



ENTRUST

SECURING A WORLD IN MOTION

Switching From Paper to Electronic Documents

A guide to universally accessible and trusted PDF documents with Entrust and iText



ITEXT

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Context

It's impossible to write an ebook about electronic documents in 2021 without starting with this evidence: The COVID-19 pandemic has profoundly changed the way businesses and institutions operate, and how documents are shared and processed. Within a few months, companies, governments, and consumers all around the world had to adapt quickly to the new requirements of social distancing, remote business, and working from home.

As part of the release of our new product, **Entrust Signing Automation Service**, we worked with **iText**, our technology partner for trusted PDF workflows, on creating this guide to help you address any challenges you may be facing around digital documents.

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Introduction

This ebook aims to provide high-level technical references and recommendations on the digitization process of documents that have been traditionally delivered in paper format.¹ Whether it's agreements, quotes, invoices, applications, bookings, personal records, reports, or even diplomas, this ebook will help you understand which important concepts should be taken into account in the digital transformation process of a document, and how to ensure the new electronic version can become a more efficient, user-friendly, and trusted format for your employees, customers, partners, and citizens.

Moving away from paper documents without losing trust and efficiency in the process

Switching to electronic documents isn't a bad thing. It may be stressful because of how sudden this became a requirement for you, but it also provides an incredible opportunity to rethink how your users visualize and consume your data.

We see two main challenges around switching to electronic documents:

1. Technological Challenge: Introducing change is never easy, but it's even more complicated when your electronic document needs to be universally accessible and compatible with a versatile audience.

2. Trust Challenge: The switch to electronic format isn't just a technological switch, but also a mindset switch. All parties involved in the creation of the digital document must trust that an electronic version of a document will be as good as a paper version.

We'll dive deeper into these two challenges with specific aspects to consider.

1. Note: this eBook provides an overview of some strategic elements to account for when issuing new documents in digital format. It does not cover the digitization of already-issued paper documents (e.g. scanning an existing paper document in order to have a digital copy).

Don't forget the legal aspects

Before switching from a paper document to an electronic version, you'll need to ensure that this won't cause any problems from a legal perspective. For example, some countries allow payslips to be delivered in electronic format, while other countries don't – or they require preliminary consent from the employee.

This ebook does not constitute legal advice. The suitability, enforceability, or admissibility of electronic documents will likely depend on many factors such as the country or state where you operate, the country or state where the electronic document will be distributed, as well as the type of electronic document involved. Appropriate legal counsel should be consulted to analyze any potential legal implications and questions related to the use of electronic documents.



THE TECHNOLOGICAL CHALLENGE

Introducing an electronic document that will be adapted and accessible to all readers

Universal accessibility starts with a universal format

It's no secret that documents in electronic format are much easier and faster to share. For example, emailing an invoice from California to Switzerland will take you seconds, and hosting a report on a public web page will make it instantly available to anyone with an internet connection. While this speed is beneficial to everyone, it comes with a compatibility challenge: How do you ensure that a document can be opened and displayed exactly how you want it to be, from any computer on this planet?

Thankfully, a solution was found quite early. In 1993, Adobe created the Portable Document Format (PDF). Adobe's objective was to create a document format that could display content in a way that was independent from any hardware, software, or operating system used. The format became rapidly adopted by organizations across the globe, and PDF became standardized with ISO 32000 in 2008.

PDF functions like a "digital container" for data. It gives you the guarantee that all of your readers will see the document exactly how you designed it. The fact that your content becomes "locked" is an added benefit. PDF documents are created for the purpose of being read, not edited. However, it is possible (and easy) to modify the content of a PDF. Later in this eBook, we provide guidance on how to ensure the integrity of PDF documents to prevent unwanted modifications.

In addition, PDF also offers many interactive functionalities, including search functions, forms, hyperlinks, electronic signatures, etc. This provides you with numerous customization and optimization features.

Thanks to these great benefits, PDF has become the de-facto standard across the globe. If you're wondering which format to use for your electronic documents, the good news is that you shouldn't need to worry about using anything other than PDF. Plus, with its ISO standardization, PDF does not require any specific licensing.²

2. Note however that the software that will be used in order to build and edit PDFs may require licenses.

PDF has become the de-facto standard across the globe

If you're wondering which format to use for your electronic documents, the good news is that you shouldn't need to worry about using anything other than PDF.

Understanding the potential use of the data inside your document

If you've started replacing your paper documents with PDF documents, and you're receiving complaints that your PDFs are "flat" and can't be properly used, this section is for you!

PDF is a fantastic format because it not only helps you display your content exactly how you want it to be, but it's also built for computers and software. An optimized PDF will contain detailed information about each layer of content it embeds. For example, if you add a picture, a video, or a table to a PDF document, each of them can be arranged in layers that computers can understand and process accordingly. This might seem trivial, but there's a good chance that someone will want to extract information from your PDF documents in order to import it into another software or application.

Let's take a simple example: If you have a banking application, perhaps you'd like to be able to extract all payments from your monthly PDF statement, and import this data into your budgeting application in order to check off all your expenses. PDF gives you this ability to transform your content into a powerful data container, which can then be leveraged for data analysis, data security, and data manipulation purposes – even in robotic process automation.





Uncovering the power within your digital documents

The latest version of ISO 32000 introduced PDF portfolios³, which enable you to embed editable documents inside the PDF document itself. This allows you to, for example, integrate an Excel spreadsheet that can be edited directly inside the PDF document. You can preview the spreadsheet inside the PDF, and double-clicking on it will open it in Microsoft Excel.

Before you start building your new digital documents, take a moment to think about:

1. The various types of data that will be included: email addresses, phone numbers, maps, charts, hyperlinks, numbers, forms, etc.
2. How someone might want to edit, complete, or extract this data to import it somewhere else. Facilitating this effort will make your customers, partners, and/or citizens much keener to receive your documents in electronic format and will encourage the transition process.

These elements will need to be accounted for when you start your PDF-generation process. Of course, there are also valid reasons for wanting to flatten your PDF. For example, if your document is intended to be printed, flattening your PDF document will help ensure that every layer of your PDF will be printed correctly.

3. Read more about PDF portfolios at itextpdf.com/en/blog/technical-notes/pdf-portfolios-and-how-use-them



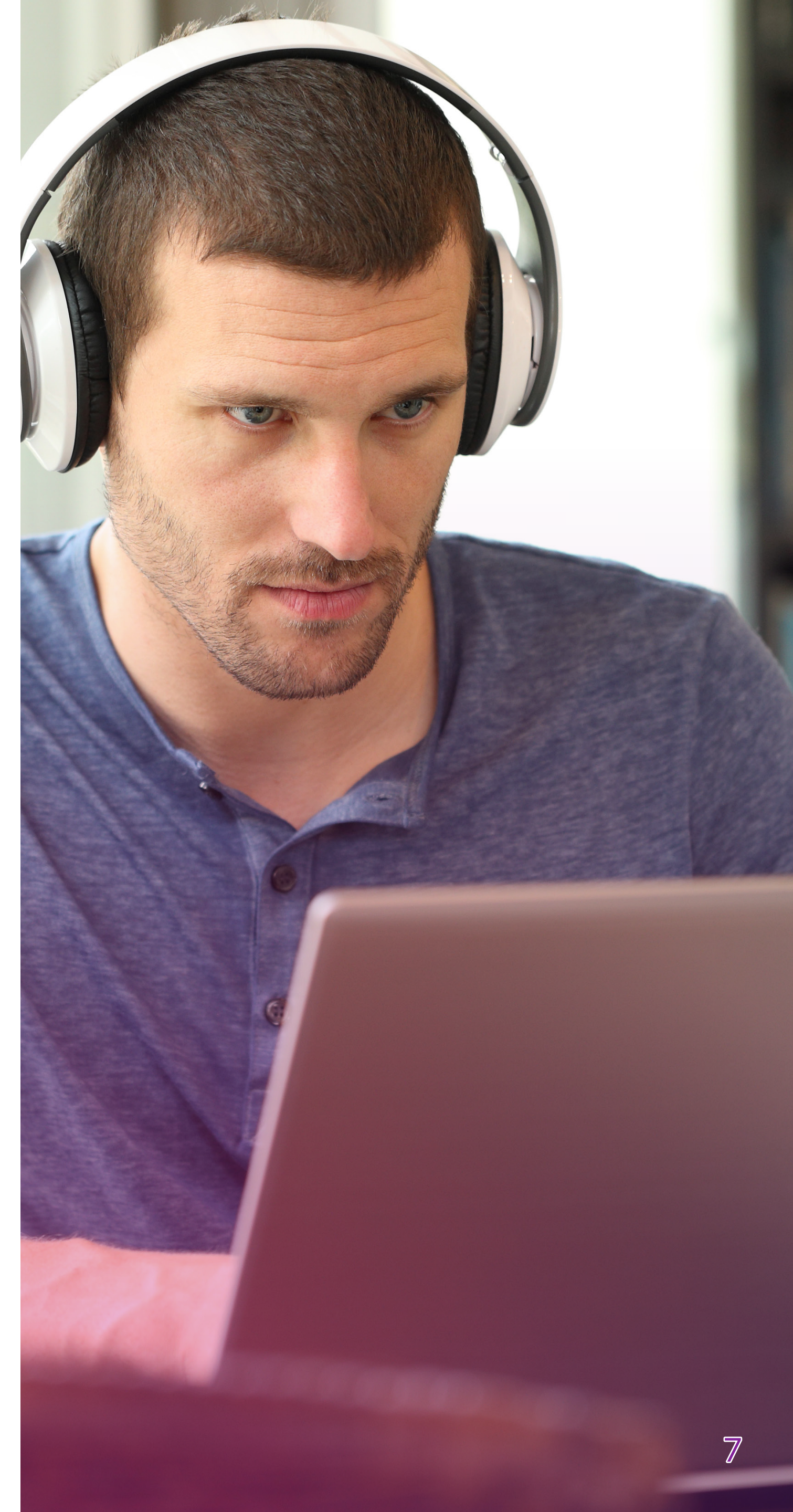
Ensuring an optimized reading experience for everyone

We previously explained how interactive and powerful PDF documents can be, and this is mostly looking at PDF from a computer's perspective. But your PDFs will be, above all, read by humans. You'll need to ensure that your PDF documents can be read and interpreted correctly by the largest audience possible, including people with a visual handicap.

Again, some good news: Universal accessibility is a topic covered by the PDF format; more specifically, ISO 14289 (also called PDF/UA⁴). This standard was created in 2012 and provides a comprehensive set of requirements for universally accessible PDF documents. In fact, many governmental organizations are required by law to make their documents accessible to the visually impaired, so you should verify if you are impacted by any similar requirement.

Creating PDF/UA-compliant documents doesn't merely mean using certain fonts or big letters. There are software and applications dedicated to helping visually impaired people read documents, and the PDF/UA standard is here to help you build a PDF that will be correctly interpreted by such software.

4. Read more about PDF/UA at pdfa.org/wp-content/uploads/2013/08/PDFUA-in-a-Nutshell-PDFUA.pdf



Embedding accessibility into everything

Following the PDF/UA standard will help you ensure, for example, that the navigation inside the document can be done using different methods, and that the text in your PDF can be easily converted into braille language. It also helps ensure that each layer of information is correctly tagged, so that assistive technology (text-to-speech, braille, screen magnifiers, etc.) can easily categorize content and facilitate reading. PDF/UA notably makes a distinction between “meaningful content” and “artifacts.” Everything needs to be marked appropriately in order to create a comprehensive structure tree.⁵



Key PDF/UA requirements

- Complete tagging of meaningful content in logical reading order
- Tags must correctly represent the document’s semantic structures (headings, lists, tables, etc.)
- Problematic content is prohibited, including illogical headings, the use of color/contrast to convey information, inaccessible JavaScript, and more
- Meaningful graphics must include alternative text descriptions
- Security settings must allow assistive technology access to the content
- Fonts must be embedded, and text mapped to Unicode



5. Read more about PDF/UA with iText at itextpdf.com/en/solutions/archiving-and-universal-accessibility-pdfa-and-pdfua

Documents lifecycle: Do you need archiving?

Often associated with regulations, document archiving is an important step of the document lifecycle. Unfortunately, switching to electronic documents will not remove the need for archiving. Instead of physically storing paper in a facility, you'll need to store your electronic documents in a data center using special services dedicated to this process. In both cases, long-term preservation is critical to ensure data conserved throughout the years remains readable.

Centuries-old paper documents can be tough to read: Our language back then was very different; writing styles, too. Plus, ink fades away, paper becomes yellow ... but if you think we don't have these problems with electronic documents, try opening a .doc file created with Microsoft Word 95. Our computers have evolved fast, we keep adding new features to our document processing software, and even PDF capabilities and features have evolved.

So if mortgage agreements, deeds, birth certificates, and other sensitive documents now need to be issued as PDFs, how do we make sure we can still read them properly 20 years from now?



Reading digital documents for years to come

PDF/A is an ISO-standardized category of PDF (ISO 19005) that was created specifically to overcome the challenge of document longevity. It provides a set of requirements and restriction on PDF features in order to maximize compatibility with future technology. It was created in 2005 with 2 levels of compliance:

- **PDF/A-1b:** Level B (basic) conformance
- **PDF/A-1a:** Level A (accessible) conformance

It has received several updates, with the next standard (PDF/A-4) expected to be released in the upcoming years.

PDF/A compliance requires a lot of sacrifices in terms of interactive features, so you need to keep this in mind when you have legal requirements that require you to keep your PDF documents for a certain number of years.⁶

6. Read more about PDF/A at pdfa.org/pdfa-faq/

Key PDF/A requirements

- Audio and video content is forbidden
- JavaScript and executable file launches are forbidden
- All fonts must be embedded and must be legally embeddable for unlimited, universal rendering (this also applies to the so-called PostScript standard fonts, such as Times or Helvetica)
- Color spaces must be specified in a device-independent manner
- Encryption is forbidden
- Use of standards-based metadata is required
- External content references are forbidden



Covering different languages in a single PDF: お願いします! (Yes please!)

This section covers the language challenges that you may face as you switch over to the electronic format for your paper documents.

This may not be a problem for countries with only one official language. But many countries use multiple official and non-official languages in their communications, sometimes with different alphabet types. Ensuring that your PDF will be able to display English, French, and Arabic correctly is a step that is often overseen in the conception of a PDF workflow.⁷

On a related note, remember that the fonts used in your PDF should be embedded to avoid displaying the wrong typeface, random spaces across your text, or overlapping letters. This is also a requirement for PDF/A and PDF/UA compliance.

7. Learn more about displaying text in different languages with iText at itextpdf.com/en/blog/technical-notes/displaying-text-different-languages-single-pdf-document





THE TRUST CHALLENGE

Maintaining a high level of confidence in your new electronic documents

Now let's spend some time on the second big challenge of switching from paper to electronic documents.

Switching to an electronic version of a document often means that you have to integrate it into a workflow, which partially or totally replaces a physical interaction. Face-to-face appointments, filling in paper forms, or signing paper documents with a pen are now done from a computer, using a web or desktop application. While this brings unmistakable benefits, it also represents significant changes for users and citizens.

If you're providing a digital version of a document that used to be delivered on paper, it will undoubtedly trigger concerns and questions about the perceived value of the document. And this you must address.

There's trust ... and there's "trust"

In the IT industry, we make an important distinction between human trust and computer trust.

For humans, trust is a feeling with numerous levels and nuances. It's a perception of confidence and security, a belief that something or someone will behave in the expected way.

For computers, trust is more rigid because it needs to be based on specific arguments such as "if this then I trust, if that, then I don't trust." This concept is especially prevalent in IT security, where the large majority of secure interactions rely on technologies (notably PKI⁸) based on standards and protocols that specifically define trust.

Why should this matter to you? Because once your documents become electronic, they'll be processed by both computers and humans. And it turns out computers have a way to trust documents, and this greatly helps humans trust the document too. The next sections explain how computers and technology can help users decide whether to trust an electronic document or not.

8. Public Key Infrastructure. Learn more about PKI at entrust.com/resources/certificate-solutions/learn/what-is-pki

To get consumer trust, you need to provide guarantees

There are four objectives to meet in order to provide the best levels of confidence and ensure users will trust your electronic documents:

1. The guarantee of legal value

The guarantee of legal value will be based on the laws and regulations in the country/state where your electronic document will be published. This ebook does not cover this legal aspect and we encourage you to:

- Consult appropriate legal counsel and government resources for questions such as the suitability, enforceability, and admissibility of electronic documents as well as compliance requirements with local regulations
- Publish information on your website and potentially on your electronic documents about the legal value of such documents

2. The guarantee of authenticity

Document authenticity is tied to the concepts of authorship and ownership. A guarantee of authenticity represents the assurance that the document does come from your organization, and that it is genuine and official.

➤ The authenticity, integrity, and non-repudiation of an electronic document can be easily achieved with the same technology: digital sealing.

3. The guarantee of integrity

Document integrity is achieved when anyone has a way to verify that the content of the document has not been tampered with, meaning there hasn't been any modification since the document was created.

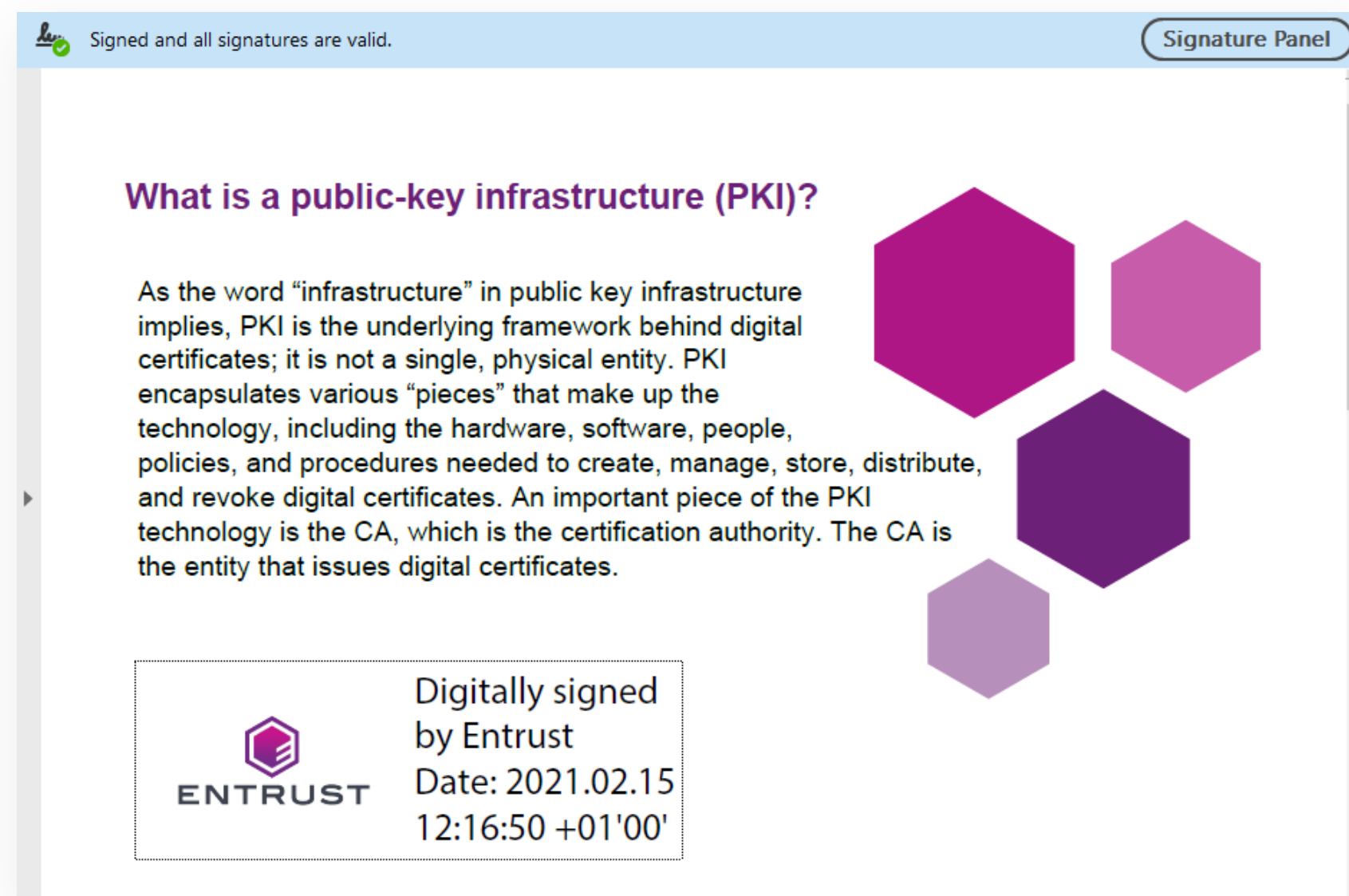
4. The guarantee of non-repudiation

Non-repudiation is an interesting concept. There is no legal or even technological protocol to achieve non-repudiation, but the idea is to ensure that the author and/or the signatory(ies) of a document cannot deny the existence of such document. Non-repudiation is typically achieved through proof of authenticity and integrity, but also using timestamping (timestamping discussed later in more detail).

With the exception of the legal aspect, the authenticity, integrity, and non-repudiation of an electronic document can be easily achieved with the same technology: digital sealing.

Digital seals to the rescue

A digital seal (also called an electronic seal) is a PKI-based technology that you apply to an electronic document. It is fully compatible with PDF format and it can guarantee the authenticity and integrity of an electronic document. Digital seals are also compatible with timestamps to ensure non-repudiation of the document (again, timestamping is discussed later in more detail).



A digital seal on a PDF document.

Note: Adobe Acrobat doesn't make the distinction between a digital signature and a digital seal, since the only difference is on the name embedded in the certificate.

How they work

Digital seals are based on the same technology (PKI) as digital signatures, the difference being in the identity bound to the document:

- A **digital signature** binds the document to a physical person (an individual)
- A **digital seal** binds the document to a legal person (an organization)

Digital seals are generated using:

1. A software that supports digital signing, such as iText 7⁹
2. A digital certificate, issued by a certification authority (CA), such as Entrust¹⁰

The certificate contains the details of your organization, and it will be embedded into the seals you generate. This is why before issuing your digital certificate, we verify the details of your organization in public records, and we verify that your organization is in good standing. This ensures that the information in the certificate and in your future seals is accurate.

9. Read more about digital signatures with iText at itextpdf.com/en/solutions/electronic-signatures-pdf

10. Learn more about Entrust's digital signing solutions here: entrust.com/digital-security/certificate-solutions/products/digital-signing


Document trust is maintained through easy verification processes

Sealing documents is not a complicated process, and it can be easily integrated into an electronic document workflow. The real benefit of digitally sealing electronic documents is that you provide computers and users with globally accepted tools to verify the integrity and authenticity of the document.


Many applications integrate digital signature and seal-verification features. PDF readers like Adobe Reader or Adobe Acrobat even provide visual indicators for the user to quickly find:

- The name of the organization
- If there was any change(s) made to the document




 Signed and all signatures are valid.

The seal is valid. The certificate is trusted and the content has not been tampered with.

 At least one signature has problems.

The seal was generated using a certificate that is not trusted (see next page).

 At least one signature is invalid.

The seal is invalid. The document has been tampered with.

From a computer's perspective, a digital seal will be considered valid if:

- The document has not been tampered with
- The certificate used for the seal has not expired or been revoked
- The issuing certification authority is "trusted"



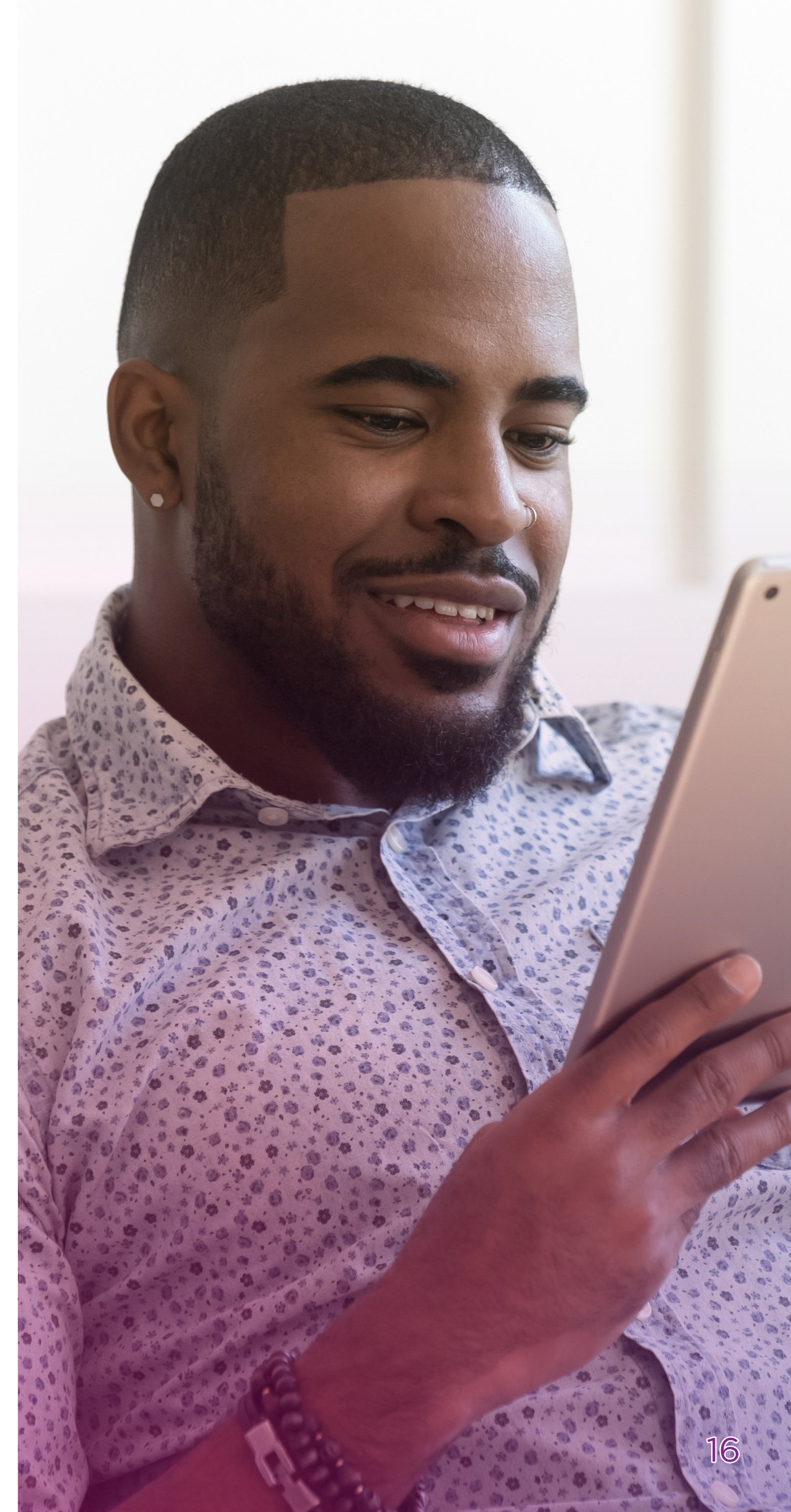
Global trust matters

This “trust” is what we referred to earlier. PKI technology is based on trusted central authorities that are tasked with the issuance of digital certificates. Roughly explained, these authorities – the CAs – are trusted to issue certificates containing accurate information about their owner so that when a computer comes across a digital signature or seal, it can safely trust the information contained in the seal because it was generated with a certificate issued by a trustworthy CA.

To put it in a different way ... anyone with a computer can create a CA and issue digital certificates for seals, but all operating systems (and sometimes software) on this planet embed a “trust list” (also called “root store”), and they will only trust certificates issued by CAs that are present in these trust lists. Being added to – and remaining in – these trust lists is a very costly and lengthy process, so it’s not something everyone can do.

For digital seals, it is therefore crucial to work with certificates issued by CAs that are included in global trust lists. Entrust is one of such globally trusted CAs, and we are also part of the Adobe Approved Trust List (AATL), which means our certificates are natively trusted by Adobe Reader and Adobe Acrobat.

Generating digital seals with certificates that weren’t issued by a trusted CA will result in computers and software not trusting the seal, unless the user manually and explicitly asks their local computer to trust the CA.



Timestamping brings significant benefits to a document's validity

We've mentioned timestamping in the previous sections as an important piece for non-repudiation. Timestamping consists of asking a timestamping service to add an extra signature to a document, using the service's own clock.

➤ **Combining digital seals with timestamps on all your electronic documents is the best way to provide your users with the confidence that the content can be trusted as much as – if not more than – their paper version.**

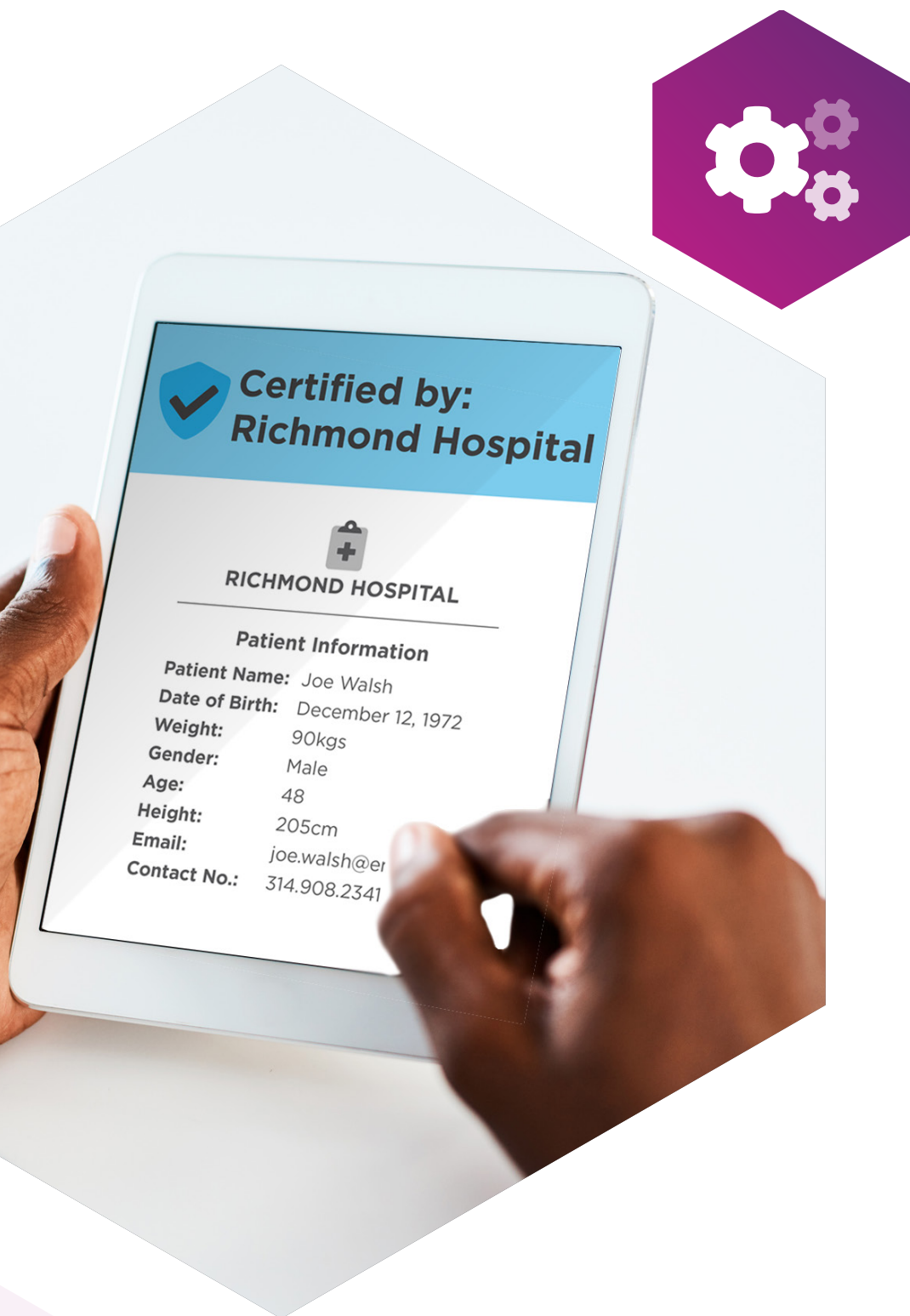
Timestamping is also based on PKI, which means it's important to work with a publicly trusted CA for this process. This ensures that the timestamp will be trusted, but also that your seal's date and time will not be based only on a local computer or server's clock, but on a trusted party's clock.

Timestamping will also extend the validity of your seals. Without a timestamp, a seal will become invalid when the certificate used for the seal expires, which is usually within three years. Timestamping services use long-lived certificates that are changed every year, so that when you timestamp a sealed document, the validity of your seal is extended. Public timestamping services typically provide an extra 9-10 years of validity. Of course, you can add a new timestamp before the previous one expires to further extend the validity of your document seal.

Timestamping is a key element for non-repudiation of a document because it can prove the existence of the document from a specific date and time. This is also why timestamping is typically used as part of archiving processes.

Combining digital seals with timestamps on all your electronic documents is the best way to provide your users with the confidence that the content can be trusted as much as – if not more than – their paper version.





COMBINING IT ALL TOGETHER

Building universally accessible and trusted PDFs with iText 7 and Entrust Signing Automation Service

Entrust and iText share a common objective: helping organizations of all sizes, in any industry, to achieve successful digital transformations. We both operate at global level and provide solutions based on highly compatible technologies. It was a natural step for us to provide a joint solution, combining our decades of expertise in digital documents and digital signatures.

Entrust and iText solutions will help you build a customized PDF creation workflow that will be tailored to your content and optimized for your audience. With an automated integration of trusted digital seals and timestamps, it'll give your readers peace of mind regarding the authenticity and integrity of your PDF documents.



About iText

iText is a global leader in innovative, award-winning PDF software. Its software is used by millions of users – both open source and commercial – around the world to create digital documents for a variety of purposes, including invoices, credit card statements, mobile boarding passes, legal archiving, and more.

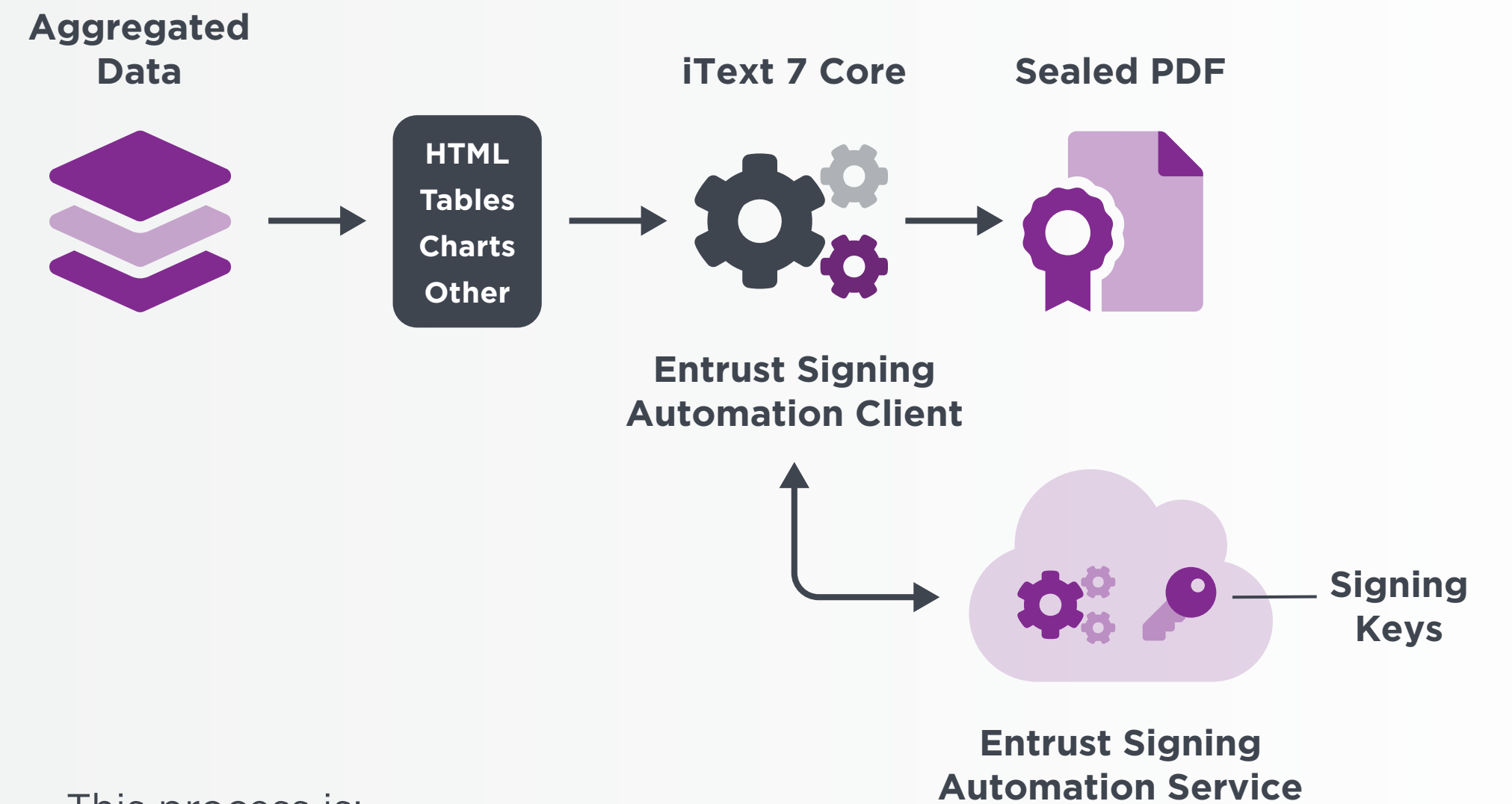
How it works

To start building your PDFs, you'll of course need to start by putting together the data that will be inserted into your PDF. The iText 7 Suite includes a Core¹¹ library as well as some add-ons to support your data acquisition and aggregation scenarios (data extraction, conversion, structuration, format, etc.)

The next step is creating templates. You can design templates for each type of document you need, allowing you to build fully automated document issuance workflows.

Once the templates are in place and your PDF build process is in place, you can easily add a document sealing step by integrating the Entrust Signing Automation Service¹² into your workflows with iText 7. Entrust provides a Signing Automation Client based on PKCS #11 that is installed together with iText 7, enabling iText to connect to the Entrust Signing Automation service in order to query a seal for each individual document generated.

Entrust is a qualified trust service provider (QTSP). We can issue eIDAS qualified certificates for the generation of eIDAS Advanced Seals.



This process is:

- **Built for Automation:** The objective is to simplify your document creation process and to make sure it can be integrated into your specific workflow (invoicing, statement issuance, reporting, etc.)
- **Secure:** Connections are strongly authenticated and secured by TLS
- **Fast:** Only a hash value of the document to seal is sent to the service, which is only a few bits long
- **Risk-Free:** Even though Entrust Signing Automation Service is a cloud-based solution operated by Entrust, it only receives hash values, so your sensitive data never leaves your premises

11. Learn more about iText 7 at itextpdf.com/en/products/itext-7/itext-7-core

12. Learn more about Entrust Signing Automation Service at entrust.com/digital-security/certificate-solutions/products/digital-signing/digital-signing-as-a-service/signing-automation-service

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ABOUT ENTRUST CORPORATION

Entrust keeps the world moving safely by enabling trusted experiences for identities, payments, and digital infrastructure. We offer an unmatched breadth of solutions that are critical to enabling trust for multi-cloud deployments, mobile identities, hybrid work, machine identity, electronic signatures, encryption, and more. With more than 2,800 colleagues, a network of global partners, and customers in over 150 countries, it's no wonder the world's most entrusted organizations trust us.

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