Introduction to JDF/XJDF:

The what, why, and how the CIP4 organization developed JDF/XJDF, and the role it plays in print automation and profit optimization

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CIP4 ORGANIZATION

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There are often questions as to what the JDF/XJDF specifications actually do, and this document is intended to distill, in very broad terminology; the roles, players, and functions of a JDF (or XJDF)-enabled workflow. A subsequent document will provide more technical terminology that is better suited to an implementation specialist.

What is a "JDF" anyway?

If we think of a PDF file (or original artwork) as data to be printed, JDF is metadata (defined as data about data), providing manufacturing instructions for the reproduction process in order to improve manufacturing efficiency, and therefore profitability.

A JDF is technically a text file that can include two types of metadata. The first, "JDF intent" provides a detailed description of the finished product or job, from the source of the content file, finished size, pagination and media to be printed, through delivery instructions. While quite precise, Intent is deliberately **not** device nor manufacturing path specific, and is similar to the information that might be provided in a detailed request-for-quote. The second metadata type, "JDF Production" provides a standard means to share the precise technical instructions to manufacture the job in a specific print production environment, with its own unique equipment configuration.

Defining these metadata types precisely and consistently provides interoperability and enables automation that is widely supported across the printing industry. This is the core reason CIP4 was formed.

Rather than the historic necessity of building custom one-off interfaces between various vendor's products, the CIP4 organization has worked to provide a standard means to communicate job status, consumables/spoilage information, and relevant job details to and from "worker" roles and "manager" roles in custom print production facilities.

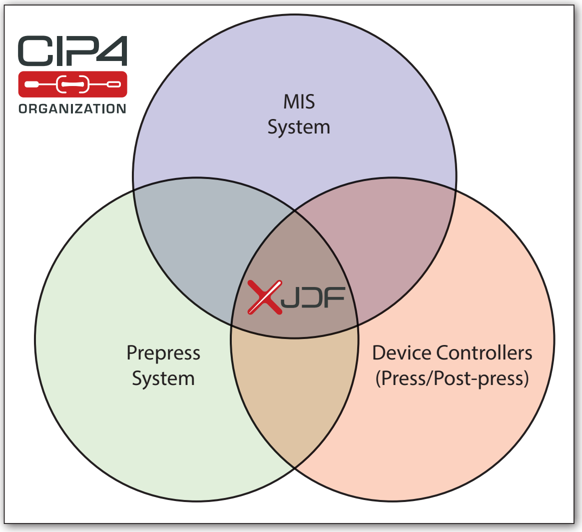
So, as we will see ahead, a JDF at its core is really just a series of standardized job parameters. This is typically defined in a standard text file of computer code, that devices and MIS

(Management Information Systems) can understand. You do not have to understand or read what XML JDF code is in order to implement it, that is the job of your MIS and your devices. A great number of the technical details are hidden from employees by the MIS, this gives the advantage of not having to know about them specifically. Once implemented properly, “They just work together.”

Why was JDF developed?

The Job Definition Format (JDF) was developed by CIP4 to provide enhanced interoperability between disparate systems in MIS-driven workflows. This is an efficient way to build a custom workflow.

In the history of digital print production and automation, most initial implementations were developed as vendor-specific solutions that were, in-effect, “walled-garden” ecosystems. When one purchased a print production solution it was often provided by one vendor from start to finish.



This originated from vendor systems that incorporated proprietary scanning, prepress, proofing, to platemaking or film, to eventual digital print. When these were being sold, many solutions were delivered as complete end-to-end proprietary vendor-specific “Systems.”

The Walled Garden approach was appealing to people who were early-adopters when investing in digital production systems, and unsure of the future of the industry adopting MIS-based automated workflows. This vendor-specific methodology was a marginally short-lived epoch in print production. The industry demanded and even required a vendor-agnostic approach to building flexible workflows.

As the world of print-production became increasingly diverse, implementing services and solutions as-needed, and from multiple vendors, became a requirement for modern workflow architectures.

A typical JDF implementation has an interaction between an MIS system, and the various production and fulfillment stages of an automated workflow. This is the model that this document will focus on. This is not to say that all JDF implementations incorporate this type of model, but as it is most typical, we will set the scope of this document towards that. The option is to utilize either full JDF integration and automation, or merely simple JDF messaging, or communicating simple job details to and from devices etc. is always possible.

What makes up the JDF toolset?

Some of the core functionality of JDF utilizes a "messaging" protocol that communicates job-status information and other relevant details between the MIS and the various production devices and systems. For example, an MIS system can "query" a system to obtain real-time job, or device status information. The system can then use this information dynamically in order to schedule and manage time on shop-floor worker devices and resources as required.

Why is this important?

In our everyday non-standardized world, nearly every system speaks a different language. This means that automated workflows that incorporate devices and systems from multiple vendors, had to build custom interfaces between each one. This is a laborious, and highly-technical task that, without standardization, requires extensive coding and programming resources. Most facilities do not have these resources in-house, and typically have required technical integration professionals to build custom interfaces. JDF was developed to prevent this hurdle to integration, and simplify the requirements to automate and streamline production.

JDF has evolved.

The CIP4 organization has worked to refine JDF over the past 24 years, implementing updated incremental changes and modern software coding techniques, while still maintaining legacy backward-compatibility. When many of the original specification parameters were developed, the status of coding techniques, operating systems, workflow priorities, and overall production planning were far different than we use today with modern tools and systems. As a result, CIP4 began work on the latest major optimization of JDF (XJDF) to meet those needs, and published the first XJDF specification in February 2018. XJDF is the evolved result of extensive vendor-cooperation, and changes based upon the updated needs and capabilities of a modern print production system. Compared to legacy JDF, XJDF simplifies application development and validation by using more modern, familiar coding techniques.

How does this impact me?

It is often the case that an enterprise will have a variety of devices and systems that are already JDF-capable, but not configured with a JDF MIS. Alternatively, a good production planning team may have designed a particular workflow based upon a system that is now obsolete, or no longer supported, and requires replacement. JDF is developed with the mindset that print providers will incorporate an increasingly diverse portfolio of hardware and software tools into their productions systems as needed, and expect to ensure legacy compatibility, and future interoperability.

In Conclusion:

It is important also to keep in mind that this document is intended to be a very high-level description of what makes up a JDF/XJDF workflow, and how it is typically utilized. This is not to say this is the only way JDF automation can be configured. The elegance of JDF is that it is almost infinitely configurable to meet the needs of virtually any workflow, either legacy or as a new plan.

JDF also need not be a full commitment to automation. The benefits of implementing JDF can be utilized either in specific portions of a workflow, or in a complete estimating-to-shipping automation scheme. This flexibility is the ultimate benefit from utilizing JDF. Integration into an existing workflow can be implemented in as few or as many of the production roles in a specific location or facility, without disrupting currently existing solutions.

We give you tools

The CIP4 organization provides numerous freely available resources to educate about JDF/XJDF, and to implement a JDF workflow with software tools.

We have an extensive library of developer-related ICS documents (Interoperability Conformance Specifications), that are our main deliverables at CIP4. These are all freely available at CIP4.org.

The tools that CIP4.org provides allow an integrator or developer to use commonly-used coding technologies to build or integrate JDF workflows. CIP4 has maintained a consistent upgrade path and has adapted to support modern coding technologies such as JSON, while still maintaining backward-compatibility with existing XML JDF that may go back 20+ years.

We encourage you to utilize the plentiful resources available at CIP4.org. It is here where we provide; examples, tools, and case-studies about JDF, XJDF and tools for developers as well as workflow engineers. JDF implementations are not just for software developers, but also for in-house architects that have a need to automate and integrate a diverse enterprise of equipment and software.

JDF/XJDF in Workflow

JDF is all about the interaction between the multitude of systems that make up a modern print production workflow. In the example on the facing page, the job will flow throughout the milestone events in getting a job delivered and fulfilled to the customer. (Equally important, JDF/XJDF MIS systems can track job status, consumables, and waste for subsequent billing of the customer.)

1 Here, notice that the workflow is fairly typical for an automated print production facility. This begins with either customer, web-to-print, or CSR order-entry. A job is typically “estimated”, with the quote supplied to the customer, before the job begins.

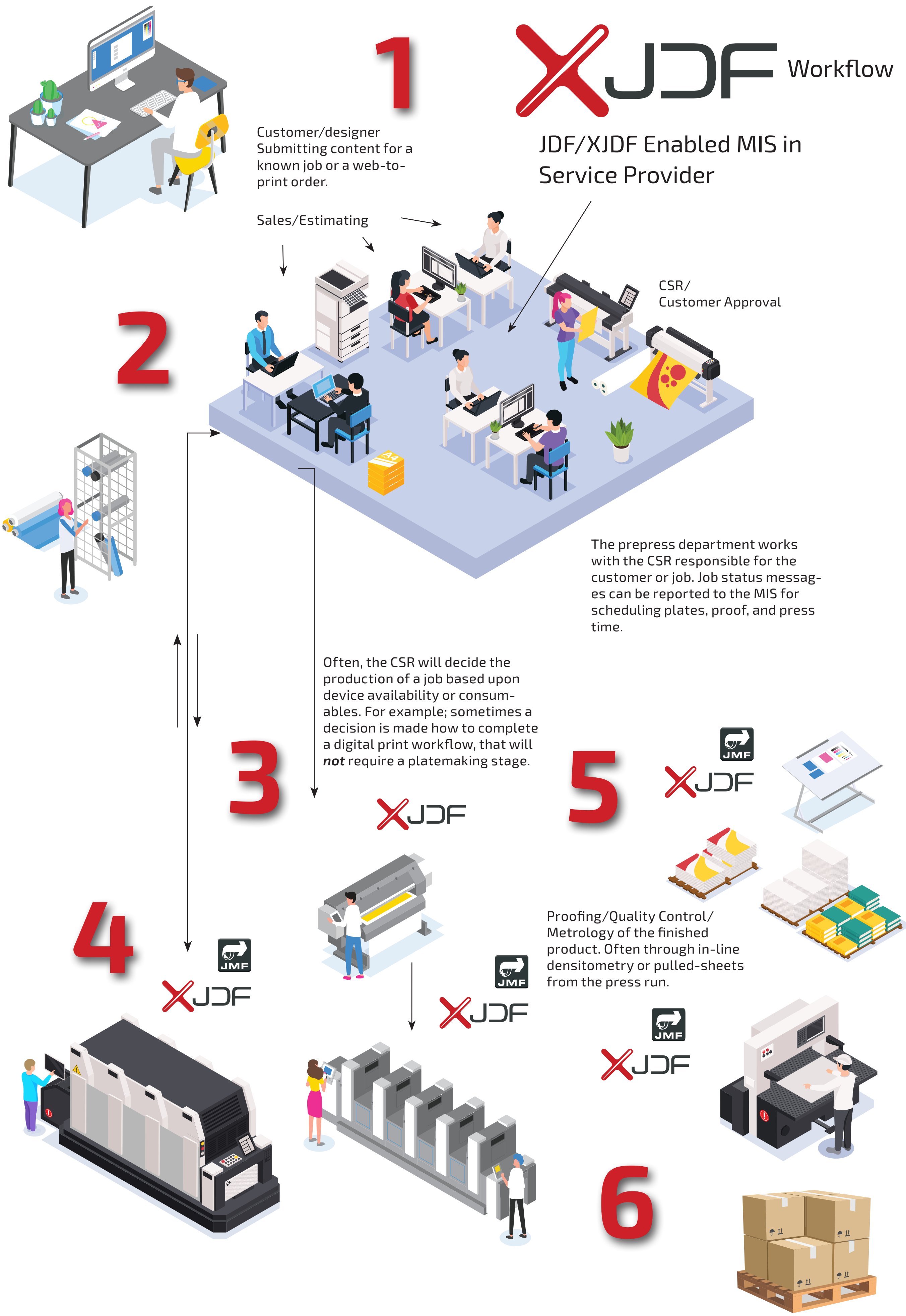
2 Once the job is agreed upon, this is usually followed by MIS-driven job scheduling/prepress/press-time, and procurement of stock, materials, inventory, in conjunction with the CSR managing the content proof approval process with the customer.

3 Once the estimating, job approval, and preflight have taken place, the job can enter production in a sequential manner, in order to flow a job through the most efficient path available. A decision can be made to use digital versus offset presses at this stage, depending upon run-lengths, or device availability.

4 Finally, the ultimate workflow has been determined. JDF is once again used to convey job-status information in a near real-time environment using JMF messaging and DFE (Digital Front End) communication of JDF job details from a specific device to the MIS.

5 Once the job has been completed, JDF is once again used to report job metrics such as spoilage, lot numbers, make-ready waste, overruns, and other job-specific details. Final cutting and finishing roles take place to complete fulfillment.

6 The MIS can then process shipping and delivery, or fulfillment protocols in order to complete the job and process it onwards to the customer.


1
XJDF Workflow
Customer/designer Submitting content for a known job or a web-to-print order.
JDF/XJDF Enabled MIS in Service Provider
Sales/Estimating
CSR/ Customer Approval
2
The prepress department works with the CSR responsible for the customer or job. Job status messages can be reported to the MIS for scheduling plates, proof, and press time.
Often, the CSR will decide the production of a job based upon device availability or consumables. For example; sometimes a decision is made how to complete a digital print workflow, that will ***not*** require a platemaking stage.
3
XJDF
5
JMF
XJDF
4
JMF
XJDF
JMF
XJDF
Proofing/Quality Control/ Metrology of the finished product. Often through in-line densitometry or pulled-sheets from the press run.
JMF
XJDF
6

INTEGRATION THROUGH COOPERATION

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