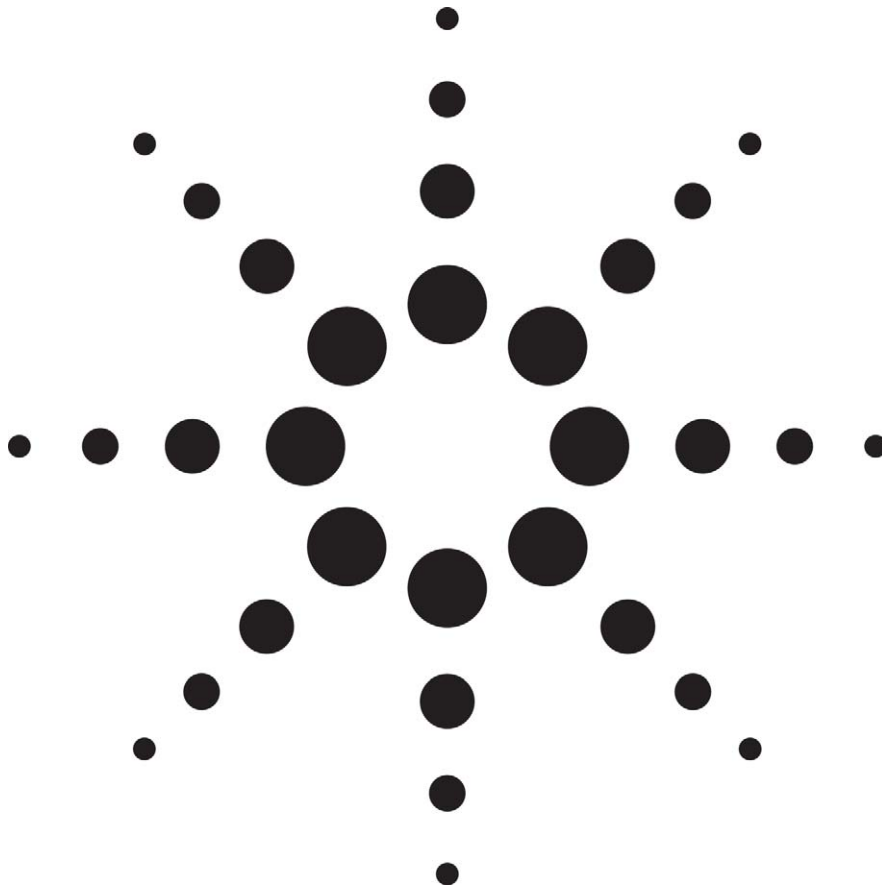# Content Management Design Features of Agilent OL

White Paper

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Content Management Design Features for Agilent OL

Agilent OL is designed as an "operating system" for the modern laboratory. It is intended to provide a scalable, flexible, and adaptable platform for laboratory instruments, laboratory operators, and laboratory work processes.   Incorporating some of the most current design concepts in computing and database architecture, Agilent OL provides a feature-rich framework for instruments and laboratory information — a strategy for integrating instrumentation, local data systems, and other laboratory electronic information into a fully protected, searchable, and archivable system.

Agilent OL provides a number of software features and capabilities for managing total laboratory information (content) as well as the laboratory instruments.   This white paper will discuss some of these major features and benefits to end users, system and laboratory managers.   A companion paper is available that discusses Agilent OL design features from the standpoint of managing instruments.

Content Management of Everything a Lab Generates

Unlike some laboratory systems that utilize a proprietary database, Agilent OL supports industry standard databases (Oracle and Microsoft SQL Server) to offer a choice in scalability. Unlike some laboratory systems that can only deal with proprietary data from their own instruments, Agilent OL manages electronic content generated from **all** laboratory instruments, users and work processes. This includes not only electronic records generated by Agilent OL's instrument control and data analysis packages, but also electronic records created by Microsoft Office (Word, Excel), Adobe pdf files, graphics files and email, and non-SSI data systems. All records become fully protected and searchable by the Agilent OL services.
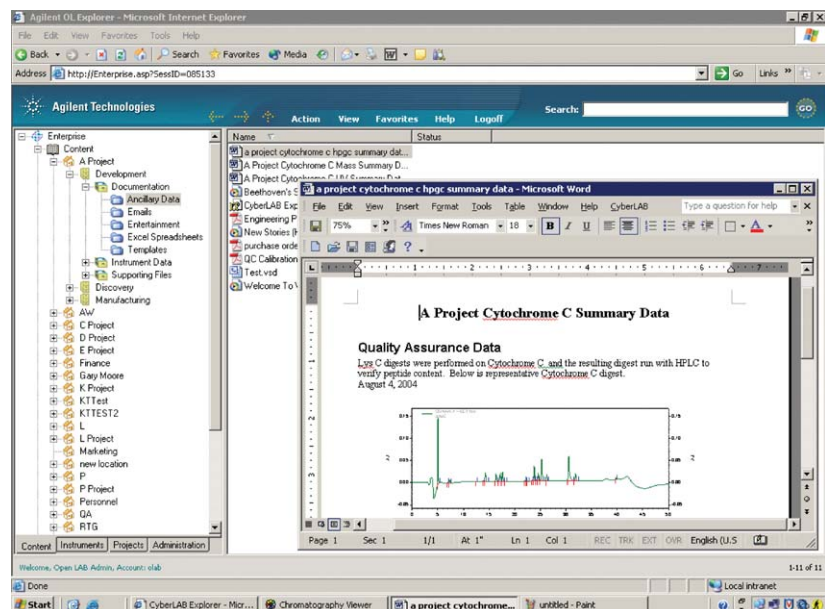

Figure 1: Agilent OL provides a "content" view of the enterprise as well as an "instrument" view.   Here, in this example, a user has accessed a content view of the enterprise through a web client. All content in the Agilent OL left pane is organized in the "LOCATION / CABINET / DRAWER / FOLDER" hierarchy, so that information can be easily assigned to a project or location folder.
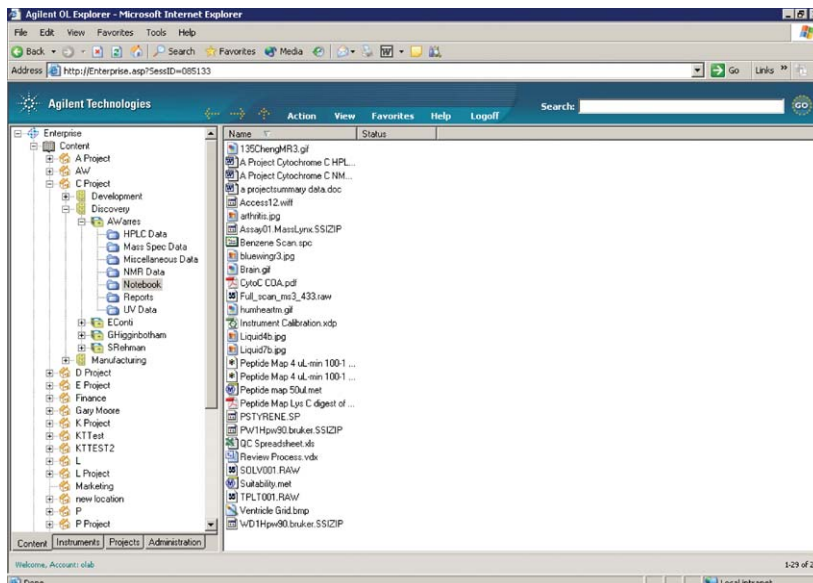
Figure 2: Typical Agilent OL client screen for content views. In this particular project, a variety of data types from different sources is managed by Agilent OL, including proprietary third party data files (raw data, methods), Microsoft Office files (Word, Excel, etc.), and graphic images.

Content is organized in an intuitive, flexible structure of *Locations*, *Cabinets*, *Drawers* and *Folders* to accommodate any laboratory organization.

These unique capabilities provide Agilent OL laboratories with an extensive toolset to share information, safely collaborate, and effectively manage all the content generated.

Network Access from Web Clients

Agilent OL is one of the first commercial software applications for the laboratory based on web clients. This provides the laboratory with more flexibility in deployment, since any hardware with a web browser can serve as a client. Validation is also simplified. Minimal software is actually loaded onto the Agilent OL client computers as the interactions rely on Agilent OL servers.

From an Agilent OL client, users with the appropriate security permissions can access their content views of the enterprise. Application access, revising files, and viewing particular folders and content can be con-

trolled at a granular level by the system administrators.

Data Viewers Eliminate Native Software on Agilent OL Clients

Unique Data Viewers have been developed by SSI so that Agilent OL clients can view a wide variety of content without the need for

loading/installing a native application. Both a Chromatography Data Viewer and a Mass Spectrometry Data Viewer are available.

These Data Viewers support a wide variety of commercial data systems.

The Chromatography Data Viewer, can directly read data files from a number of chromatography data systems including those from Agilent, Waters, Thermo, Perkin Elmer, Shimadzu, Hitachi, Varian, Beckman and Jasco., as well as industry standard .cdf files.

The Mass Spec Data Viewer can read data from a number of MS data systems including those generated from Agilent, Waters, Sciex, Bruker, Thermo and JEOL.

The Data Viewers display the full content of the file, not just a static screen capture, The Chromatography Data Viewer can display results as well as the chromatogram itself. One can zoom and resize the chromatogram in the Data Viewer to view the information in more detail. In the case of MS Data Viewer, one can view mass spectra, TICs and SICs extracted form the raw 3D data file.
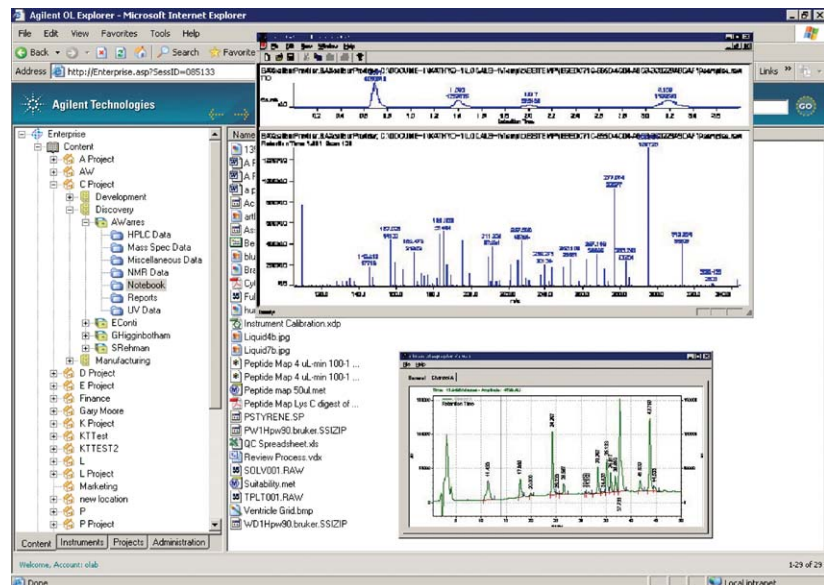

Figure 3: The Agilent OL Data Viewers can display data files on Agilent OL web clients independently, so that no proprietary file conversion is necessary and no native application software need be loaded or installed on the web client. Here, an MS data file from an Agilent MS and a chromatography injection from Perkin-Elmer's Turbochrom are accessed and displayed in the Agilent OL client.

Metadata Through Auto-mated Extraction Services

When any file is deposited into the Agilent OL Content Manager, basic information such as the client computer, the uploading user, OS, owner, file creation date and file upload date is stored as *metadata* associated with that specific file. This occurs automatically without end user interaction.

In addition, however, Agilent OL Automated Extraction Services (AES) for a wide variety of files can extract additional information. Using AES, additional information such as header data, sample names, peak names, analytical results, custom field information and much more can also be extracted into the metadata.

Automated Extraction Services allow users to select what specific information is to be extracted into the metadata. The selection is extremely comprehensive. The AES for the Applied Biosystems MDS Sciex Analyst software, for example, has over ninety (90) individual information types that can be extracted.

Agilent maintains a on-going development effort dedicated to creating new Automated Extraction Services for a variety of laboratory files. Agilent develops and releases new AES for instruments and data systems as they are developed. A current list is maintained on the Agilent web site.

In addition, Agilent OL allows user-defined metadata fields. Even if the information was not generated from the original, user-defined metadata fields allow the creation of search-able fields specific for the data.

Searching for Content

Finding the information you need is a vital component of a content management system. Agilent OL provides a several ways to search its content.
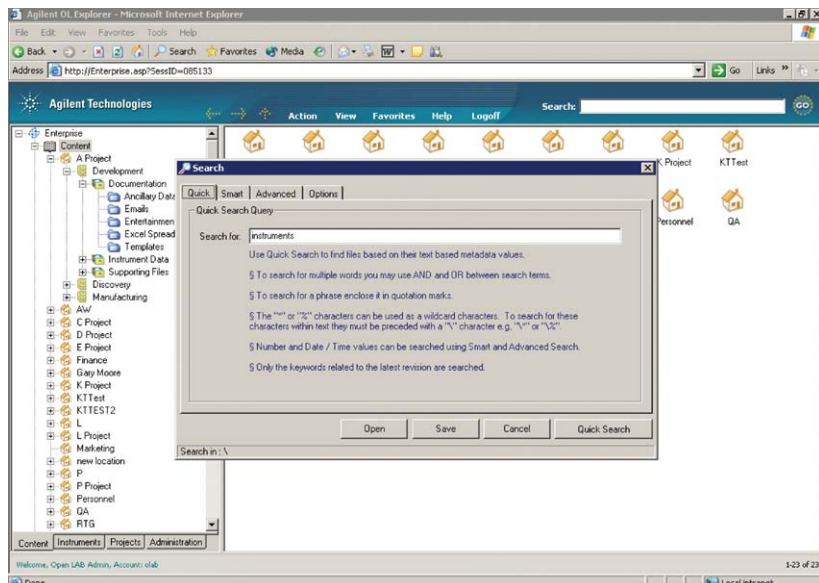

Figure 4: Typical Agilent OL search using the Quick search.

There are *Quick* searches that can be easily applied to query for files names, as well as more focused Smart and Advanced Searches that allow users to build queries to intelligently "mine" their content by specifying highly tailored search criteria.

Quick searches of the content can be conducted using a "Google" style search bar. In these queries, text based hits can be quickly compiled so that all documents containing words or phrases of interest can be found.

For more complex searches, an extended *Smart* search is available. *Smart* search queries can be saved, so that they can be recalled and run without having to recreate the search each time.

For generating even more highly precise queries, an *Advanced* search is also available. With the *Advanced* search, one can apply search criteria to a file's metadata. Using this tool, one can even apply numeric range queries to data file results.
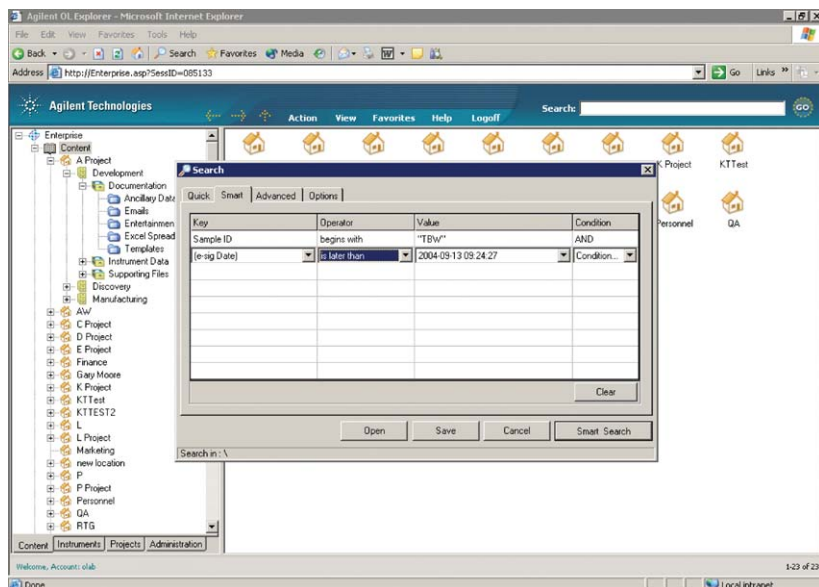

Figure 5: Example content search based on Smart searching. A search based on a Sample ID containing a certain string, and electronic signatures applied no later than a certain date is about to be run.
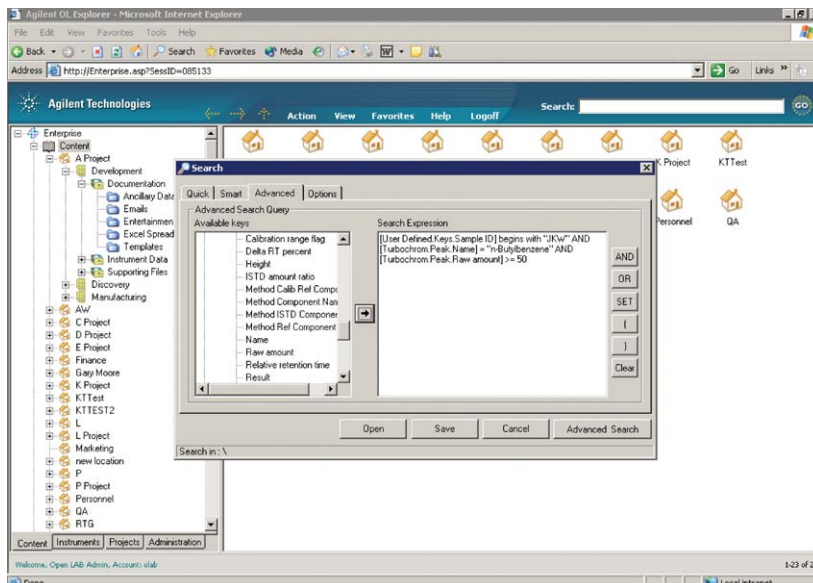
Figure 6: Typical content search based on Advanced searching. In this search, the query seeks Perkin-Elmer Turbochrom data files that have a certain Sample ID and whose components contain n-Butylbenzene exceeding a particular amount.

Advanced search queries are built using a convenient software interface. Advanced Searches can be applied within a user's project, over a range of folders or across the entire enterprise. Similar to the *Smart* Search, the *Advanced* Searches can also be stored and reused repeatedly if desired.

Depending on the search query, Agilent OL content searches can find matches across different data types in different locations and projects, restricted only by the user's access security permissions.

Searches are not limited by file type. Agilent's EZChrom *Elite* methods and data files, analytical information from other data systems, Word documents, Excel spreadsheets, graphic images and much more can all be accessed by the Agilent OL searching routines.

Content Management

Agilent OL's built-in protections for the data allow it to be used for the most sensitive and mission-critical applications. Data integrity is maintained at all times with byte-ordered dependent checksums and user name/password entry.

As a closed system, Agilent OL provides a full featured audit trail to record all changes, login security, electronic signatures, file encryption on transfer and other features that fully address 21 CFR Part 11 rules and other regulations. This audit trail is a computer-generated, time stamped unalterable audit trail that logs all activity and is itself, fully searchable.

User names and passwords can be authenticated against a Windows 2000 domain, providing a single system for user access.

Agilent OL provides controlled access to all data. Only authorized users can view and access the data, and the system provides immediate notification to system administrators upon any attempt at unauthorized system access.

A full set of electronic signature tools are built into the system, allowing multiple signatures to be easily applied to any electronic record.

Files are never overwritten in Agilent OL. Instead a complete revision history is maintained in the Content Manager.

Sophisticated archiving tools allow administrators to manage the storage of records between primary and secondary storage repositories, while still maintaining seamless user access to the information.

A comprehensive Document Retention subsystem is available to administrators, allowing precise control over file life cycles.

SUMMARY

The Agilent OL Operating System for the Laboratory provides a number of design features for content management:

- Automated entry of laboratory results.

- Networked access through web clients. Chromatography and Mass Spectrometry Data Viewers that make loading Native applications on the client unnecessary to view the data.

- Application of Agilent OL's content management to non-chromatographic instruments (as well as other electronic information from other software applications).

- Content management for laboratory information including a wide range of searching capabilities and sorting of information, on-line archiving and more.

Agilent OL Instrument Control Software

Vendor	Device	Device Type
Agilent	5890, 6890, 6850, MicroGC, 3000 GC	GCs (detectors, autosamplers, ovens, valves)
Agilent	1100 HPLC	LC (pumps, detectors, autosamplers, ovens, valves)
Agilent	1200 LC	LC (pumps, autosamplers, detectors)
ASI	MicroFAST GC	GC
GBC Scientific	LC	LC (pumps, detectors, autosamplers)
Perkin-Elmer	Series 941, 950, 960, 970, NIC 901/902	Intelligent Interfaces
Perkin-Elmer	Series 200 and Autosystem/Autosystem XL GC	LC (pumps, detectors, autosamplers) and GC systems
Shimadzu	GC 14, 15, 17, 17A, 2010	GC (detectors, autosamplers, ovens and more)
Shimadzu	LC-10Avp, LC-2010	LC (pumps, detectors, autosamplers, ovens and more)
Thermo Electron	SpectraSYSTEM, Surveyor	LC (pumps, detectors, autosamplers)
Valco	EMHCA-CE, EMTCA-CE, EMHA-CE	Valves
Waters	2690, 2695 Alliance	LC (pumps, detector, autosampler, ovens, valves)

Agilent OL Attribute Extraction Services

AES	Vendor	Versions Supported	Group
Beckman Coulter 32 Karat™	Beckman Coulter	Up to 7.0	Data System
ACCESS*CHROM™	PerkinElmer, Inc.	ALL	Data System
ACD/HPLC, MS, NMR, IR	Advanced Chemistry Development, Inc. (ACD/Labs)	ALL	Chrom, MS, NMR, UV/IR
Adobe® PDF	Adobe Systems Incorporated	4.05 - 6.0	Desktop App
Bitmap (.bmp) Files	n/a	n/a	Desktop App
Bruker BioSpin XWIN-NMR™	Bruker BioSpin GmbH	ALL	NMR
Agilent ChemStation®	Agilent Technologies, Inc.	ALL	Data System
Agilent ChemStore™	Agilent Technologies, Inc.	ALL	Chrom
Thermo Electron ChromQuest™	Thermo Electron Corporation	Up to 4.1	Data System
Shimadzu Class-VP™	Shimadzu	Up to 7.2	Data System
EZChrom *Elite*™	Scientific Software	2.0 and above	Data System
Varian® Galaxie™	Varian, Inc.	ALL	Data System
General Files	n/a	n/a	SSIZIP
GIF Files	n/a	n/a	Desktop App
JCAMP-DX IR, MS, NMR Files	n/a	n/a	UV/IR, MS, NMR
Waters® MassLynx™	Waters Corporation	3.5	MS
Metrohm TiNet	Metrohm	5	Titration System
Microsoft® Office	Microsoft Corporation	ALL	Desktop App
Waters Millennium®32	Waters Corporation	3.2, 4.0, 5.0	Data System
PCX Files	n/a	n/a	Desktop App
Varian Saturn® MS	Varian, Inc.	5.41 - 5.51	MS
Sciex™ Analyst® 1.1, 1.2	MDS, Inc.	1.1	MS

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