

PROCESS AUTOMATION IN PRINTING & PUBLISHING

It's not a Myth;
it is the motivation behind the CIP4 Organization's
JDF (Job Definition Format) initiative.

*Updated Edition
(inc. JDF 1.2 specification features) May 2004*

What it really means for you...

A guide for graphic arts production managers and IT professionals

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About the Author



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Prior to Media4theWorld he was Vice President of Spectrum Operations at Graphic Communications Association (now IDEAlliance), and prior to that he was a Business Development Manager at Volt Information Sciences where he organized and pioneered SGML services and applications, CD-ROM publishing and hypermedia applications, and object-oriented document management methods.

www.media4theworld.com



“The Myth of JDF ... Does it work? Will we see savings? Frankly, while the industry is asking these questions we have experienced tremendous savings based on JDF. You do not have to build the entire JDF environment in one full swoop. That is the value of JDF, as you build the hardware and software operations they have a means of communicating with a common language that enables the automation as a standard 'JDF'. As we architect our future at Brown Printing towards the complete CIM model, I can't overstate the value in JDF enough; it brings our community to one common front.”

Scott Borhauer, *Central Imaging Manager, Brown Printing Company*

The Key to Your Process Automation

Process automation is not a myth; it is the motivation behind the CIP4 Organization's JDF (Job Definition Format) initiative. Although many would argue that the primary benefit of JDF is the elimination of redundant data entry and the minimization of administrative time and labor, others would argue that JDF's real value is plant automation and increased workflow flexibility.

More than 220 leading industry vendors are investing many millions of dollars in building *open, non-proprietary, and productive* process automation into their software, systems, and equipment. Currently there are about 150 JDF-enabled products and services, and that number is expected to rise to 300–400 by the Fall of 2005. There are already JDF-enabled products for just about every step and function in the production workflow and you don't need to wait for an end-to-end, enterprise-wide JDF-enabled solution; you can start implementing process automation and capture productivity improvements *today*. Dozens of companies already have implemented JDF-enabled solutions and have realized impressive returns on their investments – you just need to know where to begin ...

The Crunch

CTP, digital file exchange, in-line measurement, and advances in proofing technologies have produced improved productivity in print media publishing and production in the last few years. Yet production managers and print and publishing IT managers are being pushed to find still more ways to cut costs, increase labor efficiency, improve productivity, and provide processes that are increasingly agile and enable shorter turn-around times. For many companies, a key objective is to increase production capacity while lowering costs and without major changes in their capital footprint.

In today's market new purchases of software, equipment, and production systems must provide both a good return on investment (ROI) as well as strategic advantages. Many production managers and IT professionals are looking to process automation for answers, and those answers are now coming to light.

Process automation isn't new to the graphic arts, but prior to JDF it was too expensive and proprietary for most companies to implement. The key to creating and implementing a process automation strategy is to base your strategy on open standards so that what you invest today will continue to provide a return for many years. This is the foundation that JDF provides. Your first step is to learn more about process automation and the changes that JDF is bringing to the production environment.

Get Smart

The first step is for production managers and IT professionals to learn what JDF is, and what JDF is not. JDF is an agreement between printing, prepress, advertising agency/print buyers, and publishing organizations on how job information is organized and exchanged. That agreement is based on the language and organization of information detailed in the JDF specification.

For production managers and IT professionals alike, the JDF specification today provides a “cookbook” of data elements covering 90 production processes (i.e., “approval,” “imposition,” “RIP’ing,” “Trimming,” etc.) and 185 logical and physical “resources” (including customer instructions, logical elements such as “Address” or coil binding parameters, and physical resources such as “Device,” “ColorControlStrip,” “Ink” and so on.) The developers of JDF have done a great job of defining each process and resource technically, and these definitions can be used by you to:

- ▶ Model your workflow and processes
- ▶ Standardize data definitions used across your systems to minimize the need to customize your applications or maintain complex and custom data translation routines between systems
- ▶ Provide a common foundation and language for workflow systems, asset management systems, and production systems integration
- ▶ And with JDF 1.2, automate the incorporation of new JDF-enabled devices into your JDF environment

Eliminate *Data Waste*

Process automation should minimize work, not add to it! One of the most important aspects of JDF for production managers is that it can be used to reduce wasted effort by eliminating the need to re-key or enter data. From customer specifications and creative development to all aspects of your production operations, job data is only added once and is conserved throughout the entire life cycle of each job, cradle to grave. Some of the sources of data that feed into JDF may include:

- ▶ Customer files and metadata
- ▶ JDF-enabled preflight software that captures data from files and may also prompt print buyers for additional information
- ▶ Details of your customers through your company's website or via an e-commerce partner
- ▶ Defaults and presets on your own equipment (For example, you may have a wire stitcher that is capable of five or six types of staple folds, but one is used as the default in 99.99% of your jobs)
- ▶ Job "profiles" and defaults set in your workflow and management systems, including estimating, scheduling, workflow, and inventory control modules
- ▶ Direct entry – The choice of last resort

However, for all of these options (even direct entry) the end user should never have to look at the XML code behind JDF.

For Production Managers

The JDF specification provides a blueprint for process automation programs that will help lead you to select products for your automation program and design how they should be implemented. JDF allows you to add and replace equipment as you modernize your operations without the need for the complex integration of proprietary data and equipment interfaces.

It may also help you create more flexible workflows that allow you to adapt to changing specifications and new jobs quicker and more effectively than ever before. Furthermore, JDF-enabled environments will allow you to automatically identify and correct bottlenecks in your workflow, and give you a common language to build bridges between front-office systems, production, and logistics so that you may improve scheduling and throughput. JDF supports three areas of process automation:

- ▶ “Job tickets” that describe a print job throughout its lifecycle
- ▶ A means for workflow and management systems to organize command, control and configuration of plant automation and job production
- ▶ A common controller language for all production systems that allows workflow and management systems to “command” software, systems, and equipment automatically

For IT Professionals

JDF provides:

- ▶ A single syntax (XML) that will eliminate the need to learn, implement, and maintain proprietary data formats
- ▶ A common data format that eliminates complex many-to-many component integration in favor of many-to-one, one-to-many component integration
- ▶ A syntax (XML) that is directly supported in common programming languages such as JAVA, C++, and .NET, and is supported by many database and data processing applications
- ▶ A messaging environment that will run over open IP networks and uses open messaging protocols
- ▶ The ability to use an XML schema and JDF-aware validators to test designs and to troubleshoot workflow problems quickly and effectively
- ▶ “Interoperability Conformance Specifications” that establish the minimum JDF support requirements for different types and classes of devices to use in equipment testing and selection
- ▶ A common set of data elements, attributes, and values that can be used to bring order to your development environment and speed the design and implementation process

For Printers (*digital and conventional*), Prepress Services, and Bindery & Fulfillment Operations

JDF means:

- ▶ The elimination of re-keying
- ▶ Improved flow of business information from sales through to production
- ▶ The ability to get a better picture of work in progress, inventory requirements, and scheduling
- ▶ Improved job throughput
- ▶ Increase labor efficiency
- ▶ The ability to better integrate front-office systems with production and workflow



“Within the Wyndeham Press Group and our supplier and customers’ businesses there are many islands of relevant information. JDF and JMF will give us the common language to enable accurate and efficient communication. This in turn will provide improved efficiency and greater automation. The adoption of this is a vital ingredient for a ‘printer of the future’ and its trading partners.”

Jon Hearnden, *Divisional Group Sales Director, Wyndeham Press Group plc*

For Publishers, Advertising Agencies and other Print Buyers

This means that JDF can help them:

- ▶ Automate their processes
- ▶ Eliminate paper-based buying and job instructions
- ▶ Eliminate errors that result for re-keying or other communications problems
- ▶ Achieve faster more precise scheduling and faster turn-around times
- ▶ Enable the printer to use provided imposition and book makeup instructions that can be imported directly into their systems, saving time and re-keying errors
- ▶ Provide a degree of direct control over the production process



“The potential for JDF is clear. Consider the change PDF (Portable Document Format) has made to magazine manufacture in almost no time at all. The opportunity for JDF to make at least as fundamental a change is one we all need to grasp. JDF will give the

whole magazine supply chain the automated, measured and predictable world which most modern industries can rightly claim to already have.”

Eric Lambert, *Production & Facilities Director, Reed Business Information*

“At Mediengruppe Universal our JDF implementation has made planning much easier now as we have feedback information from production to disposition, and sales too. So we gained more production time and are able to react earlier on changes. If you're contemplating a JDF-enabled workflow of your own -- Just do it!”

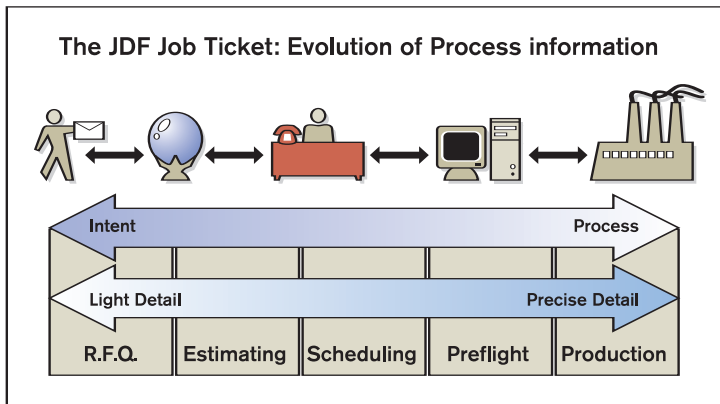
Albert Contzen, *Managing Director, Mediengruppe Universal*

“I’ve worked in both broadcast media and print media. Media buyers have made it clear to me that they believe creative development in broadcast is difficult but production and distribution is easy and quick, while creative development in print media is a less difficult but print media production and distribution is too complex and time consuming. It is imperative that the print industry make production and distribution clearer and more immediate to effectively compete against other media.”

Therese Mulvey, *Vice President/Strategic Marketing at Vertis, Inc*

The JDF “Job Ticket”

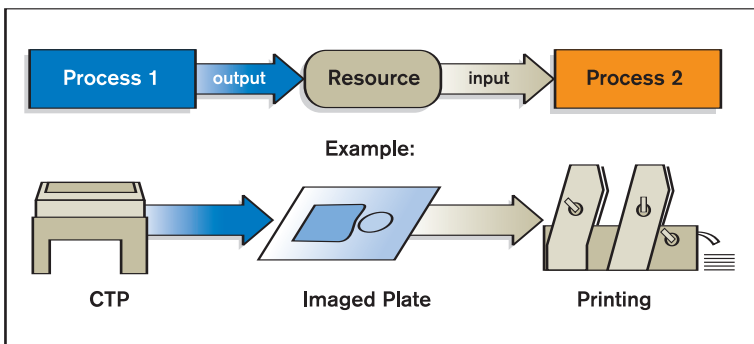
In JDF, a “job ticket” is a collection of job information that stays with a job throughout its lifecycle – and its more than you would expect of a job ticket in that it also facilitates the collection of processing data, quality control, and management reporting data. Even though this information may at times reside in the databases underlying your various workflow and management systems, the JDF specification provides a model for organizing that information and for exchanging it between different systems. As you would expect, a JDF job ticket may originate with your customer’s production files or purchasing documents in electronic format. As illustrated below, the information may be added to a JDF job ticket as it moves from the customer’s buying process, through estimating and scheduling. By the time the job goes into production, the job ticket will contain enough information to drive JDF-enabled devices automatically.



JDF Workflow Using Building Blocks

In JDF each job is described using well-defined processes and resources. Every process, (such as conventional printing, cutting, scanning, and so on), has a set of inputs and output that are called resources, because the output of one process is the input to the next process. These resources include both physical materials, (such as ink or plates), and data about the job including processing instructions and job parameters.

JDF-enabled systems use these well-defined processes and resources like a set of building blocks. They are able to communicate with one another, in part, because processes and resources are so well defined. JDF does not just provide a common language, but also provides a defined way of describing what is required from input and output systems from different manufacturers. Furthermore, with JDF 1.2 your JDF-enabled workflow systems can look through your plant and pick the optimal workflow for a new job.



Before any device can begin work, it needs to have the appropriate instructions and materials (digital or physical). Your JDF-enabled workflow and management systems can determine when everything needed by a process is ready to go and automatically set that process in motion ... full process automation! Furthermore, jobs can be automatically routed to available devices and workflows can be configured automatically based upon information in the JDF job ticket when new jobs come in.

Process Automation is not JDF Alone

JDF is just a foundation for process automation, but process automation is more than JDF:

- ▶ You can't "buy JDF": rather you buy JDF-enabled systems
- ▶ JDF does not standardize a workflow; just the opposite, JDF is extremely flexible, even allowing you to build concurrent workflows, to pipeline several processes into one stream, and much more. The JDF-enabled software and systems will vary in the features and performance they offer
- ▶ Process automation may include much more than JDF. From inline color measurement, robotic materials-handling systems, to embedded preventative diagnostic systems, your process automation implementation extends beyond job data and must be designed to best fit your needs

JMF – The New Language of Print

JDF includes an open device command language called the “Job Messaging Format” or “JMF.” JMF may be used by workflow and management systems, or even by other devices, to query a device or provide processing instructions to devices. New JDF-enabled systems, software, and equipment (from proofing systems to bindery and labeling equipment ... and everything in between), will support JMF. Legacy systems may be updated by adding a new JMF controller module.

There are four options of JMF support. Production managers and IT managers should know which JMF support options fit into their automation plans to improve their ability to make buying decisions today that will support the long-term ROI.

JMF Support Levels

Notification – Devices that support notification provide unidirectional messages that inform the controller when they begin and complete execution of some process within a job, and may also provide notice of some error conditions

Query support – Devices that support queries respond to requests from other devices by communicating status information such as current job progress

Command and support – Devices that have the ability to process commands

Submission support – Devices with controllers that accept JDF jobs via HTTP and support MIME multipart documents

Establish Your Own Process Automation Goals and Objectives

The goals and objectives of your process automation program must be grounded in your ROI expectations. You'll want to implement process automation where it will provide the most immediate benefits. Don't create failed expectations by starting with a company-wide program. Pick a test implementation that is focused on a specific production line or customer group, and get some production experience with JDF. The lessons you will learn will allow you to then create broader JDF implementation programs and objectives that are more realistic and grounded.

Use this check list as a guide to establishing your goals and objectives, and plan on updating your goals and objectives periodically.

- ▶ What is the market value of greater flexibility and time to press for your business?
- ▶ What is the current cost of plant integration, equipment interface training, and what will you save if your plant engineers had one device language to learn?
- ▶ How will JDF play into your supply chain management and maintenance programs?
- ▶ Are your clients looking for more direct input into production or are they demanding faster turn around times? What value do they put on these needs?
- ▶ Will better management control over production workflows provide a competitive edge?

- ▶ How complex are your operations? The greater the number of systems in your production environment, the greater the value of implementing JDF
- ▶ What is your natural equipment replacement turnover: five, ten, twenty years? Will you need to accelerate investment in new equipment in order to achieve your objective return on investment in JDF-enabled equipment?
- ▶ What will it cost to capture your unique workflow requirements and tailor a JDF environment to meet your needs? Do you need help from consultants or do you have internal IT expertise? Are your systems, databases, and workflows well documented or do you have to do some reverse engineering to go about implementing JDF smartly?
- ▶ What are your technology providers' plans for providing JDF features with their equipment? Are they offering or planning to offer upgrades and a migration path or bridging software that will allow legacy systems to participate in a JDF workflow?
- ▶ What customized or legacy systems do you have that are too costly to reengineer and replace and how will they fit into your process automation program? Some JDF-enabled product vendors provide departmental controllers that accept JDF/JMF and either provides it directly to JDF-enabled devices or in proprietary format for legacy systems
- ▶ What is your competition doing and what will it take to stay one step ahead of them?
- ▶ What is your time line for recouping your investment?

Buy Smart

In general, you'll want to make sure that your JDF-enabled software, systems, and equipment meets some basic criteria.

- ▶ JDF allows for users and vendors to create “JDF extensions,” which are XML elements and attributes that are not defined in the JDF specification, but are declared and defined according to the rules established in the JDF specification. Extensions allow users to add and manage data elements to their process automation programs that are unique to the markets they serve or their own production processes. Likewise, vendors may have unique features that also merit use of JDF extensions

Be sure that the JDF-enabled systems you select can handle exceptions, but keep the use of JDF extensions to a minimum. JDF extensions should not be proprietary hooks that could be otherwise managed with standard JDF, and users and vendors are encouraged to submit their extensions to CIP4 for consideration as part of the JDF specification. Buyers should verify that their vendors are submitting extensions to CIP4 and are participating in the development of the JDF specification

- ▶ Each major component in your process automation environment should be able to validate JDF data against your schema, which is a composite schema consisting of the JDF schema and any extensions that you employ

- ▶ Validation means that JDF data is checked for its conformance to the JDF schema, but it doesn't mean that the job instructions make sense! JDF validation may not tell you that saddle stitching a 600-page book is not a good idea (although your system may report that it cannot find an available saddle stitcher with that capacity). Be sure that the JDF-enabled software and systems that you select will also support your business rules
- ▶ Avoid one-way traps ... systems and software that read JDF data, but will not write JDF data as needed
- ▶ If vendors provide extensions, they should also be able to provide you with documentation
- ▶ Any software or systems that can't make use of JDF extensions should "pass them through" and not strip the JDF data
- ▶ Be prepared to test. Create a JDF schema derivative that fits your needs, to include any user extensions that you will need, and create a couple of hand-coded JDF document instances. Use these benchmarks to test candidate products and systems. Consider introducing a couple of deliberate and documented errors to see how candidate products and systems handle them

Take Action

1. Begin by making someone responsible. Designate a team that includes a balance of production and IT or technical staff and give them the time and responsibility to “get smart” on JDF, Schema, and XML data processing. Consider involving your customers and suppliers in the development of your process automation plan.
2. Pick a path. Determining where to start is half of the battle. Is there a plant or production line or process that is due for replacement? Is there a particular customer or market segment that you serve that would be particularly interested in the benefits of your process automation program?
3. Document your current environment. You may have at least a few customized systems in place. Document your environment formally, to include creating data models of your systems and information flows and collecting data dictionaries of the information elements you presently use. Having this information will help you to determine what JDF can and cannot do for you “off the shelf,” and will help you determine if you will need to create JDF extensions.
4. Remember that JDF will not eliminate human error! As you design and implement your process automation plan, be sure to keep track of your old quality assurance measures and know how they will be either automated or improved as you go forward. But make sure they are not accidentally dropped!

Glossary

CIP4 – The International Cooperation for the Integration of Processes in Prepress, Press and Postpress (CIP4) Organization; a not-for-profit association responsible for JDF.

Device Capabilities – A new (JDF 1.2) feature that allows a JDF system to inquire about a new device's capabilities in order to automate integration of new devices and provide the information necessary for the workflow or MIS system to construct a graphic user interface for set-up and command of the integrated device.

Document Instance – An XML document or data file that conforms to a particular schema. Document instances need not exist as documents per se – they may exist as streams of bytes sent between applications, as fields in a database record, or as collections of XML “Information Items.”

JDF – Job Definition Format, an XML schema-based specification for process automation in the printing and publishing industries.

JDF-Aware Validators – XML validators (see below) that also check and validate the application JDF's of industry specific rules described in the specification that cannot be validated by generic validators.

JDF-enabled MIS Systems – Workflow, production management, and printing MIS systems that provide the command and control in JDF-enabled implementations, including process automation of job production and messaging to shop floor devices.

JDF Extensions – JDF extensions are XML elements and attributes that are unique to a vendor's products or to a user's implementation that are also declared and defined as specified in the JDF specification.

JMF – Job Messaging Format.

JMF-Enabled Software and Systems – Devices (plant equipment, NOT MIS systems) that use JMF.

XML – The Extensible Markup Language (XML) is a subset of the Standard Generalized Markup Language (SGML) whose goal is to enable user-defined generic markup to be served, received, and processed over the Worldwide Web.

XML Schema – XML Schemas express shared vocabularies and allows machines to carry out rules made by people. They provide a means for defining the structure, content and semantics of XML documents.

XML Validator – XML Validators are software utilities that check conformance of XML document instances to the XML standard. In the case of JDF implementations, validators should also be able to check conformance of document instances against the rules established in the schema.

About CIP4:

CIP4 Organization, a not-for-profit organization, brings together vendors, end-users, and all other sectors of the graphic arts and print communications industries in focused working groups to define future versions of JDF and to study user requirements for process automation.

www.cip4.org

Adobe Systems

"JDF will revolutionize publishing production, radically simplifying information exchange between the applications and systems – and Adobe will be among the first to show JDF deployed in end-to-end print workflows. As a founder of CIP4 and one of the creators of the JDF specification, Adobe plans to integrate the CIP4 standard across its publishing and design platform to drive JDF adoption."

Don Walker, General Manager, Publishing Technologies and Services

www.adobe.com

AGFA

"Agfa is one of the co-founders of CIP4 and currently chairs the Prepress and Origination Working Group in CIP4. This clearly illustrates Agfa's substantial investment in open standards for connectivity in prepress workflow and customer focused project management. Within the Graphic Enterprise, we strongly believe JDF and JMF are key enablers of optimized, integrated and automated workflows."

Jan De Clippeleer, General Manager Software Solutions

www.agfa.com

EFI

"EFI is committed to bringing the benefits of Computer Integrated Manufacturing (CIM) to its customers by providing JDF-enabled systems. We are leading industry software integration efforts by actively participating in CIP4's development of JDF. Our long-standing commitment to industry standards enables our customers to implement the solutions they require today while gaining the flexibility they'll need for the future."

Margaret Motamed, Director of Product Planning and Design EFI, and Marketing Officer of CIP4

www.efi.com

Markzware

"Markzware chairs the CIP4 Preflight Subgroup and believes that JDF is a tool for both now and the future. Communicating key tasks and responsibilities through JDF is essential for a smooth, integrated workflow, as is preflighting, (a process that helps ascertain the quality of all digital files), ensuring correct output. I believe successful JDF workflows will include preflighting."

Patrick Marchese, CEO / Co-Founder

www.markzware.com

OneVision Software AG

"As a provider of open and modular workflow solutions for preflight, editing, and imposition, OneVision has a vital interest in standardized communication with other workflow and management systems. Aware of growing customer demand for seamless integrated workflows, OneVision is committed to deploying JDF-enabled solutions and making an important contribution to networked print and media production."

Frank Ladwein, Head of Product Marketing

www.onevision.de

Optichrome Computer Systems Limited

"OCSL has been pioneering the implementation of JDF within the MIS environment and will be demonstrating the technology during Drupa 2004 on three different stands, as well as having equipment throughout Printcity. OCSL recognised early on the significance of JDF and the relevance of MIS in allowing it to be utilised in the industry."

Henny van Esch, International Director OCSL and Chairman of the MIS CIP4 working group

www.optimus2020.com

Screen Europe

"Screen's new range of modular tools within its Trueflownet JDF-compliant environment are designed to maximise printer's CRM services. These tools, compatible with Screen's Trueflow workflow and any open workflow, provide printers and their customers with easy to use online print ordering, PDF creation, file transfer and approval services to maximise efficiency, productivity and profitability."

Phil Eaves, Marketing Manager

www.screen europe.com

Tharstern Ltd

"Tharstern have always been an innovator and embraced new technology. JDF in our opinion represents probably one of the most ambitious collective goals, for printing industry vendors and already opportunities as well as benefits are continuing to present themselves that would never have existed without the adoption of this open standard."

Keith McMurtrie, Managing Director

www.tharstern.com

TripleArc Limited

"TripleArc has developed online solutions for over five years and has established a substantial JDF expertise. JDF is a cornerstone of our development strategy and as such can be found throughout our service offerings. This enables us to automatically link to compliant third party systems, such as HP's Production Flow. TripleArc is effectively leveraging JDF to make software communicate."

Daniel Emerson, Managing Director

www.triplearc.com

Vio Worldwide

"Vio is committed to open standards, and has been delivering JDF solutions since 2002. Vio uses JDF to automate end-to-end workflows, especially the more efficient delivery of advertising, which is both preflighted before being sent, and then automatically delivered, according to publishers' pre-set preferences. Vio chairs the Asset Transfer committee of CIP4, and is a member of the Preflighting Subgroup."

Richard Horwood, Chairman

www.vio.com