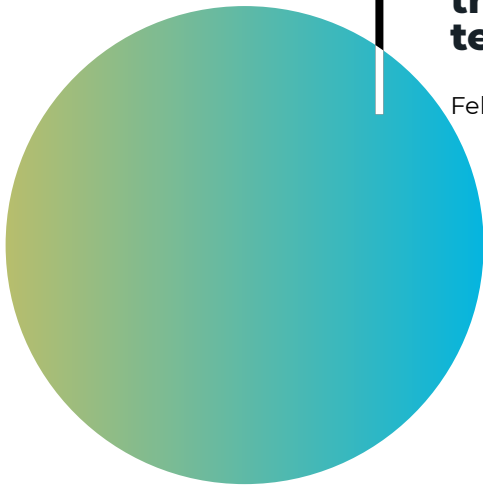# CERTILOGO

Connected Product: QR Code VS NFC Tags
Dispelling the False Myths

Everything you need to know, that they won't tell you about

February 2022

Contents

About this report

How much of what you have been told about NFC tags and QR codes is true?

To find out, over the course of 2021, Certilogo's sales, marketing, and account management teams documented the knowledge and awareness of QR codes and NFC tags, and the perception of perceived pros and cons as digital 'connected product' identities, among prospective clients.

The most common beliefs were then rigorously reviewed by Certilogo's team of experts, equipped with the best in class experience of over 80 connected product and authentication implementations within the luxury fashion and apparel industry.

The findings identified 10 commonly held misunderstandings, which if not corrected in the earliest stages, are likely to impact significantly on the successful delivery of a digital connected product strategy.

These 'false myths' are dispelled using examples and data-driven insights harvested from the Certilogo platform, which powers a new product engagement every 8 seconds, and has given a secure identity to over 500 million products.

This report is designed with a brand's **Innovation, Digital Transformation and Sustainability project teams** in mind, to help align the Operations, Brand Marketing, Systems, Product Design and Brand Protection functions early on in the process of developing their connected product strategy.

"If you want to do smart tagging, tag in a smart way…"

Introduction

The objective of this white paper is to highlight and dispel the most commonly held and unhelpful false myths surrounding QR code and NFC tags, that pose the greatest risk to the successful outcome of connected product identity implementations.

The number one objective for fashion marketers is consumer engagement, so it is of no surprise that 36% of digital leaders are planning investments to connect physical products with digital services that enrich the brand experience anywhere the product is found[1]. Digital transformation, sustainability and brand protection strategies are also increasingly demanding a connected product identity.

One of the fundamental decisions for brands as they embark on their connected product strategy is to choose which smartphone readable tagging technology they will apply to their products. **This decision is prone to two key risks: It can be made too early in the process, prior to acquiring an understanding of**

the critical role played by the underlying platform that will power the consumer experience; and by being based on misinformation perpetuated about QR codes and NFC tags.

Suppliers and manufacturers are often bound to one specific tagging technology. Like most proud parents, they tend to oversell certain features and overlook altogether the challenges that come with adopting their preferred technology. This mis-selling leads to the proliferation of disinformation across websites and blogs dedicated to the subject. **It is often what vendors will not tell you, that is of most vital importance. Leaving it for brands to find out months into implementation, that the platform is not as robust as promised, by which time, it has become very expensive to turn back.**

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[1] *Certilogo 'Consumer Engagement 4.0' report.*
https://discover.certilogo.com/sites/default/files/articolo/certilogo_consumer_engagement_4_report_2019.pdf

False myths also emerge as people base their judgments on an understanding of how well these technologies function in sectors other than apparel. **Where a tag may perform a certain task exceptionally well for one industry or category of product, it may have serious limitations in others, or vice versa.** Our own cultural and personal preconceptions, influenced by the ways in which we interact with either of these technologies on a daily basis, can also strongly bias our perception of which we think will work best. For one region NFC may be the method of choice to handle contactless payments, but in another QR codes are a way of life.

Each false myth is fact-checked with the aid of examples and insights gleaned from the data generated from 500.000.000 active product identities. Reading the full report will prime the reader on both the key success factors and the most important obstacles of implementing either technology.

So whether you are a seasoned expert on product serialization, or someone who thinks serialization is something you eat for breakfast, forget everything you think you know about QR codes and NFC tags.

Let the debunking begin.
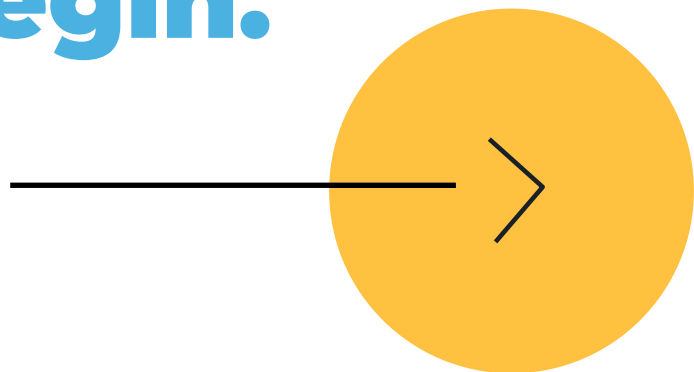
Executive Summary

Consumer engagement with both NFC and QR codes continues to rise, as they continue to grow in popularity. No one technology is set to supplant the other, rather they are most commonly being adopted together in hybrid solutions. **Brands should ideally plan to be able to manage multiple tag types, even if they will only adopt one initially.**

The most common false myths relating to security, durability, and versatility, are not ultimately what really set NFC tags and QR codes apart from each other. In most instances, the two are effectively interchangeable. **It is the underlying platform and the specific experience and skills employed during implementation that will determine the success of these themes.**

The same highly engaging connected experiences or robust product authentication can be achieved independently of either tag type. QR codes can be versatile, secure, and conveniently used throughout a 360° consumer journey to equal effect. Successful engagement with the consumer is far more dependent on a host of other factors, rather than coming as a standard with any one type of tag. **A deep understanding of the consumer must inform the choice of tagging technology.**

NFC tags and QR codes can both endure the entire life of the product. **Reliability depends less on the tag itself, and far more on an ability to source the right standard of tag and use the correct methods to apply the tag, ensuring it is correctly designed to face the conditions that the product will encounter.** Underestimating the complexity of this task can lead to some unpleasant surprises.

The choice of tagging technology will mainly be driven by its economic viability, the categories of product to which it is able to be applied, the socio-demographic profile of the consumer, and the sustainability strategy of the brand. The selection of a tagging technology must be informed by an analysis of the production and distribution workflows, and the consumer journey for the entirety of the product's lifecycle.

It is strongly recommended to employ the experience of a vendor that is agnostic of tagging technology, and that has extensive knowledge of the luxury fashion and apparel sector, to determine the right tagging technology for your brand.

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Connected Product

Top 10 False Myths: QR code vs NFC tags

Ease of Use

#1 The QR code has been superseded by NFC technology.

#2 People are far more likely to engage with NFC tags.

Implementation

#3 Projects that adopt QR codes are simple enough to implement in-house.

#4 NFC tags are not suitable for use on categories of products that require treatments or washing during their production or end-use.

Versatility

#5 NFC tags are more versatile. They can store more data, be edited and deliver a greater range of content, including video. QR codes can only encode a web link.

#6 The QR code is not suited for use as a connected product identity to empower 360° customer experiences.

Durability

#7 QR codes are not durable and are easily damaged. NFC tags are far more reliable.

Security

#8 QR codes are far less secure than NFC tags. QR codes can easily be duplicated, faked, and hacked, while NFC tags are impossible to clone.

#9 It is not possible to track counterfeit products when they adopt fake NFC tags.

Cost

#10 The final cost of a connected product and authentication projects is mainly determined by the choice between QR code or NFC tag technologies.

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#1
The QR code has been superseded by NFC technology.

Fact Check Busted!
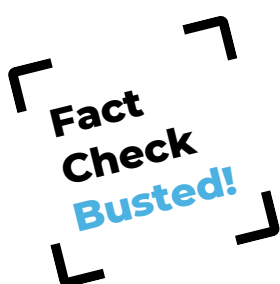
Just as television did not replace the radio or the cinema, and the invention of cars did not render bikes obsolete, NFC tags will not be 'the death of the QR code' as some proclaim. Since the arrival of NFC technology, the use of QR codes has grown exponentially and still far exceeds that of NFC.

Both technologies are thriving and empowering an ever-growing range of experiences we encounter in our daily lives. Each has carved out their own specific niche for which they are most commonly associated: NFC for contactless payment and transit ticketing, QR codes for marketing activations, event tickets, and vaccine passports. The perception of each is often cultural, and must be taken into consideration. In China, the QR code is the most commonly used technology for managing contactless payments for example[2].

When adopted for product authentication and connected product identifiers the technologies are essentially interchangeable, with each one able to do a vast majority of the same tasks. Rather than one technology supplanting the other, they are increasingly used together in a hybrid solution.

The adoption of NFC tags in this sector has grown in popularity since 2017, but the share between the two is now stabilizing with a fairly even split between the two technologies (**Fig. 1**). QR codes have a series of unique strengths which will be discussed throughout this white paper, that can make them better suited than NFC tags for certain types of application, which sets them on a path to enduring for a long time to come. In fact, product engagements via QR codes continue to grow exponentially year over year (**Fig. 2**).

It is strongly recommended to build flexibility into your strategy, by working with partners who are agnostic of any one technology, and not to build a platform that is bound to one specific type of identification tag. Certilogo supports a range of different product identifiers, including both QR and NFC empowered solutions.

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[2] *Chinese users of WeChat generated an estimated 140 billion unique QR codes during the pandemic, and are forecast to use 600 billion codes per year from 2022.*

Fig. 1.

Share of NFC and QR Code scans by year on a sample of Certilogo clients with hybrid implementations (QR Code combined with NFC).

While the adoption of NFC has grown across the Certilogo portfolio of clients, QR codes continue to manage a significant quantity of product engagements.
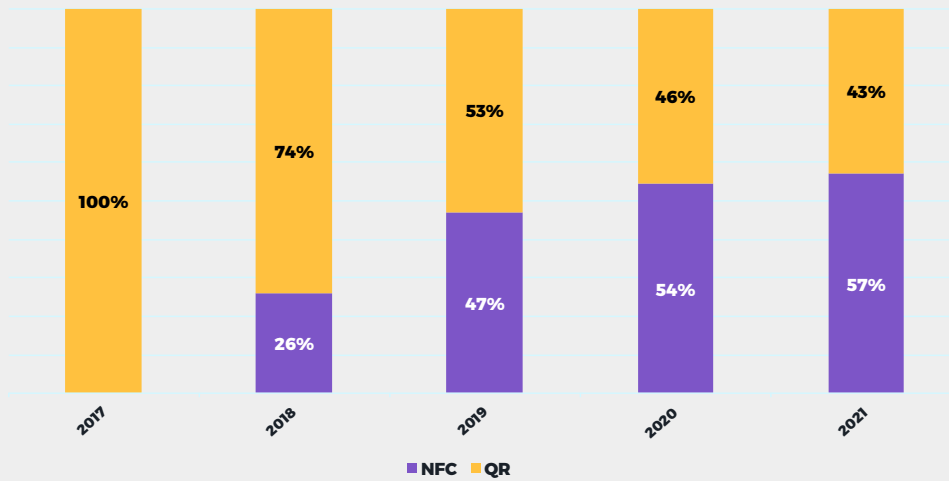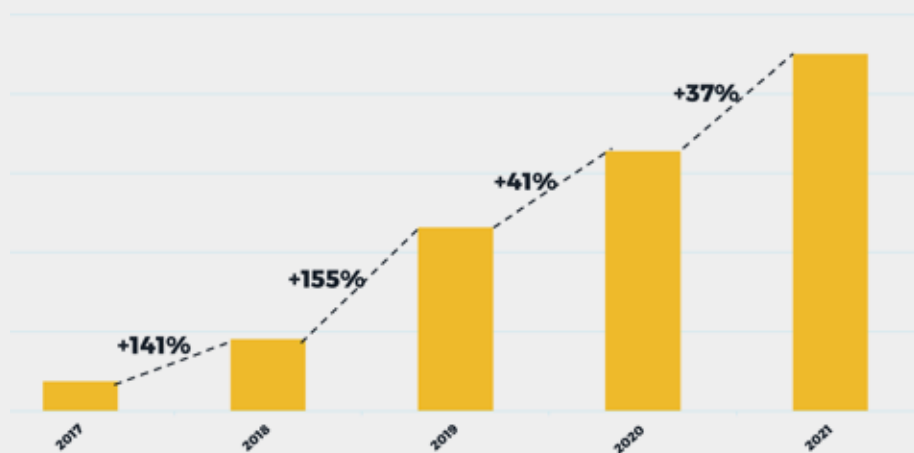

Source: Certilogo Analytics 2022

Fig. 2.

Yearly growth of connections through QR code across the Certilogo portfolio.
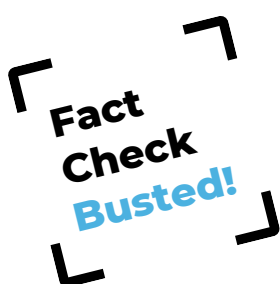*QR codes engagements continue to grow at an exponential rate.*

Source: Certilogo Analytics 2022

#2
People are far more likely to engage with NFC tags.

Fact Check *Busted!*

The perception of being a more advanced, faster or easier to use solution does not automatically translate into NFC's being more attractive and engaging to the end consumer. The consumer is actually more likely to instinctively engage with a QR code than an NFC tag.

In many cases, there is little to no significant difference in the speed or convenience between one tagging technology and another when considering the complete user experience.

The adoption of QR codes increased rapidly ever since their readability was integrated into the camera app of all smartphones as standard. The recent pandemic has seen an exponential rate of engagement with QR codes thanks to their adoption for facilitating track and trace 'check-ins' to bars and restaurants, contactless digital menus, and green passes for the easy sharing of vaccine status. Thanks to their increasing pervasiveness in our daily lives, and their iconic design they are far more familiar to most people than NFC tags. The highly visible QR code has become a call to action in itself that says, "scan me, I am useful".

NFC technology on the other hand often tends to be hidden out of sight when we use it: Tapping our phone on a credit card terminal to pay for our shopping or nearing our smartwatch to the gate to gain access to the metro station. Each experience is different and has a totally different iconography, which makes it challenging to recognize an NFC tag and to anticipate the benefit to be had by scanning it. Depending on the demographic, there is also less chance people will have a device that can read the tag, than for a QR code. While most, but not all smartphones, now include NFC readers, there are still many older smartphones in circulation that are not NFC ready.

This means that products with QR codes can on average expect to see a higher rate of engagement than products with NFC tags. More people are inclined to recognize the tag, know how to activate it, and ultimately feel compelled to use it. (**Fig. 3** and **Fig. 4**).

Fig. 3.

QR code vs NFC: Product engagements as a percentage of total active tags.C

omparing two best-case implementations of QR-only and NFC-only solutions, the consumer is more likely to engage with the QR code than an NFC.
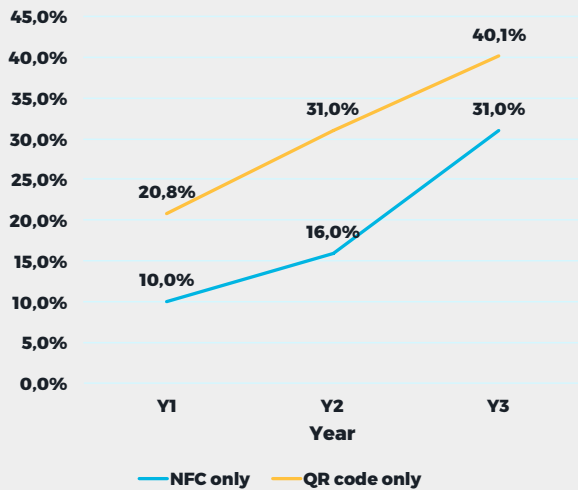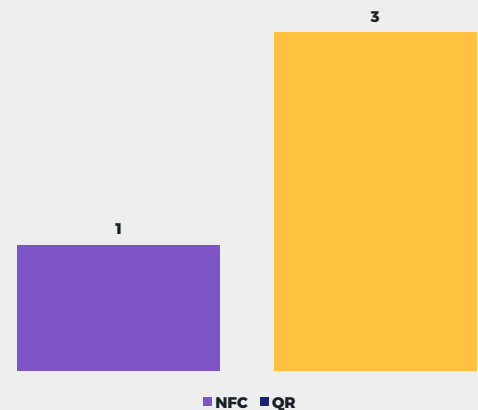

Source: Certilogo Analytics 2022.
Number of product connections as a percentage of active tags

Fig. 4.

QR code vs NFC: Average frequency of engagements.

Across a sample of NFC-only and QR-only Certilogo implementations, QR code engagements occur 3 times more frequently than for NFC.

Source: Certilogo Analytics H1 2020.
Average interactions with QR/NFC in the same timespan (2 minutes).

An NFC tag can be read swiftly with just a simple tap of the phone, and instantaneously return a clear and 100% trustable confirmation of the authenticity of a product. This advantage over the QR code can be especially useful if the tag is used to access marketing content. However, for product authentication, for example, the full experience can be richer. An authentication experience must avoid wrongly certifying false products, be able to recognize all possible cases of counterfeit products, and offer support where a user's smartphone is the cause of an inconclusive authentication. When adopting best practice principles, the use of an authentication site or app is recommended and so any differences in tag reading speed become less relevant.

When evaluating the advantage of one tag type over another, it is essential to consider the entire consumer experience, as small gains in one part of the experience could result in greater inconvenience later on. NFC tags can be faster to provide a trustworthy certification of an authentic garment, but can result in a higher incidence of inconclusive responses than QR codes when encountering fake or corrupted NFC tags, and due to consumer error, (**Fig. 6**). Certilogo data from hybrid implementations highlight that by including both technologies, brands can maximize the overall engagement with the product (**Fig. 5**).

The adoption of a connected product tag, regardless of tagging technology, does not guarantee consumer engagement with a product. No one tag is necessarily better than the other. The brand, the value of the product, and the consumer demographic can all influence which technology will offer the greatest engagement. The tag must be executed with the right design, placement, and messaging to the consumer, and most importantly of all is to offer the consumer an experience that they desire to engage with.

Fig. 5.

Maximum level of engagement recorded on a sample of Certilogo clients when adopting a hybrid of both tagging solutions.

While the consumer was more likely to engage with the product via the QR code, the inclusion of both tag types maximized the engagement with the product.
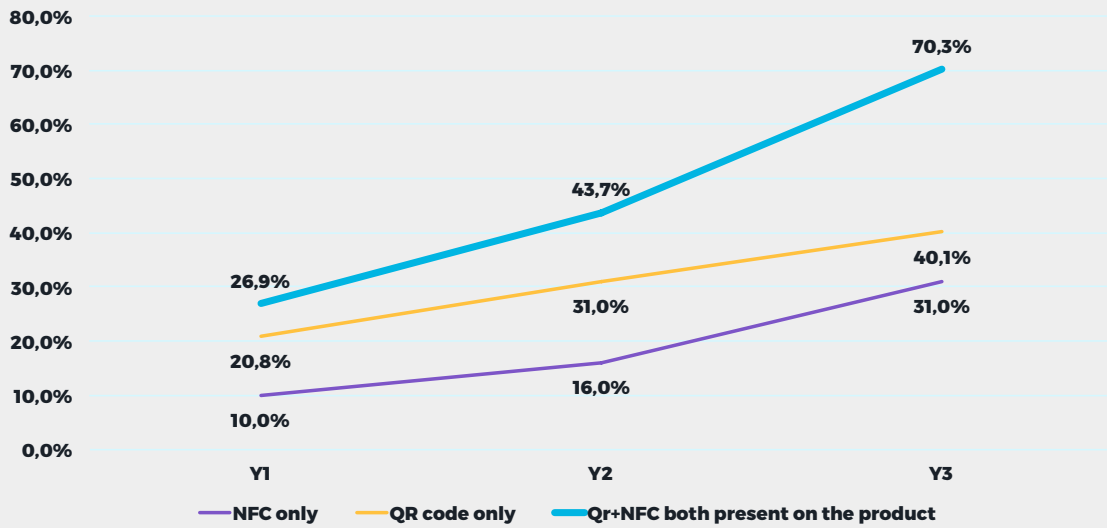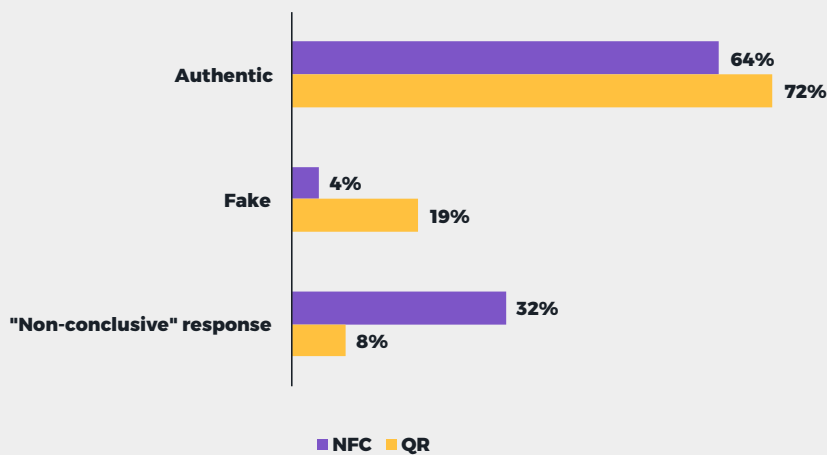

Source: Certilogo Analytics 2022.
Number of product connections as a percentage of active tags

Fig. 6.

Share of delivered responses by type of tag (QR vs NFC).

*Each tag interacts with the backend platform with a different methodology to authenticate the product. **NFC demonstrates a higher incidence of non-conclusive responses which require the support of a customer care intervention to resolve. Non-conclusive responses deriving from NFC interactions are mostly generated by cloned or counterfeit NFC chips.*

Source: Certilogo Analytics 2022.

#3
Projects that adopt QR codes are simple enough to implement in-house.

Fact Check Busted!
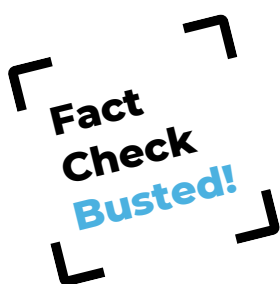
Companies with experience in product serialization often assume it is easy to develop an internal connected product solution. However, product identity is very different from product authentication or connected product identity, and projects are far more complex to implement.

QR code based implementations can be simple and fast to adopt. Unlike NFC tags they do not require any additional specialist hardware or skilled resources to produce them. But this relative simplicity can lead to a false perception of the ease with which they can be adopted for product authentication or connected product identities.

The labels themselves appear identical to standard QR codes, but the project and the underlying platform required to power it are far more complex. Failure to recognize and understand how to overcome these complexities can incentivize increased counterfeiting and lower the customers' trust in the brand, which is contrary to the project's goals.

For example, it is not sufficient to authenticate genuine tags. It is also necessary to recognize counterfeit tags; where a QR code has been cloned or a counterfeiter has applied a tag

that redirects to a fake 'authentication' experience. Once a product has been determined to be fake, the brand must also understand how to manage the consumer's expectations and resolve the problem. Products can have a long life. Will the user still be able to access a useful experience when they scan a tag several years after purchase?

These are just a few of a multitude of challenges, which if tackled without an experienced partner, will risk greatly slowing down the delivery of the project, result in costly mistakes and deliver a platform that is not agile enough to scale effectively in the future. These very same challenges are relevant independent of the product tagging technology. With an experienced partner, costly mistakes can be avoided, and projects can be implemented far quicker. Certilogo can realize projects in as short a time as four weeks.

#4
NFC tags are not suitable for products that require washing or treatments during their production.

Fact Check Busted!
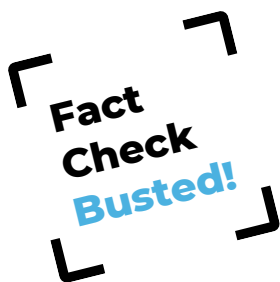
Specialized NFC tags incorporate enhanced chip designs and protective casings, that enable them to resist the harshest production processes. They can withstand extreme temperatures, color dying, chemical, and abrasive treatments, and endure the most demanding wear and tear encountered by extreme sports and outdoor wear.

Standard NFC tags are prone to damage when exposed to water and chemicals, UV radiation, extremes of temperatures, and from the abrasion, collision, or bending that can be caused through the use of a product. Even the slightest flaw can render the NFC tag unusable. Certain materials can interfere with their antenna and prevent them from being read. It is, therefore, necessary for apparel and accessories applications, that the NFC tags are specially designed for such use, and placed away from zips or metallic accessories.

Brands must ensure they have the required skills and experience to identify and

procure the correct NFC tags. The tags must be suitable to both meet the specific performance standards required of the brand's own products, that respect the economic viability of the project. These specialist NFC tags are more expensive and their protective casings are more rigid, larger, and heavier than standard NFC tags, which will make them unsuitable for some categories of apparel.

Authentication and connected product identities are intended to remain functio-

nal for the lifespan of the product, and luxury items endure for generations. It is therefore essential to map in detail the entire production and distribution workflows that occur once the NFC tag is applied to the product, and assess the end-use conditions the product will experience throughout its entire lifetime.

Failure to fully consider any factor that could damage the tag, and adopt an adequately performant design, will inevitably result in tags that will fail and unsellable products. Just as connected product identities can yield increased trust and perceived value in the mind of the consumer, should the experience fail, the consumer will not just lose faith in the NFC tag, but in the quality of the product and brand itself.


Check list QR vs NFC

Both tags can be applied to clothing and accessories, as long as specially designed tags are employed. There are some different characteristics of each technology that can determine if they are the most appropriate method for certain applications.

FEATURE	QR Code	Specialist Apparel NFC
Weight	1-3 g	1-5 g
Size	1.8cm x 1.8cm	1.8cm x 1.8cm
Pliability	Flexible	Rigid
Dye resistant	Yes	Yes
Humidity & chemical resistant	Yes	Yes
Heat resistant (iron proof)	Yes	Yes
Impact & abrasion	Yes	Yes
Sun & uv	Yes	Yes
Garment Positioning	• Must be visible • Placed anywhere	• Can be hidden • Can't be placed near metal

#5
NFC tags are more versatile than QR codes. They can deliver a greater range of experiences and content, including video.

Fact Check Busted!
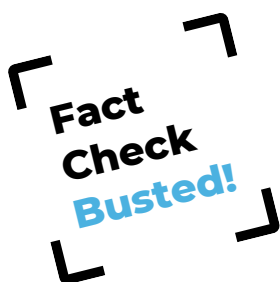
QR codes can actually be used to deliver apps, image galleries, videos, customer ratings, authentication checks, or any other content that can be accessed via NFC tags.

In best practice applications, both QR codes and NFC tags contain a URL link to information and content which are stored in the cloud, rather than on the tag itself. So, while a QR code itself can't be modified once it has been applied to a product, the experience associated with the tag can. When factoring in physical size factors, sustainable cost requirements, tag legibility and ability to endure for the lifespan of the product, neither of the largest capacity QR codes or NFC tags are actually suited for applications on apparel and accessories. Instead, the most optimal and commonly used QR codes and NFC tags for fashion, hold only 144 bytes for NFC and 40 bytes for QR codes. This is all that is necessary to encode a basic set of information required to identify the individual product, and act

as a key to access an infinite amount of information, content, and experiences that are stored online.

By redirecting the user to information and content that is stored online, rather than on the chip itself, it can be dynamically personalized, localized, edited, or even changed completely, to deliver a brand-new experience. In this way, the user experience can remain up-to-date for a product's entire lifespan, no matter how long it remains in-store, or however long it is eventually used by the consumer. In this way, the very same product tag that today may link to a product video or customer reviews can tomorrow be used to access photos of influencers demonstrating how to style the product, product authentica-
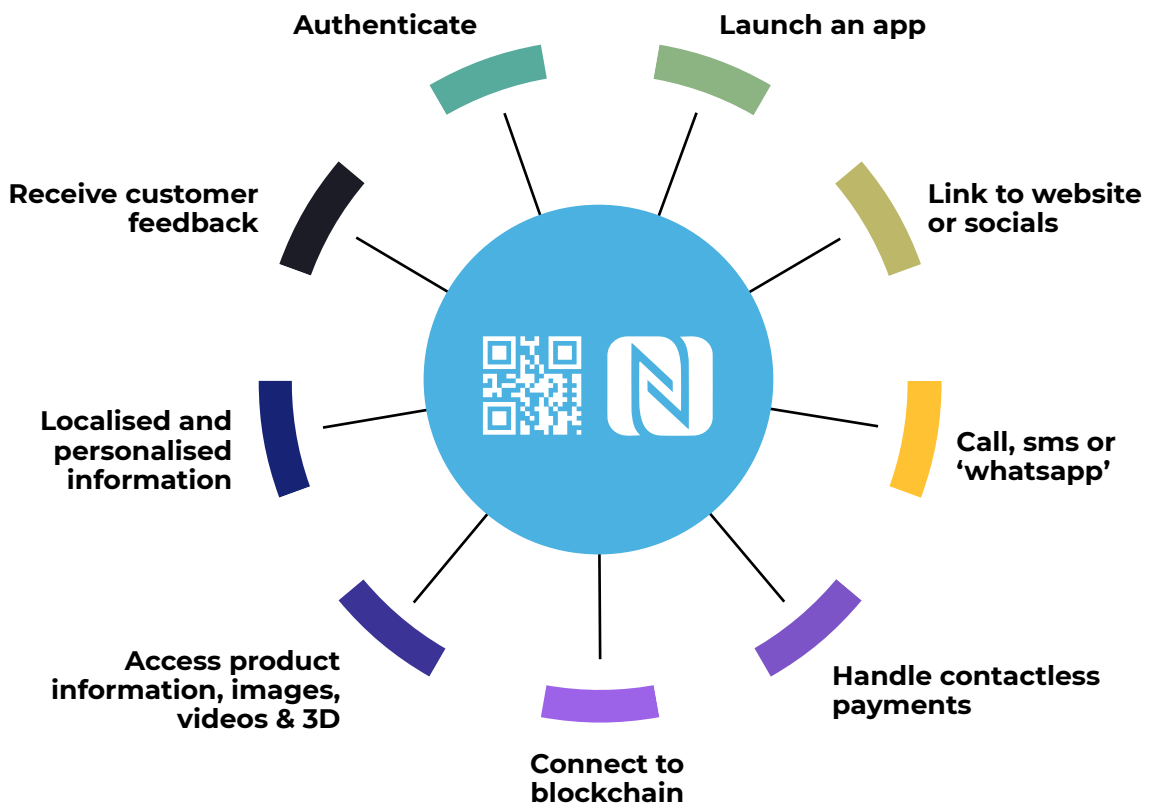
tion, or a circularity service that could allow the product to be returned to the brand for resale, reuse or recycling.

Unlike QR codes, certain types of NFC tags can actually be edited once they have been created and applied to the product. This functionality is not employed to edit any rich content on the chip. It is a feature that is exploited to enable an additional layer of security called One Time Password[3],

making it useless to clone NFC tags, and to empower a new generation of 'intelligent products'. Foods tagged with NFC tags can be edited, recording the temperatures at which they have been stored, able to provide the reader with a guarantee of their freshness. Precious wines can be tagged with special NFC tags that will register if the seal is broken, so they can guarantee that the wine has not been tampered with.

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[3]*Standard NFC tags can easily be cloned. NFC tags with OTP (One Time Password) technology render cloned tags useless as the cloned tags are unable to generate an additional dynamically generated passcode that is required to authenticate the product.*

QR codes and NFC tags can both be used to access the same connected product functionalities.

A platform that evolves with the brand.

Independent of the type of tag adopted, it is the platform that allows for experiences that are always up to date with the latest seasonal content and with new features that are added as the brand's connected product strategy matures. Experiences can be localized and personalized so they are relevant to the consumer's needs as they use the product over time.

#6
QR codes are less suited to empower 360° connected product experiences than NFC tags.

Fact Check
Busted!
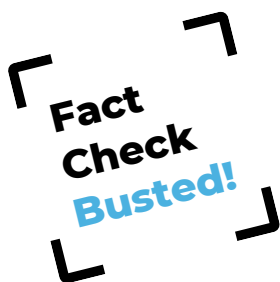
QR codes have been used successfully in many connected product implementations within the fashion industry. They are highly versatile and able to empower the widest set of use cases along the value chain.

Both QR codes and NFC tags, when implemented correctly, will long outlast the product itself. QR codes can be used to access the same dynamic information, multimedia content, and personalized experiences, all of which can be updated and upgraded throughout the lifecycle of the product. Their ability to be seamlessly integrated into apparel products makes them both non-invasive, yet visible and easy to use.

Embedded NFC tags may be elegant and essential for some specific use cases, but if intentionally hidden as part of a creative brand experience, can pose challenges for the tag to be useful at all required moments along the value chain. Tapping a logo to launch a brand's latest fashion show may

be perceived as innovative in the mind of the consumer. But, in order to be useful, the consumer first has to be made aware of this unique experience. In the moments prior to purchase, where a consumer may simply want to learn about a product's sustainability profile or certify its authenticity, such interaction with the product must be explicit, easy, and without requiring a steep learning curve.

To provide easy access to a wide range of connected product experiences along the customer journey, the product may require additional tags. It may not be considered economically or environmentally sustainable to apply multiple NFC tags to the product, labeling, and packaging.

Something that can be done for little to no additional cost with QR codes, which given their highly visible and familiar design, can prove advantageous as the consumer is often more likely to interact with them.

Consumers share the same expectations of the connected product experience, regardless of their propensity to use any one specific tagging technology (**Fig. 7**). Users that are more likely to use a QR code to engage with a product, express a desire to access the same information, content, and extended services, as users that are more inclined to use NFC tags. Demonstrating that

both tagging technologies can be equally relevant to consumers as a method to access product experiences along a rich and varied consumer journey.

When it comes to connected product experiences and the robustness of authentication, QR codes and NFC tags are essentially able to achieve the same results. The determining factors when selecting which technology relate to the cost viability, the category of product to be tagged, any desired 'smart' creative functionality, the target audience, and sustainability goals of the brand.

QR Code	NFC	Hybrid NFC + QR Code
'Circularity' T-Shirt - €60	**'Smart' Sports Shoe - €180**	**Luxury Bag - €1200**
Consumers scan the QR code to learn how to return the product at the end of life in return for a discount on a new product.	Tapping the smartphone on the brand logo users can access special events and share their social activity tracker profile with friends.	Tapping on the brand logo or scanning the QR code and the consumer can verify the product's authenticity as well as access exclusive content.
The consumer can track if the product is resold, reused, or recycled.	The shoe connects to gym equipment and alerts the user when it is time to renew the product.	The bag can be easily added to the brand's vintage collection marketplace.
The QR code label is unobtrusive, low cost, low environmental impact, while adding high value to brand and consumer.	The hidden NFC enables the tag to be readable when the product is worn, without impacting the design of the product.	The hybrid tag ensures the highest engagement with the widest audience, by being as easy to use and accessible for every consumer.

Fig. 7.

Consumers' expectations when scanning a QR code or tapping an NFC tag.
Regardless of their propensity to engage with a certain tagging technology, the expectations expressed by consumers using either a QR code or NFC tag, remain the same. Consumers that engage with products using QR codes expect the same information, content, and services as those that use an NFC tag.

What would you like to do when connecting to your product?

	NFC	QR
Get information on sustainability and production	8,0%	8,6%
Access exclusive contents and promotions*	21,1%	20,1%
Learn how to take care of my product	21,8%	20,0%
Access extra services (eg. Insurance)	6,7%	5,2%

■ **NFC** ■ **QR**
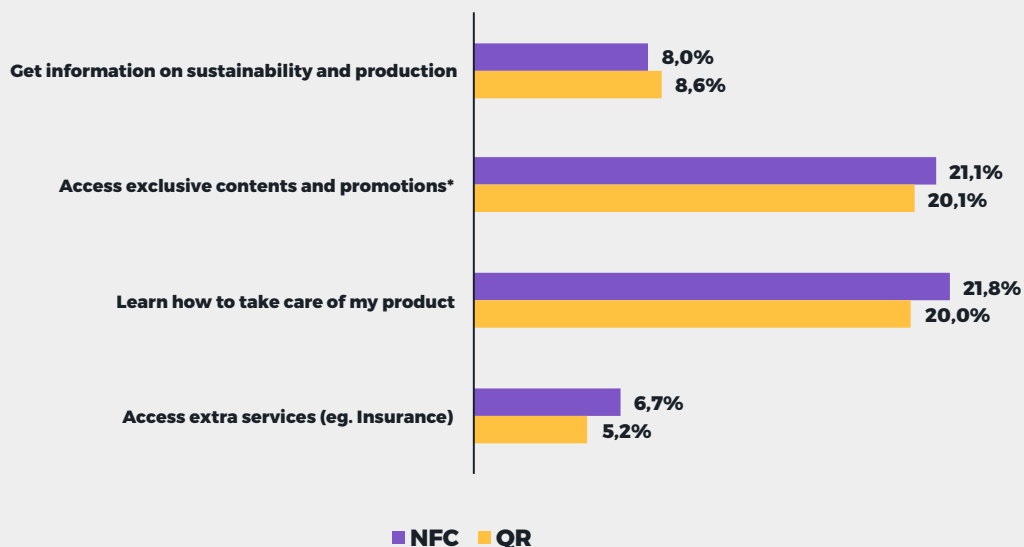
Source: Certilogo Analytics 2022.
Survey on consumers who connected to products through different tags in 2021

#7
QR codes are not durable and are easily damaged. NFC tags are far more reliable.

Fact Check Busted!
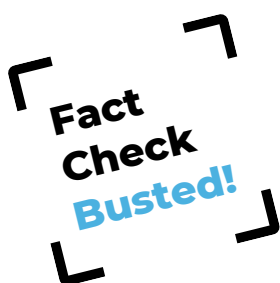
By adopting the correct materials and production processes, QR codes can be successfully applied to apparel and accessories for use as connected product identities. Thanks to their inbuilt error correction, they are actually less prone to failure or error than NFC tags.

This misconception is generally a consequence of the wide adoption of QR codes for marketing activations on printed packaging materials. Due to their exposed nature on perishable materials, they can degrade and are prone to becoming dirty, scratched, and torn over time. These 'promotional' applications may generate a perception of QR codes being ephemeral, throw-away, and fragile.

However, QR codes are simply a graphic design. It is the materials and methods used to create and display the code's design that will determine how durable the code will be. Codes can be printed with resistant inks, woven, embroidered, etched, engraved and 3D printed. QR codes have a high tolerance for error. Inbuilt error correction ensures QR codes can remain readable despite up to 30% of the code having been damaged depending on the standards adopted to encode the tag.

When adopting best practice label production methods, tags are checked at the end of the production phase, to guarantee that they work. Embroidered QR codes that are stitched to garments as a label are temperature and wash resistant, and are designed to endure longer than the article to which it has been applied.

Standard NFC tags are susceptible to break when exposed to physical, chemical, and environmental factors in the production, distribution, and use of the product. If you hit an embroidered QR code with a hammer many times, it will almost certainly remain readable. If you hit an NFC tag with a hammer just once, it will likely be rendered useless. For this reason, a QR code is highly suited to be applied as a label on products. NFC tags for apparel require specially designed protective casings, which may render them too invasive and expensive for some product categories.

QR codes can be equally, if not more durable than the most robust NFC solutions. Solutions exist to ensure that both tagging technologies can remain readable for the useful life of the product. Ultimately, for both technologies, their ability to endure depends less on the tag itself, and more on the standards with which they are applied. The full lifecycle of the product including the production, distribution, sales, and use of the product must be fully assessed and considered in detail, and an adequately constructed design adopted that offers the protection necessary to survive the specific conditions the product will encounter.

QR codes have a distinct reliability advantage over NFCs across two primary domains; production errors and device compatibility.

As with all high-volume, low-cost production methods, during NFC production a small percentage of tags will not work. These 'bad' tags must be identified and replaced with correctly functioning tags before they are applied to the product. The tags must be checked again at the end of the production process. There are tens of different standards of NFC tags, and hundreds of specialist finishings to choose from. All of these factors can compound to make NFC tags more complex to adopt as a tagging technology.

To avoid the costs and negative fallout of any possible failed tags, it is generally best practice to combine an NFC tag with an alternative fallback QR code in a hybrid solution that guarantees the functionality of the product's authentication and connected product identity. Under the QR code, there is another alphanumeric code which can also be used both as a backup and provides a human readable way to share the product identity without the need to share a photo of the code, which can be useful when the consumer needs to discuss the product with a customer care associate.

#8
QR codes are less secure. They can be duplicated and faked, while NFC tags are impossible to clone.

Fact Check Busted!
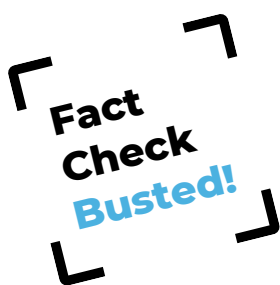
QR codes can be equally effective and secure as NFC tags as part of an authentication platform. Just as a QR code can be easily scanned and duplicated, NFC tags can also be cloned. Ultimately, security is not a feature that is embedded into the tagging technology, but a consequence of the underlying platform.

An authentic NFC tag is able to give an immediate, clear, and 100% trustworthy certification of a product's authenticity. Authenticating a genuine QR code is equally trustworthy, though while still being relatively quick, the mechanism can be slightly more complex.

Like QR codes, standard NFC tags are not infallible to cloning (**Fig. 8**). The data stored in both is intentionally open and readable. An NFC tag can therefore be read, and the data written to a new chip, creating a duplicate 'cloned' NFC tag which can then be applied to a fake product. While it is true that NFC tags will be costlier for the counterfeiters to produce than QR codes, this increased cost is insignificant when considering the high margins their counterfeit products are able to generate.

In many ways, far from dissuading counterfeiters, if a brand implements their product authentication without the right care and attention, it can actually encourage them. The inclusion of a simple low-cost NFC tag can provide the counterfeit product with a strong appearance of authenticity. Counterfeiters are known to apply authentication tags to fake products of brands that are yet to adopt a brand protection strategy because it makes them seem so genuine.

It is possible to clone the standard version of both tagging technologies. Both also have a series of anti-cloning measures. NFC tags with 'One Time Password' technology provide an added layer of security that is 100% effective against cloning. Certilogo's QR codes also include additio-

nal proprietary technology that renders them secure and absolutely reliable when it comes to authenticity verification.

Ultimately, security is not a feature that is embedded into the tagging technology. Neither are 100% perfect in and of themselves. A common assumption is that if a user downloads a brand's authentication app,

the app will be able to identify a genuine product with no doubt. However, there are multiple factors, including the capacity to identify cloned and fake tags, that will determine a project's ability to provide 100% trusted product authentication, as well as information about fake products in the market.

Can you tell the difference?

Even when a QR code is cloned, and the human eye can't spot the difference between the original, the Certilogo platform can recognise that it is fake

authentic

fake

The images above are for demonstration purposes only

A unique capability of Certilogo's authentication platform is a semi-automated Artificial Intelligence engine with machine learning. Its ability to identify fake and tampered tags from the images taken by users helps mitigate the effort needed from the legal and customer care departments to support end consumers in resolving cases where an immediate authentication might otherwise not be possible.

Fig. 8.

Average connections performed on products with authentic or fake NFC tags.
Certilogo is able to identify cloned tags. Due to their wide distribution, and use of the same tag, on average a cloned NFC tag will generate hundreds of authentications from different users and in different locations.

Authentic NFC tags — **2 avg. connections per tag** — Non cloned tags: Tags 169.930, Connections 330.686

Fake NFC tags — **70 avg. connections per tag** — Cloned tags: Tags 197, Connections 13.547
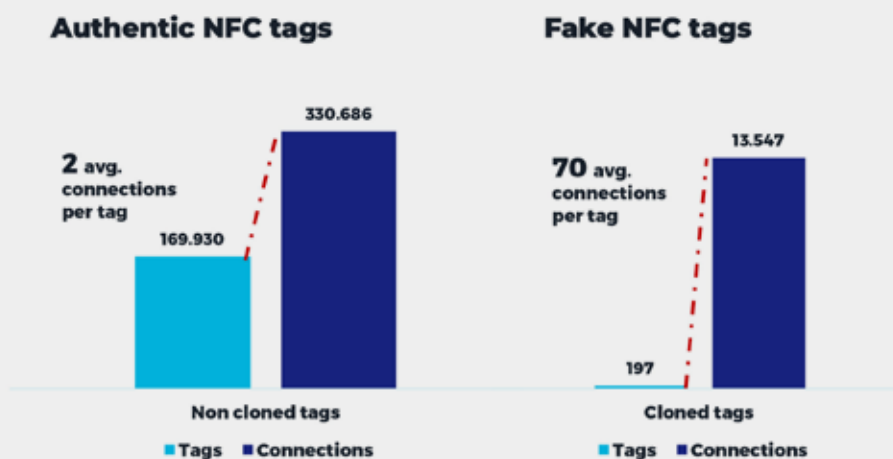
Source: Certilogo Analytics 2022.

#9
It is not possible to track counterfeit products when they adopt fake NFC tags.

Fact Check
Busted!
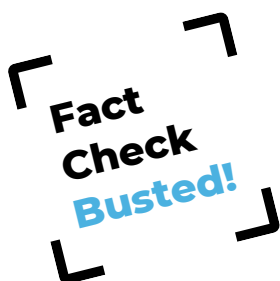
Counterfeit products that incorporate cloned or fake NFC tags can actually be identified and tracked to the same degree as those which feature cloned or fake QR codes.

While heavily dependent on the brand in question, fake products on average account for a quarter of all consumer requested authentications (**Fig. 9**). Certilogo data gathered from over 5.000.000 authentications in 2021, illustrates how counterfeiters adopt three distinct strategies when it comes to circumventing a company's brand protection strategy (**Fig. 10**).

A. No Tag

Around 10% of fake products do not include any authentication tags.

B. Cloned Tag

Authentications of products that incorporate cloned authentication tags, including QR or NFC tags, account for 70% of cases. Just as an authentic QR code can be copied and applied to a fake product, an authentic NFC tag can also be duplicated if One Time Password technology is not adopted.

C. Fake Tag

The remaining 20% of products had 'fake' NFC and QR codes. These are often programmed to launch a simulated authentication experience or simply link to the brand's homepage, which can often be sufficient for the consumer to consider the product as being genuine.

While it is a simple process for a brand to authenticate its own genuine products, a brand must also overcome the complex challenges to be able to distinguish all types of fake products. Brands must maintain the trust of the consumer by avoiding the damaging consequences of certifying fake products as being authentic, and intercepting and removing counterfeit products from the market.

There are two key challenges that brands must overcome. The first is how to recognize a cloned tag that applies the identity from an authentic product onto a fake product. The second is to intercept fake products where the counterfeiter has created their own tags that link to fake authentication experiences.

Thanks to sophisticated technology built into the tags themselves, and a powerful back-end platform using machine learning and artificial intelligence algorithms, Certilogo is able to recognize cloned NFC tags and QR codes. The platform also pulls on a rich series of user data, images, product information, and commercial data, that compare not only the product tag but also a wide range of data about the authentic product with the fake product. It is able to correctly identify fake products with an accuracy of 98%.

In order to intercept fake products that employ either no tags or create their own fake NFC and QR codes, the most effective method is to educate the brand's consu-

mers to always check for the tag and to use a product authentication app to certify the authenticity of the product. Unlike most authentication platforms, which require a user to install an app, Certilogo is able to rapidly authenticate products via a simple and fast web app, which significantly reduces the 'friction' of the user experience and increases the probability that the consumer will engage with the product. By creating an understanding that items without the tag are fake, consumers can be incentivized to photograph and report any fakes that they encounter. Turning loyal brand consumers into a powerful brand protection asset.
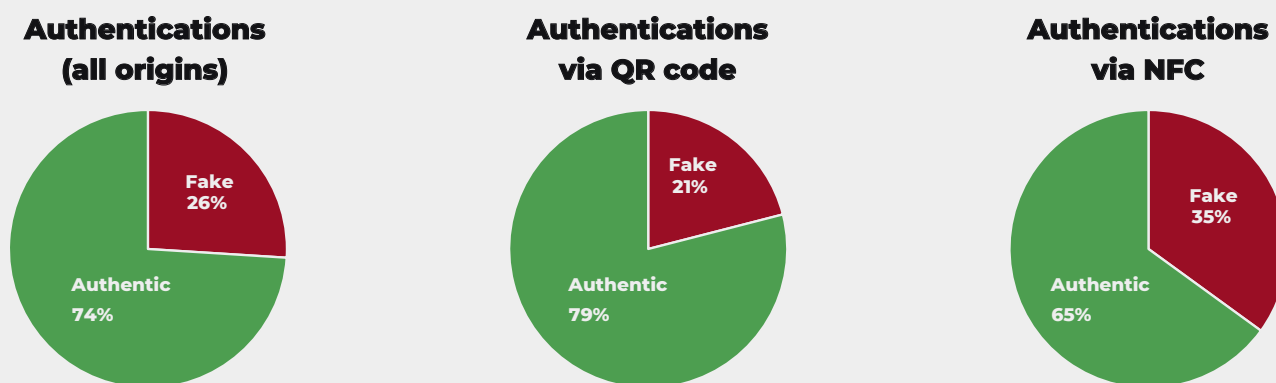
The connected product or authentication experience can also be leveraged to provide valuable and actionable insights to the organization. 'Meta-data' and information gathered during customer performed authentication can be used to analyze how the consumer is engaging with the product, identify stolen products, take down online stores dealing in fake goods, act against fraudulent 'lost' and 'over produced' products in the supply chain, and intercept grey market trading.

The Certilogo platform is unique in the powerful actionable data it can deliver to the brand. Enabling brands to not only create stronger relationships with existing consumers, but giving brands a unique opportunity to intercept lost sales to counterfeit purchases, and turn them into new loyal consumers.

Fig. 9.

Share of responses delivered to consumers.
Up to a quarter of authentications may result in identifying fake products.

Authentications (all origins)

Fake
26%

Authentic
74%

Authentications via QR code

Fake
21%

Authentic
79%

Authentications via NFC

Fake
35%

Authentic
65%

Source: Certilogo Analytics 2022.

Fig. 10.

Share of fakes by type, for a 3 year old project on a sportswear brand.
Not all fakes are alike. Authentication requires different strategies to identify and be able to manage the consumer experience for each.

Fakes with no codes/tags
10%

Fakes with invented codes/tags redirecting to alternative contents/urls
20%

Fakes with cloned codes/tags
70%
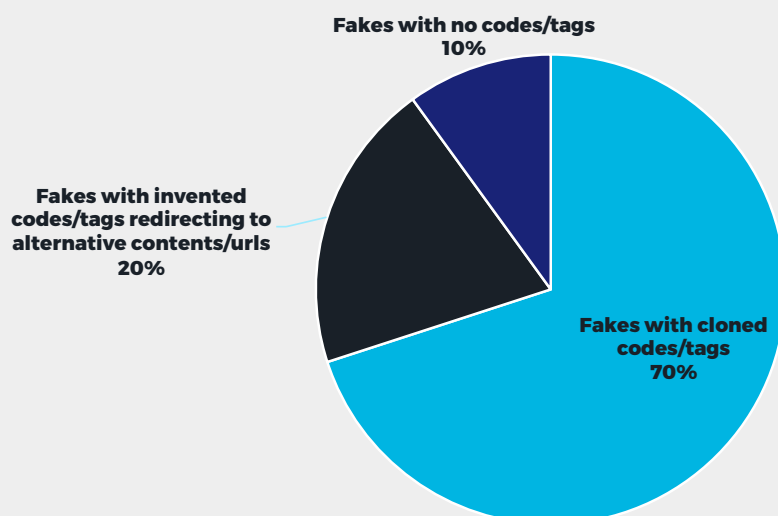
Source: Certilogo Analytics 2022.

#10
The final cost of a connected product and authentication projects is mainly determined by the choice between QR code or NFC tag technologies.

Fact Check Busted!
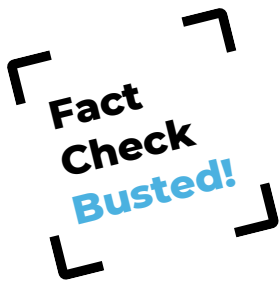
It is not enough to simply determine the economic viability of adopting either of the tagging technologies, based purely on their unit costs. There are other key factors that can have an important impact on the overall costs of a project.

QR codes are much cheaper than NFC tags to produce and apply on a cost-per-unit basis. Analysis of production volumes and the value of the product will determine the initial economic viability of either technology. However, this cost disparity can often distract from other crucial considerations when assessing the costs of a connected product and authentication project.

Project costs will be determined by the complexity of the project and depend on the moment at which tags will be applied

to the product in the production process. NFC tag applications can be more complex to configure and manage, requiring specialist equipment, and a deeper level of cross-function engagement across the organization.

The backend platform that is required to manage the engagement with the consumer must be factored in, as well as the costs of the information, images, and other content to deliver the experience, which may be required for the entire length of

the product's useful lifespan. The cost of developing any app must be accounted for. Certilogo's web app means brands have a branded, fully customizable, yet out of the box solution from day one, that allows consumers to engage with connected products without the need to download an app to their smartphone.

Simple connected product projects can be up and running within less than a month, but long-term strategic projects and robust brand protection platforms may require detailed analysis and proof of concept testing as part of the project set up, and dedicated resources to oversee them once they are launched, regardless of tag technology.

The costs of the project need to factor in the return on investment, increased brand value, competitive advantage, and the opportunity to increase productivity and reduce costs in other areas of the business.

Successful platforms and projects must be agile and able to flex as a brand's connected product strategy matures, to avoid costly re-platforming and organizational stress. While failure to understand and militate against the multitude of complexities native to such projects can lead to conditions that actually encourage counterfeit products, and reduced consumer satisfaction.

Conclusions

The success of any effective authentication and connected product strategy will not be determined specifically by the adoption of the tagging technology.

Success will be determined by the ability to identify the right technology for the right situation, set in place a back-end platform to deliver and manage the optimal consumer experience, and the ability to deliver short-term results while being ready to rapidly scale as the strategy matures.

The most common misconceptions about NFC tags and QR codes, do not reveal what really sets the two technologies apart from each other and can be misleading when making comparisons and informing decisions. In most instances both types of tag are relatively interchangeable, and can be used securely and conveniently used throughout a 360° consumer journey to equal effect.

Simply tagging a product, no matter the type of tag, does not guarantee engagement with the consumer. The value is not in the tag, but in the relevance of the experience the brand is able to deliver. The most successful projects are those where the tag is not solely adopted to convey a sense of innovation to the product, but is leveraged to deliver tangible business orientated results across the organisation.

The reliability of the experience depends less on the tag itself, and more on an ability to source the right standard of tag and use the correct methods to apply the tag, ensuring it is correctly designed to face the conditions that the product will encounter. Do not underestimate the complexity of this task.

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Check List

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Here is a check list to help inform the right choice of tagging technology, and determine the successful outcome of authentication and connected product strategies.

1. Find a partner that is agnostic of specific tagging technologies to identify the right solution for your brand. Be very wary of any partner that is married to a single technology.

2. Adopt a platform that is able to manage multiple different tagging technologies, even if you only intend to start with one initially. Even for the simplest of implementations, it is wise to seek the assistance of an experienced partner. There are many hidden challenges.

3. Your choice of tagging technology should mainly be driven by its economic viability, considering the value of the product and the economies of scale afforded by sales volumes. The categories of products where the tag can be discreetly applied. The socio-demographic profile of the consumer. The sustainability strategy of the brand.

4. The selection of a tagging technology must be informed by an analysis of the production and distribution workflows, and the consumer journey for the entirety of the product's lifecycle.

5. It is critical to understand the very specific and real differences between the two technologies. Don't adopt any one technology for its perceived advantage for one specific use, without understanding the impact on the consumer experience at all other points of engagement.

6. Keep your consumer at the center of the strategy. They are your key stakeholder, and the greater their engagement, the greater the success of the project. Without it, and the project will fail. Understand their behavior, expectations, and desires. Does your product deliver an experience that makes their life easier, more unique, and rewarding?

7. Consider how to make the experience as accessible as possible by adopting a platform that supports consumer engagement via an app, and also quick and frictionless access via the web.

8. If building authentication into the consumer experience, understand that the real challenge is identifying fake products and being able to successfully manage the consumer experience in the emotionally charged scenario that they have bought a fake believing it to be genuine.

9. The security is not a built-in feature of the specific tagging technology. It requires a platform able to distinguish each and every possible scenario of counterfeit products, and continually stay ahead of the ever more sophisticated counterfeiter.

10. Ensure your organization is ready before undertaking an NFC application. It will almost inevitably cost more, take longer, and require a wider organizational involvement in the project.

11. NFC can provide the creative opportunity for some ingenious ideas, but consider what additional effort will be required to ensure the consumer is aware of how, why and when to engage with it.

12. Don't base the estimated cost of the project purely on the cost of tagging the products. Ensure you estimate the costs of the platform, set-up costs, specialist production equipment and skills, resources to oversee the strategy, customer care, and the content and design of the consumer experiences.

13. If in doubt, conduct proof of concept tests with a sample of consumers to test the viability of both tagging technologies.

14. Ensure the implementation is leveraging every opportunity to engage with the consumer, set the brand apart, and deliver valuable feedback and insights.
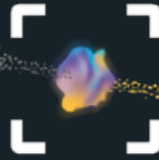
About Us

Leading the Connected Products Revolution

Our mission is to empower brands to integrate their physical products into the digital journey of their ever more demanding and connected end customers. We facilitate services that convey trust, generate engagement, and enable circular shopping.

We've been bringing Fashion & Luxury products online since 2006. Initially, by connecting products with people through authentication, up until today where our SaaS platform offering allows brands to engage their customers throughout a 360° consumer journey.

Products connected to the Certilogo platform with unique identifiers are recognized instantly when consumers interact with the service using a smartphone or digital device. Unleashing the power of the product as a communications channel with limitless opportunities to engage the consumer.

Certilogo's pioneering and cutting edge, AI-powered authentication and connected product platform is the most widely adopted by fashion, apparel, and luxury brands globally, and is used by millions of shoppers worldwide.

2018 Winner
Best Use of Artificial Intelligence in Fashion

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