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Business and IT Analysis

Masters of Machines

Business insight from IT operational intelligence

March 2014

Operational intelligence, derived from the collection and analysis of machine-generated data, has often been used purely for the monitoring and management of IT infrastructure, applications and security. However, such data can also provide invaluable new commercial insight into the way a business is performing and enable systems and processes to adjust to user demands and preferences in real time.

To achieve this, tools are needed that can collect machine data from a wide range of sources, provide insightful analysis for short and long term planning and extend the view of operational intelligence to all areas of a business, up to and including the executive level, to better enable timely decision making. Through doing so, managers gain greater control; they will become masters of machines.

This report presents new research examining the drivers for putting operational intelligence in place and the business benefits that can accrue. It shows that the more dependent organisations are on IT to drive their business, the more they are likely to turn to flexible IT infrastructure and invest in operational intelligence capability. The research should be of interest to any manager wanting to improve service levels for all IT users – customers, partners, suppliers and employees.

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EXECUTIVE SUMMARY: Operational intelligence from the collection and analysis of machine-generated data has often been used purely for the monitoring and management of IT infrastructure, applications and security. However, such data can also provide invaluable new commercial insight into the way a business is performing and enable systems to adjust to customer demand and preferences in real time. This requires tools for the collection and analysis of machine data and interfaces that can open it up to business as well as IT managers.

High commercial transaction rates increase reliance on IT	Transactions drive business and, these days, the majority of transactions are driven wholly or in part by information technology (IT). This means businesses must constantly monitor and tune their IT systems to ensure they are capable of handling the transactional load at any point in time. If they do not, business slows or, in the worst case, stops. The more transactive a business is the more of an imperative this becomes.
Highly transactive businesses share the same challenges	Businesses with above average daily commercial transaction volumes have certain characteristics in common. They are more likely to turn to flexible IT infrastructure (virtualisation and cloud services) to increase the flexibility of their IT platforms and to rely on IT operational intelligence to provide better insight for both business and IT managers.
Operational intelligence capability varies widely	Operational intelligence involves harnessing machine data to gain real-time insights into operations to access, tune and improve IT and business processes, to identify security threats, highlight performance issues and see emerging customer trends. Only the most transactive organisations are currently using operational intelligence to provide real-time business insights, but more and more could benefit from doing so as reliance on IT as a strategic enabler continues to increase.
True business insight requires providing access all the way to the executive level	To make a real difference to business operations, many areas of management and, in some cases, partners, need access to IT operational intelligence. This needs to be in a context relevant to their role and the challenges they face. They need to be able to manipulate the machine data that this intelligence relies upon to gain new insights that would not otherwise have been possible. Highly transactive organisations are the most likely to be providing access all the way up to the executive level.
Comprehensive collection of machine data is a 'big data' challenge	Effective operational intelligence is only possible when the collection of machine data is comprehensive. This includes integrating information from internal and cloud-based IT infrastructure and applications. The range of sources of machine data that can be interrogated is broad - from pure IT systems data, through user activity information, to that gathered about business processes. Internally collected data can be enriched from external sources. The overall data volumes involved make this a big data challenge.
Advanced users of operational intelligence invest in purpose built tools	Gathering machine data into traditional repositories such as relational databases and data warehouses and using business intelligence tools for analysis will go some way to delivering operational intelligence. However, ultimately, the most successful implementations are those with a unified machine data management capability and tools designed to analyse and report in both real time and from a historic perspective. Only then can real deep insight to all levels of management be provided.

Conclusions

Those organisations that fail to make use of the huge volumes of machine data that are generated on a daily basis are missing an invaluable opportunity to improve the way business processes respond to user preferences and demand. To do so they need tools that can not only collect data from a wide range of sources but also enable the business to respond in real time to changing events and provide insightful analysis for short and long term planning. To achieve this, a view of operational intelligence must be provided to all areas of management up to and including the executive level and, in some cases, partners and suppliers. Through doing so an organisation can ensure its management stays in control and is the master of its machines.

Introduction – the power of IT operational intelligence

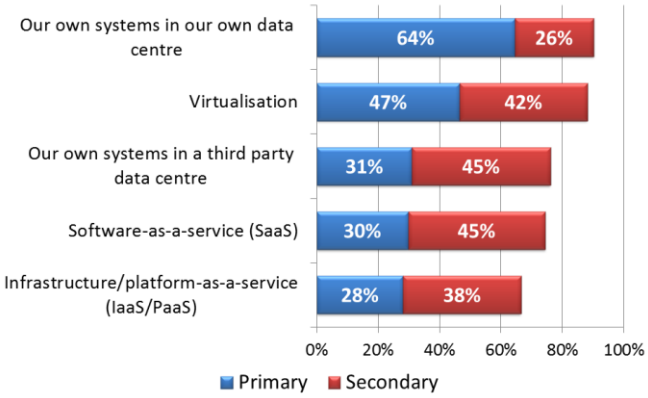
Transactions drive business and, these days, the majority of transactions are driven wholly or in part by information technology (IT). This means businesses must constantly monitor and tune their IT systems to ensure they are capable of handling the transactional load at any point in time. If they do not, business slows or, in the worst case, stops. The more ***transactive*** a business is, the more of an imperative this becomes.

When things are going well, IT systems busily store details of all the day-to-day business; vast repositories of telephone call routing records, retail purchases from web sites and via point of sale (PoS) systems, financial interactions and so on accumulate over time. At the same time IT systems log their own activity; what data went via which router, who accessed which application and when, the IP addresses, URLs and devices via which web sites are accessed and so on. This is ***machine data***, an often untapped record of information about a given organisation's activity. Some estimates suggest that 95% of all enterprise data is multi-structured (or unstructured); for many organisations much of this will be machine data, making it one of the fastest growing segments of the so-called ***big data*** market[1].

A single business's transactions may generate tens, hundreds of thousands of machine data records. Interrogating these large volumes of data provides ***operational intelligence*** to ensure IT systems have the flexibility to support the current transactional load. However, just as important is the fact that operational intelligence can provide an insight into business activity that would be otherwise unavailable.

The challenge of collecting machine data and the need for operational intelligence both increase with the rising use of ***flexible IT infrastructure***; virtualisation and cloud-based services (the latter includes infrastructure, platform and software as a service [IaaS, PaaS and SaaS]). The majority of organisations are now using both either as primary or secondary ways of supporting their IT requirements (Figure 1). Research from Quocirca and others suggests that this will only continue to increase because of the flexibility and cost savings provided as the transaction volumes supported by IT continue to increase.

Figure 1: What role do the following play in the way IT is deployed by your organisation?



The new research presented in this report shows how some European businesses are benefiting from the effective use of operational intelligence whilst others are losing out. It looks at the consequences for business when IT systems underperform, how such problems can be forestalled and how such intelligence supports a broad set of strategic uses, including measuring key performance indicators (KPIs), protection against IT security threats, reduced operational and transactional costs and enhancing the volume, speed and quality of business transactions.

The research should be of interest to business managers seeking to understand how they can get even more out of their IT systems and how operational intelligence can help bridge the gap between the technology and business spheres of an organisation. It provides an insight into how better service levels can be achieved for all IT users - customers, partners, suppliers and employees.

[1] Credit Suisse Splunk Equity Research 14 May 2012 & IDC – Extracting Value From Chaos, Worldwide Big Data Technology and Services 2012-2013

A transactive world

The volume of commercial transactions that are driven by IT on a daily basis should not be underestimated (Figure 2). In reality, for the majority of businesses, this will be all their commercial transactions, be they automated or customer initiated; financial trades, account creations, device activations, call routing, on and offline retail sales and so on.

The types of transaction vary widely; communications providers (telcos) top the list, as every call made and account activation by and to its customers shows up as a record on its IT systems. Financial services organisations are high on the list too, with every trade and customer activity generating a record.

Seeming low by comparison, other industries are still generating tens of thousands of transaction records a day. The load may not be regular and predicable, for example, a manufacturing problem may require change requests to be issued for millions of individual units at short notice.

As might be expected, large organisations clock up the most transactions. However, even smaller organisations are highly dependent on online interaction; i.e. transactions are critical to business execution regardless of the business sector and size of company.

Business-to-business (B2B) transactions dominate overall, although this varies by sector too (Figure 3). In retail, distribution and transport (RDT) business-to-consumer (B2C) transactions are the most common, whilst for gaming companies and telcos transacting via partners (B2P) is important.

Figure 2: Volume of daily commercial transactions driven by IT systems By SIZE and SECTOR

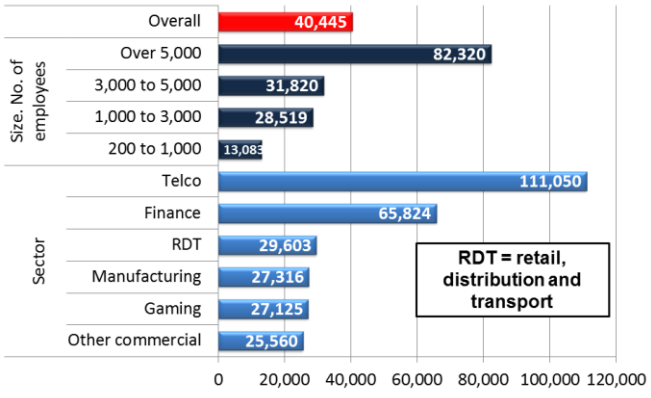
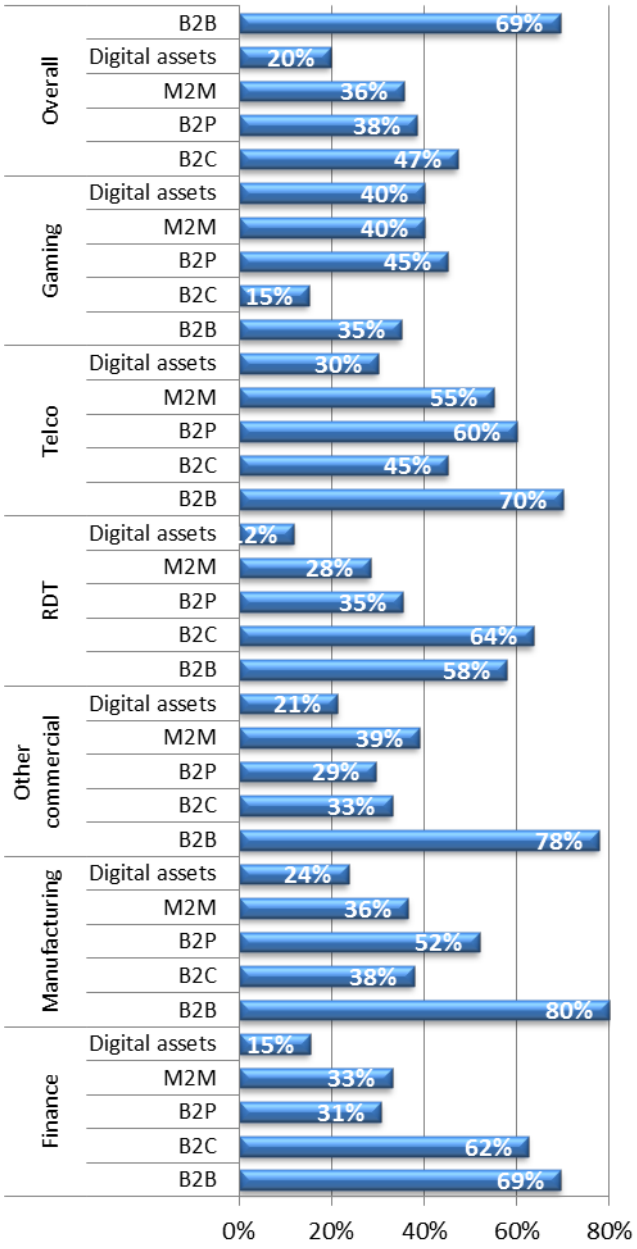


Figure 3: Types of business transactions considered essential OVERALL and by SECTOR



The daily volume of commercial transactions conducted by a given business can be thought of as its ***transactiveness***; a crude proxy for dependence on IT. The more transactive a business is the more likely it is to turn to flexible IT infrastructure (Figure 4). Virtualisation makes sense as it allows IT resources to be shared between different applications as demand rises and falls. The use of IaaS and PaaS, often as a secondary resource, makes sense too as it allows for additional resources to be brought into play only when they are needed, avoiding unnecessary upfront expenditure on resources that may lie idle for much of the time.

Whilst the use of virtualisation and cloud-based services can help organisations to manage high and variable transaction loads efficiently, it also introduces new IT management challenges. Virtualisation multiplies the number of servers and application workloads that need managing and monitoring, whilst using cloud-based services distributes them more widely. All this leads to more machine data that needs harnessing to provide a pervasive view. So, transactiveness, the use of flexible infrastructure and the need for of operational intelligence all increase together.

For purposes of comparison the organisations surveyed for the current research have been segmented into four groups representing their overall transactiveness: very high, high, medium and low (Figure 5). These are used later in the report to compare the way IT systems are managed and deployed and gauge the relative value placed on operational intelligence and the commercial insights it can provide.

Figure 4: Transactiveness and use of flexible infrastructure

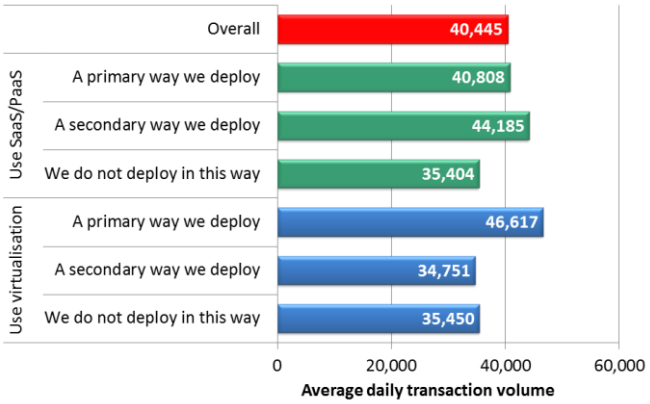
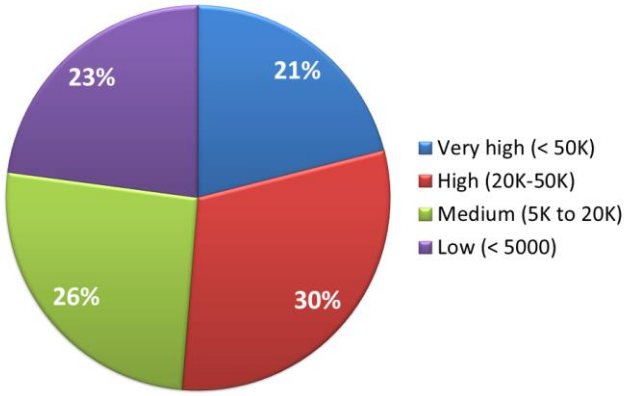


Figure 5: Transaction volume ranges



The value of operational intelligence

For survey respondents, operational intelligence was defined as:

Harnessing machine data to gain real-time insights into operations to access, tune and improve IT and business processes, to identify security threats, highlight performance issues and see emerging customer trends.

Most businesses agree that access to operational intelligence can provide them with business insights that would not otherwise be available. The highly transactive telco and financial services organisations top the list when it comes to recognising this, but other sectors are not far behind (Figure 6). Table 1 gives some examples of operational intelligence in action.

Figure 6: To what extent do you agree with this statement:
"Our organisation could benefit from the use of operational intelligence by collecting, storing and analysing real-time and historical machine data to gain insights that would not otherwise be available."

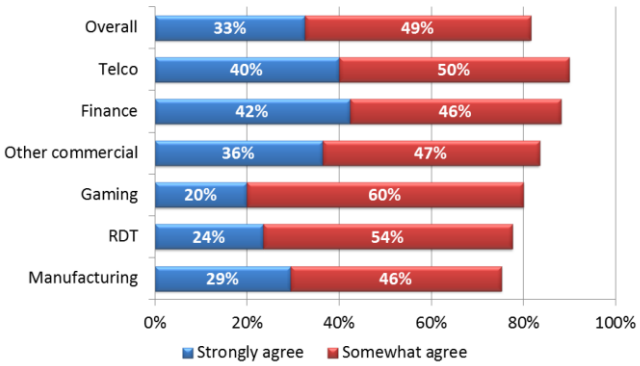


Table 1: Some examples of operational intelligence in action

- A call centre can monitor actual call volumes and/or waiting times and see if these correlate with other data, such as customer type or geographic location. Early warning of arising issues is thus possible.
- An online music service can see the most popular downloads by device type and/or geographic location and adjust its recommendations accordingly.
- In the interests of fraud prevention a bank can issue users with security warnings based on the browser they are known to use when logging in to internet banking.
- A payment card provider can highlight and flag multiple transactions occurring in different areas close in time, using both geographic and IP address data.
- A manufacturing company can monitor access to plant facilities, ensuring only users proven to be at a given physical location are authorised to operate equipment.
- Recognition of username/password attempts on a system that do not match normal usage patterns may identify a potential breach.
- A web retailer can recognise the type of device its customers are using when they make purchases and, by looking at their history, how likely they are to regularly update their devices. Those who clearly like to have the most up to date technology can be targeted with appropriate advertising.
- Attempted systems updates can be checked against configuration change requests; if there is no match a change may be unauthorised and can be blocked.
- Key performance indicators (KPIs) can be monitored; for example are response times for customers transacting on web sites acceptable? In what circumstances are targets not being met and at what times of day or in which regions?

Overall, the recognition of the value of operational intelligence is widespread; the concept does not need explaining to IT managers. Maximising the potential benefit for the business is a different matter; the degree to which that is achieved depends on the maturity of a given business with regard to how it uses operational intelligence.

The value that can be derived from operational intelligence is granular and, from a business perspective, increases as it moves through four stages from the basic investigation of IT issues to providing real-time business insights. These phases are outlined in table 2, where each is broken down into three sub-capabilities. The extent to which a given organisation can harness machine data and turn it in to operational intelligence in each of these areas is a measure of its maturity with regard to operational intelligence.

The overall capability in each area for the organisations surveyed is summarised in Figure 7. Overall, the strongest capability is found in the most basic area of operational intelligence, the capture, storage and analysis of machine data, whilst similar capability is shown in most other areas. However, there is huge variation in the maturity of individual organisations.

This can be measured using an operational intelligence index (OI Index) by applying a numeric value to each response to the 12 points in Table 2 ("strong" = 3, "would like improve" = 2, "poor" = 1 and "none" = 0). An average between 0 and 3 can be calculated for each organisation. The OI index ranges from near zero (no capability at all) to 3 (fully capable in all areas). The range across all 380 organisations surveyed can be seen in Figure 8, which also shows five OI maturity ranges used in this report (very low to maximum).

Table 2: The four stages of operational intelligence maturity

The way machine data is collected and turned into operational intelligence progresses from IT-focussed root cause analysis to real time business insights. Most organisations start at stage one and mature over time through stages 2, 3 and finally 4. The degree to which they achieved this can be thought of their operational intelligence maturity and is expressed in this report as the "OI Index".

1: Search and investigate:
1A Capture, store and search machine data
1B Search and find the root cause of important events
1C Analyse machine data to find the root cause of important events

2: Proactive monitoring:
2A Analyse machine data to notice and manage exceptions before they impact users or service delivery
2B Use machine data in real time to make decisions about tuning IT systems
2C Use machine data to provide the business insight it would not otherwise have

3: Operational visibility:
3A Use machine data to measure service levels and key performance indicators to better serve the business
3B Use machine data to gain end-to-end visibility of consumer behaviour and business performance
3C Examine machine data for general intelligence about the business, customers etc. that would not otherwise be available

4: Real-time business insights:
4A Correlate machine data with business data to provide real-time insight for tuning business processes
4B Use real-time analytics from machine data to detect patterns, identify trends and predict outcomes (e.g. for capacity planning and fraud detection)
4C Provide the business views from machine data analysis that drive real-time decision making and innovation (customer insights, marketing insights, usage insights, product-centric insights)

Figure 9 shows the average OI Index by sector and business size. The highly transactive telcos have the highest operational intelligence maturity followed by financial services. Some smaller organisations are as capable as larger enterprises; this is due to real need but may also reflect the fact that they may have less complex IT infrastructures. Smaller companies may also be more innovative, for example in gaming, and may have development/IT teams that are more agile than other sectors and potentially more predisposed to using disruptive technologies.

It has been pointed out earlier that highly transactive organisations tend to make more use of flexible infrastructure. Those using flexible infrastructure are also more likely to recognise the value of operational intelligence and be more mature in its use (Figure 10). This will, in part, be because the value of operational intelligence rises as they grapple with managing a more complex and distributed IT estate, but also because they are more transactive. These three issues increase together; transactiveness, the use of flexible infrastructure and the need for effective operational intelligence.

All this said, operational intelligence can only provide value if it ends up in the hands of the users that can benefit the most from it.

Figure 7: Please rate your organisation's ability to do the following OVERALL (see Table 2 for key)

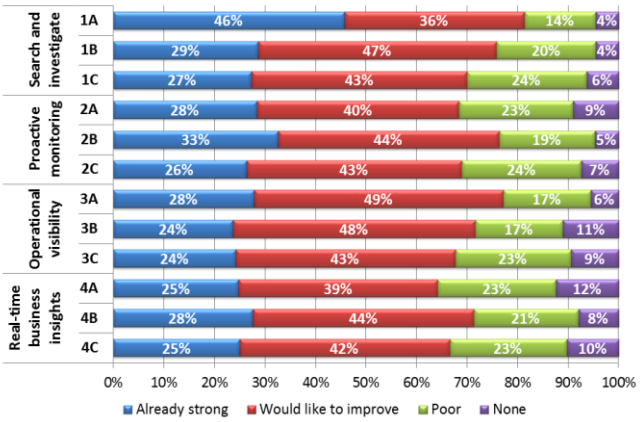


Figure 8: Operational intelligence maturity index Showing ranges used in analysis

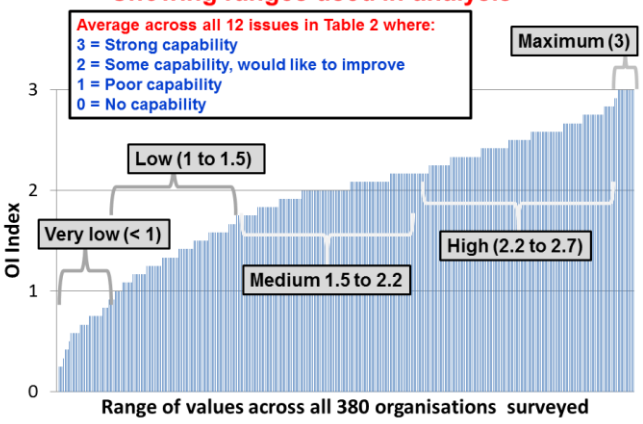


Figure 9: Operational intelligence index By SIZE and SECTOR

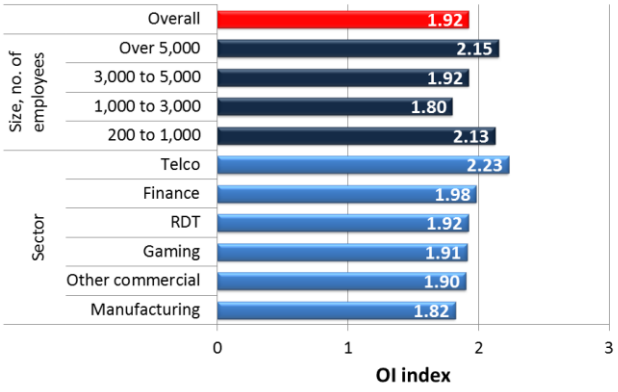
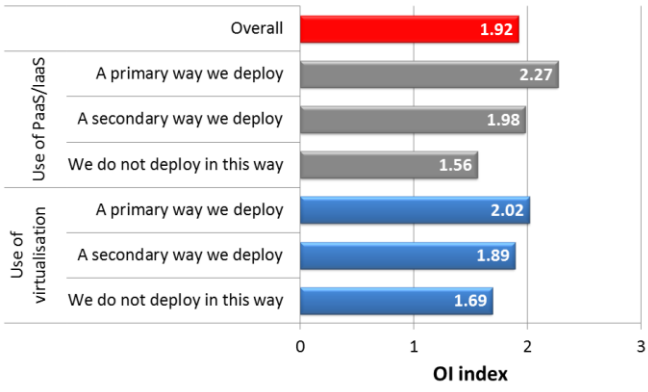


Figure 10: Operational intelligence maturity By use of FLEXIBLE INFRASTRUCTURE



The users of operational intelligence

It comes as no surprise that IT managers are the primary users of operational intelligence. However, many other job roles are also being provided access (Figure 11). Application developers need access to understand the stresses that are being put on the software they write, so, for example, they can make sure likely I/O levels can be handled. Beyond these IT-related roles, in many cases, business users are being given access to operational intelligence.

These include marketers, product managers and board-level executives. Looking in more detail at the latter shows there is a relationship with transactiveness. All but the least transactive organisations provide, or would like to provide, an executive-level view of operational intelligence, which, of course, includes telcos and financial services. This makes sense: if an organisation has invested in its ability to master machine data and the tools to analyse it, why would they not extend the value of this beyond IT to the broader business? Such access can provide more immediate insight into KPIs and other business metrics such as the volume, speed and cost of business transactions. This is exactly what the most mature organisations with regard to operational intelligence are doing (Figure 12).

Bottom of the list on Figure 11, but not to be underestimated, are external users from partners and service providers. This only makes sense if these organisations play a central part in a business's operations in some way; sharing operational intelligence enables better co-operation. This is well demonstrated at the IT management level where, overall, one third of the work is outsourced (Figure 13).

Figure 11: What roles in the organisation have access to operational intelligence? OVERALL

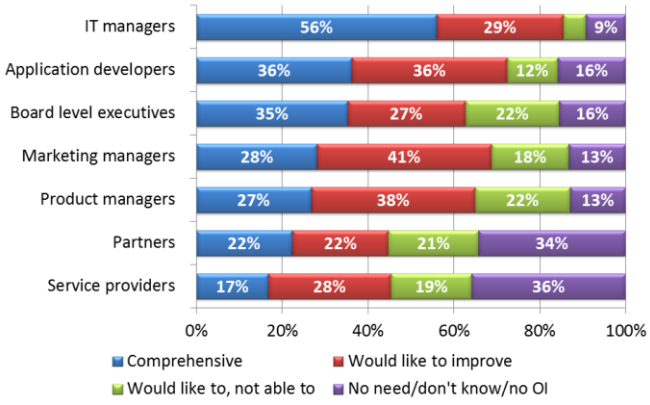


Figure 12: Board level view of operational intelligence By OI INDEX

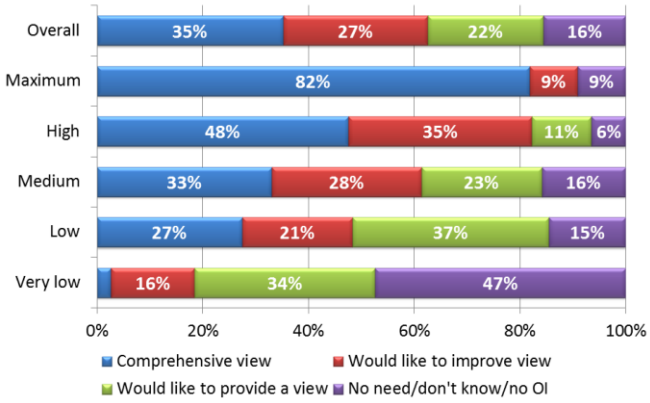
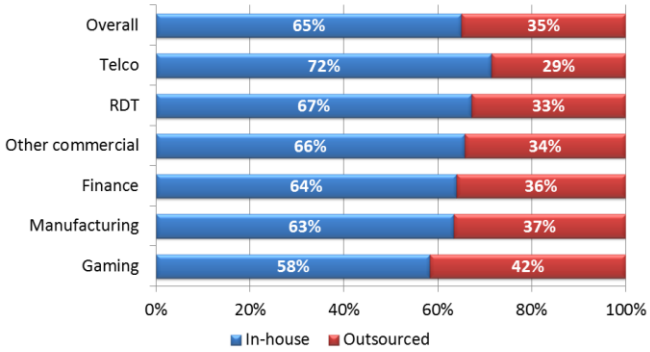


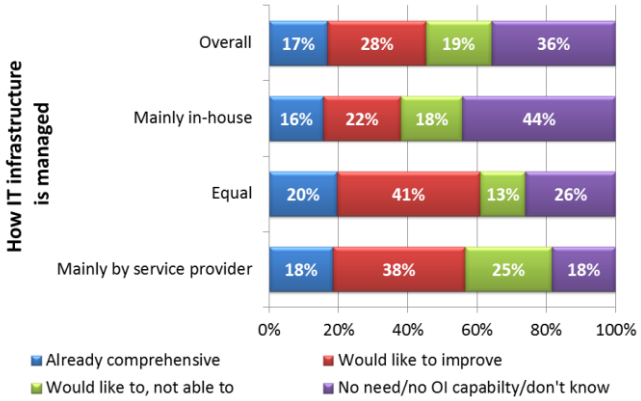
Figure 13: Percentage of infrastructure managed in-house and by service providers OVERALL and By SECTOR



Common management systems are essential for sharing information when this is the case. Those with high levels of outsourcing are more likely to ensure they provide a comprehensive view of their operational intelligence to their service providers (Figure 14) and will invest in the tools to do so. There is no reason why such co-operation should be limited to IT management; it can also be extended to business partners.

A friendly, business oriented user interface is one essential to achieve effective operational intelligence; another is the ability to gather and analyse the machine data it relies upon in the first place.

Figure 14: View of operational intelligence provided to service providers By HOW IT IS MANAGED



Gathering machine data – overcoming the big data challenge

Operational intelligence is only possible with the effective collection of machine data from as much of a given organisation's IT estate as possible. As stated earlier, this includes both on-premise infrastructure and any external cloud-based services that are in use. All but the least transactive of organisations recognise the necessity of machine data to the delivery of operational intelligence; as ever, telco and financial services organisations top the list (Figure 15).

Recognising the value of machine data is one thing, collecting it is another. Figure 16 lists some of the challenges showing how these were rated by the survey respondents. Topping the list is processing large volumes of historic machine data; in other words this is a big data issue.

Other issues listed on Figure 16 are not necessarily lower down the list because they are easier to do, but because not all organisations will be trying to do them. Whilst no organisation can avoid collecting machine data if it wants to develop its operational intelligence capability, not all will currently be attempting to use it in real time or to provide business insights.

Whilst acknowledged as a challenge by many, bottom of the list on Figure 16 is integrating and analysing machine data from both on-premise and on-demand sources. Again, this is not because it is the easiest thing to do, but because not everyone is yet trying to do so; indeed over 60% of those that are using infrastructure-as-a-service (IaaS) and/or platform-as-a-service (PaaS) admit it is a challenge.

Figure 15: How necessary is machine data for delivering operational intelligence? OVERALL and by SECTOR

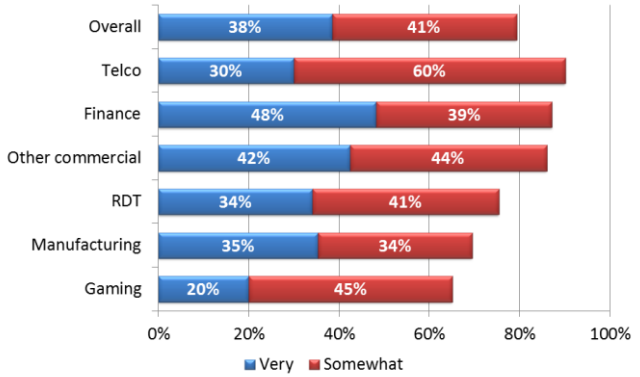
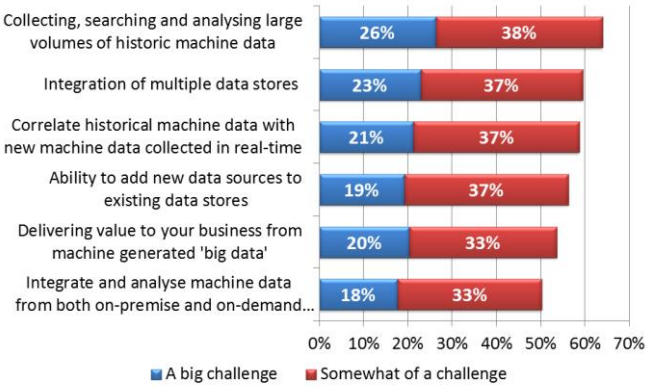


Figure 16: How much of a challenge are the following issues for your organisation? OVERALL



The ability to collect machine data increases sharply with operational intelligence maturity (Figure 17). However, it is hard to separate cause from effect; effective operational intelligence is not possible without the comprehensive collection of machine data, which, in itself, will increase the scope of operational intelligence.

As in other data processing areas, one of the challenges thrown up is the collection of data from multiple sources (See Table 3 for a list of sources). This is especially true of organisations that make extensive use of virtualisation. This is not because virtualisation is a bad thing, but because it enables the creation of vast numbers of virtual machines that all generate their own machine data – in other words it makes the big data challenge bigger still.

Despite this, those using flexible IT infrastructure still manage to collect more machine data (Figure 18). This is because they have to, for two reasons:

1. The reason they use flexible IT infrastructure in the first place is to make the IT infrastructure overall more cost effective and efficient. Neither virtualisation nor cloud-based service achieve that automatically, they must be deployed in conjunction with good operational intelligence.
2. Those organisations using flexible infrastructure do so because they are more transactive and can derive commercial benefits from effective operational intelligence.

One of the most important differentiators between organisations in the way they collect machine data and implement effective operational intelligence is the tools used for the job.

Figure 17: Percentage of IT infrastructure machine data is gathered from By OI INDEX

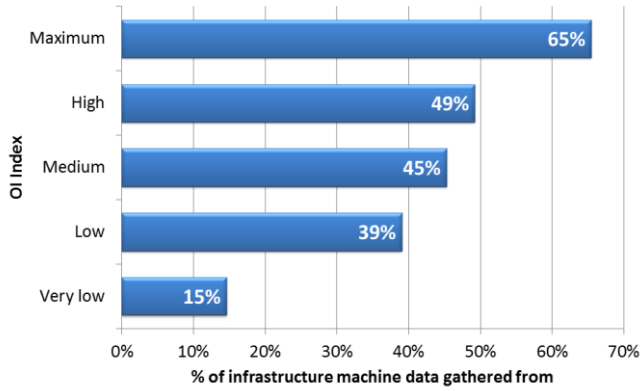


Figure 18: percentage of infrastructure machine data is collected from By use of FLEXIBLE INFRASTRUCTURE

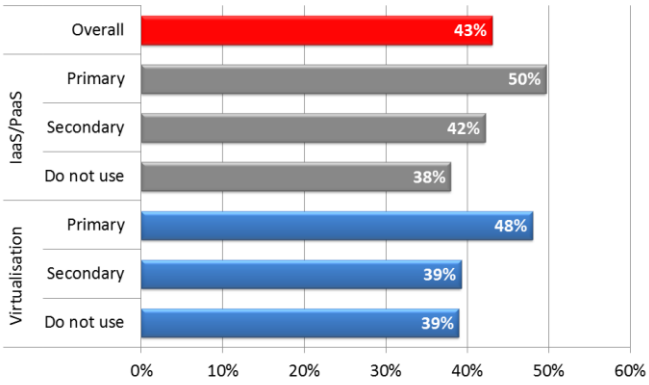


Table 3: Machine data sources	
Source	**Use**
System and network data	
I/O stats from Linux and UNIX systems and performance monitor on Windows	Usage trends, performance issues and investigation of security incidents
Storage system logs	Direct access records, i/o stats
Windows events	IT environment, usage patterns and security information
User end-point information (PCs, tablets, smartphones)	Known and unknown devices, access location information
Cloud-based applications and infrastructure	As for internal infrastructure
Operating system metrics and status information	System performance, e.g. CPU and memory use
Virtual machine data	Operating systems, applications, security devices, network devices can all be virtualised, so these logs are as important as any other
Configuration files	How each system is set up, how this has changed, how it varies from the expected
Network packet/flow data, syslog data (from application delivery controllers/ADC, routers, switches and other network devices)	Identify unexpected ingress/egress and attempts at interception
User data	
User identity records	Known users of applications and data, access rights
User activity information, data from physical security access systems (door entry systems etc.)	Physical location data
Application data	
Application logs	Direct records of user activity
Application programming interface/API logs	Indirect access information to applications via APIs
Message queues	Secondary information about application use
Database logs	Direct records of data access
File system access logs	Direct records of data access
Telephone call records, IVR systems	Communications information, billing information
Other communications logs (email records, instant messaging logs etc.)	Communications information
Web data	
Clickstream data	Internet activity by users
Web access logs	Direct internet activity by users and applications
Web proxy logs	Proxy internet activity by users and applications
Other activity information, shopping baskets, cookie records etc.	Direct insight into customer activity/tolerance
Other sources	
Security devices and systems	Permitted and denied users access information
Data supervisory control and data acquisition system logs (SCADA)	Access to and performance of industrial equipment
Sensor data (the 'internet of things'/IoT), RFID, telematics	Access and usage information gathered from IT and other systems via purpose installed sensors, e.g. environmental information
External feeds – software vulnerability information, known malware, social media, weather reports, GPS	Enrichment of internally gathered machine data sources

The tools to master the machine

In the main, organisations are using a mix of traditional IT tools to gather machine data and gain operational intelligence (Figure 19). Only 27% are using purpose-built tools and these are the organisations with the highest operational intelligence maturity and the ones that collect the most machine data (Figure 20).

Unsurprisingly, those that do not currently collect machine data have no capability and, by far, have the lowest operational intelligence maturity. However, any level of operational intelligence is better than none at all. Moving from nothing to something is the biggest leap an organisation can make; beyond this all improvements in the use of operational intelligence are driven by three things:

1. Better gathering of machine data
2. Better analysis of large volumes of machine data to provide effective operational intelligence
3. Moving from using operational intelligence purely for IT purposes to include business uses (increased operational intelligence maturity)

Gathering machine data into standard repositories such as relational databases and data warehouses and using traditional business intelligence tools for analysis will go some way to achieving these goals. However, ultimately, the most successful users of operational intelligence will be those that put in place a scalable machine data management capability and innovative tools that are designed to analyse and report upon it.

Indeed, those organisations providing a comprehensive view of operational intelligence at the executive level are the most likely to be using tools purchased for the purpose: those that are not able to provide such a view or see no need are the least likely. Table 4 lists some of the key criteria to consider when evaluating the tools for supporting operational intelligence.

IT systems will continue to become ever more complicated to support greater numbers of transactions and broader communities of users. The trend will mean more and more organisations realising the benefit of putting in place tools to gather and manage machine data, providing the operational intelligence that can improve the levels of service provided to all users and increase competitive edge.

Figure 19: How does your organisation currently capture operational intelligence?

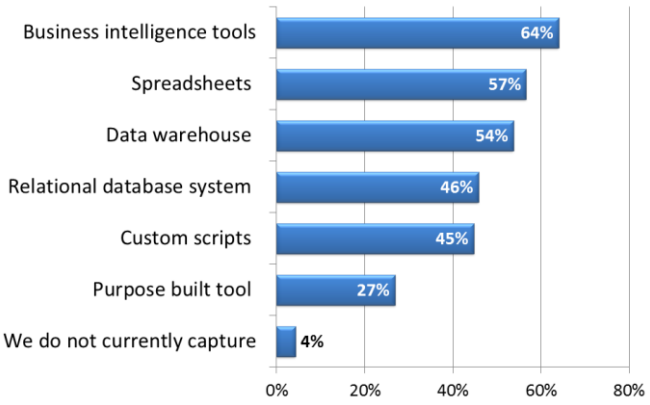


Figure 20: Machine data collected by tool used

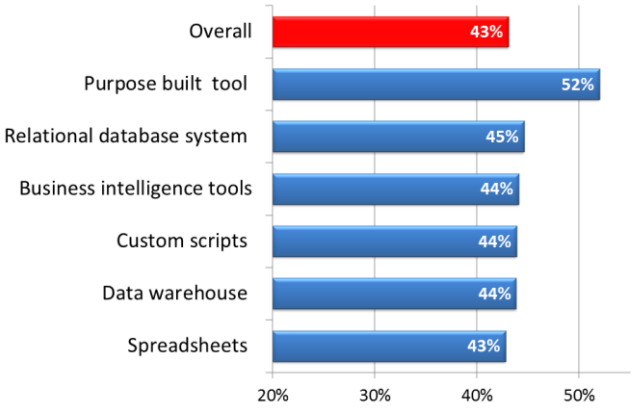


Table 4: Evaluation criteria for operational intelligence tools

The principal criteria to consider when evaluating the tools for gathering machine data and implementing effective operational intelligence

Data collection and storage

- Does the tool have built-in adapters to gather machine data from a wide range of sources?
- Does it have an API for adding your own custom sources?
- Does the tool have its own flexible repository that can accommodate data from multiple sources whist providing a meaningful representation of the underlying raw machine data
- Can new data sources easily be added to existing data stores?
- Is the tool able to integrate data from multiple sources to provide a single view?

Data processing

- Can large volumes of data be processed fast enough to provide real-time correlation between events happening now and historic data?
- Does the repository support or integrate with big data stores such as Hadoop?
- Can external data feeds be integrated to enrich internally gathered machine data, for example adding real world locations to IP addresses and mapping information?

User interface

- Is the user interface suitable for use by business as well as IT users (e.g. drag and drop interface)?
- Is the user interface customisable to support individual user preferences?
- Does it represent machine data in a format that is understandable by non-IT users?
- Are graphics and reports easy to create, customise and share?
- Is the user interface powerful enough to support complex correlations, e.g. does it support pivot tables?
- Does the tool provide automated alerting?
- Does the licencing model accommodate broad rather than narrow usage of the user interface?
- Do the tools enable external co-operation with users from external organisations such as partners and service providers?

Admin and programming

- Is the tool easy to manage with a clear administrator console?
- Does the tool provide automated alerts regarding security issues and other IT admin issues?
- Is the tool extensible, i.e. can programmers build their own add-on apps on both the client and server?
- Does the tool support standard methods for building extensions (e.g. JavaScript, Python etc.)?
- Are add-on apps easily sharable amongst communities of developers and their users?
- Does the tool integrate with other enterprise applications or custom applications?

Conclusions

The value of operational intelligence is widely understood by IT managers; however, many are becoming aware of the potential benefit to the broader business. The new research presented in this report provides clear evidence that the organisations most likely to extend the value of operational intelligence beyond the IT department to the business, and indeed the executive level, are those most likely to benefit from better insight into IT operations to support their business critical commercial decision making – i.e. those most reliant on IT to drive high daily transaction rates. However, IT drives most transactions in most business, so all have plenty to gain from better operational intelligence.

Those organisations that fail to embrace this *big data* opportunity - the huge volumes of machine data that are generated on a daily basis - are missing an invaluable opportunity to improve the way business processes respond to user preferences and demand. To do so they need tools that can not only collect machine data from a wide range of sources, but also enable the business to respond in real time to changing events and provide insightful analysis for short and long term planning. Through doing so an organisation can ensure its management stays in control and is the master of its machines.

Demographics

The graphs below show the breakdown of the sample by country, sector, company size and job role. The total number of surveys was 380, the actual sample numbers are shown on the graphs rather than percentages.

Figure 21: Countries covered in survey (showing actual sample numbers)

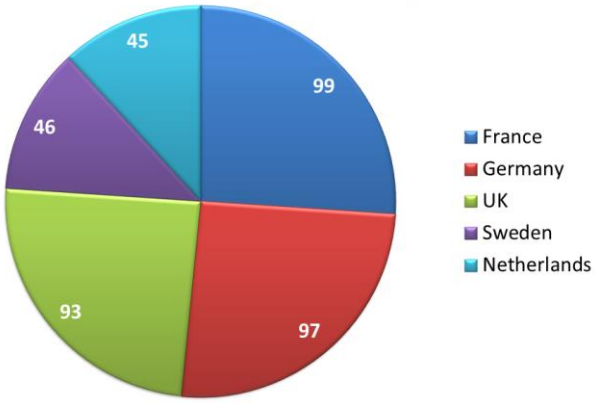


Figure 22: Industry sectors by country

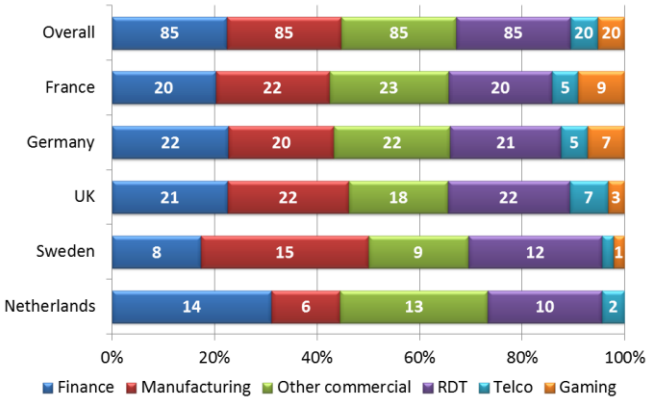


Figure 23: Business sizes by sector

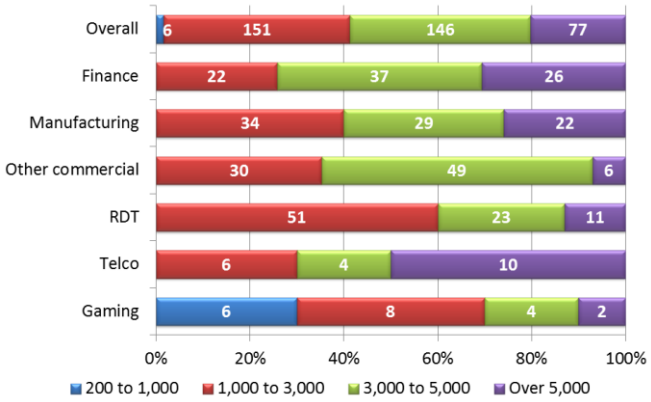
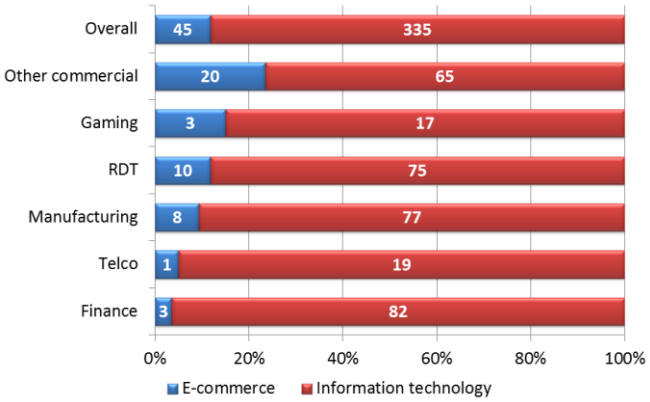


Figure 24: Job roles by sector



About Splunk

Splunk Inc. (NASDAQ: SPLK) provides the engine for machine data™. Splunk® software collects, indexes and harnesses the machine-generated big data coming from the websites, applications, servers, networks, sensors and mobile devices that power business. Splunk software enables organisations to monitor, search, analyse, visualise and act on massive streams of real-time and historical machine data.

More than 6,400 enterprises, universities, government agencies and service providers in over 90 countries use Splunk Enterprise to gain Operational Intelligence that deepens business and customer understanding, improves service and uptime, reduces cost and mitigates cybersecurity risk. Splunk Cloud™ is a service that delivers Splunk Enterprise in the cloud for large-scale production environments. Splunk Storm®, a cloud-based subscription service, is used by organisations developing and running applications in the cloud. Hunk™: Splunk Analytics for Hadoop is a fully integrated analytics platform for Hadoop that enables everyone in an organisation to interactively explore, analyse and visualise historical data in Hadoop.

To learn more, please visit www.splunk.com/company.

REPORT NOTE:
This report has been written independently by Quocirca Ltd to provide an overview of the issues facing organisations seeking to maximise the effectiveness of today's dynamic workforce.

The report draws on Quocirca's extensive knowledge of the technology and business arenas, and provides advice on the approach that organisations should take to create a more effective and efficient environment for future growth.

About Quocirca

Quocirca is a primary research and analysis company specialising in the business impact of information technology and communications (ITC). With world-wide, native language reach, Quocirca provides in-depth insights into the views of buyers and influencers in large, mid-sized and small organisations. Its analyst team is made up of real-world practitioners with first-hand experience of ITC delivery who continuously research and track the industry and its real usage in the markets.

Through researching perceptions, Quocirca uncovers the real hurdles to technology adoption – the personal and political aspects of an organisation's environment and the pressures of the need for demonstrable business value in any implementation. This capability to uncover and report back on the end-user perceptions in the market enables Quocirca to provide advice on the realities of technology adoption, not the promises.

Quocirca research is always pragmatic, business orientated and conducted in the context of the bigger picture. ITC has the ability to transform businesses and the processes that drive them, but often fails to do so. Quocirca's mission is to help organisations improve their success rate in process enablement through better levels of understanding and the adoption of the correct technologies at the correct time.

Quocirca has a pro-active primary research programme, regularly surveying users, purchasers and resellers of ITC products and services on emerging, evolving and maturing technologies. Over time, Quocirca has built a picture of long term investment trends, providing invaluable information for the whole of the ITC community.

Quocirca works with global and local providers of ITC products and services to help them deliver on the promise that ITC holds for business. Quocirca's clients include Oracle, IBM, CA, O2, T-Mobile, HP, Xerox, Ricoh and Symantec, along with other large and medium sized vendors, service providers and more specialist firms.

Details of Quocirca's work and the services it offers can be found at http://www.quocirca.com

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