



STOP PRESS!

Or how to avoid it

Hello I am...



- David Stevenson
- I'm a Product Manager at Global Graphics Software
- What would your print customer say if you rejected any PDF files that were poorly constructed and likely to slow down the press?
- With such a large number of PDF creation tools and PDF files entering a workflow from different sources they are bound to vary in quality.
- This talk discusses how we have approached this problem, from analyzing PDFs to predict their speed through a workflow, to actively changing problem PDFs with the aim of achieving the right output quality whilst maximizing device speed

Global Graphics Software



- Founded 30 years ago
- Inventors of the Harlequin RIP®
- Part of the Global Graphics plc group of companies
 - Hybrid Software, Meteor & Xitron
- Award-winning



HYBRID
SOFTWARE

Innovative productivity tools for the graphic arts industry



Develops and supplies electronics, software, tools and services for industrial inkjet systems.



Software to power prepress and printing departments

- In 2020, Global Graphics Software launched Direct, a now award-winning class of print software that drives print jobs directly to the printer electronics, without ever touching a disk
- The Direct proposition means ripping and screening in memory from a source PDF
 - No need to waste the time to RIP ahead to disk
 - No need for huge image stores holding vast amounts of data
- But this means we have to be sure the RIP can keep up with the press

Data Rate Barrier

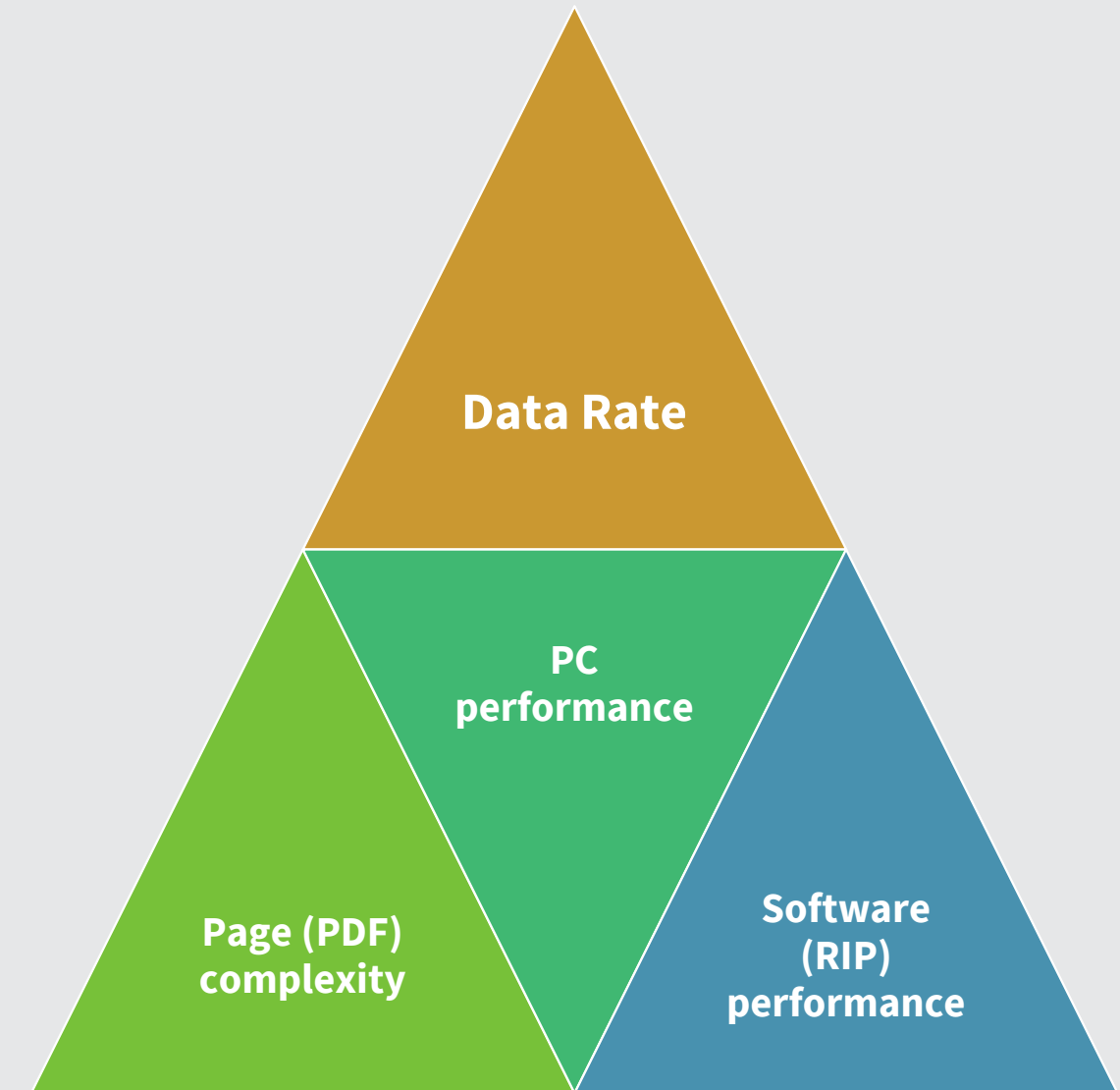
- Data rate increase
 - Press resolutions moving from 600dpi to 1200dpi
 - Single-pass line speeds reaching 300m / minute
 - Print bars up to 4m wide (e.g. flooring)
- Ditch the disk
 - Costly offline storage might not be fast enough
 - Instead: RIP, screen in memory and deliver to print head electronics
- But there are risks
 - Average speed may look OK, but one slow page can block the rip



Full Speed Ahead is our free guide to creating variable data PDF files that won't slow down a digital press

The data rate conundrum

- The speed at which data can be delivered to the press is dependent on several factors
- We have modelled numerous CPU/GPU/RAM configurations to understand how performance scales with faster hardware
 - Faster CPU suits processing vector data
 - Faster RAM suits processing raster data
 - GPU memory transfer can negate the benefit of faster image processing
- Underlying this is the need to identify (and rectify if possible) performance constraints imposed by the job itself



Preflighting for speed



- In the early days of PDF workflow, the emphasis was ensuring the RIP would render the page as expected
 - Standards such PDF/X that we now take for granted grew out of this requirement
 - Preflighting tools were developed to check compliance or make necessary changes
- The preflighting task for the ‘direct’ proposition is slightly different
 - Flag jobs that may not RIP fast enough by identifying potential RIP bottlenecks
 - Predict end-to-end RIP time
 - “Preflight for speed” by applying optimizations without compromising content integrity, or output quality

Strategy



You don't want to do this

Streamline – optimizing for a known situation

Do nothing
("fingers crossed"
approach)

Pre-rip entire
job to disk

Preflight PDF
for speed

Generic PDF
optimization

Specific PDF
optimization

Send unexamined
job straight to the
RIP

Feed press from
disk storage

Examine PDF to
identify complex
pages

Image downsampling
Font & font subset merging
Color conversion
etc.

"Tactical" transparency
flattening
Determine applicable RIP
settings

Generic PDF optimization - 1



- Image downsampling
 - PDFs often have more image data than needed for accurate RIPping and screening
 - Downsampling is an effective way of increasing RIP throughput without compromising quality
- Color conversion
 - Convert colors to the target space beforehand to reduce the work the RIP has to do
 - Convert spot to process, if appropriate
- Transparency flattening
 - This was once a “must-do” but today a more tactical approach is needed
 - Modern RIPs can handle transparency very efficiently

Generic PDF optimization - 2



- Elimination of repeated images
 - Wrap in a XObject if required
 - RIPs can cache XObjects more easily
 - Hash content to enable repetition to be detected
 - Eliminate duplicate, create reference to single instance
- Optimize fonts
 - Remove font duplicates
 - Merge font subsets
 - Embed missing fonts
- Optimize output
 - Write output from the optimization process as efficiently as possible
 - Compress object streams

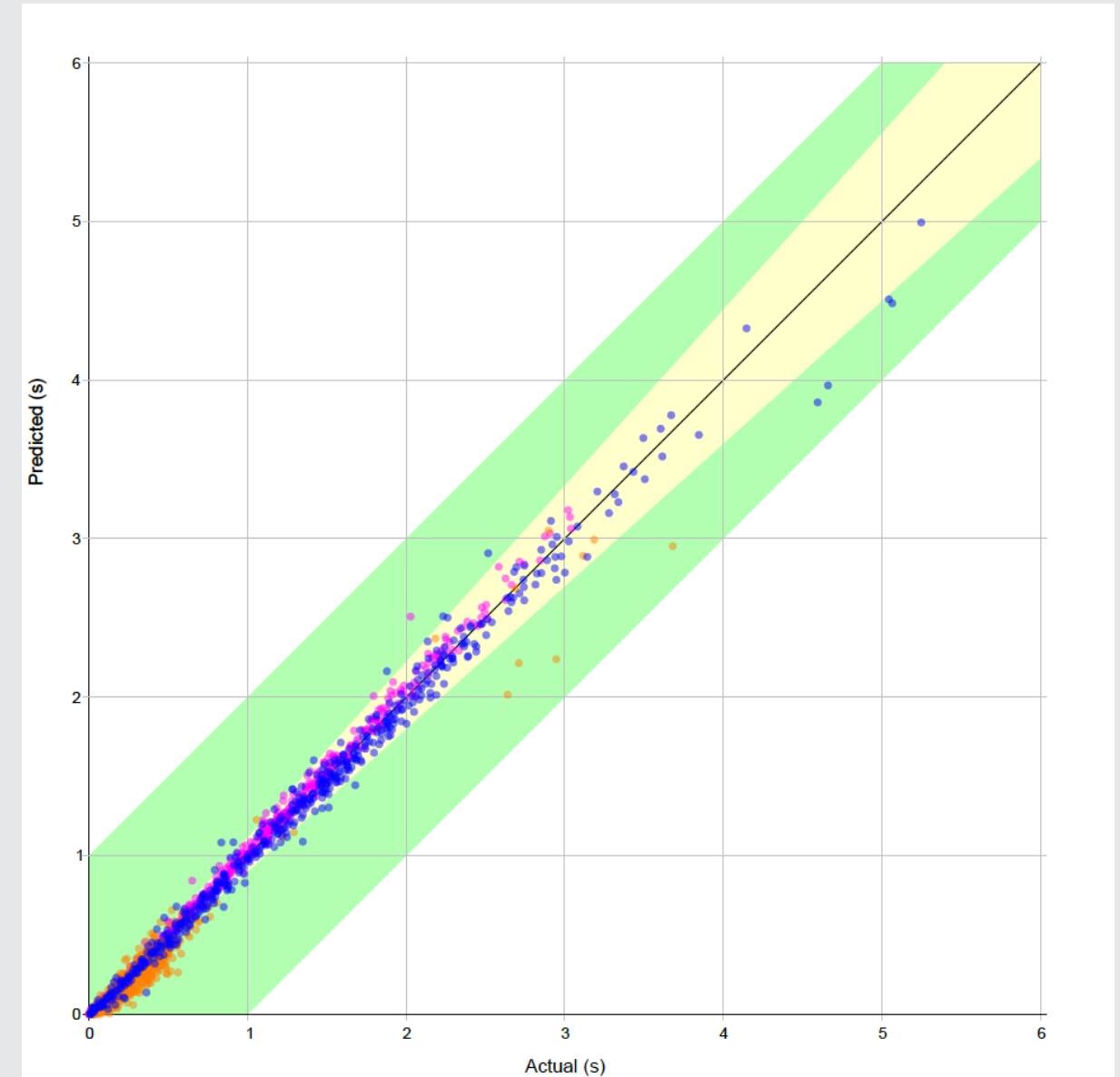
Streamline: Specific PDF optimization



- Identify Harlequin RIP settings, based on:
 - The analysis of the PDF
 - Nature of the job
 - Our understanding of the Harlequin RIP
- Transparency flattening
 - Selective based on analysis
 - Apply only to pages that need to be sped up
 - E.g. a radial gradient underneath transparent content containing a pattern
 - Raster-based or vector-based
 - Intelligently choose based on object count and external factors



















Streamline: Predict end-to-end RIP time

- This is a tricky problem to solve
- To arrive at a reasonable estimate of how long a page will take to RIP we have to:
 - Assign weights to given operations
 - Analyze the page in detail
 - Approximate the time the RIP will take
 - Compare to actual RIP times
 - Use machine learning to ‘train’ the model, adjusting the ‘weights’ to iterate towards a more accurate approximation



Practical application

- By building a Streamline component into the SmartDFE, we can signal if a job is good to run
- Red = job will not keep up with press
- Green = job is good to go
- Amber = Choose from
 - Apply an optimization and re-evaluate
 - Send to rip-ahead queue
 - Dynamically configure Harlequin RIP
 - Reject the job

Queue			Auto-Print				
	prima_1200pg	1					
	altona	1					
	45546 St Cecilia_A5_p...	1					

Full Speed Ahead



- There is a lot of talk about optimizing PDF for one purpose or another
 - Our strategic focus is on print, specifically inkjet
 - Identifying jobs that can't keep up
 - Fixing them automatically where possible
- If you want to take this discussion further, feel free to contact me at:
 - david.stevenson@globalgraphics.com
- Download the free “Full Speed Ahead” guide

