PERSONALIZED PRINT

MARKUP LANGUAGE

Introduction to the
Personalized Print Markup Language: The PPML Family of XML Standards

A widely supported, XML-based industry standard print language
and related technologies, developed by PODi,
a consortium of the world's leading manufacturers of digital print technology

Overview

PPML, the Personalized Print Markup Language, is an industry-standard language for digital print. Developed by PODi (a consortium of leading companies in digital printing), PPML is completely vendor-neutral and royalty-free, so it is available for use in a wide range of digital print systems across a broad range of applications.

Today, PPML has grown into a family of interrelated specifications that impact the entire digital print workflow, from high-speed generation of document print streams, through automated control of inline equipment attached to digital printers. Because the PPML standard is owned by no single party, users of digital print can mix and match the software and hardware they need to suit any application. This gives them unprecedented ability to capitalize on the value offered by digital print.

Importantly, PPML is based on XML, the Extensible Markup Language, which has quickly become the universal syntax for data exchange. This gives PPML access to powerful, easy interfaces with all sorts of data-driven workflows and system components.

This document briefly explains what the PPML family of standards offers and the sort of business applications that have created the need for a new industry standard, which PPML fulfills.
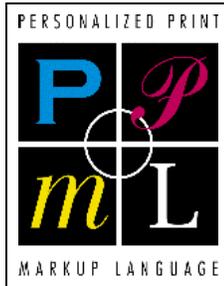
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The PPML Family of XML Applications

PPML has grown from a single standard to a broader family of standards and applications of XML technology that improve the versatility and power of print.

PPML – the Personalized Print Markup Language.
The original XML-based standard from PODi, PPML conveys document content and structure to digital print equipment.

The PPML language is the primary focus of this document.

PPML Templates:
Generating documents using
Web-standard software tools

Introduced in 2002, PPML Templating is a unique and highly productive way of generating PPML print streams.

In PPML Template workflows, document design is separated from production, just as it is with Web pages. The business rules for content selection are encoded into a PPML template in a Web-standard scripting method such as XSLT or Perl. The raw database information for each document can then be submitted to the print system, and finished documents come out the other end.
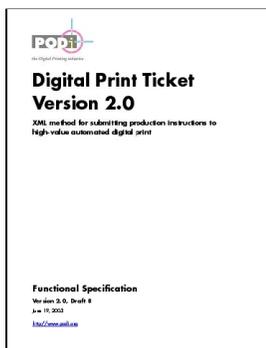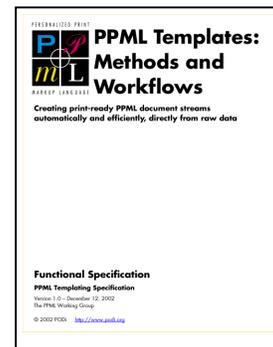
Digital Print Ticket ("DPT") – PODi's recommended application of job ticketing, for automated control of high-value digital print equipment including finishing operations. PODi members have worked since 2001 in collaboration with the JDF job ticketing team to enable the benefits of job ticketing in print applications beyond graphic arts.

Now in its second major release, the DPT has evolved into a focused, value-driven application of JDF, extending the reach of PODi technology beyond the press itself and beyond personalized print.

Today, PPML and related technologies can be applied to all types of high-value digital print, and can influence all stages of the print process, from merging data into a print stream, all the way to the end of the finishing process.

What needs does the PPML print language address?

This section provides a brief description of the key benefits that are driving adoption of the PPML family in digital print.

Years of PODi research have established that digital print delivers value through two fundamental mechanisms: more relevant documents, and more efficient workflows. PPML makes both value propositions more widely available. In addition, because PPML is built from XML, it offers a third benefit that is unique to PPML among all print languages: easy integration with Web Services, providing the best interface to print ever available from modern data-driven business processes.

But first, there are two fundamental needs that are at the heart of the flexibility that PPML-driven digital print offers compared to other types of printing: efficiency and running a print engine at full rated speed.

1. Efficient file size and resource management

PPML's Reusable Object feature optimizes file size for print jobs with high graphical content. Parts of pages that will be used repeatedly can be sent to the printer once and accessed repeatedly from the printer's memory. Then, complex variable print jobs can be executed by simply sending layout instructions and each document's unique data, instead of re-sending graphics that were used before.

This allows complex data driven jobs that could have millions of records to be transferred very efficiently, and the resources managed, over networks with limited bandwidth.

Furthermore, these objects can be stored permanently, so subsequent print runs using the same objects are even more efficient, even months later. This enables fast, cost-effective production of print projects that recur frequently with new sets of data. And checksums on each resource assure accurate production of the desired result.

2. Run printers at their full rated speed – even with graphics

PPML makes it possible for most print engines to run at their full rated speed, even with extensive graphical content, because the Reusable Object feature enables better caching algorithms.

3. More effective documents, by enabling relevant content
(previously known as personalization)

If a document's content is is genuinely relevant to a reader's interests, they respond better. The improved response makes the documents more valuable as a communication tool, so a good Relevant Content workflow increases the value of a print system.

Offset lithography cannot offer relevance, because offset creates many identical copies of a single master.[1] The long-term impact of relevance in print cannot be overstated; readers are increasingly expecting relevance, and ignoring "same to all" messages. For instance, a key factor in the explosive popularity of the World Wide Web is its ability to deliver the content that a user wants – *relevant* content, which readers prefer over "same to all" catalogs or ad sheets. PPML is the first print technology that can provide Web-like relevant, personalized messaging, in a wide range of high-quality, mix-and-match print system components.

4. Efficient, automated document workflows

Digital print workflows can be fully automated, from data to finished document, with little or no human intervention. This brings the same "mass customization" benefits to print that have already been realized in other manufacturing industries, such as PCs that are built to order instead of built for inventory:

- Lower per-job setup cost

- Lower order processing costs

- Faster turnaround

- Substantial reduction of finished goods inventory and waste due to discarding obsolete inventory

Because PPML is the universal language that is produced and consumed by virtually all digital print software and hardware, users are free to assemble these high-value automated workflows using a much wider range of choices than has ever before been possible. This reduces user risk, which encourages innovation and growth.

5. Easy integration with Enterprise Systems and Web Services

The growth of digital print is driven by business needs, many of which are increasingly tied to business's use of XML and Web Services. Because PPML is built on XML, it is uniquely well suited to integration with this technology.

Significant economic forces are driving the Global 2000's move to Web Services – forces that are substantially bigger than print itself. Web Services simplify integration of all data processing, with important improvements in cost, implementation time, versatility and efficiency. The World Wide Web Consortium's introduction to Web Services makes clear the far-reaching importance of this: [2]

> The advent of XML makes it easier for systems in different environments to exchange information. The universality of XML makes it a very attractive way to communicate information between programs. Programmers can use different operating systems, programming languages, etc., and have their software

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[1] "Lithography" derives from Greek for "writing in stone." This accurately connotes the inflexibility of offset printing.

[2] http://www.w3.org/2002/ws/Activity

communicate with each other in an interoperable manner. Moreover, XML, XML namespaces and XML schemas provide useful mechanisms to deal with structured extensibility in a distributed environment, especially when used in combination. ...

The power of Web services, in addition to their great interoperability and extensibility thanks to the use of XML, is that they can then be combined in order to achieve complex operations. Programs providing simple services can interact in order to deliver complex added-value services.

It's easy to see that PPML, with its XML foundation, is the ideal print language to be directly generated in a Web Services environment.

Who's using it? What products support it?

Today, PODi has dozens of member companies, including the leading users of digital print. A regularly updated list of members is available at www.podi.org/sponsors.

Virtually all vendors in the digital print industry support PPML, including many non-member companies. The following is a partial list of companies who offer PPML products:

Electronics for Imaging (EFI)	Hewlett-Packard	IBM
NexPress Solutions, LLC	Xerox	Creo
Océ	Xeikon	Banta I.M.
Edmond R&D	Exstream	GMC Software
Pageflex	Printsoft	XMPie

An updated catalog of PPML vendors is available at www.podi.org/about-ppml.

How does it work? What difference does XML make?

PPML is a simple, human-readable language that describes a document stream as a hierarchy of structured data. This example shows the basic structure of a PPML print stream that might be emitted by a PPML print driver or a PPML-enabled Web application:[3]

```
<PPML...>...
    <DOCUMENT_SET...>...
        <DOCUMENT...>...
            <PAGE...>...
                <MARK...>....</MARK>
                <MARK...>....</MARK>
            </PAGE>
            <PAGE...>...</PAGE>
            ...
        </DOCUMENT>
        <DOCUMENT...>
```

Each "Mark" element contains (or references) page content in any print language supported by the machine: PostScript, PDF, SVG, image formats such as JPEG, etc. This

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[3] In this example details are omitted, to make the logical structure more apparent.

open, flexible architecture lets PPML be adapted to any sort of print environment, wherever vendors and users see an opportunity.

For most users, PPML is just an efficient interoperable way to submit print jobs to a wide range of equipment. But to technically oriented users, additional benefits are apparent. For instance, because PPML is built on XML, PPML document streams can be queried, modified, subsetted, transformed and debugged using ordinary XML software tools. The PPML itself actually *is* a structured database of information.

What business applications does PPML enable?

In addition to developing software specifications, PODi works to understand the underlying business applications that drive adoption of digital print, so that each finished specification has a compelling business case for users to adopt it.

PODi research has shown that automated, relevant digital print is changing the landscape of what can be done with information on paper. Consider that none of the following examples was feasible ten years ago, and all are enabled by digital print workflows, and particularly fortified by PPML:

Applications where Relevance improves value include:

- **Direct Marketing:** Highly relevant marketing messages can composed from a "virtual catalog" of reusable content items. The "catalog" of items can be loaded into the print system; then, highly personalized documents—letters, brochures, catalogs, statements—can be printed without slowing the printer down.

- **Collateral Management and Fulfillment:** "Build your own brochure" systems are transforming how manufacturers interact with their dealer network, and even with individual customers. These systems let people select more of the information they want, and leave out information they don't care about. Is it any wonder that documents created on these systems are strongly preferred by the people who request them?

- **Customer-friendly Transactional Statements:** Individualized *image-rich* documents can be assembled and printed at full speed—something that was never before possible. Since color and images communicate much more effectively, this is important to the potency of the document. These "customer-friendly" graphics have become almost mandatory in the Investment Statement segment; financial institutions that don't offer such statements find themselves at a competitive disadvantage. Not surprisingly, market adoption of this high-value statement printing technology has been almost universal.

Applications where Automation is pivotal include:

- **Collateral Management and Fulfillment.** These same systems bring a second major benefit: efficiency. Typically, after the user clicks the options they want, virtually no human labor is involved until the paper emerges from the digital press. If Digital Print Job Ticketing is used, even the binding operations may be automated (for instance, folding and stapling).

    - **Print to Order:** In addition to the relevance/personalization described above, the Collateral Management segment also includes short run "print to order" for static (non-personalized) documents. Users can order 25 or 50 brochures at a time, when they need them, eliminating the need for inventory and storage space, and ensuring that everything that gets printed gets used. This is a radical improvement in efficiency compared to the familiar sight of thousands of brochures being discarded when the product they describe changes – which is increasingly frequent in today's rapid-innovation business environment.

- **Transactional** documents such as insurance policies and proposals can be automatically generated by automated document systems, so they contain exactly the information the reader needs, at lower cost than the bulky and unfriendly "all in one" document packets required by older technology.

What is the relation of PPML to other standards in the industry?

The three standards most discussed in the high quality digital print industry are PPML, JDF, and UP³I.

- **PPML** is a print content language, based on XML. It defines what goes on which page of which documents, using logical structured XML data. As noted earlier, related standards in the PPML family include PPML Templating and the Digital Print Ticket (DPT) application of JDF.

- **JDF** (Job Definition Format) is a data format for job ticketing, not for page content. It is designed as a universal format for exchanging information between system components in the graphic arts, where a job typically consists of many identical copies of one master.

    JDF has no constructs or parameters for generating the print stream; it implicitly presumes the document master is a resource that was created before the job enters production. In contrast, PPML's features can significantly influence the upstream processes that generate the document. For instance, in streaming applications,[4] the

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[4] "Streaming" refers to jobs that are so lengthy that the print system must begin output before all the data has been received. This is significant because many industry observers, including PODi, believe that long-run jobs represent the best profit opportunities for digital print. This is another key difference compared to offset, where the trend is toward *shorter* run lengths.

upstream data often influences when and how the production equipment must perform certain operations. (Example: page 3 of one document may require switching to blue paper, while another document may do it at page 5 or not at all.) To optimize digital print job ticketing, PODi is collaborating with the JDF team to define practical applications of JDF for digital print, with or without variable content.

- **UP³I** is a physical layer standard based on iEEE 1394 (also known as Firewire or iLink). UP³I is not a print language like PPML, nor is it a job ticket like JDF or its DPT subset. Rather, UP³I is a means of *transfer* of control data for pre- and post processing devices. (UP³I is "Universal Printer, Pre- and Postprocessing Interface.") It does not have any logical construct for workflow or document content.

What does the future hold?

Every year since its introduction, PPML has been enhanced and expanded with new features and related specifications. Additional initiatives underway in 2003 include:

- **PPML 3.0:** new features for high volume digital print jobs that have high graphical content

- **Digital Print Ticket 2.0:** the new version of PODi's subset and recommended applications of JDF for digital print as described above.

- **Tools and infrastructure** for developer support: a new Web-based home for PPML test jobs and developer tools, such as a desktop PPML viewer.

How can I learn more?

PPML was first demonstrated at the worldwide "drupa 2000" printing exposition in May 2000. Product shipments began by year-end. The next "drupa" in 2004 will include PPML products from dozens of companies.

- **Specifications** for PPML and related standards are freely available at www.podi.org/get-the-spec

- **A catalog of PPML products** is available at www.podi.org/about-ppml

- **Developer Support** information is available from DeveloperSupport@podi.org

- **Additional information:**

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