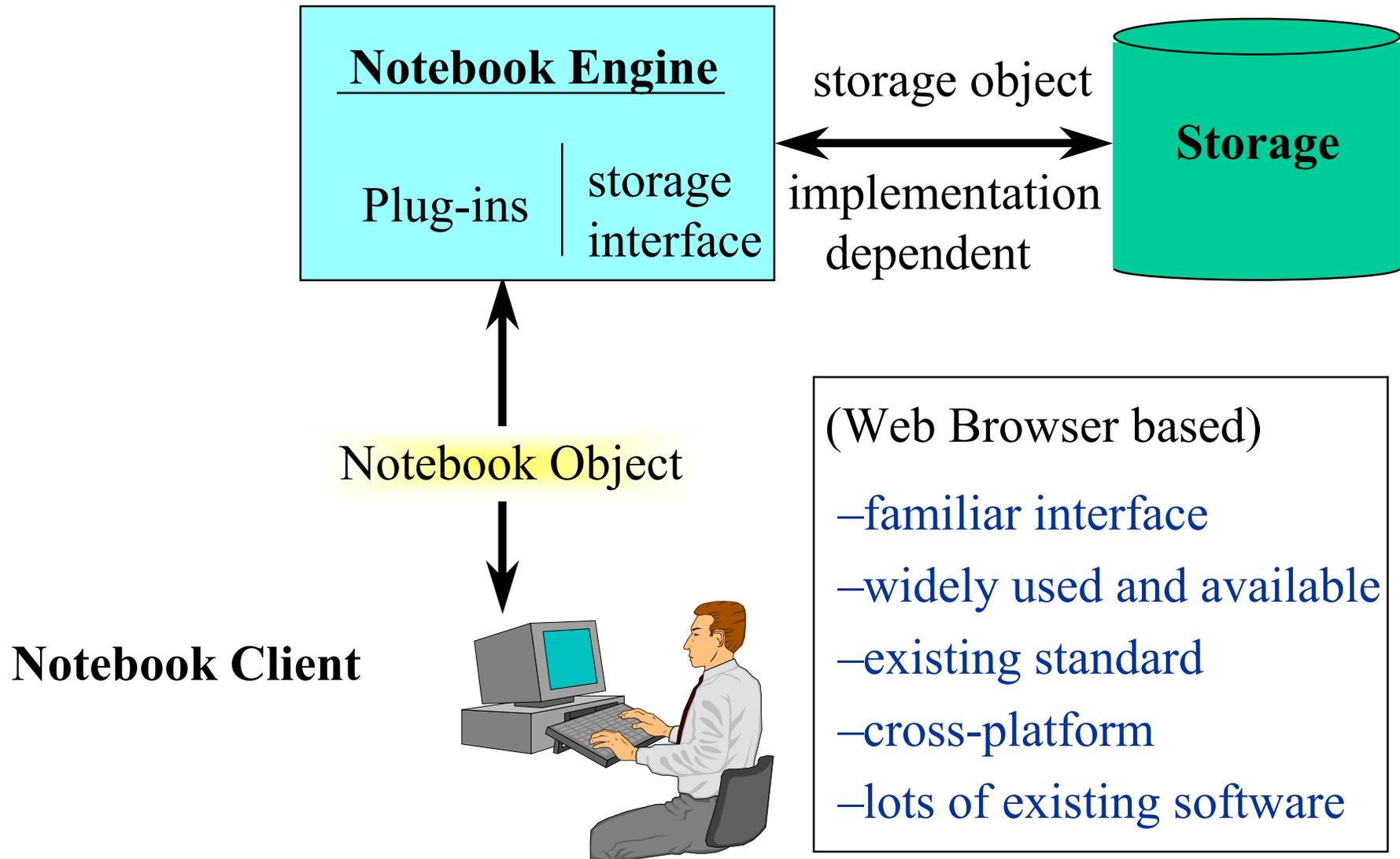
Notebook is a chronological record of ideas, data and events.

Project Goals

- Design a common (open) Notebook Architecture
 - extensible as technology advances
 - interoperable with other notebook viewers
 - customizable for unique inputs of a given project
- Develop prototype implementations
 - make them available to DOE laboratories
 - general research community
 - education
 - industry



Notebook Architecture Design



Client: Key Goal is Ease of Use

- Designed so it can be used w/o a manual.
 - intuitive entry, search, viewing, and navigation
 - look and feel of paper notebook
 - on-line help and recipes linked off page 1 of each notebook
- Input methods and tools
 - interface to Web publish tools (e.g. Netscape, MS Office)
 - supply input tools sketch pad, input image or file
 - annotation of existing pages
 - Project Specialized Interfaces
 - direct instrument interface
 - data analysis tools



Basic Design Issues



- Design that allows shared and private notebooks
 - private ideas
 - shared information
 - easy to move information between notebooks
- Can I still read entries 25 years from now?
 - computer technology and interfaces will be much different
 - long term storage - format readable 25 years in future
 - transfer of notebook entries as machines upgrade (eg. 64 bit)

Legal Design Issues

For industrial use, the electronic notebook must be accepted by the courts as a legally binding record.

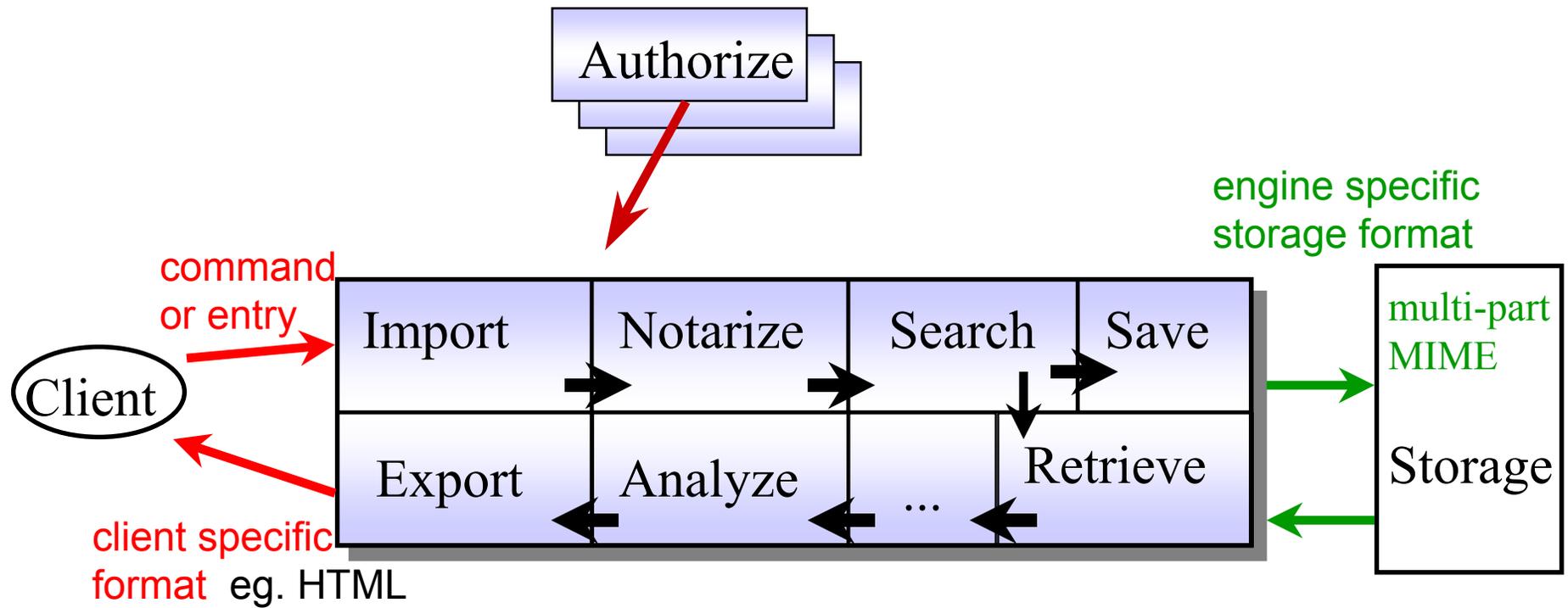
Tamper-proof entries

- Authentication
 - digital signatures used to verify author
- Notarization
 - third party notary + non-electronic verification
 - time stamp must be based on trusted source
- Secure Storage
 - entries can be verified as not changed since notarization



Notebook Engine Design

Modular dual pipe design can be customized with additional plug-ins



Modules based on the input and output of basic notebook objects

Electronic Notebook Users Include



Multi-organization Collaborations

- Radiation Safety Information Computational Center (**RSIC**)
- Center for Radiation Dose Modeling and Computation (**DOE/EPA/DOD/NRC**)
- Materials MicroCharacterization Collaboratory Project (**ANL/LBL/NIST/ORNL/U III**)
- Beamlines at FermiLab, ANL, ORNL, TJNAF, Brookhaven, ...

Industry

- 3M, Hydro-Quebec power, Eli Lilly, Hoffmann-La Roche, ...

Education

- Krell Institute, Shodor Education Foundation, ...

List of users is rapidly growing! (100+ groups)

<http://www.ornl.gov/~scist/livv/applets/cnote/users.html>

For Further Information

DOE 2000 Electronic Notebook Website

<http://www.epm.ornl.gov/enote/>

Follow links to:

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Get the latest project news,
And much more...**