

XML Conversion Overview

Since its founding in 1986, Quality Associates, Inc. (QAI) has remained faithful to its guarantee to construct unparalleled electronic document conversion services based on a rich legacy of superior customization and exceptional quality. QAI is a leading US-based organization that currently operates one of the most advanced facilities of its kind, with extensive capabilities to capture data from text from virtually any computer medium and format, as well as from paper and microfilm, and reformat it to fit a client's emergent needs.

QAI provides a world-class mix of services and software to a broad range of industries such as, federal, state and local government agencies, publishing, aerospace and transportation, defense, manufacturing, telecommunications, technology, professional societies and services, and institutions. QAI's expertise is widely acknowledged.

Understanding our clients' requirements

We work with our clients to understand exactly what they need, assuring that we meet all requirements as we develop the appropriate plan ultimately moving into full production.

Quality you can rely on

We employ disciplined project management techniques assuring that all steps in our process are focused on delivering on time and to specification.

Risk minimization

Our approach is based on a tried and proven process that has been perfected over thousands of conversion projects and more than a billion pages converted. We apply a methodology with numerous checkpoints to ensure that the process stays on-track.

QAI represents the best value, highest quality and lowest risk towards meeting specific client requirements. QAI has a proven track record of excellence offering state of the art technology, a winning culture based on excellence of service, quality of product, and a commitment to success.

On-time delivery

QAI's Production Control System (PCS) tracks the status and location of every product (or record) and allows clients to monitor all online through secure access on the web. We do not miss deadlines!

Flexibility & multiple outputs

A process designed to be easily modifiable as requirements change and to deliver client files exactly the way they need them.

Scalability

We have processed more than a billion pages to date and are continually expanding our infrastructure to handle the rapidly increasing needs of electronic distribution. Every step of our process has been designed to be easily expandable to a much larger scale.

Proven Multi-Phased Proprietary Project Methodology

The keys to QAI's success in project performance are the efforts we make to thoroughly understand our clients' needs, tailoring our process to fit their precise requirements, and using the project management systems in place to make sure that we deliver as promised. From the up-front analysis designed to thoroughly understand every nuance through to QAI's automated Production Control System (PCS) tracking the status of every unit, everything is focused on accuracy and on-time delivery.

The benefits are numerous:

Consistency - Because our specification is meticulous and guides our programmers and our editors in the validation process, similar constructs in the data are always treated with consistency. Clients have approved these specifications prior to any data being validated and will not have to settle for any surprises.

Fast Turnaround - Once our production process is in place it functions smoothly and efficiently from start to finish. Every step is documented and analyzed in terms of its relationship to the entire process. This minimizes glitches that might result in rework or even mid-process re-engineering - measures that can be catastrophic in their effect on delivery schedules.

Flexibility - If there is a need to change a specification midstream, to modify the rate of production, or to add new materials to the validation mix, our production workflow is easily adaptable. QAI operates using tested process-engineering methodology, never on a "trial-and-error" basis.

"No Surprises" - Your data is extensively analyzed prior to being processed, ensuring that there are no surprises and a greatly reduced need to develop ad hoc "solutions" when in validation.

Extensive Experience Managing Complex Data Conversion

Maximizing our proven, proprietary methodology and decades of in-house experience, we convert every type of information—paper as well as all major word processing, typesetting, document formats—to virtually any target structured or unstructured format, including custom and highly specialized DTDs and schemas.

QAI's approach goes beyond traditional conversion and digitization. We work with our clients to reorganize and enhance content to the new, more exacting requirements of electronic publishing, data extraction and content distribution. We provide the project management, tools, and control systems

to ensure on-time, accurate delivery, with the flexibility to meet future requirements. QAI is experienced in dealing with complex documentation of all types generally characterized by elaborate tables, equations, cross-referencing, special characters, footnotes, and complex imaging requirements. Utilizing a vast library of specially developed conversion filters, QAI can adapt and modify its software to handle any data set. This automated approach yields an uncompromisingly consistent end product.

Quality Assurance Included throughout QAI's Entire Process

QAI's quality control process incorporates numerous specific quality check points throughout the production phase including use of our proprietary QAI QA software, XML validation, and editorial review. The quality process is further enhanced through QAI's Production Control and Delivery methodologies. Success relies on flawless execution, and QAI has invested in the tools that allow us to scale up to large production quantities while maintaining high accuracy levels and on-time performance.

Quality review steps are built into every task - Each task incorporates a series of tests that materials must pass before they can go on to the next task. This approach makes sure that problems are identified and corrected early so they do not impact the schedule.

Continual improvement - As the project continues, there will be constant refinements based on technology improvements and new knowledge. Our modular approach facilitates this refinement and provides for enhancements to be tested against benchmarks and then incorporated into the process.

Web-based production tracking system - QAI's Production Control System (PCS), discussed previously, is used to monitor the correct movement of the data through the conversion process and confirm that these are working efficiently enabling us to address issues or problem files, and rearrange as necessary.

Automated packaging software - The details are critical. QAI has developed automated packaging software to assure all files are properly prepared for shipment. This software organizes all materials per your requirements, assures that naming conventions are adhered to, and performs a series of checks to ensure that all needed components are included.

Delivery modes - A wide variety of delivery options are available. Many customers prefer to accept deliveries via our supported FTP facility.

Configurable Suite of Conversion Software Tools Ensure Highest Accuracy Levels

QAI's conversion software suite is designed to be configured to the precise needs of a conversion project to optimize automation, thus minimizing the need for manual correction. We Configure specific modules based on the required architecture rather than building new conversion filters, saving both time and money on each project.

QAI's proprietary technology suite includes:

- Adaptable conversion software to support recurring data streams and content reuse
- Content harmonization software to identify reusable text across large content collections
- Robust quality control software to highlight and resolve inconsistencies
- Conversion automation system enabling superior management of complex workflows and operations
- Production Tracking System (PCS) allowing clients 24/7 access to the status of their projects

US-Based Project Management and Production Teams

Sophisticated automation is an important element of any good conversion process...but a great conversion requires intelligent and agile individuals who are trained to think outside the box. At QAI, we are tasked daily with highly complex issues that would easily derail most organizations. It is the expertise of our US-based production teams that enables us to work through the challenges and present solutions that others are simply unable to do.

Project Management - Our Project Management team is highly experienced in all facets of data conversion, with each manager having at least 10 years of experience at QAI. Members of this team are well regarded as experts in their field, and are frequent speakers at conferences and trade shows. Each Project Manager has a proven track record of leading multi-functional project teams through the conversion lifecycle in order to deliver projects accurately, on time, and within budget.

Software Development - QAI's Software Engineers are highly skilled in the development and delivery of scalable, top-quality conversion products and software, configured to meet the unique business needs of our clients. Our engineers have decades of experience in achieving efficient, accurate high-volume conversions to/from virtually almost any format. Their expertise also includes robust Quality Control software to intelligently query conversion results to highlight and resolve inconsistencies.

Automation - QAI's Automation Engineers are highly skilled workflow and management reporting professionals. Our engineers manage QAI's Conversion Automation System, one of the most efficient automated Conversion Workflow management and reporting products in the marketplace today. This system enables QAI to transform business operations and provide comprehensive management of complex conversion workflows, delivering maximum productivity for our clients.

Editorial - The Editorial team at QAI serves as the quality control arm of the QAI conversion process. Each Electronic Editor is proficient in XML and the associated editing and viewing tools, and their role is to ensure that all files pass a stringent QA test before final delivery.

Production Center - The Production team at QAI handles all of our large-volume projects with multiple vendors or clients. Members of this team specialize in the scanning and manipulation of various graphic formats including TIFF, JPEG, GIF and PNG, with various color schemes and technical requirements.

Conversion Methodology – Project Configuration

QAI offers each client a conversion process configured to the specifics of its documents and requirements, and follows a structured process by which it reviews customer materials, configures software, and tests that results are optimal. The following describes the typical project configuration stages through which QAI finalizes the project requirements and prepares for ramp-up to volume conversion.

STEP 1 | *Project commencement.*

A strong manager, with both technical and functional conversion expertise, plays a critical role in the project's success. The QAI Project Manager manages the project schedule, costs, resources, and risks, and should also have the ability to make complex decisions regarding the many conversion-specific issues that arise during the span of the project. At project commencement, the QAI Project Manager is responsible for the assembly of the conversion team, consisting of a Data Analyst, a Lead Programmer, and a Lead Editor.

STEP 2 | *Document analysis.*

In this step, the Data Analyst performs a thorough analysis of data and project requirements. The goal of this step is to identify and understand all data elements with respect to the client DTDs and project requirements. This analysis provides the QAI team with an understanding of how different tagging nuances may affect how data can be handled. An important part of this analysis is to review a representative sampling of documents to ensure that all cases have been covered. The analyst works with the client and the client's content experts who need to verify that the collected materials are truly representative.

STEP 3 | *Conversion Specification.*

QAI will develop a Conversion Specification. The conversion specification is a set of guidelines designed to formalize the tagging rules and the conversion protocols. The Conversion Specification typically contains the following items:

- Elements or data types found in the document set
- Examples of where these elements can be found within the document
- Concrete rules as to how these elements are identified
- A sample of the data identification (or tagging) that will be used for each element
- Description of any open items awaiting resolution

Typically, the Conversion Specification development process produces a list of elements that have no apparent tags, and a list of elements that can be tagged in more than one way. The Conversion Specification is used as a discussion document during the analysis. Once all element issues are resolved, the final version of the Conversion Specification is submitted to the client for approval. This step is crucial to ensuring that all parties understand the tagging guidelines so that documents can be tagged consistently.

STEP 4 | *Hand-tagged sample.*

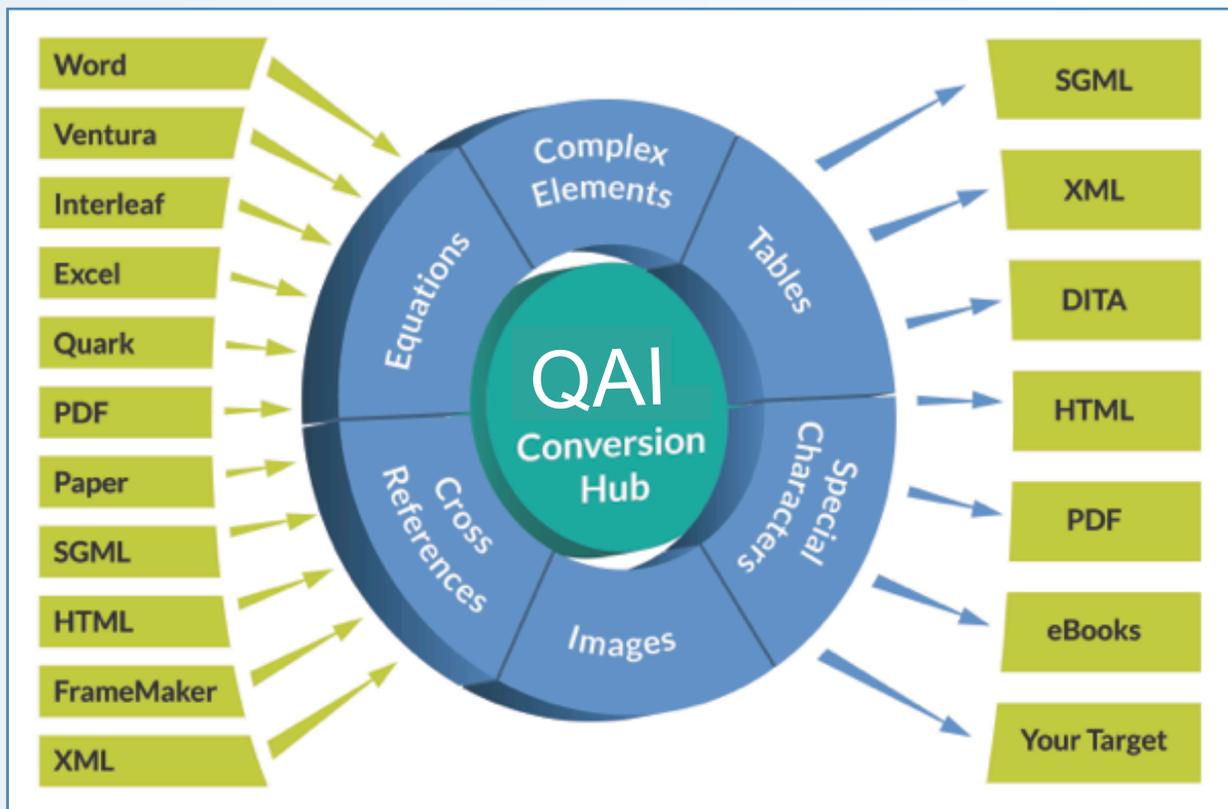
Based on the Conversion Specification guidelines, the Data Analyst produces a hand-tagged sample for the purpose of reviewing what data would look like, prior to performing significant software configuration. This is often the first significant test of how the tagged data would look in a live environment. This data can now be reviewed by the client and loaded onto various applications, and possibly go through several rapid iterations, to ensure that this initial version of the tagged content works as expected. This sample would then be approved by the client.

STEP 5 | Software Configuration.

QAI's software is designed to be configured to the precise needs of a conversion. Upon client approval of the hand-tagged sample, the project team's Lead Programmer, in collaboration with the Data Analyst, works on configuring QAI's conversion software to optimize conversion automation according to the project and client's specific needs, thus minimizing the need for manual correction.

Using QAI's Hub-and-Spoke model, individual modules are configured rather than new entire conversion filters built. This approach saves time and money on each project. With many years of experience, QAI has amassed a considerable library of these input and output conversion modules.

QAI Software Model



QAI's team of programmers configures appropriate modules from the QAI Conversion Software Suite for each project. In order to make this process as fast and flexible as possible, QAI has developed the Hub-and-Spoke software architecture in which all data is normalized in the QAI Conversion Hub, as shown above.

The boxes on the left are source formats. These represent only a small sample of the source formats for which we have already built conversion filters to convert into our hub format. The QAI Hub is an SGML-based superset format that standardizes all files and breaks them down into their key elements. The files are then filtered into their target format.

STEP 6 | Proof of Production sample.

After QAI has configured its conversion software to the project’s specifications, larger electronically tagged data samples are provided by QAI for the client’s review in order to reinforce our understanding of the conversion requirements. These production samples help to resolve any ambiguities in data presentation by serving as live examples of how the converted data will look. Once the final sample is approved by the Client it serves as a project Proof of Production.

STEP 7 | Acceptance Test Plan creation.

With the knowledge gained from developing the conversion specification and samples as outlined in the previous steps, QAI will create an Acceptance Test Plan detailing the test procedures that will be used to demonstrate compliance with the conversion specifications. During the analysis and final configuration of the software, items that were identified which require special attention during production will be incorporated into the Acceptance Test Plan and implemented during the Quality Assurance phase of the production process.

STEP 8 | Ramp-up to production.

The project then enters the production phase and an orderly ramp-up to the planned volume level begins. Once this phase is complete, the infrastructure will be in place to convert large volumes of data in a consistent manner within a very short timeframe. Throughout this process, QAI actively solicits and encourages ongoing client feedback, so that needed adjustments can be made quickly and efficiently.

Production Methodology – Conversion to XML

The following is an outline of the steps in the QAI production process.



STEP 1 | Document submission.

Documents are submitted, usually in batches, for processing.

STEP 2 | Document logging.

The document coordinator logs the batches received into QAI's proprietary Production Control System (PCS), and performs an initial analysis of submitted materials. The analysis identifies any exceptions or missing items, and provides early warning if new types of materials require process enhancements. PCS is available to track the progress of work through the conversion process, providing real-time detailed information on each document's status. This information is used to project delivery schedules, confirm that processes are working properly, and determine what reprioritizations may be necessary. PCS is web-enabled and provides real-time, secure information on project progress.

Below is a sample page from the web-based reporting function of PCS.

Production Report **University**

- Find by unit name

unit name includes

Sort by:
- Find all units for which a process was done between specified dates

UnitName	Page Count	ReDos	Fixed	Hold Action	Receive Doc	Zoning	Proofreading	Styling	Parse View	Parse View QA Int	Parse View QA	Ship
10298534	14				11/17/2011	11/18/2011	12/5/2011	12/9/2011	12/9/2011	12/12/2011	2/22/2013	2/25/2013
10300344	37				9/1/2011	9/1/2011	9/2/2011	9/7/2011	9/8/2011	9/12/2011	9/14/2011	9/14/2011
10300534	25				9/20/2011	9/26/2011	10/5/2011	10/7/2011	10/10/2011	10/13/2011	10/24/2011	10/24/2011
10300634	28				11/1/2011	11/4/2011	11/22/2011	11/30/2011	12/5/2011	12/6/2011	3/12/2013	3/12/2013
10300734	32				5/30/2012	6/1/2012	6/6/2012	6/7/2012	6/8/2012	6/11/2012	6/13/2012	6/13/2012
10300934	47				6/21/2012	6/22/2012	7/3/2012	7/5/2012	4/24/2013	4/26/2013	5/28/2013	5/28/2013
10301034	11				6/21/2012	6/22/2012	7/5/2012	3/11/2013	4/4/2013	4/5/2013	4/9/2013	4/9/2013
109834	208				9/1/2011	9/2/2011	9/9/2011	9/12/2011	9/16/2011	9/16/2011	9/20/2011	9/20/2011
Total # of Pages		402										
Total # of Manuals		8										

STEP 3 | Automated Conversion.

With preparatory work completed, the QAI conversion software converts the documents and inserts tags as appropriate. The automated process ensures accuracy and consistency across large volumes of material. QAI's automated conversion process, configured to the specifics of their client's conversion needs, provides a very high level of accuracy. During this step, images will be extracted from the FrameMaker files as JPG, PNG or TIF depending on requirements defined during Stage 1.

STEP 4 | Parsing.

In this step, the converted data is validated according to predetermined validation rules. The tagging that was automatically generated by QAI's software will be validated against the client's DTD. Data is also run through QAI's proprietary QAI QA software, a quality assurance tool that has been configured according to project specifications to test for a large number of conditions, as defined in the Acceptance Test Plan, and as further developed through a continual improvement process.

STEP 5 | Editorial Review.

Due to the complexity of human language and the fact that most documents were not initially created for the target formats currently envisioned, an automated conversion process cannot attain perfection. A key aspect of QAI's approach to data conversion is the effective, efficient combination of human and automated efforts. In this step, the human element, with the help of proprietary QAI tools specifically designed for this task, is integral to ensuring a quality conversion output. During this step, QAI Editors will run the acceptance test process outlined in the Acceptance Test Plan. The acceptance test will include viewing files in the FrameMaker application developed by ADG, and also generating the PDF to ensure quality.

STEP 6 | Final Quality Assurance (QA)

QAI's proprietary QAI QA software performs a series of final checks on document quality. The purpose of this step is to ensure that editorial reviews have not overlooked anything. This extensive review process is designed to minimize the client's review burden, allowing data to flow into production as smoothly as possible, and minimizing in-house cleanup costs.

STEP 7 | Delivery.

QAI's proprietary automated packaging software, prepares the file for shipment. The packing software organizes all materials according to client specifications and performs a series of checks to ensure that all necessary components are included for delivery of the final product in accordance with the client's requirements. The deliverable will include the XML as well as the print-ready PDF generated from FrameMaker.

STEP 8 | Feedback and resubmission.

If needed, PCS can provide a formal process to address client feedback, and to handle resubmission in the rare event that it is required. This process ensures that client specifications have been met and that any needed enhancements to the process are appropriately executed.