

STANDARDIZATION AS PROFITABILITY DRIVER in print







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1. EXECUTIVE SUMMARY

In a changing industry, with its drive to shorter runs, quicker turnaround times, and lower margins, automation—of all workflow processes—is no longer a nice to have. It is essential to remain competitive. This white paper explores the prerequisites for successful automation: standardization, quality control, and connectivity.

Automation is not possible without standardization. Although the underlying file formats used in the production workflow were standardized long ago, consistently using those standards is often problematic. Using appropriate, modern versions of those standards appears even more difficult. Even though this white paper focuses on file formats, standardization also refers to all other aspects of a printer's business.

Quality control is paramount to accommodating (and enforcing where necessary) standardization. Problems that are allowed to proceed through a workflow become increasingly expensive. They cause additional costs, delays in order turnaround times, and—worst case—reputation damage. How quality control is implemented is often highly strategically important. It touches on the relationship with the customer and whether a business wants to be a cost leader or a quality leader.

Excellent quality control requires proper connectivity between different systems and people. While it is possible to preflight a job in isolation, having information about that job (what type of job is it, how big is it supposed to be, how many pages am I expecting...) increases the number of problems that can be identified and allows increasing standardization. This is not just a technical issue; increasing connectivity often requires re-engineering workflows and touchpoints with the different stakeholders in those workflows.

The technical building blocks and processes required for standardization are well understood. They 'merely' need to be implemented correctly for maximum effect. Unfortunately, that often does not happen yet; it is easier said than done. But, as explained in this white paper, 'doing it right' can tremendously affect profitability.





2. THE IMPORTANCE OF STANDARDIZATION IN PREPRESS WORKFLOWS

The Portable Document Format, or PDF, has long been the foundation of print workflows. Invented by Adobe as early as 1993, it was quickly adopted by the graphic arts industry. However, the format was initially intended to be used as a digital documentation format and as a compact, layout-oriented format for use on the Internet. Hence, it was much more flexible and supported far more features than ideal in print workflows.

Good examples of this flexibility are the support for hyperlinks, all types of annotations often used in digital approval workflows, the ability to include sounds and movies, and perhaps most problematic, the ability to create PDF files that do not contain enough information to be printed exactly as intended. Correct font handling and color-managed files are essential in print workflows, and while PDF supports both, it does not require it.

Restricting PDF for use in print with PDF/X

This is where PDF-based standards such as PDF/X come into play. PDF/X is an ISO (International Standards Organization) standard that imposes additional rules and restrictions on PDF files to optimize them for print.

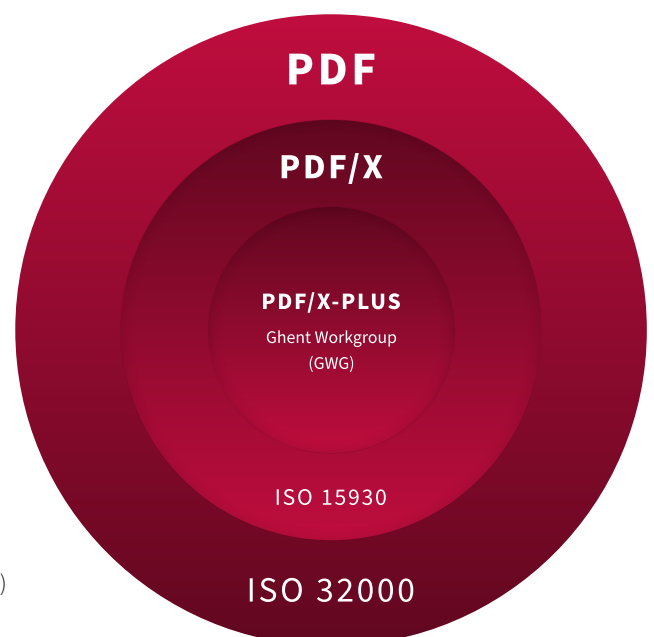
PDF/X files are not allowed to include sounds and movies, for example, or use color spaces that are not correctly color managed. They must identify the PDF/X version they are compliant with and all fonts used in a PDF/X file must be embedded (essential parts of the font file must be included in the PDF file).

All these requirements were included in the PDF/X standard to allow “blind exchange”

between the PDF file creator and the printer. This means there shouldn't be a need for communication between the creator and printer; the PDF file itself suffices.

The PDF/X standard removes some flexibility from PDF-based workflows and replaces it with additional reliability.

In a strange turn of events, PDF/X became an ISO standard long before PDF itself was standardized, making it an ISO standard based on a proprietary, albeit openly specified file format (from Adobe). This was rectified in 2008 when Adobe transferred the PDF specification to ISO, and it became ISO standard 32000.



PDF standards in a nutshell

Different standardization levels for PDF

- PDF (ISO)
- PDF/X, PDF/A, PDF/UA, PDF/E, PDF/VT, PDF/VCR (ISO)
- PDF/X-Plus (GWG)
- ...

The Ghent Workgroup and PDF/X-Plus

While receiving a PDF/X file is a massive improvement over receiving a random PDF file, it still doesn't guarantee that the file will be suitable for a given purpose. Think about the diversity of print products: the requirements for billboards next to a highway aren't the same as those for a business card or an ad in a newspaper.

The Ghent Workgroup—a standardization organization founded in 2002 with vendors,

users, and educational organizations in print—addresses those concerns by creating different specifications per market segment. This allows billboards to require a different minimal image resolution than business cards, or newspaper ads to require a different maximum ink usage. The Ghent Workgroup specifications are built on top of the ISO PDF/X standards, so there is no conflict between the two approaches.

Standards today and tomorrow

Standards must reflect advances in technology (both hardware and software). Over the years, this has led to developing different PDF/X versions and Ghent Workgroup specifications. This proliferation of standards and their highly technical nature often makes it difficult to determine what to settle on in your business.

Two generations of PDF/X are frequently used today: the older generation with PDF/X-1a and PDF/X-3, both over 20 years

old and lacking support for live transparency (because that was not invented in PDF yet!). And then the 'younger' generation consisting of PDF/X-4, which does support live transparency, and a host of more modern PDF functionalities.

Given the current state of technology, the best advice is to use PDF/X-4 whenever possible, preferably using the 2022 Ghent Workgroup specifications. Those are built on top of PDF/X-4 and are fully compliant with it.

You may have heard about PDF 2.0 and PDF/X-6. PDF 2.0 is an updated version of the ISO PDF standard, and PDF/X-6 is an updated version of PDF/X based on the new PDF 2.0 standard. While these offer new capabilities and can have advantages in specialty workflows, they are not (yet) well supported by software and hardware, and as a result, it is not advisable to use them.

Standardization doesn't (always) stop at PDF/X

If you have a typical commercial print business, using the Ghent Workgroup specifications built on PDF/X may be all you need for proper standardization. Your print jobs will involve tight deadlines, high volumes, and diverse requirements across different output types, from brochures to flyers to business cards. Standards such as PDF/X-4 help ensure that all design elements are rendered correctly, regardless of the complexity of the files.

It is important to know that PDF/X isn't the only PDF-based ISO standard that can affect your business.

Processing steps

Technical colors such as cut and fold lines, varnish or white layers, and Braille must be clearly identified and separated from the main design in the label and packaging sector. The ISO standard for 'Processing Steps' helps streamline the production process by ensuring that automated tools correctly embed and interpret these elements.

This would, for example, allow a label printer to automatically detect incoming PDF files missing a die line. It could also

allow the standardization of the spot color used for the die line so that downstream tools reliably detect it. Or it could allow the automated separation of design and die line elements so that these can be sent to the printing and cutting machines, respectively.





Variable data and transactional workflows

Variable data printing, where elements such as names, addresses, or promotional codes change from one printed piece to the next, is increasingly popular for personalized marketing and invoices. The ISO PDF/VT and PDF/VCR standards were developed explicitly for handling static and variable content efficiently, ensuring that each page is processed with minimal delays.

A direct mail campaign for a retailer might use PDF/VT to optimize performance. This ensures repeated elements like logos are cached and reused, while variable data such as customer names and offers are processed quickly. An additional ISO standard, Document Part Metadata, or DPart, could be used to identify where each mail piece starts and ends and what the delivery address is. This allows finishing equipment to separate and mail each piece correctly and decreases mailing costs by pre-sorting mail based on their address.

Life outside print

Just as PDF/X was developed to enforce print workflow requirements, other ISO standards were designed to support different use cases for PDF files. The two most notable in this context are PDF/A and PDF/UA.

Imagine that you create a PDF file today and want to ensure it will still be usable 50 years from now. To put that in historical perspective, that would be the same as opening a file created in the 1970's today. To support this kind of requirement, ISO developed the PDF/A standard (where the "A" comes from "Archive").

The "UA" in PDF/UA, on the other hand, comes from "Universal Accessibility," a standard that supports the use of screen-reader software (and other utilities). This allows people with visual impairments to use PDF files with that special software.

While you might not come across these use cases as a printer, it is still important to realize that the PDF standards ecosystem is more extensive than PDF/X.



PDF/X

Industry standard **for consistent and predictable printing**

PDF/A

Industry standard **for the archiving of digital documents**

PDF/UA

Industry standard **for accessible PDF documents**

PDF/VT

Industry standard **for high-volume printing of personalised documents**



3. QUALITY CONTROL TO ENFORCE STANDARDIZATION

Where standardization sets the rules, quality control ensures those rules are followed. As soon as people started using PDF in print, software vendors created preflight software to ensure those PDF files were suitable. Initially, there were no standards to rely on, but as soon as standards were established, preflight software started to incorporate those.

When performing quality control in print workflows, the term “preflight” is typically used. Of course, this is a term borrowed from the aviation industry, where preflight checks are done before a flight takes off. In both cases, those checks are done to minimize the risk of undetected problems later in the process.

Modern preflight software supports standards such as PDF/X or the Ghent Workgroup specifications out of the box.

Using standards... with a twist

While previously discussing standards, it became clear that there is a hierarchy. At the bottom is the ISO 32000 standard for the PDF file format, in the middle, the ISO PDF/X standard to restrict PDF to print workflows, and at the top the Ghent Workgroup specifications to ensure that PDF files are suitable for a specific market segment or use.

Often, an additional layer is introduced that represents company-specific or job-specific requirements. For example, a printer might get an order for a 2-color double-sided business card. The Ghent Workgroup has a specification called “2022 - Sheet CMYK”, which provides all the basic checks needed for printing this job. Because it is part of the 2022 Ghent Workgroup specifications, it’s compliant with PDF/X-4, so all of our standard bases are covered.

Before printing this job, it would be wise to verify that the supplied PDF file has only two colors and consists of two pages (given that it’s a double-sided business card). This is the company-specific or workflow-specific layer added to the standard preflight.

Types of preflight

Examining the preflight process from the “standards layer-cake” perspective is interesting, but it raises a different question: What types of problems can be detected during preflight? Two main types of preflight can easily be distinguished. No industry-standard terminology exists, but the intuitive names are technical and intent preflight.

when considering standardization, knowledge about a job’s market segment or the technology used to print (sheetfed offset vs. digital, for example) is vital to knowing what preflight rules to apply, even during technical preflight.



Technical preflight

Technical preflight examines the PDF file in isolation. It inspects the file’s properties, resources (images, fonts, and color spaces), and page elements. It’s easy to find good examples of technical preflight:

- Are all fonts embedded in the PDF?
- Is image resolution high enough to ensure good print quality but not so high that it will cause issues with PDF file size?
- Are there areas where too much ink is being used?
- Are the correct overprint rules for black and white elements followed?

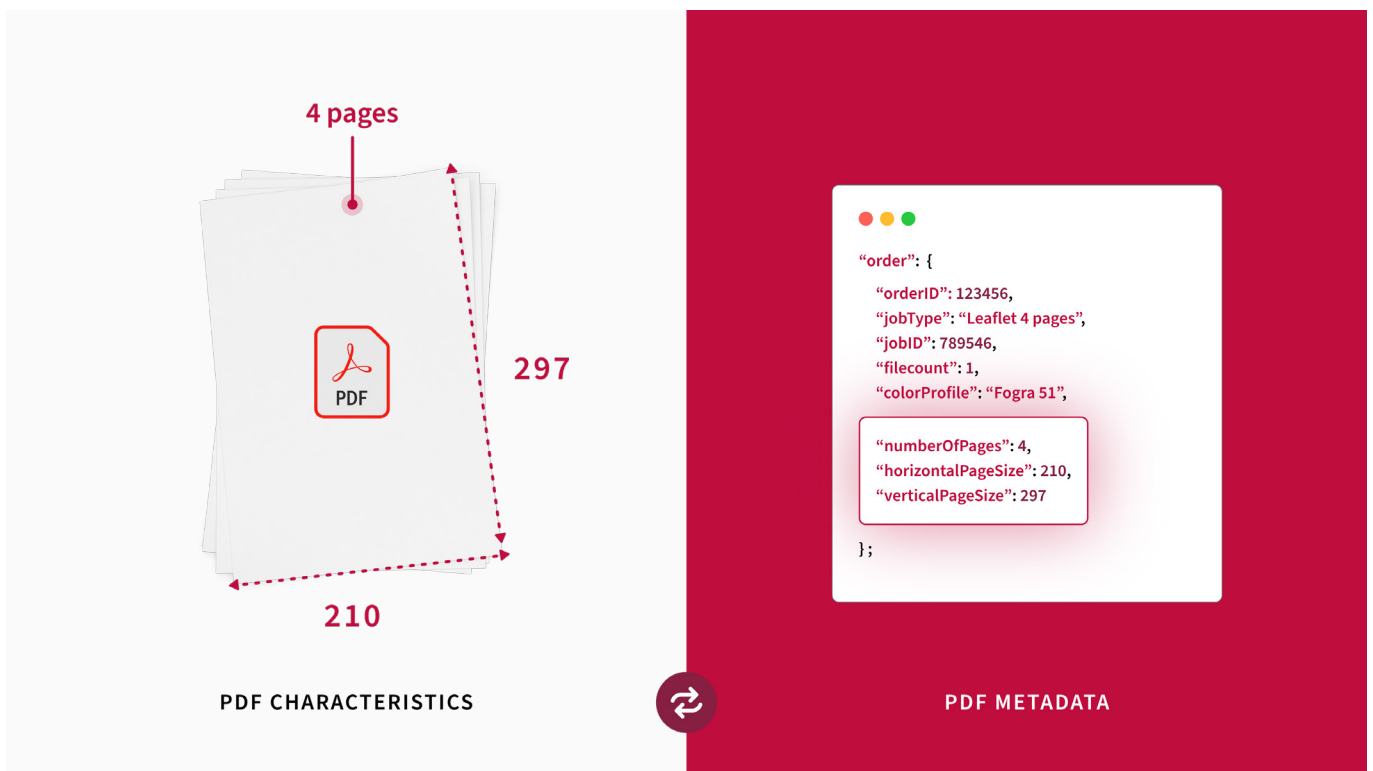
The “in isolation” statement must be taken with a pinch of salt. As discussed previously,

Intent preflight

This leads us to the second type of preflight: intent preflight. Intent preflight uses business information (often called meta-data) about the job to inspect it further. The need for this is easy to understand: a PDF file may be entirely technically correct yet utterly unusable for a particular job.

Using the same business card order example, a technically correct PDF file may have the wrong number of pages or a mismatched trim size for the job. In such a case, the technical preflight rules would give the OK, but intent preflight would fail the job. Where this job metadata comes from isn't essential when considering intent preflight; what is crucial is that the information is usable during preflight.

Web-to-print solutions, MIS, or ERP systems are typical examples of systems that could provide usable job metadata. Ultimately, any system that knows about the job and can pass that knowledge to the preflight process qualifies.



Identifying a third type of preflight besides technical preflight and intent preflight is possible. The distinction is a little less clear, and this type of preflight is not done as frequently (also because it is typically challenging). Called “creative preflight,” it has more to do with checking the creative aspects of the PDF than its technical aspects. Examples would be spell-checking the text in PDF documents, verifying the correct use of brand elements, and so on.

Checking vs. fixing

So far, preflight has been described as checking PDF files for suitability for print. However, almost all modern preflight software can easily check and correct common problems. This leads to a strategic business decision: does a printer just check documents or fix them as well? There are no right or wrong answers here: both have advantages and disadvantages.

The advantage of the checking-only strategy is that it is quick, and the customer's PDF files are never changed. As a printer, you don't take responsibility for modifying the incoming PDF files. However, you may turn down customers and require them to fix and re-submit their PDF files. This could lead to customers looking for an "easier" printer to work with.

If you also correct incoming PDF files, you might still have to get updated files from the customer for some problems, but this will happen much less frequently. On the flip side, if something goes wrong during print, you may suffer the consequences if you touch the files. Then again, aren't printers often liable when something goes wrong anyway?

Three additional points are worth considering on this topic. First, if you decide to correct incoming files, discuss whether this is a free service or something you want to charge for. Regardless of the answer to the first question, ensure the policy you decide upon is executed as agreed. It is pretty common to have companies that have an official "no corrections", or "no

free corrections" policy, where on the shop floor, PDF files are routinely fixed because "otherwise we're stuck".

A last and essential point is that it may be possible to fix PDF files on the fly, as directed by the customer. Quality control technology can and is increasingly integrated directly into job submission portals. This allows fixing to be done 'by the customer' and the result to be approved immediately. It removes the question of responsibility when fixes are performed that later turn out incorrect.

Why are we still debating preflight after all these years?

To highlight how important it is to preflight incoming PDF files and to develop strategies to deal with problematic PDF files, have a look at the results of a survey conducted in 2008 and then again in 2017. The same question was asked in both cases: "What are the ten most common preflight problems in incoming PDF files?"

Remark that most of the problems remained the same, and if the survey were done today, they would likely still be the same. This doesn't mean that our technology didn't improve; it absolutely did. It highlights that some of these problems are unfixable and will likely never change.

It's easy to find contributing factors (think of creatives lacking production knowledge or document creation shifting to much less experienced office workers rather than experienced service bureaus), but the causes are almost irrelevant. What is crucial is making workflows resilient enough to deal with problematic PDF files. Because the evidence is that these are not going away any time soon.

PDF problems	
2017	vs. 2008
Low-res images	Not-embedded fonts
Wrong color space	Low-res images
No bleed	Wrong color space
Incorrect number of spot colors	No bleed
Overprint problems	Transparency problems
Ink coverage	Overprint problems
Incorrect trim size	Corrupt fonts RESOLVED
Transparency flattening problems NEW	Incorrect number of sport colours
Problems with technical links NEW	Ink coverage
Not-embedded fonts ON ITS WAY OUT	Incorrect trim size





4. CONNECTING THE DOTS

To implement first-class quality control around the correct standards and achieve the most significant return, the right people must get the information they need (and understand), and the information must flow between systems correctly. Because this involves processes and how people use those processes, this aspect is often more challenging than the purely technical aspects around quality control.

Quality control reports

All quality control solutions can create “preflight reports,” which summarize the inspection results for a particular job. Those reports can be suitable for further automation (such as XML or JSON) or be targeted for human consumption (typically a PDF file). The problem with these is that they are rarely adjusted to the specific needs of the people receiving them, and the information in them is thus less useful than it could be.

To have good communication between parties in a workflow, some essential questions need to be asked:

- Is the information distributed to the right people? This works in two directions: do the people who need the information receive it, and does it go only to them? If people routinely receive information that isn't helpful for them, they stop reading it altogether.
- Is the language used in preflight reports understandable for the people receiving them? If your prepress people have trouble understanding what “notdef glyphs” are, or what precisely the difference is between a trim box and crop box, why would you think your customers would?
- Do people get the information in a timely manner? The best moment to have people fix problems is when the job is still fresh in their memory. Two days later, they moved on to other jobs, and wrapping their heads around something they sent two days ago is much more difficult.

Empathy is an underrated aspect of automation workflow creation. Workflows are routinely designed by highly technical people (which certainly has merit). However, that makes it easy to fall into the “let's share everything we have and what I would like to receive” trap. Experience with highly effective workflows shows that sharing minimal and simple information often gives much better results. Share only what is essential and understandable.

Data disconnects

Intent preflight was defined as exploiting additional business information while preflighting jobs. Even for technical preflight, it became clear that some information about the job still needed to be available to get good results. From this, it follows that connectivity between systems is essential to improving quality control and reducing the number of problematic jobs. There is an important caveat when discussing job information (or metadata). Though this white paper primarily examines the need for standardizing PDF files (the job data itself), the importance of standardizing job metadata cannot be underestimated. If a printer wants to do proper preflight in their workflow, the job metadata from the web-to-print system needs to be available

in the workflow for jobs coming in through that system. The information also needs to be consistent and reliable. That implies that good preflight is possible only if the web-to-print system is correctly set up. Allowing customers to enter “free form” information about the job, for example, is almost always a recipe for disaster. Such information is not structured, repeatable, or reliable and generally requires another human being to interpret it. Precisely what you don't want in an automated workflow.

Experience with many automated workflows leads to another conclusion: the connection between systems must be automatic. There should be no humans involved in copying information between systems.

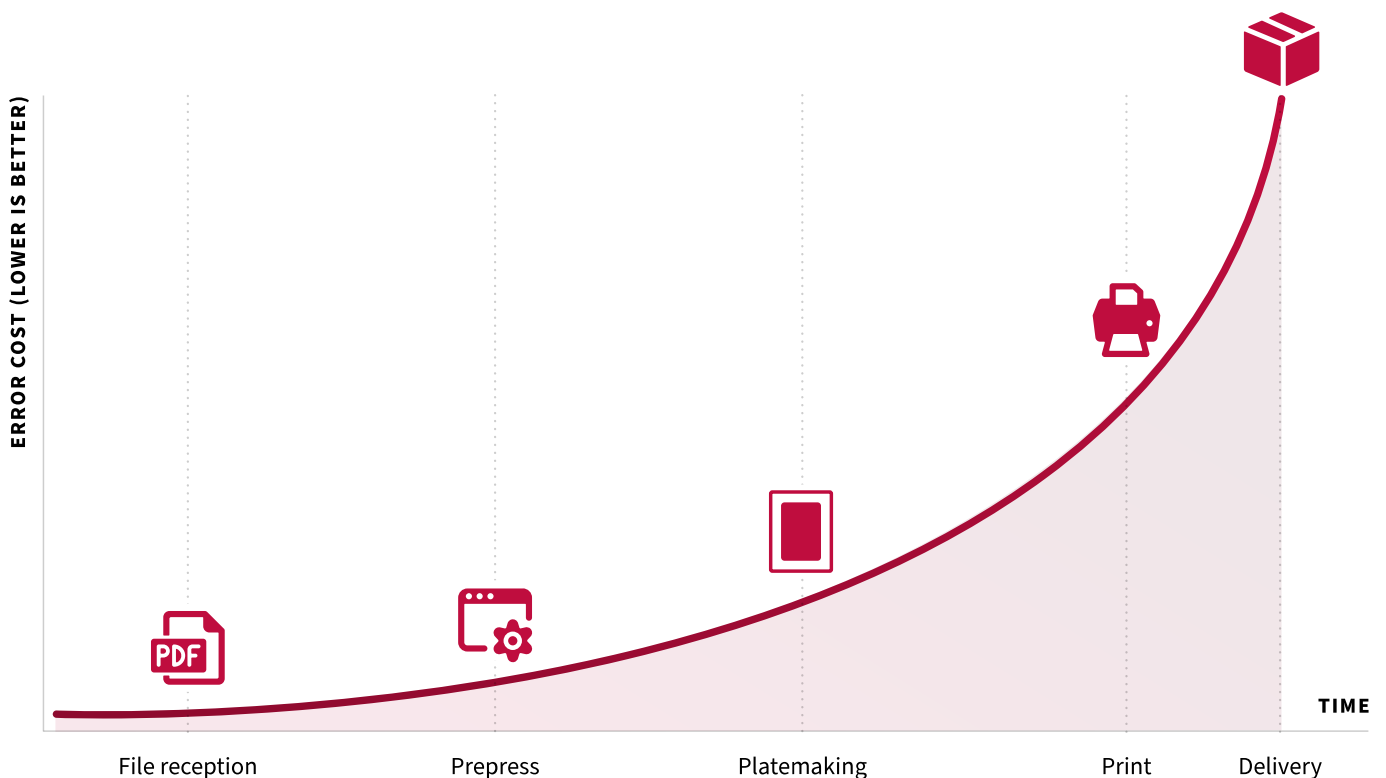
Two important reasons are at the base for this:

- First, given labor costs, is copying and pasting information from one system to another really the best use of people's time?
- Second, mistakes will be made if people have to re-enter or copy information. There is nothing that people are so bad at than prolonged repetitive tasks that still require attention to detail.



5. STANDARDIZATION AND PROFITABILITY

After exploring the trifecta of standardization, quality control, and connectivity, how can what was discussed be used to maximize profitability in print workflows? What practical lessons are to be learned?



Begin at the start

In every workflow, the earlier problems are detected, the less costly they are. Print workflows are no exception.

If a customer submits a PDF file that doesn't fit the requirements, the best time to find out is immediately after it has been uploaded. At that point, no labor has been expended on the job, no consumables (plates, media, ink) have been wasted, and there is minimal impact on the print deadline for the job. Additionally, if the problems are communicated to the customer immediately, they can quickly correct the situation before moving on to other tasks.

As a result, any improvements that can be made early on in the workflow will have the most significant impact on profitability through waste reductions. But this is not the only effect at play. The more input is standardized, the more automation can be effective in the rest of the workflow. This makes improvements at the beginning of the workflow doubly important.



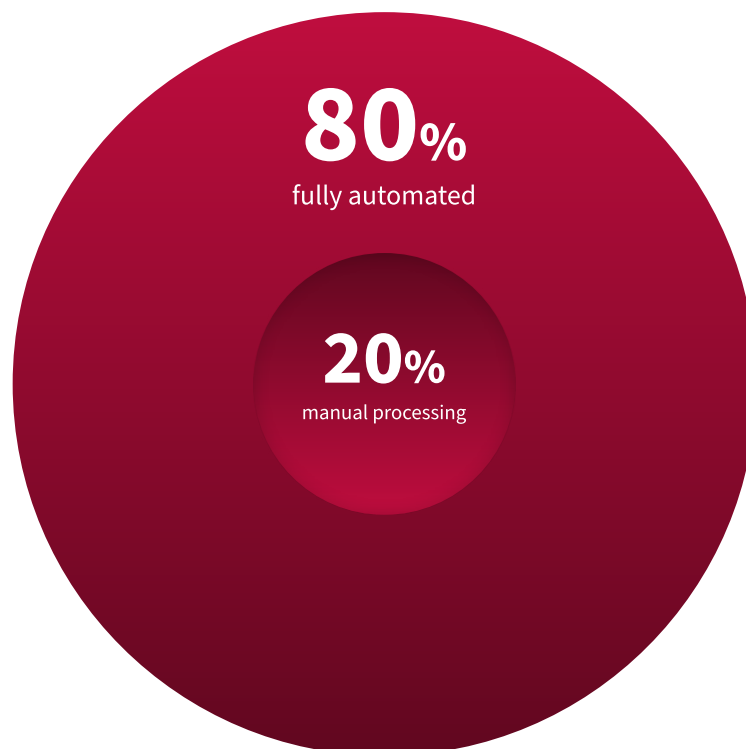


The 80 / 20 rule

Even though we would like to be able to build workflows that are 100% automated and 100% effective, the reality is that this is never going to happen. Even in the highly regulated aviation industry from which we borrowed the preflight term- exceptions still occur. Things still go wrong.

Striving to attain 100% standardization or automation will cause frustration and ineffective expenditures. Workflows should be built to allow flexibility and handle both simple and complex jobs. The same people who are bad at repetitive tasks excel at handling exceptions and complex situations.

The lesson here is to accept that 100% will never be realistic and to focus on the low-hanging fruit. The lesson is also that identifying jobs that can and should be standardized and fully automated and separating them from the more complex jobs is an essential part of workflow design that should be done early.





6. ARE YOU DOING THE RIGHT THING?

Standardization shouldn't be a dark art, nor should you think it is impossible to attain. An excellent way to improve your business is to ask a series of very practical questions. If you have to answer "no" to any of them, you just identified an area you can work on.

1

Do you know what standards you use or want to use? Is that choice communicated within your business so that all decisions can be taken in function of that choice?

2

Do prepress people and account managers have adequate technical training? Can they have a proper technical discussion internally or with customers?

3

Does your website contain information about what you expect from customers regarding submitted files? Do you offer additional resources such as templates, pointers to industry associations, and application settings... to make it easier for customers to do the right thing?

4

Do you communicate with customers when problematic jobs are detected? Is the information shared with customers written at their level of expertise?

5

Is there a standardized way for customers to supply jobs? Does that allow for uploading PDF files and sharing job metadata?

6

Is there an immediate feedback loop for customers sending in jobs to notify them of (potential) problems?

7

Do you do intent preflight, or is the workflow limited to technical preflight?

8

Is there an internal policy on correcting customer files? If so, is that policy adhered to by all parts of the organization? If corrections are supposed to be charged to the customer, does that actually happen?

9

Are all links between systems automated (as in, no one re-enters or copy and pastes information between systems)?

10

Do you differentiate between "easy" jobs that should run through the workflow completely automatically, and "complex" jobs that require manual handling? Was that decision made consciously by the business?



7. CONCLUSION

Modern print workflows will always have complexities. Conscious standardization, not only for the file formats used but also for the processes involved, helps to keep those complexities under control. Standardization shouldn't be considered a theoretical topic but an enabler of automation and, through that, profitability.

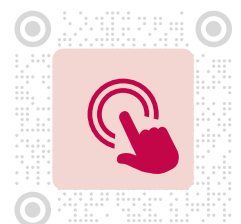
Good standardization isn't possible without adequate technical information and knowledge of how choices will influence the business. Deciding on what standards to use should not simply be a technical discussion but a strategic one. How to perform quality control and ensure connectivity between people and systems should be an integral part of this strategic exercise. Standardization reduces errors and waste, increases print quality, reduces turn-around times, and positively affects customer relationships. You cannot afford to ignore it in a modern print company.

Where to go from here? Plenty of sources of additional information are available, starting with the callas YouTube channel. Much information about standardization and quality control can be found there, often very technical. Organizations such as the Ghent Workgroup have great websites and YouTube channels as well. Don't overlook industry associations active where you have your business. A lot of free information is available.

Finally, don't hesitate to reach out to partners. Many excellent consultants and system integrators are around to help you figure out how to profit from all the technology out there today. Don't underestimate the importance of an outside view to help you optimize and build the best business you can.



If after reading this white paper, you would like more explanations on a particular topic, don't hesitate to ask for clarification. Scan the QR code, or go to [explain.callassoftware.com](https://www.callas.com/explain).



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