

Mark of approval

Manufacturing & Logistics IT spoke with a number of leading vendors and analysts from the printing & labelling sector about recent, ongoing and possible future developments in this important technology space.

The printing & labelling solutions sector has to be fast-changing in a number of ways, largely to meet changing end user needs and desires; for example, their need to remain compliant in the face of changing regulations in different parts of the globe, greater workforce mobilisation, and their growing awareness of the data visibility benefits achievable by networking a greater number of objects and devices used within the warehouse and manufacturing space. There are also fresh developments regularly brought to market by the solutions vendors and the wider platform community.

From the perspective of Richa Gupta, senior analyst, auto-ID & data capture at VDC Research, the conversation over the past few months seems to have moved beyond print technology and technical specifications to device management capabilities, Cloud-based platforms, and managed services. "While hardware continues to be at the centre of most investment discussions, users are increasingly evaluating the role that these systems have to play as part of the broader automation infrastructure setup," she said. "Workforce mobilisation and related requirements will spur current and anticipated product development enhancements, requiring support for various mobile operating systems, and seamless

integration with various transaction-enabling solutions and contactless technologies like Near Field Communication (NFC). Demand is rising for portable solutions that are not only WiFi- or Bluetooth-enabled but can also seamlessly communicate with disparate solutions both on-premise and in the field. As the diversity of consumer and enterprise-grade devices increases, the need for mobile printers to be platform and OS-independent will rise."

As regards drivers for change, Gupta makes the point that enterprise end users are making more technology investments than ever before – in both traditional systems as well as those that fulfil their next-generation application requirements. "They now have a bigger say in vendors' technology roadmaps, particularly in today's age of technology confluence," she said, adding: "The Big Data revolution has especially triggered users' interest in and support of next-generation solution sets."

Janet Suleski, research director supply chain & PLM at Gartner, points out that the complexity of managing label and artwork data has grown tremendously over the past decade or so. "Because of the international expansion of companies in sectors such as food & beverage and consumer products, together with their need to meet multiple regulatory requirements in multiple environments simultaneously, it has

become increasingly complex to coordinate all of the data management that is needed for efficient and compliant label and artwork management," she said. Suleski added that Gartner has also seen consumer products companies adopt some of the selling patterns of fashion companies, and as a result there are products with labels that have shorter and faster life cycles. "So, life cycles have shrunk at the same time as the need for accuracy has become more complex, both in terms of the content of the labels and in making sure products that are shipping to specific markets and geographies have the right labels applied to meet regulatory compliance requirements for those precise locations," she remarked.

Gartner recently conducted an analysis of product recalls in the US and this showed that a substantial number of product recalls were due to labelling errors. "This is a very costly type of error for companies to make, and they simply can't afford to keep making those errors in the very competitive and regulatory environments they operate in," stressed Suleski. "So it is essential that they find better ways of scaling their ability to manage that data, as well as having visibility of all applicable regulations and what may recently have changed. A lot of companies have relied on home-grown applications for managing all of this data, but the use of such systems can

become ineffective because the size and complexity of the data they are expected to manage simply becomes unmanageable.”

Validation and verification

David Taylor, business development manager – manufacturing & supply chain at Zebra Technologies, reflects that one key current talking point is the validation and verification of integrity of the data that is being applied to products and assets. “There is an increasing pressure on stakeholders within manufacturing and supply chain to be able to guarantee that the items they are producing or handling can be tracked accurately,” he said. “In some industries the label is now seen as being part of the product as opposed to a simple identifier – those with zero defect tolerance in production are now applying that stricture to their labelling. This starts with the management of the source data, but is also heavily affected by the quality and management of the machines applying identification marks or labels. This demand for consistency carries through to the materials used and processes that validate their correct application.”

Taylor adds that Zebra has seen some impressive use of its print engines in in-line applicators with real-time visual verification of the label. Errors are captured by package rejection on the conveyor or more recently with twin-head applicators where one backs off while the other continues. “Our Link-OS enabled printer ranges are capable of connecting out to a predetermined URL where they can either be remotely managed or – where compliance is a driver – confirm the formats and data that they are printing in real

time,” explained Taylor. “We have an API (application programming interface) that allows the user to define the behaviour of the unit and even archive the bitmap image that was sent to the print head.”

In terms of key industry drivers for these kinds of developments, Taylor reflects that this heavily depends on the particular industry or vertical and whether they have legislative compliance or just mandates to their suppliers. “Food labelling can be caught up in compliance issues,” he pointed out, “for example, the EU has ruled by December 2014 all consumers are given comprehensive ingredient listing information for foods sold non-packed or pre-packed for direct sale. Not only has the format and content of the data changed, but the number of end-users affected has increased too. Unpackaged goods in hospitality or retail are now affected where previously it was just packaged food. Another pitfall is the demands of the (bigger) end customers where failures in label integrity can result in fines or rejected shipments.”

As extended supply chains become more global and businesses strive for new levels of operational efficiency, Ken Moir, marketing director at NiceLabel, believes next-generation enterprise labelling solutions are replacing current generation label designers. “Public and Private Cloud technologies are making it easier to instantly deploy and centrally control labelling solutions across the supply chain,” he said. “This technology also allows labelling solutions to be extended to business partners and suppliers allowing for stronger collaboration and more accurate labelling across the extended supply chain.”

Moir adds that improving operational efficiency and meeting customer and regulatory requirements are driving enterprises to deploy standardised labelling solutions that are centrally managed.

“Fragmented and disparate systems expose companies to risks of human error and inconsistency in labels between locations, which leads to expensive maintenance and compliance fines,” he said. “In addition, many enterprises are seeking to reduce the instances of counterfeiting of their brands and centrally controlled labelling is a step towards achieving this.”

According to Mari Waldron, EMEA printer product marketing manager at Honeywell Scanning & Mobility, one growing trend among companies with barcode printing operations is to leverage the capabilities of ‘smart’ printers, which are printers that integrate the power of a personal computer. “Smart printing takes advantage of the memory and processing power available in advanced printers to run printing operations independently, without a PC or network connection to another host computer,” she said. “Smart printers can run software applications and can function as PLCs to control other devices, including scales, scanners and label applicators. By using the computing power that’s in the printer, organisations can reduce their IT hardware, networking and support requirements, lower the total cost of printing operations, and create work processes that improve productivity and reduce opportunities for errors.” Intermec by Honeywell introduced the widely used C# programming language into its SmartPrinting solution last year. This makes it possible to design sophisticated graphic interfaces for the applications, which make them even easier to use. Intermec by Honeywell Smart Printers include a comprehensive selection of rugged, industrial fixed printers as well as the industry’s only Smart mobile receipt and label printers.



Andy Johnson,
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at your side



As regards drivers for change, Waldron believes end users are forever looking for ways to make their operations more efficient. "Because smart printers are programmable and can operate without a computer or network connection, they provide tremendous flexibility in where they can be placed and how they can be used," she said. "Using the printer as a controller or programmable logic controller (PLC) eliminates the need for operators to trigger label requests or other actions, and therefore reduces the opportunity for operator error. Industrial smart printers can be installed in harsh environments where PCs can't, while mobile models can bring new intelligence and hardware independence to workers in the field. As a result, organisations can optimise their business processes and logically integrate printing into operations, rather than treating it as a separate, inefficient step."

Andy Johnson, product and solutions manager at Brother UK, observes that NFC (Near Field Communications) is a relatively new technology in printers and label printers, but one that is gathering pace within the industry as users look to make printing as quick and simple as possible. He added that Brother's new range of colour laser machines will use NFC as a means of authentication with the company's B-Guard pull printing solution. Additionally, Johnson believes printer manufacturers are responding to the increased use of mobile devices in business by providing wireless and Cloud print solutions as standard, allowing workers to print important documents directly from smartphones and tablets. He adds that Cloud support also enables users to print directly from and scan to the Cloud. Additionally, Johnson makes the point that the demand for



Mari Waldron, EMEA printer product marketing manager, Honeywell

portable printing has also increased, as today's workforce is becoming more agile. "At Brother, we have seen a significant increase in sales of our range of portable printers in the past year," he said.

In terms of drivers, Johnson observes

that the way people work is changing, therefore printing now needs to be accessible from any device, anywhere. "A YouGov survey last year revealed that 47 per cent of all British adults now use their smartphone, laptop or tablet for work purposes," he explained. "The increase in BYOD (Bring Your Own Device) and CYOD (Choose Your Own Device) has led to a rise in demand for printing from mobile devices, with businesses striving to streamline the process. The proliferation of mobile working has driven the market for portable printers, as printing 'on the go' saves supply chain time that was previously spent travelling back to the office."

Jörk Schübler, European marketing manager for Citizen Systems Europe, considers that iOS integration is a major talking point, as is Cloud integration of systems. "That's because customers increasingly demand the capability to print from mobile devices," he said. In his view that is also why BYOD (Bring Your Own Device) is receiving more and more attention. "We haven't yet seen any serious integration of BYOD but it will come," he said, adding: "Currently, manufacturers are providing more market-specific products than ever before and we've expanded the capability to print from mobile devices. The consumerisation of IT in business and print on-demand at the point of purchase is revolutionising the use of small, mobile printers. Recent research from the International Data Corporation (IDC) estimates that by 2015 around one-third of the global workforce will effectively be mobile."

Blurring of work and personal time

Schübler makes the point that we are surrounded by devices with mobile capability in our everyday lives. "We are accustomed to it, so it is only natural that customers expect the same capability from printing and labelling," he said. Another driver in Schübler's view is that, with the increasingly mobile workforce, there's a blurring of work and personal time, which brings us back again to BYOD. "Of course, a strong driver is always the need to make cost savings, and mobile printing can achieve this," he said. "If a product can be labelled where it already sits,

without having to be moved to a labelling station, that saves a lot of time and manpower."

Matt Parker, independent auto-ID analyst, believes if one looks at the end user marketplace – the organisations that are actually buying printing, labelling and

marking systems today – the overwhelming desire is one of extending network reach. "There are very good reasons for this; one being that anything that is networked is visible," he said. "Once you can see it then you can monitor it, you can measure it and therefore you make changes and improvements based on the information you're receiving. So in the auto-ID sector specific to printing & labelling, once again we're seeing a tremendous increase in the number of systems and projects that are coming in, but on the back of this desire for increased network reach. This is because ultimately the means of doing that is by applying a code of some kind to an inanimate object. While it may not be physically networked via an industrial Ethernet, having a code on it that is readable – either by an automated system or a manually operated scanner – means for that split second an item becomes networked, in my view. It's visible on the system; you can know its location, what its status is and what it's doing, and you are therefore able to make changes and adjustments based on that information."

Parker considers that the drivers behind these changes are based around the need for greater visibility of objects. "If you can't see something you can't measure it, and if you can't measure it then you can't improve it," he said. "Companies such as manufacturing organisations need to be able measure and understand flow and performance – and the way to have the means to do that is through having greater visibility. I think the innovations we are seeing on the back of that within printing & labelling systems really is now less about the physical technology – in terms of



David Taylor, business development manager – manufacturing & supply chain,



how it prints and how fast it can print – it's much more to do with how it fits into an enterprise and how it can respond and react to requests; whether they are from distance or whether they are in some cases automated print requests that are coming in from a cause-and-effect relationship based on greater visibility. So today an in-line printer should be able to constantly readjust and adapt its content or the location on which it's printing something based on what is going through. Equally, there are those items that are reading objects when they are coming through the other end, marked either directly with a label or otherwise."

The back end

In terms of the relationship between printing and labelling systems and back-office systems such as ERP and WMS, what do our commentators consider to have been some of the recent key developments? Taylor believes that, without doubt, the ubiquity of smart computing in the hands of everyday users has driven expectations of connectedness in our work environment. "Having a smartphone that connects you in real time to a vast number of sources of information does make you question why systems in your work aren't so accessible," he said.

Taylor adds that The Internet of Things – or Internet of Everything, as it is now being referred to – can, from printer perspective, be seen in two ways. "First, any asset that is given an identity (barcode, RFID tag, etc.) gets a 'digital voice'," he explains. "We now expect to be able to identify what an item is and discover (or even add to) its provenance. Devices that are used to mark assets should themselves be



Matt Parker,
independent auto-ID
analyst.

connected and remotely accessible to confirm they are doing what they are supposed to be doing." Secondly, Taylor makes the point that not only are our printing devices connected but we can now gather data

from any suitable network connected device where a ZATAR (<http://www.zatar.com/>) gateway is present. "We can create a device profile called an Avatar and users can develop their own analytics using the ZATAR API," he said.

Janet Suleski's view is that the market can mainly be broken down into at least two main areas, and companies need two different strategies to deal with this. The first area is concerned with the labelling and artwork that goes on to a physical product, and the second is the labelling that goes onto the packaging in which the product is shipped; i.e. carton label management. "There are currently two separate pools of solutions that are used for addressing these areas," said Suleski, "and many companies would like to source these types of solutions from a single provider; although that's not where the market is currently." In terms of coordinating with some of the back-end systems, Suleski explains that the most direct link is with ERP as the system of record for product masters and synchronising changes in product label and artwork management with changes in the product masters. "Many companies have conducted this process manually, but this can cause a number of errors to be made over time," she adds. "Some companies have undertaken to clean up the errors that have been made, but they would like a more automated way of maintaining that synchronisation between all the different moving parts of their label and artwork management supply chain.

The good news is that almost all of the software vendors we have spoken with have standard application programming interfaces (APIs) to the large ERP systems available today, such as SAP and Oracle; and other ERP systems as relevant to their specific industries."

Single source of the truth

Moir observes that enterprises are focusing on driving labelling directly from their ERP systems such as SAP/Oracle and connecting to their master data. "They are leveraging, not changing, their existing business processes," he said. "Label printing with label content data driven directly from ERP transactions,

the single source of the truth, improves labelling data accuracy and increases efficiency. Label Lifecycle management helps enterprises manage versions, revisions and compare/track changes. This is especially critical for regulated industries such as pharmaceutical, healthcare, chemical, food & beverage etc. Universal smart label templates, one template instead of hundreds, work across many brands and models of printers." Moir also pointed out that by implementing an enterprise-centric labelling strategy, companies benefit from more efficiency, greater accuracy and improved customer responsiveness. "They dramatically reduce the total cost of ownership of their labelling processes and reduce downtime," he added.

The big change in Schüßler's view is that mobile solutions have now been broadly accepted by management as well as workers. "This has led to the availability of many products on standard platforms, which in turn have encouraged yet more users to move towards providing mobile capability," he said. "The latest generation of portable printers have been made smaller, lighter and more robust, while incorporating greater functionality, performance and a longer battery life; this additional functionality has included WiFi and Bluetooth. Mobile printing is now a major focus for manufacturers and Cloud computing via mobile devices is leading customers to request facilities to print from mobile devices, which is why the market leaders are expanding their capability to print from mobile devices."

According to Schüßler, the key benefits to users are the ones they feel most – savings in time and cost. He adds that there is also increasingly better integration to bear in mind. "We offer SDKs with our printers and, as most serious players are doing it, integration is much easier than before," he said, adding that, historically, one of the challenges has been the



Janet Suleski,
research director
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Gartner.

complexity of creating mobile enterprise-wide printing platforms, linked to the best choice of print hardware, while delivering reliable point-of-transaction printing that improves worker productivity, labelling accuracy and responsiveness to customer needs. "Portable printer technology continues to evolve but has now reached the point where establishing enterprise-wide platforms is much less complex," he said.

Matt Parker believes today there is much tighter handshaking between the printing & labelling device and the overarching management system. "Again, it comes back to this concept of an extended and richer network depth," he said. "Anything that is hanging off a central planning or management system needs to be able to respond and adjust what it is doing based on information that is coming down. Equally, what it is producing needs to be readable; if the printer is producing something that causes an onward problem because the barcode, RFID tag etc. is unreadable for whatever reason, then that can cause issues."

Therefore, Parker maintains that one of the improvements we are seeing beyond the handshaking and interaction systems in the slave devices is the materials on which barcodes are being printed. "There is now a much greater variety of materials that can have codes printed on them," he explained. "Some of these materials are able to withstand extremes of temperature, can be used outdoors as well as indoors, are tear-resistant and tamperproof. We should consider those kinds of things as well because when we are talking about the types of flow-based processes found in manufacturing, logistics or

retail we constantly should be thinking about the next stage in the process. The communication and interaction between the printer and WMS may be absolutely fine, but if this interaction is producing something that is going to cause a problem on line-side further down the

process then that's going to be an issue. So manufacturing is an interesting sector because we have to think about the 'soft' elements as well as the hard elements in terms of the physical printed output."

Convergence

And what of functionality convergence currently taking place within the printing & labelling solutions arena? Parker believes the kind of convergence we continue to witness will revolve around how items are read and how they are absorbed into a planning system or centralised management system within an organisation. "I think we will see increased convergence in that area within the broader auto-ID ecosystem because to stand alone doesn't really make a lot of sense," he said. "Slave devices such as printers are increasingly becoming an integral part of a network and linked to the manufacturing process."

Gupta considers that technology convergence as a trend is extremely beneficial to the user community. "Printing & labelling systems are part of the overall (factory or logistics) automation solution, serving a very particular application requirement," she said. "This requires extensive collaboration with systems integrators to ensure seamless communication across major solution components, driving them to perform a specific function."

Suleski thinks these tools are now very much focused on becoming better label and artwork management systems, rather than broadening out into areas of converged functionality. However, she adds that where there has been some convergence is in the use of artwork across multiple channels of communication with the customer. "For example, if a food & beverage manufacturer has a piece of artwork that is applied to a package of dairy products, the company often wants to ensure that same artwork is used on its online channel and in its printed material channels such as paper flyers and inserts," she said. "So there is definitely a focus on using these systems to coordinate brand identity across multiple channels of communication."

Schübler believes convergence is undoubtedly

a positive thing.

"Nowadays, mobile devices such as smartphones and tablets are commonplace and we place significant emphasis on their use in our daily lives," he said. "However, until now, the use of generic mobile devices for use in the working environment has not reached its full potential due to lack of crucial functions such as restricted access to printers. Now, as I said before, many offer standard platforms today such as Android, Windows or even iOS, so brand manufacturers should have no problem working together."

Moir reflects that the connected extended supply chain is a great opportunity for companies such as NiceLabel. "We can now implement centralised labelling solutions that can be scaled across the entire globe to factories, warehouses, distribution centres, shops, franchises and suppliers," he said. "We have some unique features in the way we do this – and our Enterprise solutions are built up from our core technologies and products, MS certified printer drivers, label designers and application development tools. These are volume tested and proven every day in millions of installations worldwide – NiceLabel technology is shipped by the leading label printer manufacturers and powers in excess of all label printers sold today. So even the largest enterprises with the most complex of label management needs can be sure that NiceLabel will be a safe technology choice as well as a highly attractive and versatile one."

Waldron commented that Intermec by Honeywell's programmable Smart Printers are a good example of technology convergence. "The printer can act as a computer, there is no need to purchase a PC to do data processing," she said. "The PM43 range of industrial printers takes this 'PC inside the printer' approach one step further by offering a touch screen interface on the printer, making the user experience very similar to that of using a smart



Richa Gupta, senior analyst auto-ID & data capture, VDC Research
Insights for the Connected World



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phone: you scroll through menus, e.g. if you are not sure how to change a label roll, you can see the instructions on your printer's screen. You can also load printing programs into the printer and the touch screen can be used to interact with the

program. This is very powerful and can help to simplify printing applications such that training requirements are minimised and the whole process is simplified and made more efficient. We think this is a good thing – end users want to get more out of their printer investment and intelligent printers make that possible.”

Things to watch

What might be the next key developments to look out for over the next year or two within the Printing & Labelling space? Gupta reiterates that innovation in the printing & labelling systems market is not going to be restricted to hardware alone. “Expect to see a stronger demand for device management capabilities, data security, integration with Cloud-based platforms, and managed print services,” she said. Johnson expects the mobile print market to grow significantly in the coming years, as Juniper Research predicts that the number of employee-owned smartphones and tablets used in business is expected to exceed one billion by 2018. “The most important factor in the speed of this growth is education, as most smartphone owners are unaware that they can print from their device,” he said. “If we raise awareness of these features amongst end users, and make mobile printing as seamless as possible, then this will contribute to a rapid increase in those using it.”

Moir believes the extended supply chain will continue to get ‘more connected’, and that Cloud technology, Big Data and the ‘Internet of things’ will all play an increasingly large part in the printing & labelling space. Schüßler’s view is that we can expect to see the same evolution that we have seen in mobile phones –

smarter, lighter, systems that are more app-based. “With the increasing availability of inexpensive off-the-shelf mobile devices, portable and mobile printers will offer wider scope to businesses, particularly smaller, faster paced businesses or those on the move such as retail, logistics and the restaurant sectors,” he remarked.

Waldron sees linerless printing as a clear trend that seems to be getting stronger, and observes that linerless label materials have improved over the years. “The technology has matured and the applications work very successfully nowadays,” she said. “The drivers for this trend are environmental – liner is not recyclable – but also related to health & safety and operational efficiency: the liner can cause a slip hazard in a warehouse or a retail store. Some users have also been able to achieve clear ROI on investing in linerless technology due to the time saved by not having to peel backing paper off labels. Linerless is now also becoming popular in mobile printing and we expect to see more innovations both in the linerless label materials as well as on the hardware side.”

As consumer industries require a much richer and higher level of intelligent packaging, Parker believes it is obvious that we are going to enter a level of requirement for intelligent labels that are put on parts, components and materials to eliminate that point-in-time issue he spoke of earlier. “Again, it comes back to the requirement for an extended network reach,”

he said. “There will be a situation that drives the need for increased visibility of previously inanimate objects that were just scanned and were just visible for a certain amount of time. Something to look out for in the near future will be an intelligent label with a more feature-rich sensor embedded in it, as opposed to a traditional RFID tag. This intelligent label could possibly communicate over a much greater distance, and give much greater levels of information within a certain zoned environment or area of the shop floor or warehouse. We are already seeing this sort of technology adopted in the healthcare space.”

Suleski thinks we will see continued interest in companies wanting to source their label and artwork and packaging design and engineering solutions from a single vendor. “There are currently three or four different kinds of software vendors that are serving the label and artwork management space – in particular, I am referring to the specialist ERP and product lifecycle management (PLM) vendors,” she said. “Many companies consider label and artwork management to be part of the PLM process, so I believe we will see more consolidation of label and artwork management capabilities into PLM, although at the moment there is still very much a place for market specialists. When talking to companies and their future needs, many of these relate to basic ongoing requirements for cleansing and synchronising their data, and putting the most effective workflows in place to speed-up their processes.” ●

