The Print Security Landscape, 2020

Print security trends in the US and Europe

QUOCIRCA

Executive Summary

As cyberattacks continue to increase, capitalising on the new vulnerabilities of remote working, securing the print infrastructure – across the office and home environments – must be a strategic priority. Quocirca's Print Security Landscape 2020 study reveals increasing concerns around the risks of printing, and declining confidence in the ability to protect the print infrastructure against security breaches. The attack surface has now expanded to encompass remote endpoints such as home printers, which may fall through the gap of traditional print security measures.

This heightened exposure to possible data loss is leading organisations to lose confidence in the security of their print infrastructure. Just 21% of IT Decision Makers (ITDMs) say they are completely confident, compared to 33% prior to the COVID-19 pandemic. In the past six months, 64% have reported a data loss as a result of unsecure printing practices, with reasons ranging from improper disposal of confidential information by employees to device malware. This is leading to an average cost of a data loss reaching £1.2 million in the US and £825,000 in Europe, significantly higher than in 2019. This can be attributed to the likelihood that organisations are improving their capabilities around detecting and reporting on data losses.

Despite the significant levels of data loss and associated cost, ITDMs still place print security much lower on the IT security agenda. While email, networks and cloud are ranked in the top three, securing printing is in seventh place. With 77% of ITDMs indicating that printing will remain critical (29%) or very important (48%) to their businesses in the next 12 months, organisations cannot afford to be complacent.

While many are implementing a range of measures such as risk assessments, pull-printing, analytics and content security, adoption varies widely by region. According to Quocirca's Print Security Maturity Index, based on the number of measures implemented, just 19% of organisations are considered Print Security Leaders. This rises to 28% in the US and falls to 12% in the UK and Germany. Print Security Leaders are more likely to spend more on print security and report higher levels of confidence.

Adapting to any crisis requires action. As remote working becomes a permanent feature for many organisations, ITDMs cannot ignore the potential threats and vulnerabilities from printing in the home environment. As more organisations turn to a zero trust model to enforce more stringent access controls both inside and outside the network perimeter, the print infrastructure must adapt accordingly. The hybrid workplace is here to stay and it is imperative that organisations mitigate the risk of data loss by protecting printing endpoints in both the home and office environments.

This study is based on the views of 508 IT Decision Makers (ITDMs) in the US and Europe. The report also includes detailed profiles of print security offerings from the major print manufacturers and key ISVs. The following vendors participated in this study:

Manufacturers: Brother, Canon, HP, Konica Minolta, Lexmark, Ricoh, Xerox
ISVs: EveryonePrint, LRS, MPS Monitor, PaperCut, Pharos, Printix, Ringdale, Y Soft

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Key findings

- **COVID-19 has accelerated the move to remote working and cloud computing.** Before the pandemic, an estimated 39% of employees worked from home all or part of the time; this is expected to rise to 48% after offices fully reopen. The crisis has also embedded confidence in the use of cloud services – 34% of organisations are currently using cloud for all their IT requirements, rising to 43% of organisations by the end of 2021.

- **IT security remains the top investment priority over the next 12 months.** 67% of ITDMs say IT security is one of their top three investment priorities. Cloud is second in importance (44%) followed by managed IT services (42%) and managed print services (35%). Today 63% of organisations are using an MPS, while half report that they are using a Cloud Print Service.

- **An ongoing reliance on printing creates the need for effective print security**. 28% of organisations indicate that printing will be critical to their business in the next 12 months. Once offices reopen, 73% expect home printing volumes to increase, with 59% anticipating that office printing volumes will do likewise. As the hybrid workplace evolves to encompass both home and office printing, ITDMs need effective print security tools in place to minimise the risk of this expanded threat landscape.

- **Adoption of print security measures varies widely by region.** The most commonly implemented measure is a formal procedure for responding to print security incidents (48%). 43% of ITDMs have revised their BYOD policy for home printers; this is most likely to be the case in the US (48%) and least likely in the UK (33%). Pull printing, where output can only be released to authenticated users, is least common in France. Overall, 34% of organisations overall have adopted a zero trust model, rising to 44% in the US.

- **According to Quocirca's Print Security Maturity Index, only 19% of the organisations can be classed as Print Security Leaders.** These organisations have implemented six or more security measures, and report higher levels of confidence in the security of their print infrastructure. This rises to 28% in the US and falls to 12% in the UK and Germany. Print Security Leaders are more likely to spend a higher amount on print security and report higher levels of confidence.

- **Confidence in how well the print infrastructure is protected against security breaches has decreased since the onset of COVID-19.** Prior to the pandemic, 33% of ITDMs said they were completely confident, compared to 21% now. The steepest drops are in the US (50% to 33%) and the professional services sector (43% to 27%).

- **In the past six months two thirds of organisations have experienced data losses due to unsecure printing practices.** This rises to 74% in the US and drops to 57% in Germany. This has led to a mean cost per data breach of £1,023,168 (£1,238,411 in US and £825,243 in Europe). SMEs are more likely to have suffered a print-related data loss in the past six months (69%), with professional services the most affected sector.

- **Just over a third (37%) of ITDMs are very satisfied with their suppliers' print security capabilities.** This drops to 31% amongst SMEs, and 23% within the public sector. Just 18% of organisations in Germany are very satisfied, compared to 55% in the US. Notably, just 17% of ITDMs overall would turn to an MPS provider for print security guidance, while 23% would consult a print manufacturer.

- **Almost 40% turn to Managed Security Service Providers (MSSPs) for print security advice.** 37% indicate that MSSPs are their primary source of guidance, rising to 45% in the US and 40% among SMEs. 23% would turn to a print manufacturer and 17% would consult an MPS provider. This points to an opportunity for MPS providers and channel partners to collaborate more strongly with MSSPs.

A year of pandemic-driven change

Both the private and public sectors have demonstrated flexibility and resilience in maintaining operations in the face of disruption. COVID-19 has driven organisations to fast-track their adoption of new technologies to support the almost overnight shift to remote working. Flexible workplace arrangements supported by cloud-based services and remote access have become a must-have, with technology rollouts taking just days rather than weeks or months.

Remote working is here to stay

Before the pandemic, an average of 39% of employees were working fully or predominantly from home. This is expected to rise to almost half (48%) once offices fully reopen (Figure 1). Pre-COVID, 51% of the US workforce worked from home on average, compared to 27% in Germany. France is expecting to see the highest increase in working from home, from 30% to 43%. On average, 48% of those in business and professional services were working from home, compared to just 27% in the public sector. When offices reopen, retail is expected to see the highest increase in employees working from home, from 29% to 44%.

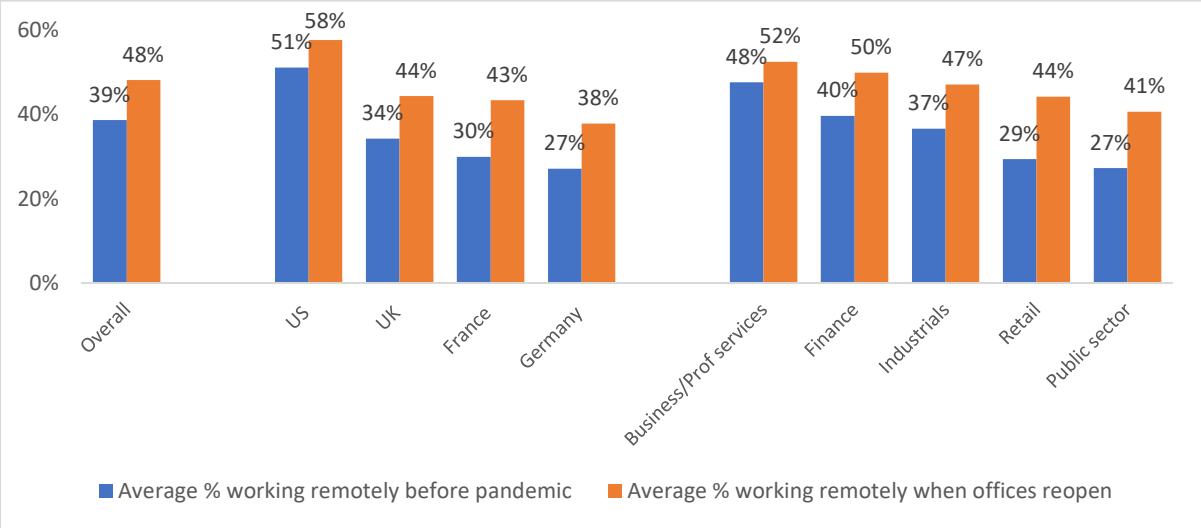


Figure 1. Average percentage of workforce working fully or predominantly from home

The cloud-enabled business

The pandemic has accelerated the uptake of cloud services, especially those that enable remote collaboration such as Zoom and Microsoft Teams. The resilience of cloud services throughout the crisis has increased confidence where there was hesitation before. More than a third (34%) of organisations now use cloud for all their IT requirements, with 43% expecting this will be the case by the end of 2021 (Figure 2).

The figure is highest in the US where 46% of organisations already use cloud for all IT requirements, well ahead of Europe, where the figure for Germany is just 22%. Use of cloud services for all IT requirements is set to surge from 21% to 43% in retail, and from 32% to 46% to the industrial sector over the next 12 months, while the public sector will lag behind at just 27%.

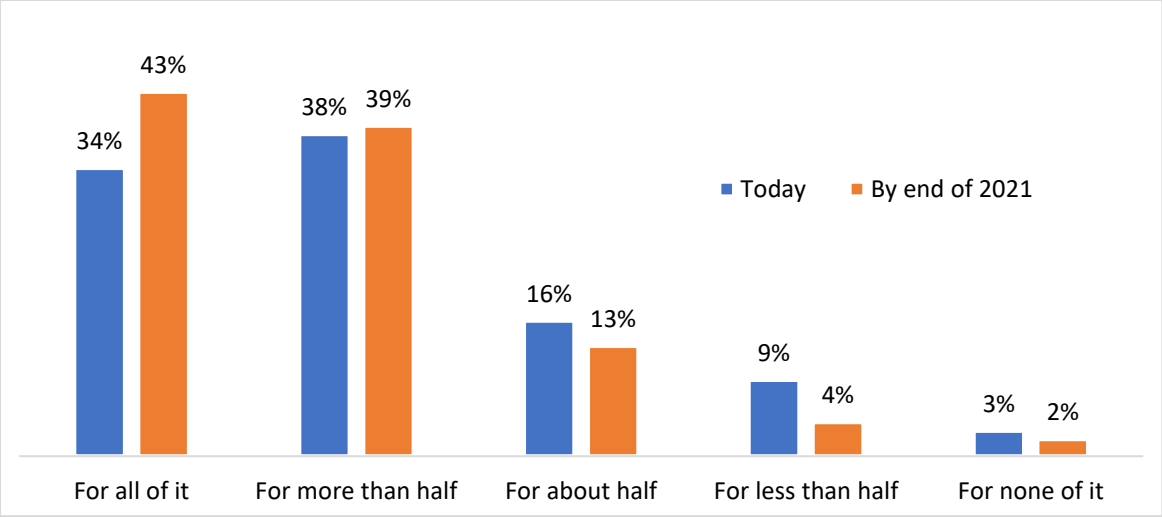


Figure 2. To what extent is cloud computing used to support any of overall IT requirements?

Printing moves to the cloud

Cloud adoption is extending to the print infrastructure (Figure 3). A cloud-based print service enables organisations to eliminate all or some of their on-premises print servers and host them in a cloud environment, which is managed by a third party MPS provider. This reduces IT burden, lowers costs and provides flexibility and scalability to add or remove printers as business needs change. A cloud print service can also help address security concerns by ensuring printing is tracked for both home and office workers.

Cloud print service adoption is highest in the US (57%) and lowest in the UK (40%). Just 33% of organisations in the public sector use a cloud print service, compared to 54% in retail. Adoption is highest in larger enterprises (52%).

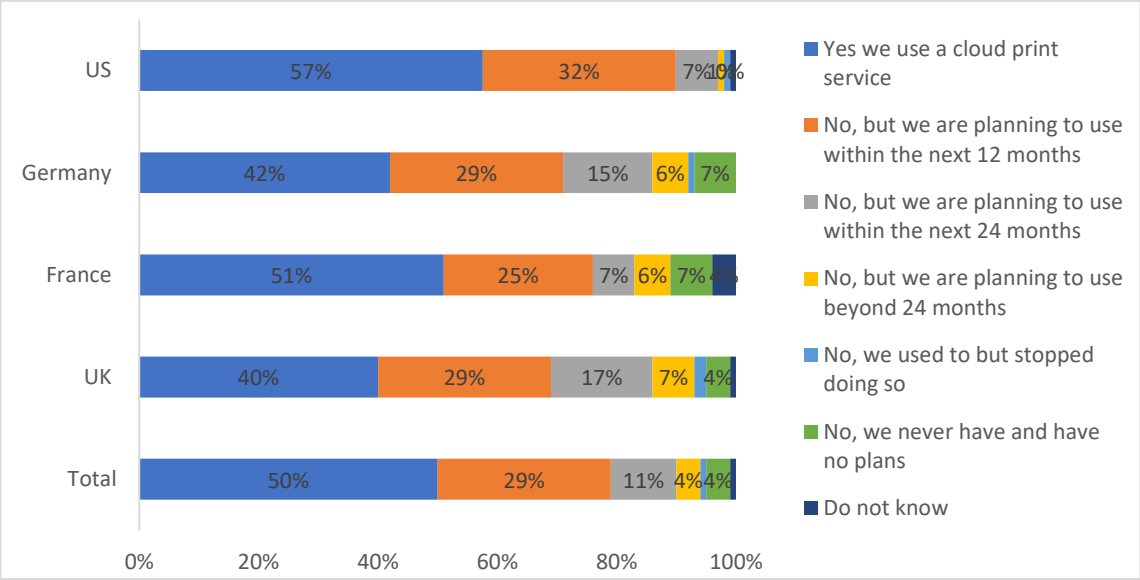


Figure 3. Cloud print service adoption

Shifting IT investment priorities

The pandemic has accelerated the pace of digital transformation, and technology is playing a pivotal role in reshaping business. This is shifting investment priorities over the next 12 months (Figure 4). Above all, organisations are looking to improve cyber resilience and cloud migration.

The top investment priority is IT security, cited by 67% of all respondents, rising to 71% in the US and Germany. This is followed by cloud services (45%) and managed IT services (41%), which will be key to supporting business continuity, particularly for those organisations that lack IT resources. Midmarket organisations (500-999 employees) are more likely to prioritise investment in managed IT services (49%), along with the business/professional services sector (53%). US organisations are most positive about managed IT services, with 54% prioritising investment in these, compared to 29% in France.

Overall, 35% expect that Managed Print Services (MPS) will be a key investment priority over the next 12 months, rising to 45% in France. Certainly, with many organisations potentially looking to operate offices at lower capacity, the need to evaluate current printer fleet deployment and implement solutions that support both office and remote workers will come to the fore.

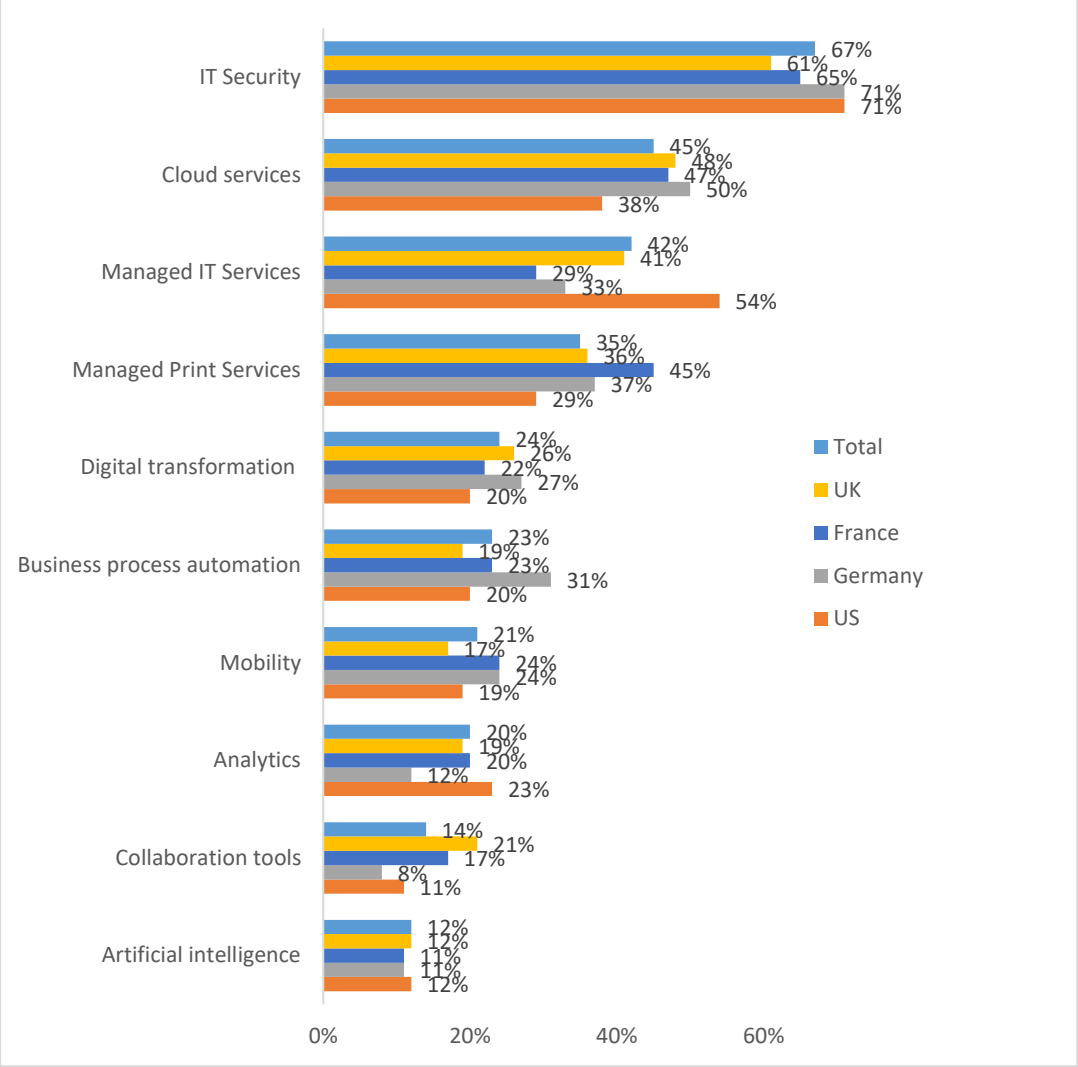


Figure 4. Top technology investments for the next 12 months (Top 3 selected)

Organisations will continue to rely on printing

Despite the increase in homeworking, printing is still critical to 29% of organisations today (Figure 5). Overall 77% indicate printing will be critical or very important to their business in the next 12 months, down only slightly from 83% now. Printing is most likely to be critical to the public sector both now (38%) and in the next 12 months (36%), closely followed by finance, with 36% of respondents saying printing is critical now, dropping to 28% in the next 12 months.

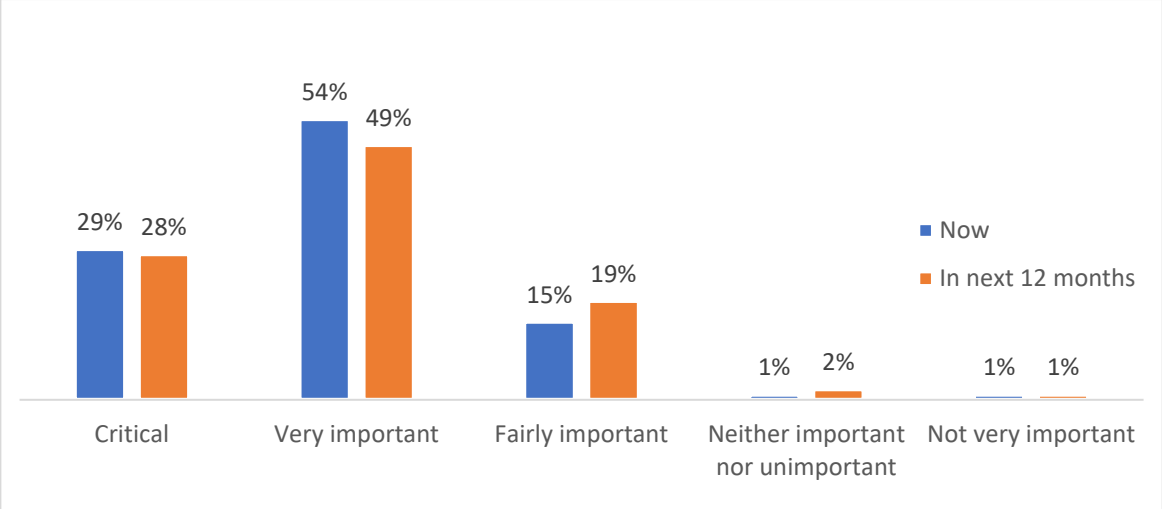


Figure 5.The importance of printing to businesses

While office closures have severely impacted office print volumes, the majority of respondents expect print volumes to increase over the next 12 months (Figure 6). This reflects the situation once lockdown measures are relaxed and employees return to the office – even if it's on a flexible basis. For many home workers, home printers will not be suitable for the professional quality required or volume of print that is common in the office environment. Overall, three quarters (73%) of ITDMs expect home printing to increase over the next 12 months. More than half (59%) also predict office printing will increase, but 18% anticipate a decrease.

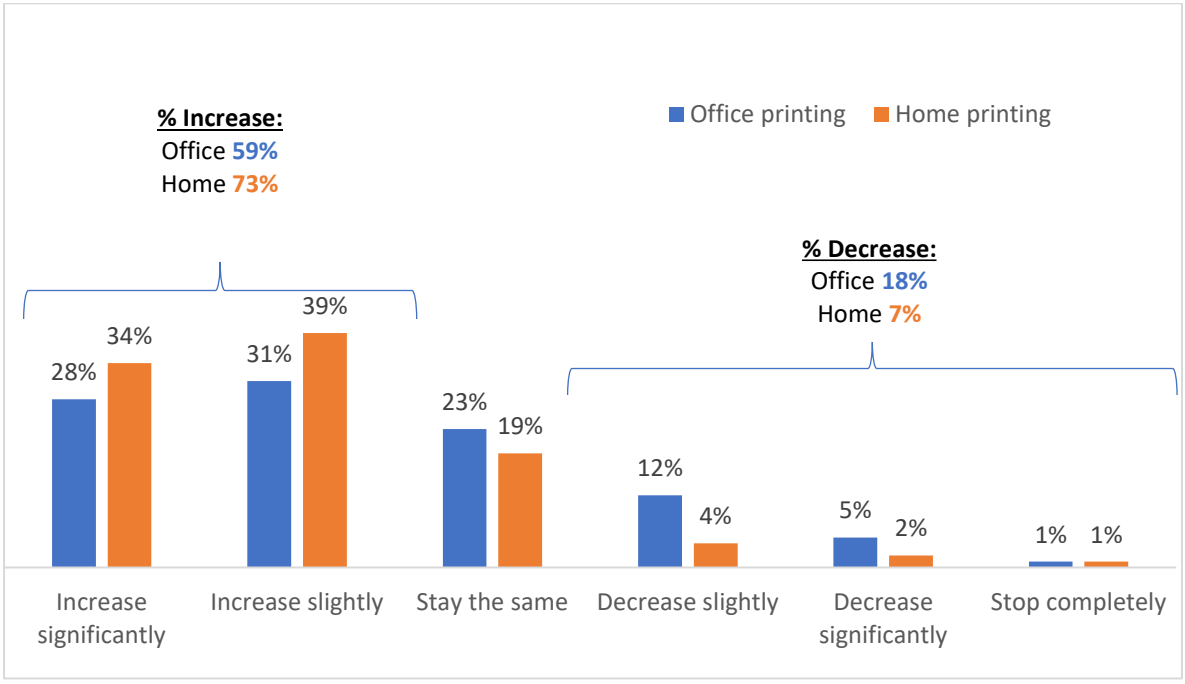


Figure 6. Expected change in print volumes over next 12 months

Print security is low on the IT security agenda

Print security continues to be lower on the security agenda than other elements of the IT infrastructure (Figure 7). The risk from printers is less recognised than other risks, such as email (selected by 44%), networks (41%) and traditional end-points (36%). As a result of this prioritisation, print security may often be neglected and not treated with same urgency as other IT security issues.

Overall 32% of ITDMs consider employee-owned home printers a potential security risk, rising to 39% in the US and dropping to 25% in Germany. Organisations in the US are also most concerned about office print (35%), compared to 19% in France. 37% of respondents from the finance sector ranked office printing as a high risk, compared to just 19% in the public sector.

Smaller companies (250 to 499 employees) are more concerned about employee-owned printers (35%), while concern is highest in business/professional services companies (38%), which are more likely to have employees printing at home. Overall, employer-provisioned devices in the home were considered safest, with just 23% selecting them as a top-five risk. This is likely to be because the employer maintains control of the device, and sensitive print output is less likely to be seen by the wrong eyes in an employee's home than in an office.

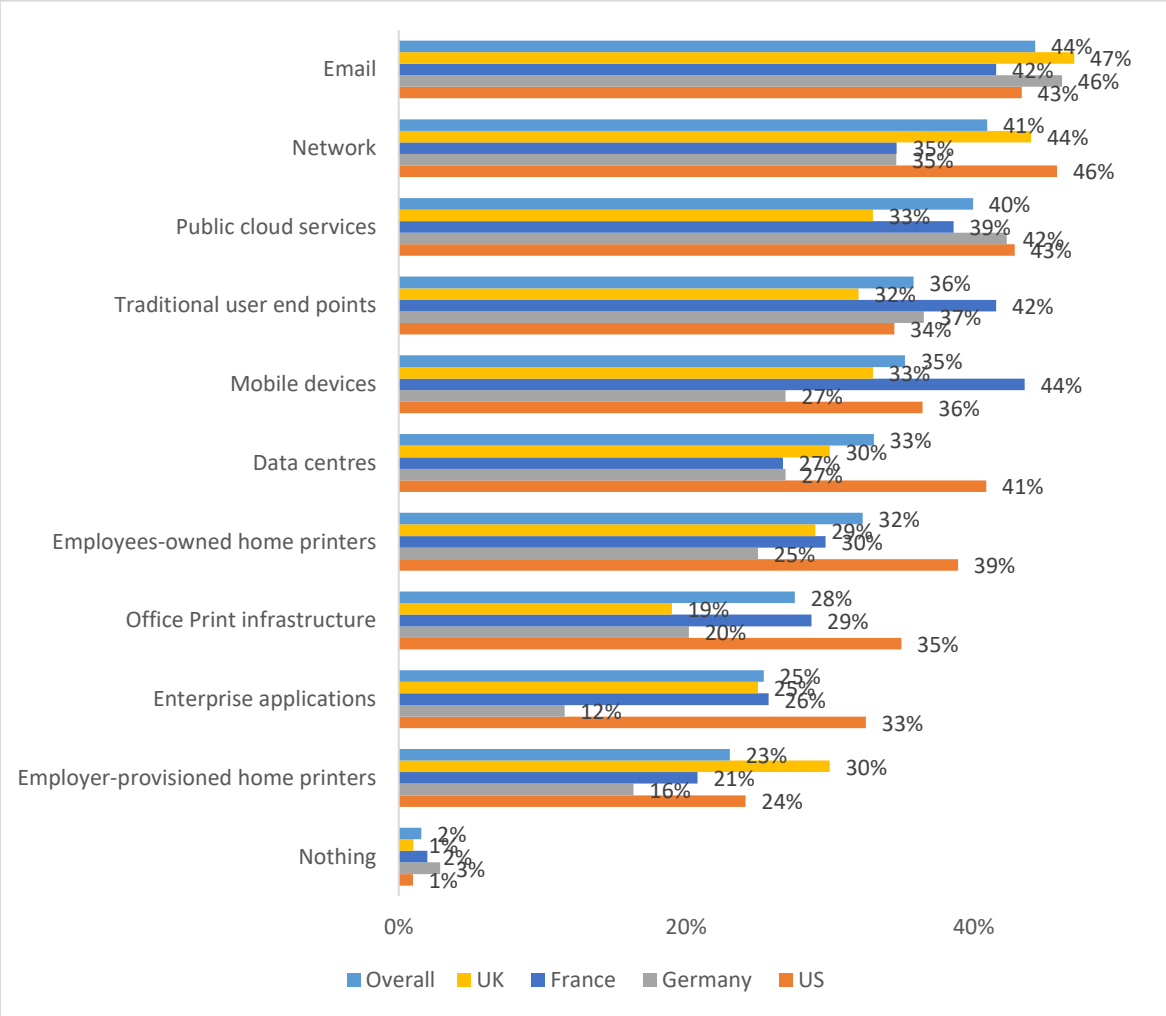


Figure 7. Which of the following areas are considered to pose the greatest security breach risk? (Select up to five)

Complacency or lack of awareness?

Print vulnerabilities
This lower priority applied to printing could either be down to complacency or a lack of awareness of the potential vulnerabilities. However, print infrastructure is vulnerable for several reasons:

- Neglected printers can be easy entry points for deeper network penetration
- Printers themselves can store sensitive information which, if compromised, can be a source of data leaks, although home printers tend not to have their own hard disks
- Print output, if left unattended, is a potential source of data leaks
- Printers have their own processing power and, if insecure, may be recruited to botnets

The risk of home printing
Home printers exacerbate all these problems. They add to the heterogeneity of the overall fleet, they have to be managed remotely and whatever employees do with printed output is beyond the control of the physical environment of an office, where, for example, the disposal of paper can be controlled.

A decision must be made, often on a case-by-case basis as to how home printing is supported. There are three basic options:

1. Block all home printing
2. Provide printers to employees which are owned by the business, and use is limited to these printers whilst other print devices are blocked
3. Support employee-owned printers

Taking measures to address print security

Comprehensive security strategies can help organisations mitigate the risk of data loss through unsecured printing in both the remote and office environment.

Print security spend set to increase over next 12 months

Overall, 78% of organisations expect their print security spend to increase over the 12 months (Figure 8). This rises to 87% in the US and drops to 69% in Germany.

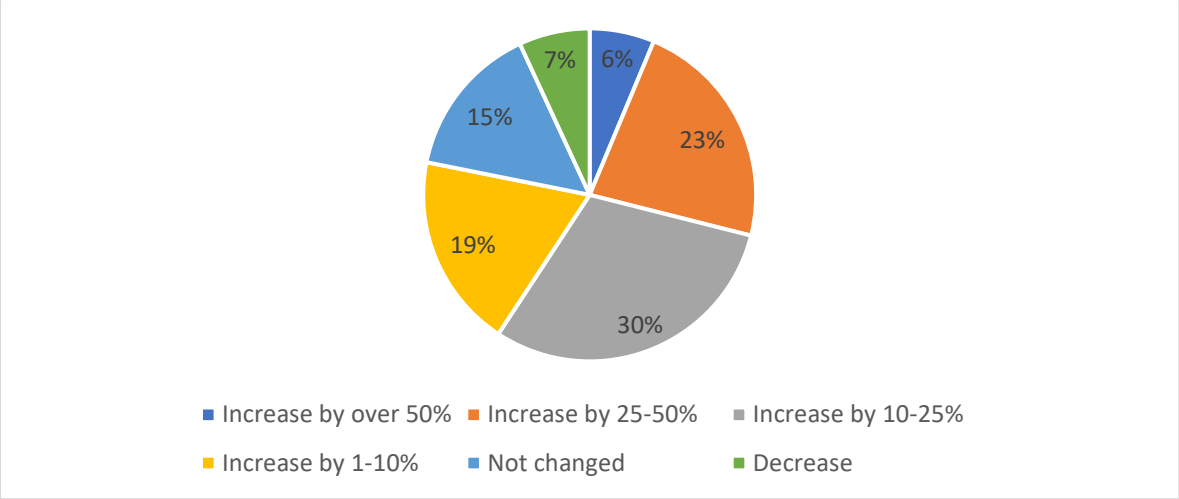


Figure 8. Expected print security spend over next 12 months.

Organisations adopt a range of print security measures

A range of print security technologies and processes are being adopted (Figure 9). The most widely implemented measure is a formal procedure for responding to print security incidents (48%). 43% of ITDMs have revised their BYOD policy for home printers; this is most likely to be the case in the US (48%) and least likely in the UK (33%). Pull printing, where output can only be released to authenticated users, is least common in France.

The finance sector is most likely to adopt a number of print security measures, including those specifically addressing home working; 52% of finance organisations provide printers to home workers compared to 29% in the public sector.

Notably, 42% of ITDMs overall have undertaken print security risk assessments, which are fundamental to evaluating the current print security posture of any organisation. This rises to 49% in the US, but drops to 32% in Germany.

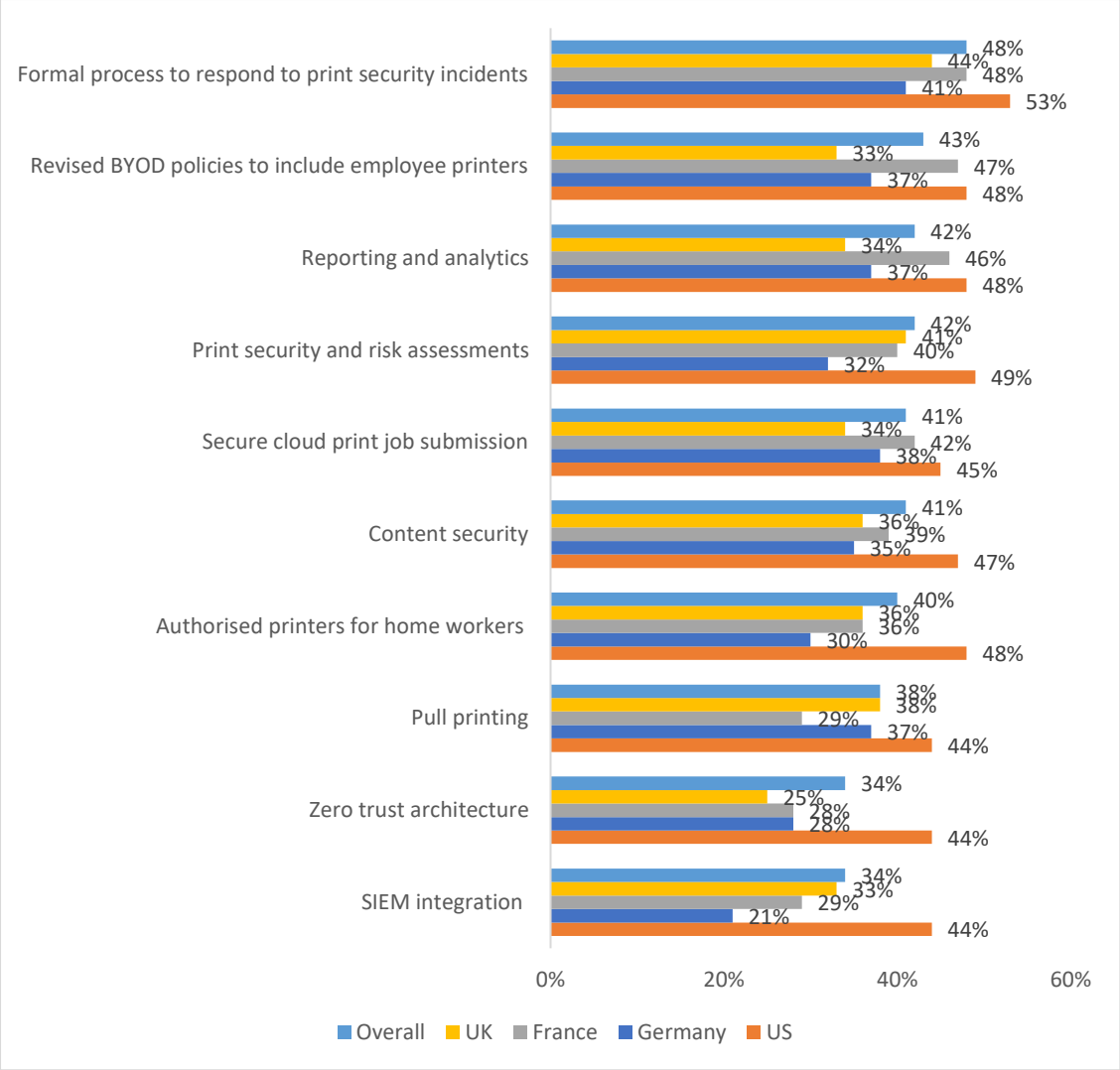


Figure 9. Print measures already implemented

The Quocirca Print Security Index

To understand and compare the extent to which organisations are adopting these measures, Quocirca has created a Print Security Maturity Index based on the number of measures implemented by our research sample, dividing them into leaders, followers and laggards.

- **Leaders** have implemented six or more of the measures.
- **Followers** have implemented between two and five measures.
- **Laggards** have implemented one or none of the measures.

Overall, just 19% are classed as print security leaders, rising to 28% in the US and 26% in the finance sector. 36% of public sector organisations are qualified as laggards, while only 12% in the UK and Germany are in the leader category (Figure 10).

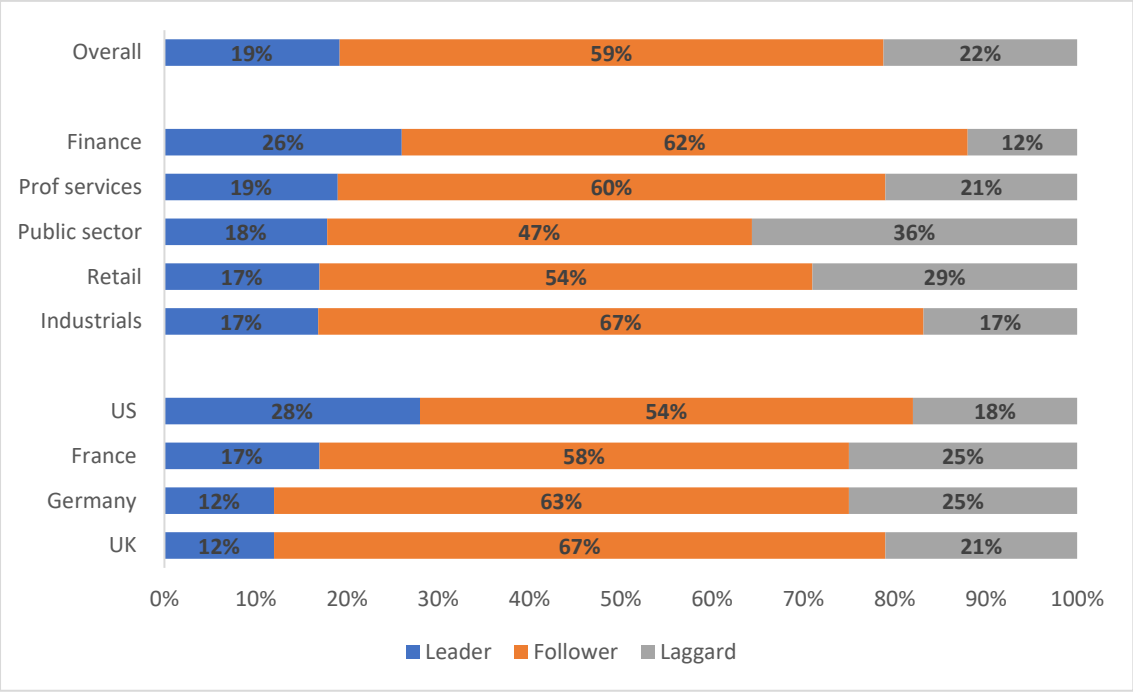


Figure 10. Quocirca's Print Security Maturity Index

Declining print security confidence

The rapid shift to remote working is undoubtedly increasing the risk of security incidents in general. The attack surface has expanded to include home printers, which are not only often insecure, but also create concerns around how documents are protected in the home environment.

There is certainly more concern around security breaches due to insecure printing practices with home printing (76%) compared to office printing (63%) – Figure 8. ITDMs in the US are most concerned about both office (78%) and home printing (85%), while those in Germany are least concerned (40% and 58% respectively).

71% of ITDMs in business and professional services companies are concerned about office printing security, compared with just 51% in the public sector. CISOs are most concerned about security breaches resulting from office (73%) and home printing (80%), while those in non-managerial IT roles are least concerned (44% and 59%).

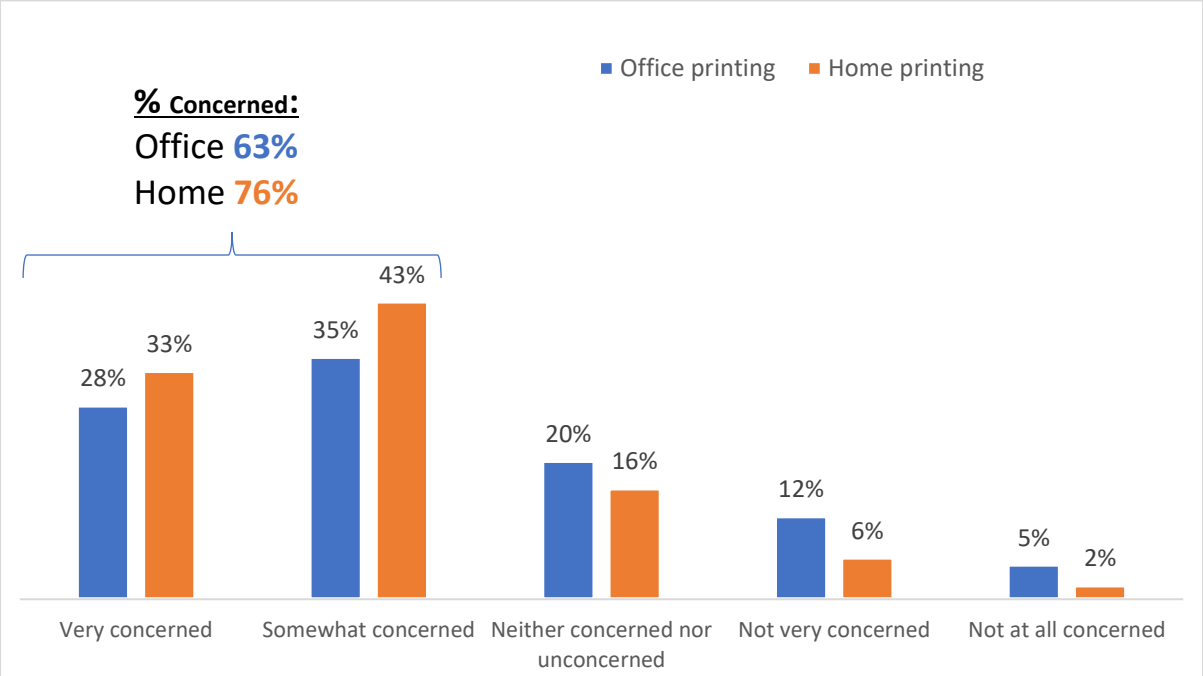


Figure 11. Concerns with home and office print security.

As explained above, print security is lower on the IT security agenda than other elements of the IT infrastructure. This is perhaps the reason behind an overall lack in confidence around how well the print infrastructure is protected.

Before COVID-19 33% of ITDMs were completely confident, compared to 21% now (Figure 12). There have been steeper drops in print security confidence in the US and UK (Figure 13). While 50% of US organisations were completely confident prior to the pandemic, this now stands at 33%. The UK has seen a similar decrease, from 33% to 16%. Those respondents in business and professional services companies are most likely to have been completely confident pre-COVID (43%), and also now (27%), while those in the public sector demonstrate the lowest confidence levels, both pre-COVID (22%) and today (12%).

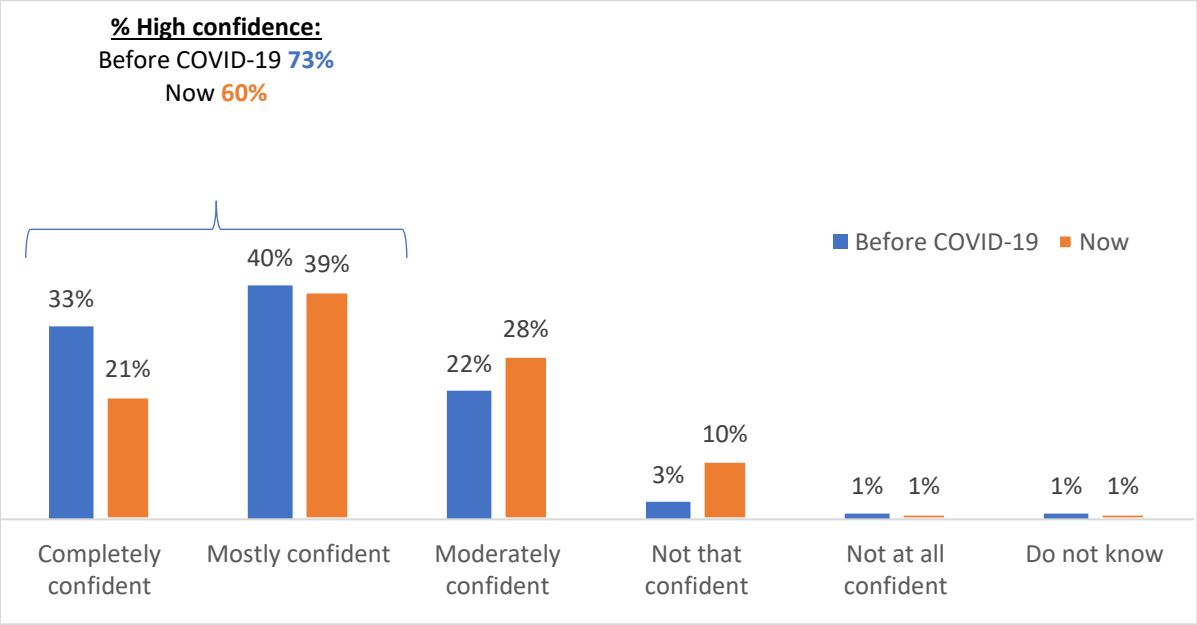


Figure 12. How confident are you that your organisation's print infrastructure (office and remote workplace) was/is protected from security breaches and data loss?

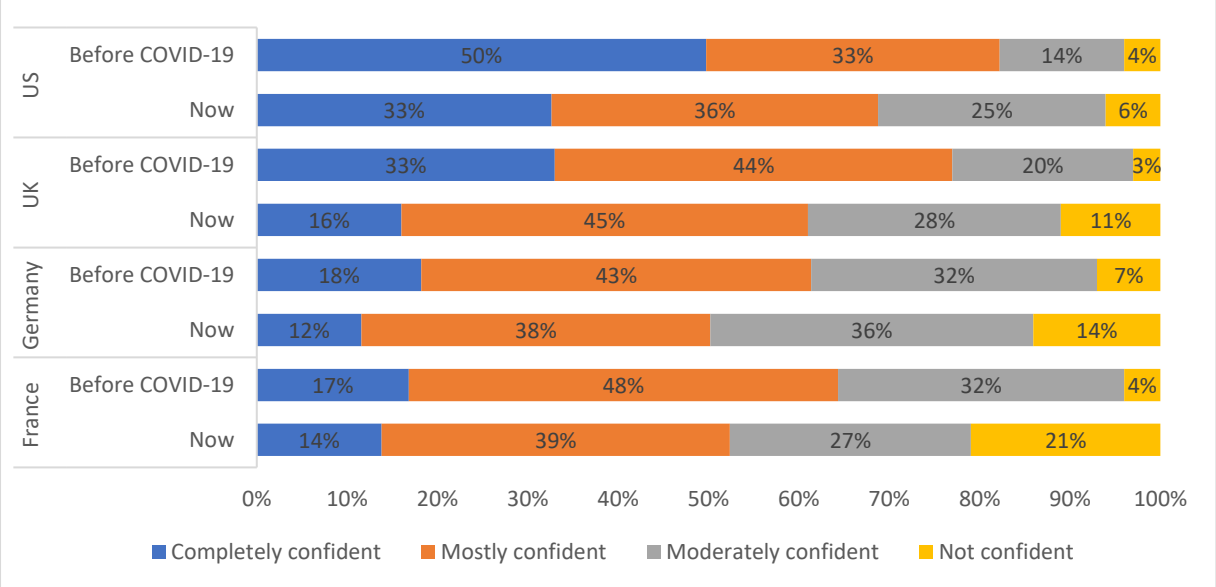


Figure 13. How confident are you that your organisation's print infrastructure (office and remote workplace) was/is protected from security breaches and data loss? (By Region)

Print security leaders report higher levels of confidence (Figure 14). 58% were completely confident before the pandemic and 47% afterwards, while just 18% of followers and 7% of laggards are completely confident in the security of their print infrastructure now.

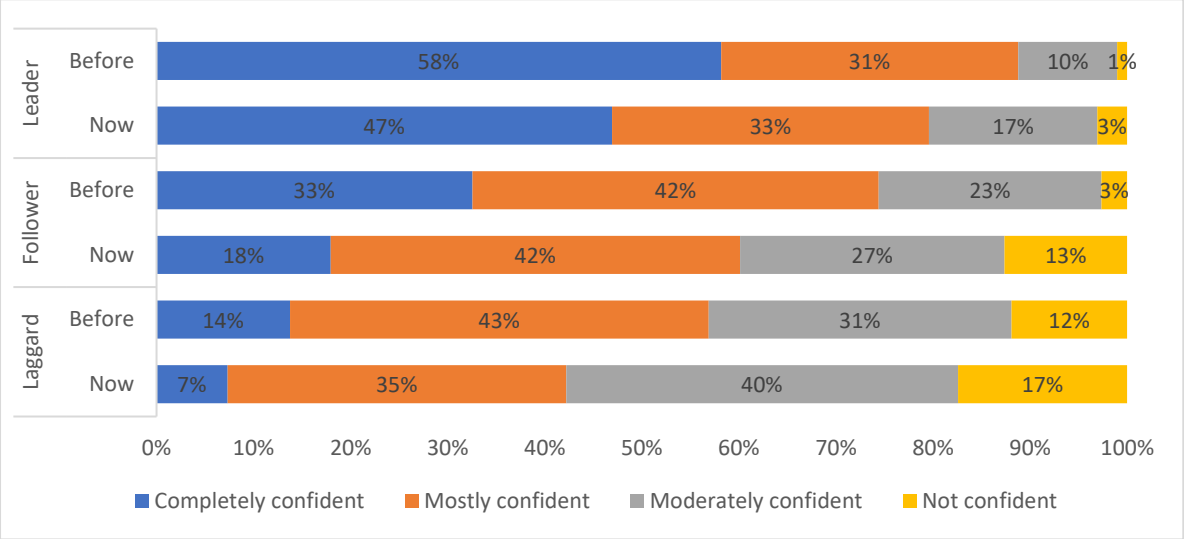


Figure 14. Impact of print security index on print security confidence

Figure 15 illustrates the varying levels of print security confidence by sector, size and industry post-pandemic.

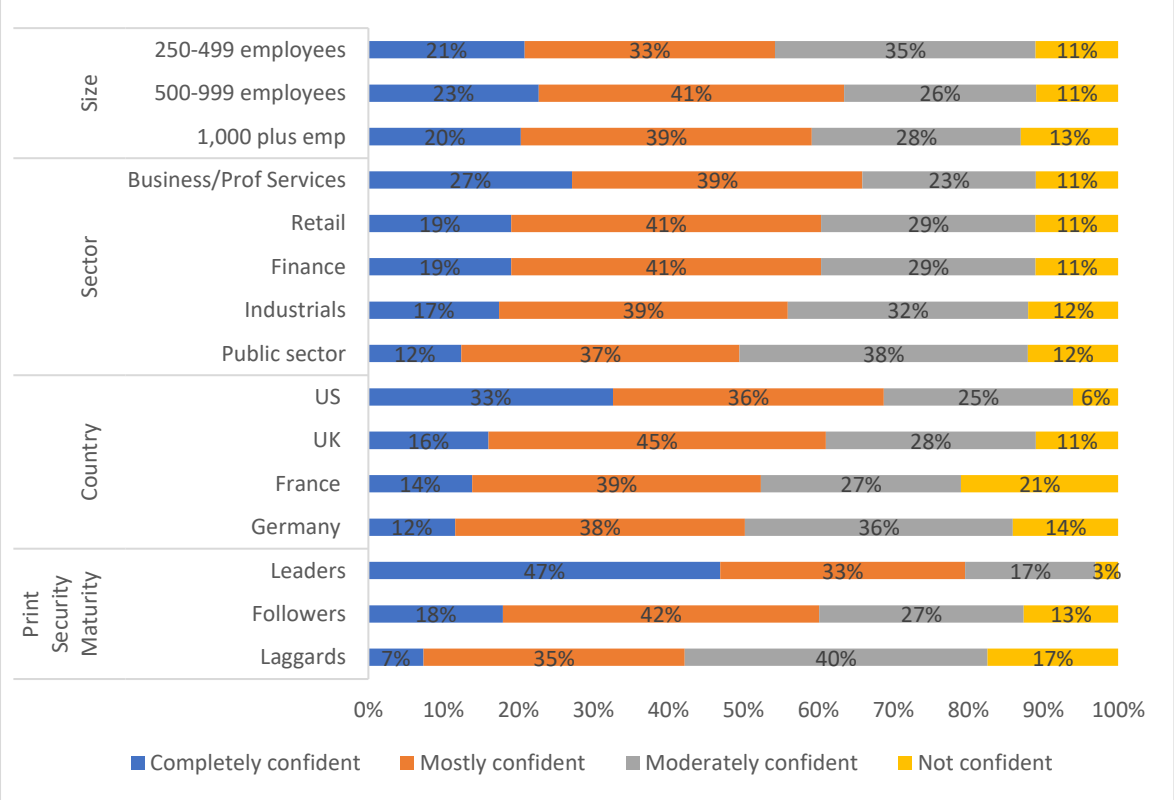


Figure 15. How confident are you that your organisation's print infrastructure *now* (office and remote workplace) was/is protected from security breaches and data loss? (By Region)

This indicates a significant opportunity for MPS providers to help organisations achieve higher levels of confidence. Broader implementation of security measures will certainly help to improve security preparedness and resilience, and mitigate the potential risks of print related security breaches.

Print-related data losses

Given the lack of confidence in the security of their print infrastructure, it's not surprising that the majority of ITDMs have reported at least one print related data loss over the past 18 months (Figure 16). 64% reported having suffered a print related data loss in the past six months, compared to 66% prior to COVID-19.

Those in the US are most likely to have experienced data losses both pre- and post-pandemic (75% and 73% respectively). 51% of organisations in Germany experienced a data loss pre-COVID, and 54% in France post-COVID. Business and professional services companies were most likely to have experienced a data loss during either period (72% and 69%), while those in the public sector were least likely (56% and 49%).

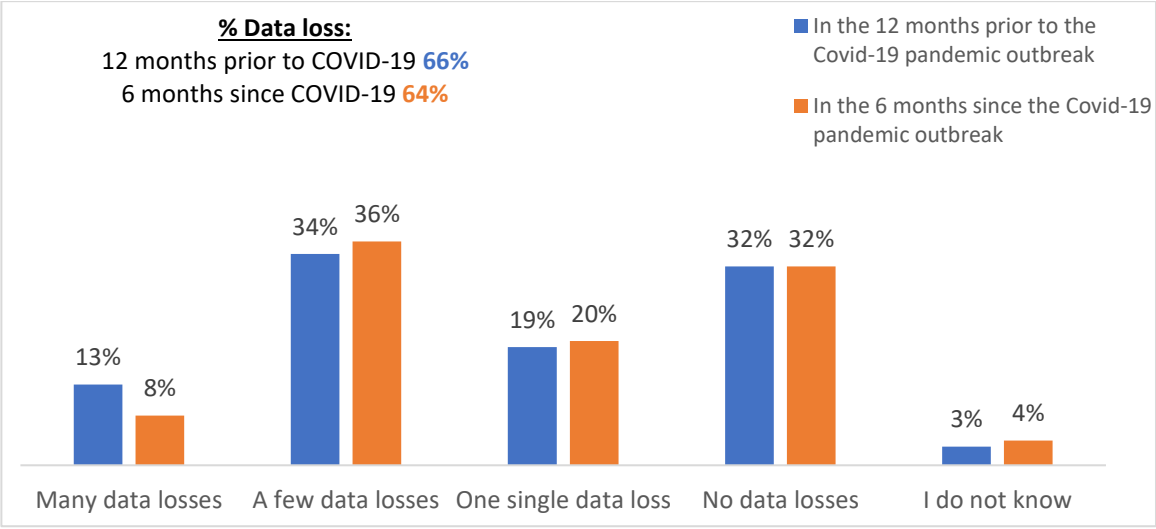


Figure 16. Level of data losses through printers/MFPs due to insecure printing practices

When asked to consider the reasons behind the print related data losses they had suffered, the top reason cited by ITDMs was home workers not disposing of confidential information securely (32%). 27% indicated it was due to printer malware (rising to 36% in the US), and 27% cited confidential information being accessed at the output tray by unauthorised users, rising to 36% in the finance sector.

Notably, data loss is more prevalent in multivendor environments. 42% of ITDMs that operate a standardised fleet report no data losses, compared to 28% that are using a multivendor fleet (Figure 17). Unless integrated print security measures are applied consistently, it is more challenging to secure a diverse mixed fleet. This is because a standardised environment is much more likely to include integrated security controls which also can be easier to track and manage.

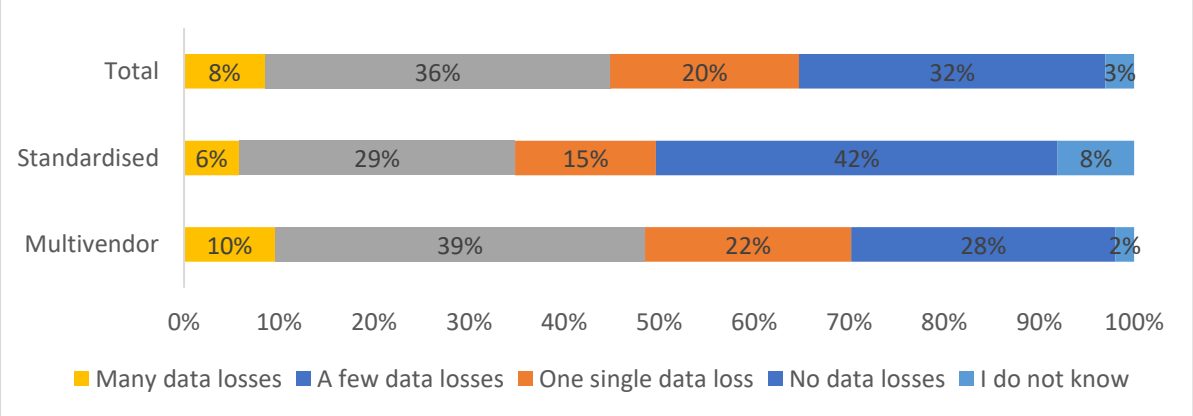


Figure 17. Data loss by print environment

These data losses are costing organisations an estimated average of £1 million, rising to £1.2m in the US and dropping to £825K in Europe (Figure 18). The 2020 figure is skewed by some high individual estimates of more than £10m. This may be due to improving capabilities to quantify losses, or simply down to growing awareness that data leaks are more expensive than previously understood for a range of reasons, including the cost of regulatory fines and of executing the required actions following a loss, through to the cost of damaged customer confidence and reputation.

The costs are highest in the US and the UK, where there are more print-related data losses, and within the finance and professional services sectors and larger businesses.

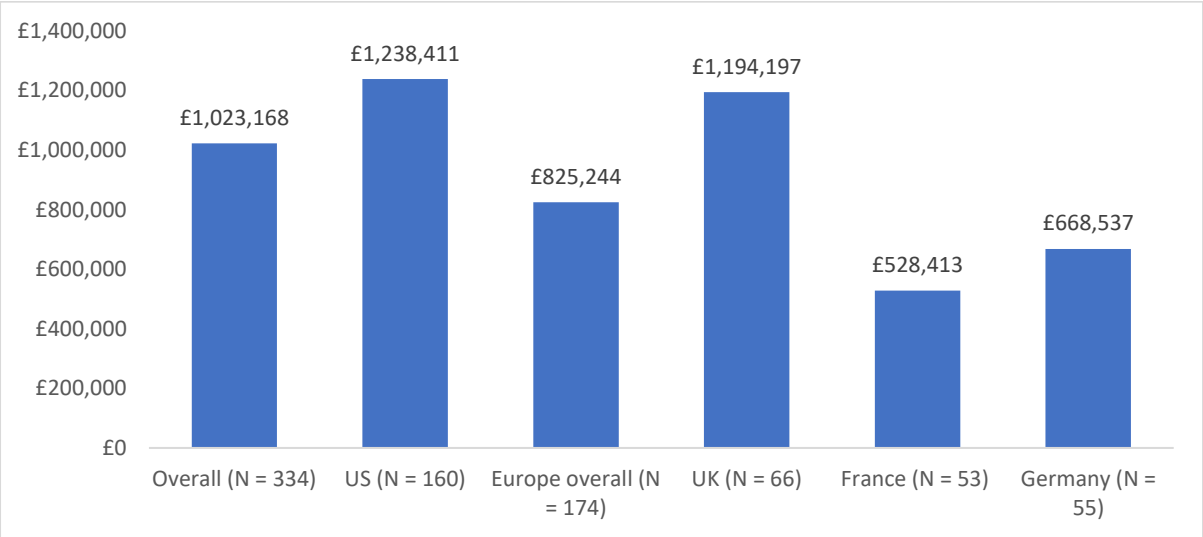


Figure 18. Estimated average cost of a data loss

Supplier choice and satisfaction

US organisations are most satisfied with their print suppliers' print security capabilities (Figure 19), with German respondents least satisfied. Notably, they also tend to be least confident in their print security.

Just 23% of public sector organisations are *very satisfied* compared to 44% of professional services organisations. There is an opportunity here for suppliers to drive up satisfaction rates by extending their security offerings and working with customers to increase confidence in print security.

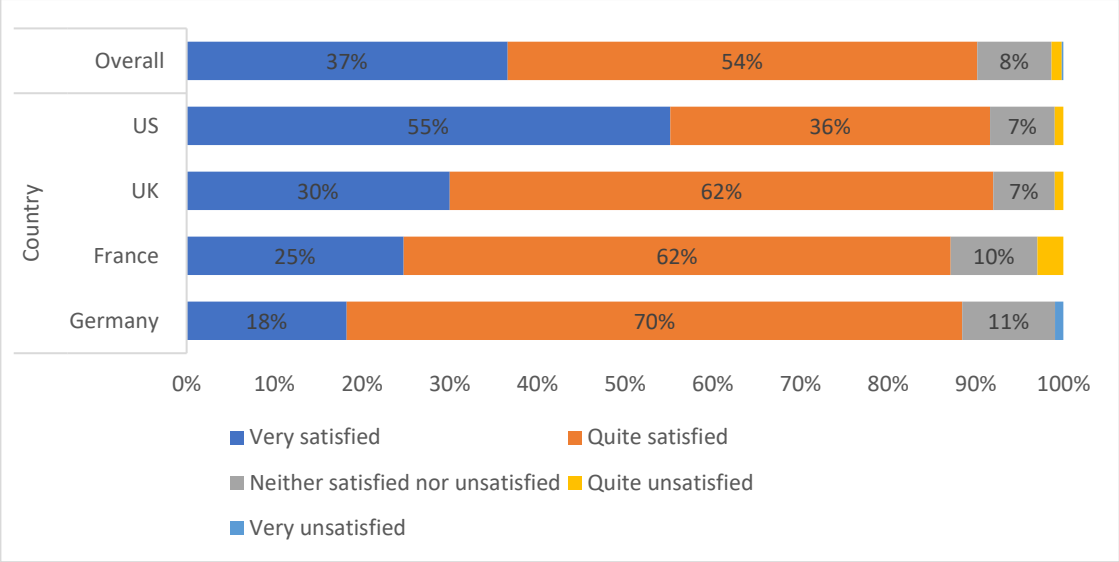


Figure 19. Satisfaction levels

Managed security service providers (MSSPs) are a popular choice for print security advice (Figure 20); overall, 37% of ITDMs say they would turn to an MSSP in the first instance. 23% would turn to a print manufacturer, with smaller businesses most likely to do so as they're more likely to have a single supplier. 17% of ITDMs overall would consult an MPS provider for print security advice. However, in reality print manufacturers and MPS providers overlap, as both tend to be seen as suppliers by their customers, so taken together they dominate – except in the US, where MSSPs prevail.

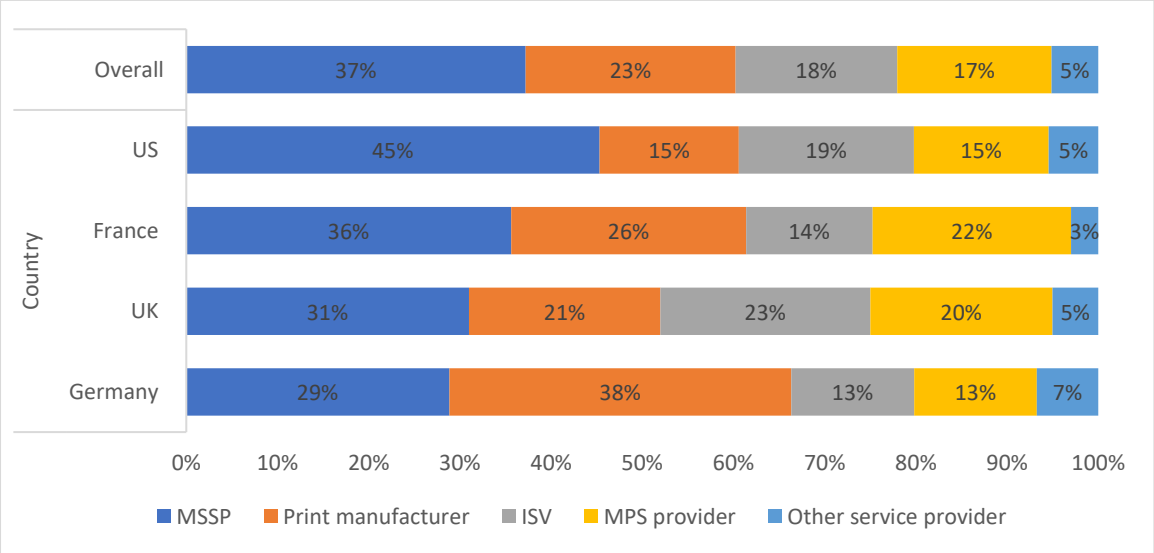


Figure 20. Where would your organisation go first for more information about improving print security?

Buyer Recommendations

Print infrastructure remains an integral element of the overall IT landscape. As devices become more sophisticated, organisations must pay far closer attention to ensuring the print environment is protected, particularly as the potential threat landscape has increased with the rise in home printing. This study has demonstrated that investment in the following areas can build print security confidence, and ultimately lead to improved resilience. Through being better prepared, organisations can improve the prevention of data breaches and losses, as well as the monitoring and remediation required when they do happen.

Quocirca recommends that buyers evaluate the following processes, policies, tools and technologies, in addition to evaluating the hardware security features of MFPs.

- **Authorised printers for home workers**: Quocirca's research shows that employees continue to rely on the printed word as they work from home. One approach to making printing in the home more secure is to only allow the use of authorised printers. This can be achieved in two ways, either by issuing employer-owned printers and blocking other printers, or by certifying the use of employee-owned home printers that can be made safe (for example, those which can provide sufficient log data to a SIEM system). A third approach is to block all home printing – but this will impede productivity.
- **Content security**: Specific policies can be set based on the sensitivity of content, for example: '*this document cannot be printed*' or *'this document can only be printed on an approved printer*'. This enables home-based employees to use their own printers for routine jobs without the risk of restricted documents ending up in their wastebins.
- **A formal process to respond to print security incidents**: Even when all available security measures are in place, data leaks – including those that occur via printing – are likely to happen. Most of the respondents to Quocirca's latest research had at least some security measures in place, but 75% still experienced at least one print related data loss in the past 18 months. Organisations must accept the risk, and put appropriate processes in place to respond to them. These should include the allocation of security staff to assess the nature and seriousness of an event, and to enact the follow up, for example contacting impacted data subjects and co-ordinating with regulators.
- **Pull printing**: This allows certain types of sensitive output to be printed only when the user requesting it is actually at the print device ready to release and receive it. Pull printing is most useful for printers in shared access environments, as is the case for many office printers. However, it could also be applied to allow home users to submit print jobs securely via the cloud to office printers, or even their own printer – enabling print jobs to be tracked at a central level.
- **Print security and risk assessments**: Making sure an organisation's print security requirements are fit-for-purpose is an ongoing task, requiring regular review. This can be carried out internally, or by third parties such as managed security service providers (MSSPs) or managed print service (MPS) providers. Even where an existing assessment was in place before the on-set of the pandemic, it will almost certainly need updating as many employees have started working, and printing, from home.
- **Reporting and analytics**: Risk assessments, tuning content security and configuring SIEM (security information and event management) systems all require insight provided by gathering reports from across an organisation's network, including its extension into employees' homes. SIEM systems themselves can often provide this information, as can broader log management tools. Service providers, including MSSPs and MPS providers, will also have the tools to produce reports and carry out analytics.
- **Revised BYOD policies to include employee printers**: The term bring-your-own-device (BYOD) was first devised when employees started using their own mobile devices to access corporate networks. With the rise of home working, any policies need to be extended to incorporate home printers. Even though content security systems can be used to block home printers, the starting point should be for employees to understand their own responsibilities and the sanctions that can be applied if they try to work around the rules; this is the essence of an effective BYOD policy.
- **Secure cloud print job submission**: Whilst a lot of printing is informal and needs to be near to the user to be effective – for example, printing a report in order to review it – other print jobs are part of larger business processes, and the user that submits the job never sees the output, for example,

letters to be mailed to customers. Employees can securely submit such jobs from home to a cloud print service, which can check the veracity of the submission, and seek secondary authorisation before allocating the job to the most suitable print resources available.

- **SIEM integration**: SIEM (security information and event management) systems use device log data to seek out events in order to check and tune the security status of IT infrastructure. Devices covered can include any printers made visible to a given SIEM system – including those located in employees' homes. The system will be able to identify unexpected access requests to printers, incidents of sensitive content being sent to insecure printers, and so on.
- **Zero trust architecture**: Zero trust is the concept of 'never trust, always verify'. Zero trust operates on the principle that no device, whoever owns it, should be fully trusted as being secure. Typically this approach has been applied to user end-points, giving a company-issued device the same level of trust as one owned by an employee. Any attempt to compromise a device will meet the same rigid security barriers. This approach can be extended to printers, especially those in the home, so no printer, whether company-owned or employee-owned has a lower security state than is considered minimally necessary.

Conclusion – dealing with permanent change

There is no doubt that 2020 has been a year of massive change for businesses and society as whole. As the year draws to an end, and with the real possibility of vaccines to address the COVID-19 pandemic on the horizon, it is not yet clear which of these changes will endure. However, the trends towards more home working and increased adoption of cloud computing seem unlikely to go into reverse.

It is also clear that these changes have not led employees to rush away from printing and paper, and as a result the security problems specific to the use of printers have been exacerbated. To address these risks, organisations need to deploy more of the print security measures available to them, and seek advice from service providers and manufacturers about how best to do so.

Vendor Profile – PaperCut

Quocirca opinion

PaperCut's commitment to security is strongly evident as it continues to innovate, invest and build on its strong security credentials. These have long been embedded in PaperCut's strategy - from product development to service and support. PaperCut is one of the few software vendors in the print management space that has already addressed the emergence of the zero trust security environment. This is a strong differentiator for PaperCut, particularly in today's market where the acceleration of remote working is expanding the attack surface for many organisations. This demands a robust approach to authentication and identity, as well as data protection.

PaperCut has a robust cloud strategy. PaperCut MF's Scan to Cloud Storage and Document Processing services are built on Google Cloud and their data centres. Notably, PaperCut has developed its cloud-native portfolio from the ground up, taking a security by design approach. This platform is based on edge mesh technology as a replacement for local print servers. This merges two key IoT concepts: edge computing - leveraging the power of devices that are local or on-premise, and mesh - multiple devices working together in a zero trust, self-healing mesh network. PaperCut Pocket (beta) and Hive are the first two products launched on the cloud-native platform.

PaperCut's key differentiators fall into three main categories:

Zero trust through edge mesh technology
PaperCut Pocket and Hive utilise PaperCut's Edge Mesh technology, which is a Zero Trust Network where trust of any device is never assumed. Every laptop, phone, desktop, or server that's connected into the Edge Mesh is authenticated and explicit authorisation is required to enter the mesh. When the job is replicated into the mesh, it's always encrypted in both transit and at rest. With PaperCut NG or MF organisations that prefer to restrict all inbound network traffic to their infrastructure can opt for the Mobility Print Cloud Print feature. With this feature, an encrypted peer-to-peer connection is established between the client and the server, even if the server only has an outbound internet connection.

Securing all phases of the print lifecycle
PaperCut offers a comprehensive approach to securing the complete print lifecycle, namely "secure before, during and after printing". This applies to all PaperCut products regardless of whether they are Cloud-native or locally hosted and encompasses system access control, device and network security and secure printing software.

Features include print job encryption in transit and at rest, OS level encryption and secure print release. Device errors and continual print server monitoring ensure that print jobs are not released if there is a device error or server downtime. PaperCut also supports multifactor authentication (MFA) to provide an additional layer of security – for instance combining card ID identification with a PIN.

Full document tracking and auditing by user and device is standard, along with watermarking with user information and digital signatures.

Securing off-network printing from untrusted locations.
PaperCut has added secure printing from untrusted locations (e.g. cafés, home WiFi or a remote site) functionality to all its products. This builds on the Zero Trust model - "never trust, always verify". When a job is printed from off-the-network, it is always encrypted end-to-end and all users are authenticated. Organisation administrators have full control over whether this printing option is enabled.

Quocirca expects PaperCut to further reinforce its security credentials over the next year. It continues to develop its products in line with security best practices such as CERT coding standards, OWASP Top 10 and Oracle Java Security Guidelines. PaperCut's cloud strategy will come to fruition in 2021 as it further builds out

hybrid cloud strategy. Its heavy investment in adding security features to support Zero Trust networks also positions PaperCut extremely well to address the future requirements of printing in the new hybrid workplace.

Product security features

PaperCut products address vulnerabilities before, during and after a document is printed.

Before printing

- PaperCut implements security measures such as system access control, device and network security and secure printing software to ensure security prior to the printing of a document. For PaperCut NG/MF Mobility Print and Print Deploy, addresses issues around users printing from their own mobile devices by ensuring jobs are correctly authenticated before being accepted by a print server.

- Zero trust security is addressed by using the Print Deploy feature in PaperCut NG/MF. This helps organisations by enabling users to join the network but does not give a user access to anything more than what they would have had access to when connecting to the internet at a coffee shop. Client devices can be restricted to only accept trusted SSL certificates when establishing HTTPS connections. This means that no one on the internet can impersonate the server or intercept any data.

During printing

- **Encryption.** This adds an additional layer of security to print jobs in progress. With PaperCut NG/MF 20.1, print jobs can be encrypted at rest on Windows print servers. With PaperCut NG/MF, print jobs are encrypted from the client to the server, can be configured to be encrypted at rest, and also supports encrypted transmission to the printer over IPPS.
- **Print policies.** Supports rules-based printing via built-in customisable options.
- **Secure print release.** Provides print job release upon user authentication, ensuring confidential or sensitive print jobs are not left uncollected in output trays.
- **Managing device errors.** Prevents the release of jobs when a printer is in error, avoiding these print jobs being printed once the printer error is resolved and the owner of the document is no longer at the printer. Additionally, PaperCut NG/MF also monitors the availability of a print server, and in the case where the server is not available and cannot process a release action, the release action is cancelled.
- **Multifactor authentication.** Provides an additional layer of security by requesting additional authentication information from the user, for example providing a PIN to be entered as the second factor to authenticate a user after swiping their card or entering their ID number.

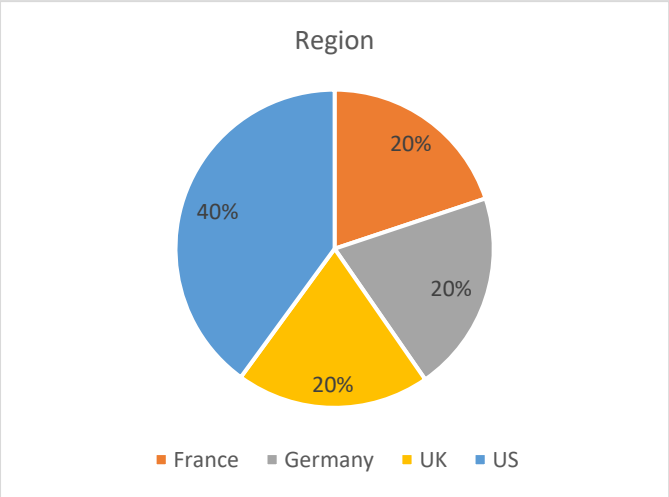
After printing

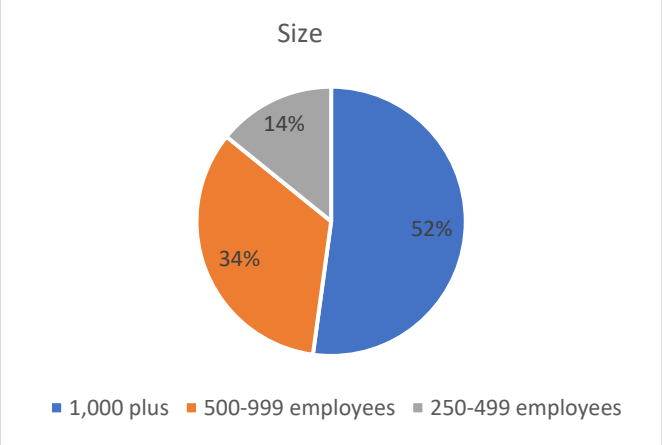
- **Audit trails and reports.** Enhances accountability and traceability by keeping a comprehensive record of all information identifying the user, the document name, the computer used to generate the print job, the output device, and the date and time of printing.
- **Print privacy.** Provides the ability to hide document names either at an individual print queue level or across the entire print server to avoid being seen in the print queue.
- **Watermarking.** Augments a printed page with text added at the time of print. It may contain information such as the user who printed the document, the date on which it was printed, and the printer used. In this way, watermarking can act as a reminder to users that the source of a document can be identified and traced back to them.
- **Digital signatures** - A digital signature is a digital code uniquely generated by taking various print job attributes, such as print time, username, printer name, and document name, and combining them with a secret key. A digital signature applied to a printed document as a watermark can be used to quickly trace a printed document back to a specific entry in the print audit log.

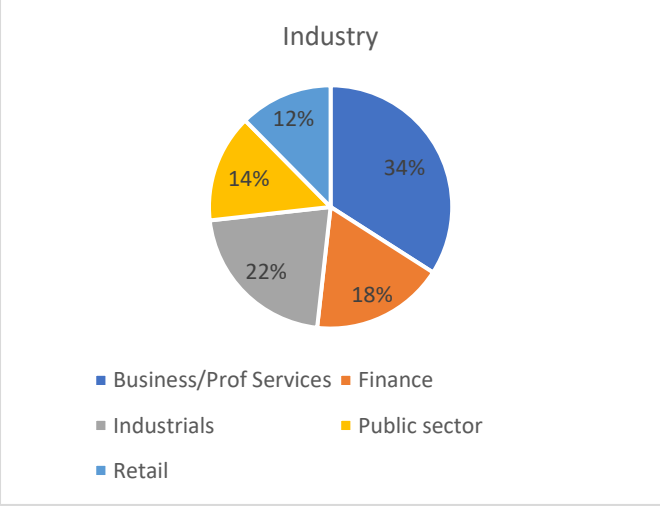
Appendix 1: Demographics and research process

508 IT decision makers were interviewed, all with responsibility or involvement in the management and control of their organisation's print infrastructure and its security. They were based in the USA, UK, Germany and France. A range of business sizes and industry sectors were covered including professional services, industrials, financial services, the public sector and retail.

The breakdown of the 508 interviews by country, industry sector and business size is provided below:







About Quocirca

Quocirca is a global market insight and research firm specialising in analysing the convergence of print and digital technologies in the future workplace.

Since 2006, Quocirca has played an influential role in advising clients on major shifts in the market. Our consulting and research is at the forefront of the rapidly evolving print services and solutions market, trusted by clients who are seeking new strategies to address disruptive technologies.

Quocirca has pioneered research in many emerging market areas. More than 10 years ago we were the first to analyse the competitive global market landscape for managed print services (MPS), followed by the first global competitive review of the print security market. More recently Quocirca reinforced its leading and unique approach in the market, publishing the first study looking at the smart, connected future of print in the digital workplace. The Global Print 2025 study provides unparalleled insight into the impact of digital disruption, from both an industry executive and end-user perspective.

For more information, visit www.quocirca.com.

Disclaimer:
This report has been written independently by Quocirca. During the preparation of this report, Quocirca has spoken to a number of suppliers involved in the areas covered. We are grateful for their time and insights.

Quocirca has obtained information from multiple sources in putting together this analysis. These sources include, but are not limited to, the vendors themselves. Although Quocirca has attempted wherever possible to validate the information received from each vendor, Quocirca cannot be held responsible for any errors in any information supplied.

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