

Transforming to a world less papered with PDF

YouTube channel DESIGNSPEAKING (<https://www.youtube.com/watch?v=s2jIR7DcdrY>) offers a short clip that briefly made the rounds on the Internet in late 2014ⁱ. It shows a timeline of what a professional desk has evolved into from 1980 until the current age. The desk starts out filled with office appliances and objects such as a notepad, scissors, a calculator, a clock, a notification board, and as the years pass, all these things either move to the computer screen as a digital application, become infinitely smaller or are folded into combined objects. The clip ends with a desk that just has a laptop and a phone on it.

PDF, the alternative to paper

PDF (Portable Document Format) started out in 1993 and has been contributing to this evolution. Its main draw is that it can partially or fully replace paper better than any other type of document can. Like paper, it's virtually platform agnostic, requiring no proprietary software to create or view, and its source can be almost any file type.

Also, unlike other file types, PDF is a container format in that it can retain vital file information from its source file while rendering its content for the human viewer as its creator intended. This and several other advantages that will be discussed later in this paper make it an excellent choice to switch to a low-paper environment, but the most important upsides of doing so are obvious:

Paper	PDF
Snail mail	Send in real time
Manual checks	Immediate authentication
Environmentally wasteful	Sustainable
Printing / scanning	Direct duplication / backup
Physical archives	Cloud storage, improved search
Physical accessibility constraints	Omni-channel access possible

So why do we still use so much paper?

While fully embracing PDF has been possible for a few years now, clearly not every company or organization is doing it. A 2011 study conducted by the MIT Center for Digital Business and Capgemini Consulting indicated that only one out of three companies has a digital transformation initiative in placeⁱⁱ. It is a question of strategy more than it is a question of technology, a 2015 research from the same organizations claimsⁱⁱⁱ, and this strategy includes overcoming inertia and resistance. After all, paper is not irreplaceable.

Fear of change

A primary factor that hinders the development of the paperless work-environment is that people are resistant to change^{iv} and prone to bureaucratic inertia^v. Indeed, a "big bang"-approach where

all paper is banned at once can be scary and is prone to fail because getting everything right in one go is hard^{vi}. In addition, no organization is forced to completely forego paper at all.

But regardless of strategy, some objections may be technological in nature, or at least be rationalized as technological concerns. These boil down to the persistent idea that PDF is nothing but a “static printout” that can’t be interacted with.

Security concerns and limitations

A piece of paper can be signed with an individual signature that is hard to forge. But how can you “sign” a PDF? Or add a company’s seal of approval? In more than 25 countries, electronic signatures can be legally binding, and their numbers are growing

To make electronic signatures via PDF safe and legal, in 2009 the PAdES (PDF Advanced Electronic Signatures) standard was released, which regulates how PDF and digital signatures interact with one another and makes it compliant with the European eIDAS (Regulation on electronic identification and trust services for electronic transactions in the internal market) directive. PAdES will very likely become a part of the upcoming PDF 2.0 ISO standard in the course of 2016-17.

Invoices

While many companies already send out invoices in PDF, they usually still require customers to manually make the payment and it requires both parties to agree on the proper method and procedure to follow, even if it happens through a banking application or with electronic card readers. Especially smaller companies can’t afford the fees to work with the kind of software required for that or do not have the same volume of invoices to justify this purchase. On top of that, EDIs exclusively offer device-to-device invoice methods. However, the German ZUGFeRD standard makes it possible for people to handle invoices without additional software requirements beyond the ones specified by the ZUGFeRD standard itself.

ZUGFeRD-compliant PDF documents contain structured XML data that can be read and interpreted by computer programs, and visuals that can be read and by humans. It is not an entirely new standard, but is based on the Cross Industry Invoice standard that is backed by the United Nations.

General interaction

However, as noted earlier, PDF is a container format that can comprise a surprising amount of information. Depending on the type of metadata embedded, it can make editing possible, contrasting with the widely held assumption that PDF documents are entirely static – a misconception further aided by the fact that typical PDF freeware offers only the creation or conversion into just that.

Although still difficult for the ordinary user, programmers and developers have several tools at their disposal with which they can’t just guarantee that their PDF documents will adhere to ISO standards, they can also go back and change some content. For instance, when a company changes its logo or needs certain information to be wiped, these tools can take care of that without needing to create entirely new documents from scratch. This makes PDF superior to paper, which will always have visible traces of being edited.

PDF/A, the star of the show

The ZUGFeRD standard uses the ISO PDF/A standard, which was primarily designed for easy archiving (and allows its data to be searchable). Of its three subtypes, PDF/A-3 – the specific format used by ZUGFeRD – even allows users to embed any type of data to the file, making it versatile for adoption by any business unit that wishes to switch to a less paper-intensive workflow.

As noted before, this requires more than just turning to a freeware PDF creator, but the cost of investing in programs or file libraries that can bring this benefit to an organization is negligible compared to the gains that will be made in terms of time, cost, space and sustainability.

Factor	Benefit of PDF
Time	Shorter process cycles
Cost	Less printing costs
Space	No physical storage required
Software	Less programs required
Security	Safe digital signatures
Sustainability	Lower paper consumption

Managing the change

As noted before, a step by step approach in converting from a paper to a PDF work environment is strategically more sound than doing it all at once. Organizations can use different ISO PDF standards when looking at processes and horizontal and switch to a low-paper or paperless workflow for them one by one. First, they can map their business and organizational needs on their technology needs and then execute the plan according to a predetermined blueprint. This is already a common practice in many digital transformation projects^{vii}, and an approach that increases chances of success when trying to switch from paper stacks to PDF.

ⁱ DESIGNSPEAKING, THE EVOLUTION OF THE DESK, <https://www.youtube.com/watch?v=s2jIR7Dcdry> (last retrieved March 31, 2016)

ⁱⁱ Capgemini, Digital Transformation, A Road Map for Billion Dollar Organizations, https://www.capgemini.com/resource-file-access/resource/pdf/Digital_Transformation_A_Road-Map_for_Billion-Dollar_Organizations.pdf (last retrieved March 23, 2016)

ⁱⁱⁱ Sloan Review, Strategy, Not Technology Drives Digital Transformation, <http://sloanreview.mit.edu/projects/strategy-drives-digital-transformation/> (last retrieved March 23, 2016)

^{iv} Dynamics University, Managing Resistance to Paperless ERP, <http://dynamicsuniversity.com/managing-resistance-to-paperless-erp-what-to-do-when-paper-lovers-wont-fold/>, (last retrieved March 23, 2016)

^v Forrester, Paperless Plight: Growing Resistance Outpaces Adoption Among US Bank Account Holders, <https://www.forrester.com/Paperless+Plight+Growing+Resistance+Outpaces+Adoption+Among+US+Bank+Account+Holders/fulltext> (last retrieved March 23, 2016)

^{vi} NCBI, The Myth of Going Paperless, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2815440/>

^{vii} Sloan Review, The Nine Elements of Digital Transformation <http://sloanreview.mit.edu/article/the-nine-elements-of-digital-transformation/> (last retrieved March 23, 2016)