

LiftERP White Paper

April 2019

Enterprise Resource Management and the Print Industry

ERP stands for information technology and management systems which knit together and integrate functionality within enterprises under a single application, and achieve efficiencies in time and cost throughout *all* enterprise processes from business origination through final delivery and everything in-between. ERP is a very large industry at about \$45B globally with companies leading the industry like NetSuite, Oracle, SAP, Epicor, Sage, Microsoft, just to name a few.

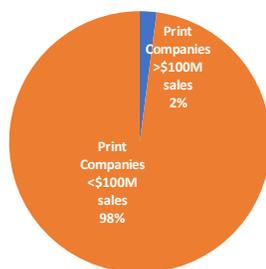
ERP Has had great success in its ability to customize and handle complexity within an overarching unified system and it has done it in manufacturing and service industries alike. However, its application to the Print Industry has been an afterthought in a way that shouldn't be so with global printed product enduser revenues still close to \$1Tr. But on the other hand most print sectors are fragmented and local in the extreme. That is the glory of the print industry in being close to users, but it is the bane of efficiency as we enter a digital print age.

So let us look at the state of ERP in the US commercial print industry today as a kind of emblematic case study, and explain why there is such a strong case for a new print ERP initiative in the commercial, and all other print sectors including packaging, publishing and industrial.

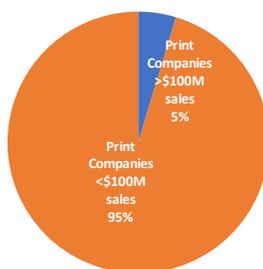
US Print Industry Structure CY 2018

	# of Companies		# of Sites		Revenues	
Print Companies >\$100M sales	55	2.06%	275	4.68%	\$26,205	39.11%
Print Companies <\$100M sales	2,619	97.94%	5,607	95.33%	\$40,795	60.89%
	2,674		5,882		\$67,000	

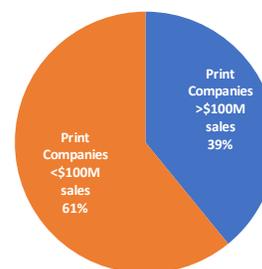
of Companies



of Sites



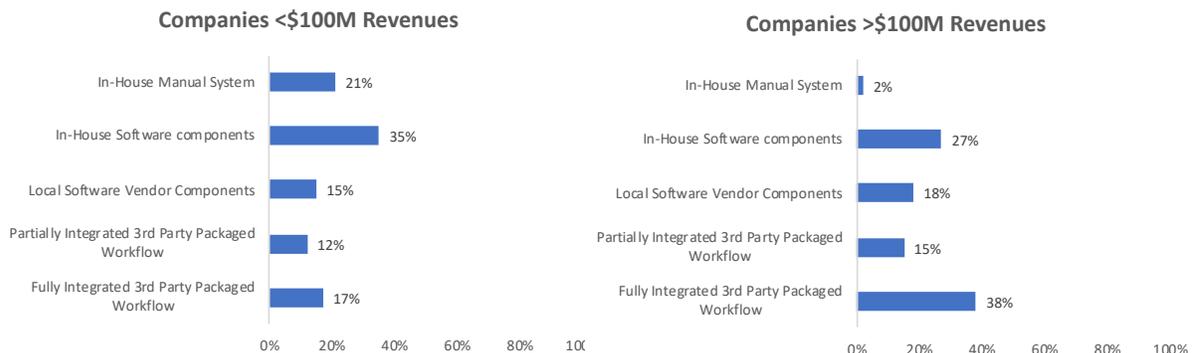
Revenues



The statistics graphed above show that in terms of sites (which in their individuality and localism determine the differentiation of workflow structures and formats) the print industry remains overwhelmingly local and small-scale even as ownership patterns show much more market concentration. This locality and fragmentation continue to stamp their identity on the US print industry however ownership may scale. The result in terms of workflow architecture, formats and implementation is a mish-mash of mostly locally-sourced and -created solutions whose full integration across processes is patchy at best. As can be seen from the following graphic quantifying varying approaches to workflow systems implementation, the share of 3rd-party non-locally-sourced integration product gets to 29% among companies under \$100M revenue, and 53% among larger companies, but even then, only respectively 12% and 15% of companies are estimated to have system-wide fully-integrated implementations.

So systematic compatible integrated software systems to knit together work and administrative process components are fairly rare, with most companies implementing in-house solutions or sourcing products from strictly local companies. This has suited the culture of this locally-organized industry and their accompanying reluctance to think in terms of systems or major expenditure. But we are reaching a point in the industry now where print and communications technology are evening out competitive conditions for printers and their ability to survive in future is likely to be tested on a much more even playing field. This is going to force a much more standardized approach to integrated workflow. And as we shall see below, technology of print and communications in their own right are creating conditions of complexity and fast cycling which positively force automation.

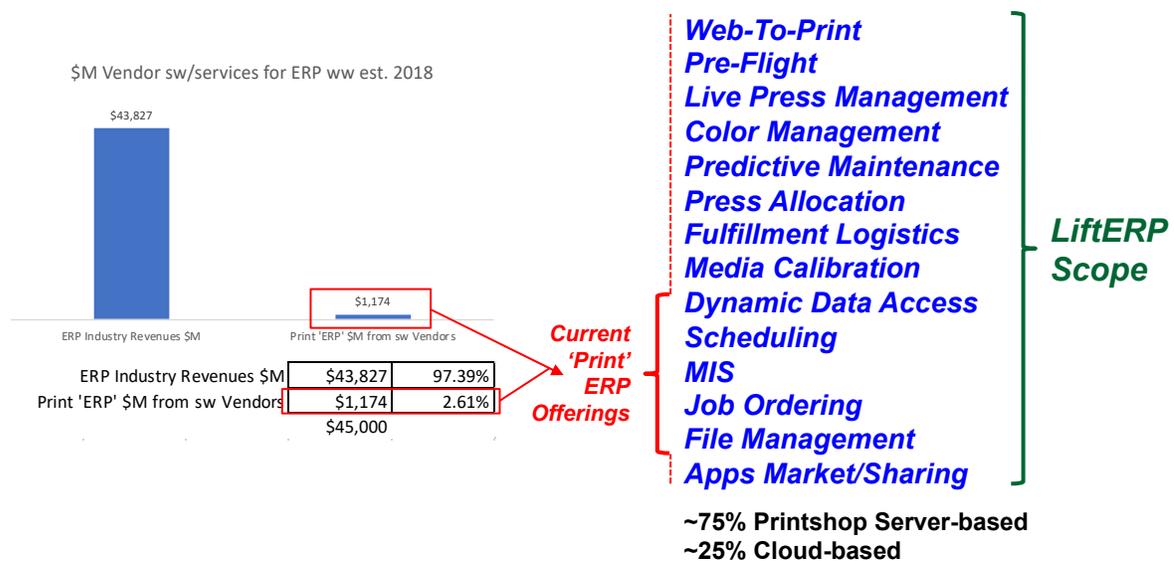
US Print Industry Workflow/ERP Deployed Architectures



If we take a closer look at typical common components of workflow within the print industry, they largely share three major characteristics:

- Mostly printshop server-based, rather than cloud-based
- The share of true ERP print products within the overall ERP industry is well under 10%
- The scope of what is called ERP within the print industry is varied, but tends to focus on MIS (accounting), file management, data linking and job scheduling. But the extent to which this can be called true ERP against our original definition of a single application driving all processes is limited

Core Print Workflow Components *(non-exhaustive)*



Perhaps beyond these observations about the current print ERP market the most important driver of change and integration of ERP for print is print technology development, both analog and digital. Both types of technology – but above all digital – have enabled much faster commercial cycles (= very short lead times), variability of information, and the ability to satisfy a much wider range of markets through being able to print micro-runs (anything <1,000, and often *much* less). The result of this has been mounting complexity with much less time to deal with it than ever before. This is not yet the dominant dynamic of most print volumes, but it is growing, and it is to be found where printers want to grow and where they make their best profits, so that the importance of these changes is much greater than volume alone would lead you to believe.

If you look at today's estimated Print ERP expenditures as a ratio to company revenues, and compare the print industry to other industries you see a further indicator of the relatively undeveloped market for

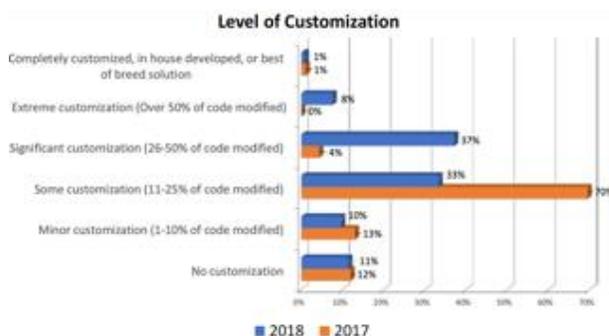
print ERP. Print ERP is around 1% as a ratio, where average for all industries is in the 1-2% range, while the average for small companies (tending to be first-time adopters of fully integrated single applications) is closer to 4%. In that context remember the pronounced orientation of the print industry to that kind of small site structure.

\$B

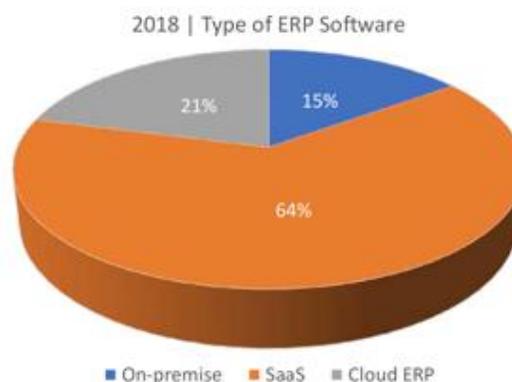
\$120.00	Print industry revenues ww
\$1.17	Print ERP Expenditure
0.98%	est. Print ERP Expenditure as a ratio to Revenue
~2.00%	Average company expenditure on ERP as a ration to revenue (all industries)
~4.00%	Average <i>small</i> co. expenditure on ERP as a ratio to revenue (all industries)*

* elevated ratio due to high first-time adoption costs

Research into ERP also shows a strong trend to customization and cloud implementation (including SaaS):



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Current offerings to the print industry around the area of ERP have been partly from industry-inexpert sources (some standard ERP vendors) as well as print workflow vendors who have taken elements of their workflow products, often around MIS, and have further integrated them and renamed them ERP. But in general the offering of ERP to the print industry is immature and undeveloped. Advances in analog and digital print technology, both of which are actually highly-digitized offerings, are now driving the case for much more highly integrated ERP with real urgency. That product has to be comprehensive, informed by a deep knowledge of the print industries and their need for high customization, and must be a cloud-oriented product with clear IT DNA which draws from the experience of implemented ERP in other fast-cycle industries like retail. That is a good description of LiftERP and the backgrounds of the people developing it.

Digital Print as the Driver of Extended Print ERP Functionality

LiftERP is a pioneering cloud-based software initiative focused on automating and integrating the components of digital print order capture, manufacture and fulfillment. This is a white paper intended to describe what it does, and why it is set to fulfill a critical need of today's digital print providers and likely lead a long-term transition to the scalable automated digital print market of the future. This initiative was born within the Wide Format digital print provider community, and its power is being adapted to the full range of digital print applications.

The Digital Print Market – A New Species

Democratization Of Print

No one's job is too small for digital print and nearly everyone in business can gain from the new targeted and efficient communication that modern digital print can be



From Volume to Microruns

The modern (digital) print world is busy exchanging large volumes of static print content for microruns below 1,000 of variable content



Re-Focus from Manufacturing to Market

PSPs are free as never before in an automating digital print world to re-focus on market development and customers

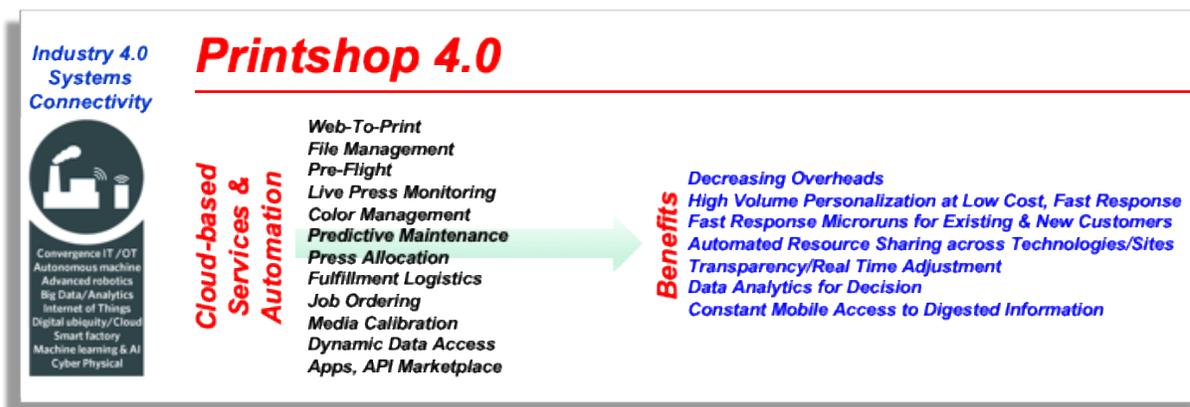


The digital print market is not about replacing analog print with more of the same. Digital print succeeds and is far, far more profitable than analog print because it does what analog print cannot. It does that in ways that are different for each market, but it can mean the availability of batch-printed variable microruns, very fast response, local content, and a range of other benefits. The big picture can be summarized like this:



- **Democratization of Print**
 - Digital print has democratized the print market by making personalized print available almost instantly to almost anyone.
- **Micro-runs Rule**
 - Digital print can be and usually is made available in microruns well below 1,000 down often to one!
- **Re-Focus from Manufacturing to Market**
 - Digital print in its increasingly automated format is properly allowing PSP management to turn leww towards the factory and more towards the vast emerging market of new users for new print products

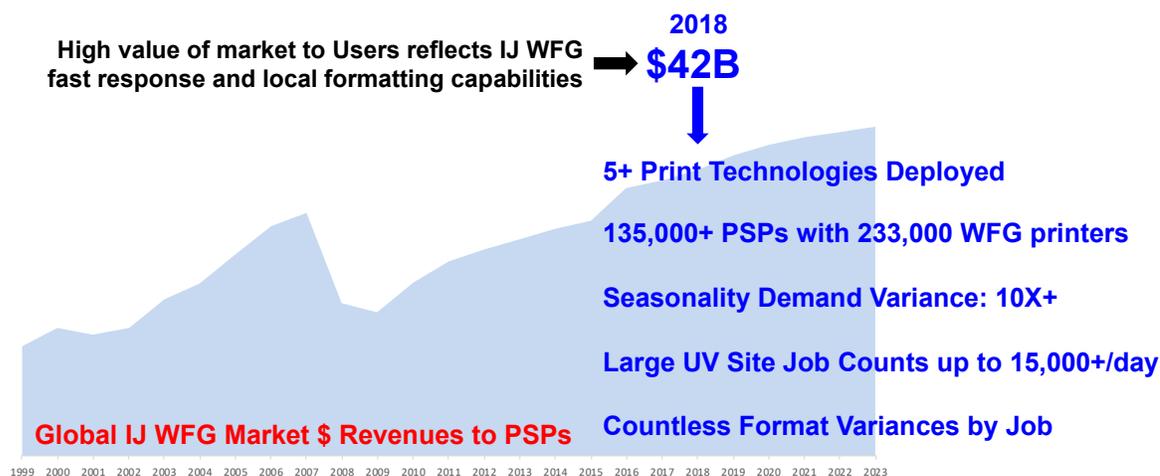
As Industry 4.0 goes, so follows Print 4.0



The print industry is going the way of all industry, which is inexorably the way of Industry 4.0. That is to say, where industry 1.0 started as mechanical fabrication, industry 2.0 got electricity and more efficient energy, then Industry 3.0 benefited from the early IT revolution around PCs, and then we reach industry 4.0 today, where all processes are ideally digitally connected and controlled, and ultimately feed in real time into the unending and expanding dataflow from social media through remote process control. For the print industry digital print is the major accelerator of this transformation.

Up to now digital and analog printshops alike have been run on a workflow infrastructure based in most cases on local server-based software with a very large degree of non-standard variation in functionality. The Print 4.0 iteration of workflow is by contrast becoming a real-time dataflow-connected, cloud-based integrated system allowing remote and instant order capture, file processing, manufacturing process control, fulfillment and shipping processing on a single mobile platform. It is efficiency all the way around elimination of errors and wasted time, but in fact it is really forestalling a coming crash caused by a gathering tsunami of complexity and accelerating work cycles that has the power to powerfully diminish the ability of more developed digital print shops to sustain their competitive edge.

WFG & Digital Print – Market Sizes, Work Profile and Sectors



In the Wide Format Graphics (WFG) digital market we have seen a market now 25 years old yield values measured by PSP revenues globally of over \$40B. That large strategic-scale number reflects the huge value WFG has brought above all to retail where digital has uniquely been able to provide micro-runs with almost no appreciable lead time which retailers have paid well for as they see their sale of goods clearly and materially influenced by the use of timely and localized color graphics. Another glory of the WFG market is now its scalability as well, now that we have a vibrant UV production sector able to respond to the highly seasonal accelerated advertising demand of major retailers (sometimes over 10 times average demand) resulting at the largest PSPs in thousands of orders needing to be executed daily.

The production infrastructure of the WFG market is based on the deployment of 5+ print technologies with all their unique performance parameters and ink/media differentiations over more than 130,000 sites worldwide providing a large variety of finishing capabilities.

The accompanying feature of the scalable and segmented WFG market with its fragmentation and super-fast cycling is complexity. This is especially true of WFG where the final product is itself complex like no other print product with its vast variety of surfaces, locations and format of installation.

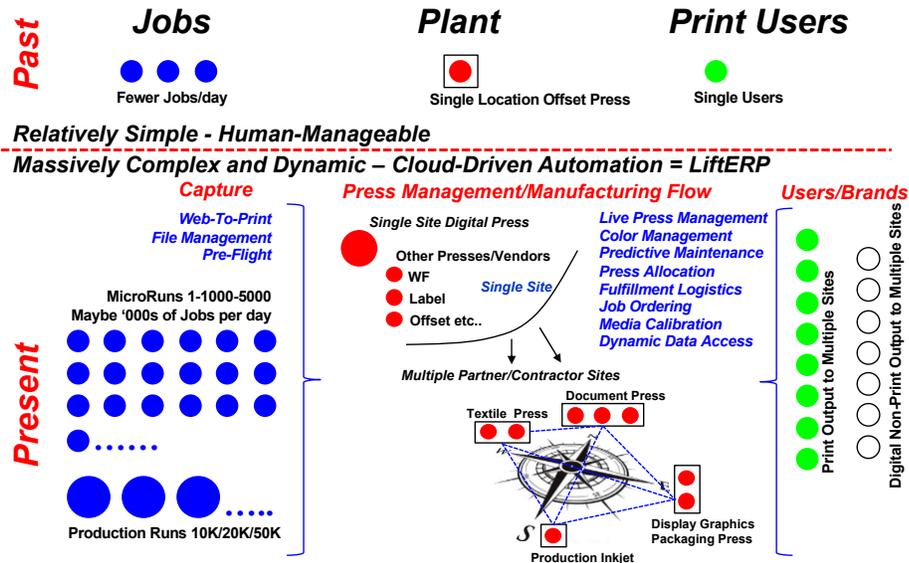
The complexity and cycling speed of the new digital markets is what is driving the capture, manufacturing and fulfillment process beyond the limitations of non-standardized server-based workflow. That is the gateway for cloud-based integrated control services like LiftERP.



Facilitating Access

Digital Print Technologies Are becoming Channel-Blind

Inside the world of individual PSPs in the case of leading and larger digital PSPs their world's new complexity hat success has brought can be schematically illustrated this way:



What was once a relatively simple supply chain with a relatively manageable product format has now become an ever-morphing process around a myriad of formats, locations and services. The market is approaching a situation that can no longer be efficiently managed manually, and there will be no alternative but to automate.

The Natural Alliance of Digital Print Value Propositions with Workflow Automation

The real value propositions of digital print around complexity and speed are intimately connected to the issues which drive the need for integrated automation. This is a short list of some of the most value parameters which have lent success to digital illustrating this connection and its logic:

Favors Small Brands, corresponding to Modern Consumer Demographics

Small brands beat large brands more and more in creating loyalty

Intimate Engagement with the Print Addressee

The sense of being personally addressed

Sustainability

Allows efficient print physically closest to demand, minimizing shipment costs

New & Small Businesses

New and small businesses with low-scale demand have a disproportionate influence in business relative to their size as companies

Immediacy & Relevance

The digital ethic is print now for use tomorrow

Enables Manageable Complexity

The fear of too many systems in too many places with too many disparate parameters goes away allowing technology and sector access at will

Enables Technology & Sectoral Convergence

Standardization, exact predictive measurement of performance of costs allow investment for multiple sectors

Printshop Transition to Automated Cloud Workflow

The physical changes in print supply enabled by digital and their obvious logic in driving automation systems do not guarantee that success will be achieved by every printer. For printers to automate requires a digital outlook and digital skills that do not emerge easily or naturally from existing print industry tradition. This creates a kind of fear factor around automation which is in a creative conflict with printers' other fear – that of becoming obsolete (FOBO).

What is interesting and inspired about LiftERP is that the product has been evolved by and within the environment of a high-production WFG print shop. So the people who developed the system are the very people who had reached maximum inefficiency in managing manual job folders but who come to system design with an intimate knowledge of the workings of a digital print business. They added to that expertise from an industry which has taken integrated information and supply chain systems to their farthest level of development anywhere – the retail industry. All this has allowed LiftERP to develop a maximally-pain-free method for training and enabling printshop adoption.

What LiftERP does

LiftERP takes written physical job folders and puts all the information they contain into the Cloud in real-time for processing and display through an integrated and mobile-accessible software suite covering all the order capture, manufacturing and fulfillment processes in which a printshop is involved. It is the Cloud as a basic component of 4.0-level automation of course which removes all processing and speed constraints to the access and analysis of complex data.



The reasons for doing this, or the objectives of LiftERP, if you like, can be summarized this way:

Master Complexity and Maximize Leveraging of Digital Print's Strengths

Enable human decision-making to keep pace with the new technology capabilities of digital print in the areas of aggregation of large numbers of microruns (order fragmentation), variable data & customization of content, fast product cycling and data analytics of manufacturing processes as well as of commercial activity.

Make Print Management More Efficient

Enable print management to streamline their real-time mobile management of production in a way that allows them to devote a larger proportion of their time to the new market development opportunity which digital print technology gives rise to.

Less Waste, Fewer Mistakes

Minimize waste in materials and time, and avoid mistakes in processing

LiftERP was developed within and to reflect the needs of a high volume WFG production environment where high seasonality, super-fast response and extraordinary diversity in product specification/fulfillment are dominant factors driving job processing. This is close to the most complex kind of digital print environment you can find and forms a basis for the product's adaptation now to other digital print environments like, for example, label printing and DTG to name two early cases. It is an automation initiative deeply rooted in printshop working practices and it is in a positive way fully agnostic around print systems in its basic architecture of empirical manual data entry within the shop

shared between central systems administrators and functional printshop nodes.

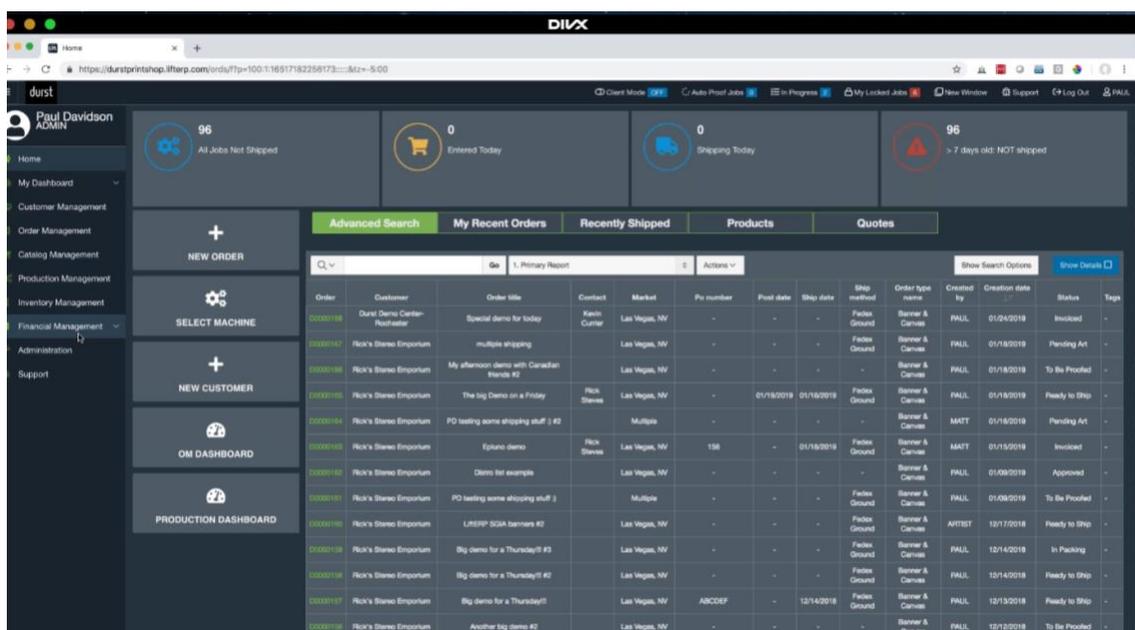
LiftERP covers all aspects of printshop functionality from order capture, through pre-press/pre-flighting, print, conversion, fulfillment and shipping. For all these areas and their sub-functional layers the system takes in data in formats customized to the printshop's specific needs and configurations. The data is input partially by centralized system administrators, and partially at different points in the shop where new data inputs arise (such as production data off the presses for example, either as a data file or manually). The input can be automated within the software to as high a degree as appropriate to the individual shop around specific product formats, information inputs and working practices, taking in and outputting custom-designed spreadsheets of information for example.

LiftERP is organized into six major functional activity components as follows:

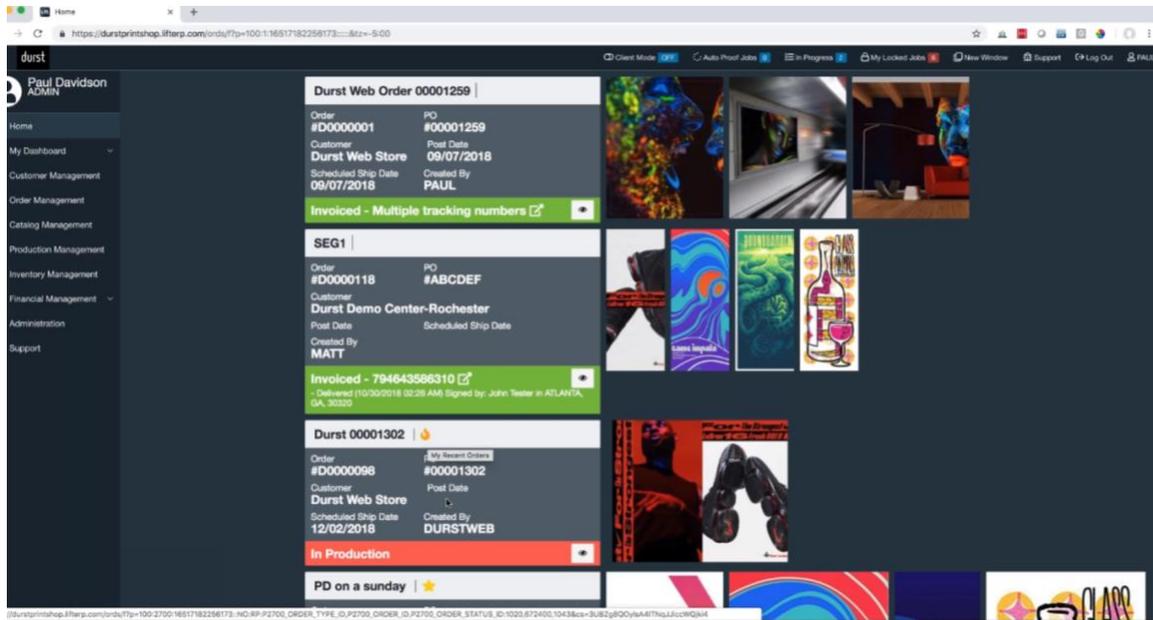
- **Customer management**
tracking standard and variable information about customers and their specific needs of product, fulfillment, pricing, shipping etc. as well as incorporating customer-specific pricing modes (matrix pricing, customized discounting, custom quoting etc.)
- **Order management**
overseeing order capture, pre-press and pre-flighting, then tracking orders within each customer portfolio with their detailed specification, stages of manufacturing/fulfillment in real time and flagging for changes, errors or process-decisions
- **Catalog management**
maintaining a central registry of product capabilities and customer-specific product specifications from which to supply repeat order specs or to use as a base for variation
- **Production management**
tracking and controlling print and manufacturing against technical and commercial order specs and plant capacity and capabilities. Includes fulfillment and in shipping functions integrated to shippers. This includes production configuration against cost according to pricing or available capacity (scheduling)
- **Inventory management**
maintaining a central registry of the total flow of product in the shop allowing of a historical and real-time measure of efficiency by customer as well as for the shop as a whole
- **Financial management**
customized integration of manufacturing and customer/order data into external accounting systems allowing of automated order confirmation, invoicing, accurate pricing and profitability analytics

Within all these functional areas separately and where appropriate through their integration, LiftERP is able to analyze data in real time in customized ways that allow management or operators to take fast decisions on the spot and remotely as they grasp the measured effects and implications of their decisions.

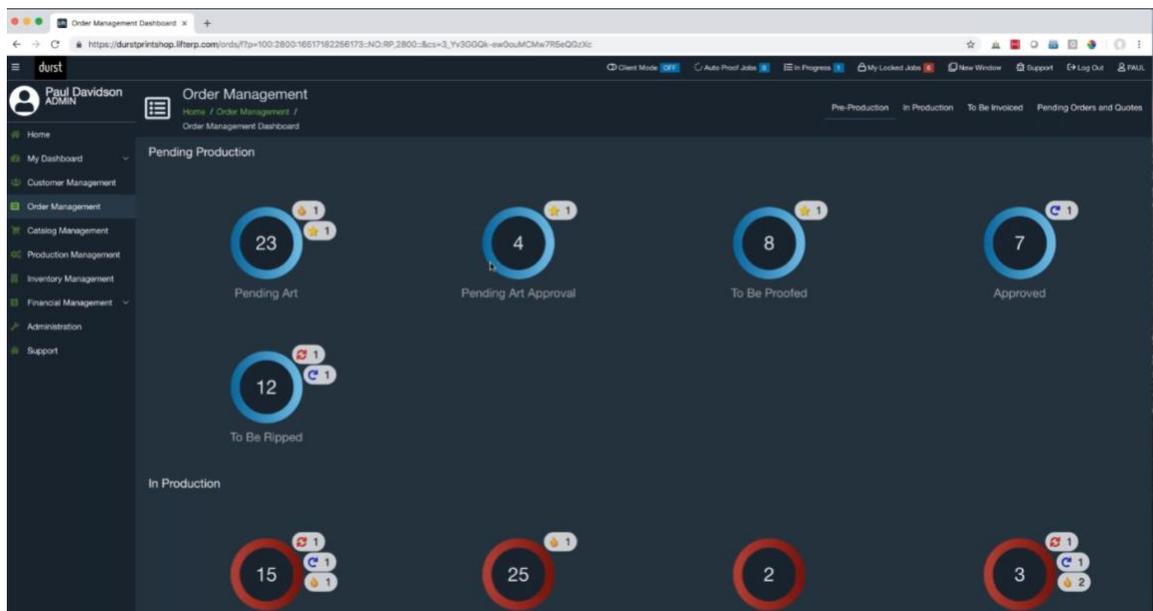
As with any mobile control software the idea of its real functionality is best understood in looking at screens which have to distill the functionality to its simplest most comprehensible format. If it isn't obvious there what can be done the it isn't going to work. The basic screen has the component menu on the left side and can display any selected information group in the center. Across the top in this case 'most urgent' parameters of what orders are at what stage in the shop are displayed, while selectors for new customers, orders, machines or manufacturing analysis are also in a secondary menu on the left.



Individual orders can also be displayed with thumbnail artwork included for easy recognition and review (and by the way, this thumbnail artwork view is also usable on the shipping label for ease of fulfillment at shipping and arrival-at-user stages.



One other nice example of simple functionality is the primary screen view of each major functional component which shows activity in sub-functions as circles with varying color coding and individually-coded call-outs around the circles for issues outstanding or calling for decision which can be called up by clicking on them.





One final remark on display and appearance of LiftERP concerns an aspect of display which sees real-time press production data being displayed on large screen visible to all in the printshop. That is a nice and important touch and is the pinnacle of a system deploying i-pad and monitor displays at all relevant nodes of manufacturing, control, fulfillment or administration as a part of mobile functionality.

This a very small selection of functional views of the software on screens and of course they are formatted also for mobile display. But the availability to the printshop of so much information in such a wide variety of customizable formats in real time with decision functionality built in should be seen as a remarkable innovation barely available to what is already a fiercely complex business of large proportions. We see the latent demand for this kind of functionality as very large.

As we have already stated, this is printshop functionality in a Cloud-based highly automated process control package, and it is designed to take advantage of existing expertise and experience within each printshop in the way data is input and understood. Correspondingly LiftERP have developed a strong training/installation method involving printshop staff over an average of a four-month period. That does not mean everyone full time, but the process extends as long as necessary to allow for non-interference with real workflows while bringing the whole shop within the control of LiftERP.