ADD N°06

ARGON CONSULTING JOURNAL OF IDEAS

- PROCUREMENT
- R&D AND INNOVATION
- PRODUCTION AND MAINTENANCE
- SUPPLY CHAIN AND LOGISTICS
- CUSTOMER RELATIONSHIP MANAGEMENT
- SG&A OPTIMISATION
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IS DIGITAL TECHNOLOGY GOING TO ALSO TRANSFORM YOUR OPERATIONS?

ARGON CONSULTING

DIGITAL TECHNOLOGY: A VECTOR OF OPERATIONAL EXCELLENCE

Nowadays digital technology is indisputably revolutionising certain economic sectors. In a few years, the global economy's new flagship brands Uber, Airbnb, Amazon, etc. have revolutionised our consumer habits.

We forget too often that these leaders have also emerged because they achieved operational excellence by fully using the capabilities offered by digital technology. Beyond breakthrough business models with considerable deployment capacity, it's also the ability to keep promises for clients which has made them global superstars.

It should also be borne in mind that digital technology offers the possibility of substantially changing operations (including support functions), from the supplier through to final client.

Supporting our focus on operations, in this 6th edition of ADD – Argon Consulting Journal of Ideas – we have sought to explain and demonstrate the impact of digital technology on the entire supply chain.

In addition to feature articles written by Argon experts, you will have the opportunity to share the "digital" vision of Karine Gosse, Digital Development Director of the Fives group which is directly involved in the French government project of the Future Industry, and the vision of Christian Gheorghe, founder & CEO of Tidemark, on the contribution of digital technology in economic management and business. Finally, two French masters of connected devices, Thomas Nicholls of SigFox and Xavier Lafontan of Intesens, give us their interconnected views of an expanding market which is revolutionising how operational data is captured and processed.

We hope you enjoy this edition of ADD, and trust it will enlighten you about this unmissable revolution and push you one step further in your quest for operational excellence. This is more necessary than ever in a period of profound change and uncertainty.

We hope you enjoy your reading,

Yvan Salamon
President

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DIGITAL TECHNOLOGY: A REAL OPERATIONAL REVOLUTION?

Are we at the dawn of a new industrial revolution or is digital technology an incremental evolution of operations? Before answering this question which is at the heart of this magazine, here are a few key points to remember:

The "digital revolution" relies on five technological breakthroughs…

1. Cloud Computing
2. Artificial intelligence and algorithms
3. Connectivity
4. Smart devices
5. Digitisation of physical objects

… giving access to these new capabilities.

Remote monitoring and control

Remote updates of material information and monitoring in real time

Personalisation and ergonomics

Customised differentiation of products and services, adjustment of performances using user preferences

Empowerment

Optimised and self-regulated systems, self-learning artificial intelligence

Explanatory & predictive analyses

Advanced explanatory analyses through the operation of big data, predicted faults and anticipated maintenance

Pooling of needs and resources

Visibility and optimisation of user needs vs available resources

Digital technology is therefore naturally bringing to light new operational opportunities.

	OPPORTUNITIES	LEVEL OF BREAKTHROUGH
Distribution Customer relationship	• Development of revenue (product range, pricing and new channels) • Development of new business models	
Logistics	• Improved flexibility and increased traceability • Improved ergonomics and increased productivity	
Maintenance	• Improved knowledge and management of equipment • Reduction of running and maintenance costs	
Manufacturing	• Digitisation and optimisation of processes • Improved ergonomics and increased productivity	
Procurement	• Improved understanding and monitoring of costs • Facilitated decision making	
Supply Chain Planning	• Improved forecasting • Facilitated integration of the extended supply chain	
R&D Engineering	• Reduced development time • Transformed development practices	
Finance Support functions Reporting	• Digitisation of relationships • Improved collaboration and data processing	

We consider it obvious, indeed indisputable, that digital technology will have an impact on operations. Is this still a revolution? For certain functions, yes. For others, we should perhaps speak of an incremental evolution of practices. This answer is therefore complex and we invite you to delve into it in the following pages.

DIGITAL RETAIL: THE NEW RULES OF THE GAME

Laurent de Bourmont, Partner, Argon Consulting

The advent of digital technology is leading the retail sector to overhaul the way it meets consumers' new expectations; they have become highly informed, impatient and volatile.
Retailers must not only rethink their business and marketing strategy (role of points of sale, product mix, price and deals), but also their Supply Chain strategy: where should inventories be located? From which storage sites should clients be supplied? Within what time frame? How can costs be controlled in the face of exceptional demand for service improvements?

The point of sale is not extinct! Nowadays the need for an online product range is no longer in doubt. Offering the broadest possible product range on the web – the famous "long tail" – is a way of generating additional revenue. That is the goal of the "big players" like Amazon, JD.com and Cdiscount. Moreover, for retailers offering "generic", broadly similar products, offering the broadest possible product range is an important lever of differentiation.

However, the physical network of points of sale, which had been thought to be on the brink of extinction, continues to play a central role in distributors' omni-channel strategies. To its traditional sales function it is adding the functions of showroom and services centre (Click & Collect collection point, point of contact for after-sales service, etc.), enriching the unique, personal shopping experience created for the end consumer.

For conventional distributors, the combination of sales channels will allow the product range available to multiply. Hence, at Grand Récré, for 4,000 items stored in the point of sale the seller can offer its clients more than 35,000 items online, with the possibility of home delivery or in-store collection. Conversely, brands that once had an exclusively online distribution are now opening physical stores or showrooms, to create a greater connection with the customer. Indeed, Amazon opened its first physical store in Seattle in November 2015.

Une nouvelle vision de l'assortiment

For these physical stores or showrooms, a choice must be made as to what product mix to hold in stock, display items not in stock and make accessible (via tablet or terminal). This choice will depend on how the distributor's products are categorised and differentiated. Immediate availability is therefore not crucial for a large piece of furniture or large appliances, which can be delivered to home or, in the case of an exclusive or differentiated product, which the customer can't obtain elsewhere.

Having a real-time view of inventories has become an imperative in omni-channel strategies.

However, when it comes to a generic, classic product at the same price, the consumer will generally buy the product from whichever retailer offers the shortest delivery time. In-store availability will thus be essential when the purchase is made. Therefore, a retailer like Maisons du Monde applies a very different storage policy according to customer sensitivity to immediacy (e.g. large furniture not stocked or displayed even but rather decorative items which are displayed and stocked).

Operational excellence is no longer optional

Digital technology requires more demanding operational execution for retailers so that they can keep their promises to ever more demanding, fickle consumers. Having a real-time view of inventories has become an imperative in omni-channel strategies. Implementing Click & Collect

requires, for example, a real time view of shop inventories which must be perfect. The store where a customer orders or reserves a product can't disappoint that customer just because the computerised inventory was wrong when the order was placed. This real-time view of inventories should be coupled with astute sales forecasting capabilities, in order to establish a forecast inventory at all storage locations and therefore forecast restocking accordingly. Digital technology also helps to improve the reliability of sales forecasts through big data or a better picture of sales trends on the website.

The order management tools that enable real-time modelling of collection and delivery options and optimise the cost - time – inventory equation are becoming critical for operational excellence: they facilitate judicious trade-offs and controlled inventory and delivery costs in accordance with promises to the customer.

Digital technology is finally involving the implementation of rules and tools covering orchestration, prioritisation of controls and dynamic allocation of inventories between channels. Inventories available through sales channels can be reserved early in the period to ensure a channel based service. Through net sales, it should then be possible to reallocate goods between different channels (with priority rules) to optimise flow and maximise profitability or revenue. This dynamic sharing and reservation system is beneficial for the whole company, but requires sophisticated information systems.

Digital technology involves the implementation of rules and tools covering orchestration, prioritisation of controls and dynamic allocation of inventories between channels.

This new environment has an impact on a retailer's entire organisation: the role of the shop changes, causing many changes for teams and operational processes. Since interaction with the customer must be unique and perfectly executed, the retailer must bring about effective collaboration between different sales channels teams. Finally, operational excellence in restocking and customer orders is a prerequisite not only for managing customer satisfaction but also to control inventories and costs.

THE DIGITAL REVOLUTION AT THE CORE OF LOGISTICS

Isabelle Hautant, Director, Argon Consulting
Xavier Calamy, Director, Argon Consulting
Nicolas Gellé, Partner, Argon Consulting

The last link in the chain, logistics is a strategic but undervalued function of the company. Yet it represents a significant share of added value and a real opportunity for differentiation through service.
Logistics is not immune to the digital revolution.
In partnership with École des Ponts university, we have sought to analyse the challenges of 3.0 Logistics.

Differentiation by service

Customers are increasingly demanding more: in terms of service, responsiveness and communication of information. Operational excellence is no longer an option; it has become an obligation. Technology's contribution to improving the quality of order preparation is now obvious. The goal of "zero defects" has almost become a reality through the development of information technologies and warehouse automation.

Similarly, the ability to respond to risks inherent to warehouse and transportation operations has increased significantly through technology: from re-routing a lorry in real time to by-pass traffic congestion to alerting the final recipient of delivery, to providing additional services (digitisation of documents, management of letter boxes, last-minute order changes, etc.).

Ergonomics and the arduousness of work

Warehouse productivity is of course limited by the arduousness of work. An order picker commonly shifts several tonnes each day and can travel about ten kilometres.

In these circumstances, it becomes unrealistic to speak of productivity without bringing any solution to workstation ergonomics, especially given that regulation around these issues is becoming stricter in the fields of warehousing and transport. In this regard, the contribution of new technologies falls into two categories:

- assisting the picker in implementing their tasks: “goods to man” systems (in which the objects are brought to the operator) avoiding trips on the picker’s part, grip support or even robotic gripper systems to facilitate transfers and avoid risky movements, augmented reality glasses for automatic product recognition. Exoskeletons is a technology that might prove attractive in the future for the handling of heavy loads.

- monitoring and alert vs tolerated thresholds: individual sensors measure distances travelled and weights carried by each operator. Before the acceptable threshold is reached, the system can automatically reassign the operator to another, less arduous, task type.

Technology’s contribution to improving the quality of order preparation is now obvious.

Productivity and flexibility of logistical infrastructures

Automation (automated storage and retrieval systems, terminal systems, sorting lines, conveyors, etc.) in vogue in warehouses in the 1990s proved rigid and hard to adapt, even as Supply Chains were being revolutionised by globalisation with Far East sourcing requiring the review of warehousing facilities.

The evolution of technology towards lighter mechanised solutions (palletizing robots and automated guided vehicles (AGV)) serves to reconcile productivity and flexibility. “Goods to man” solutions are spreading to the movement of mobile shelving (Amazon).

Some operations can now be performed at night by intelligent robots, avoiding the need for a human presence in unsocial hours. This is the case for warehouse security which can be done by intelligent drones that alert a security centre if needed.

Safety and traceability

The health scandals of recent decades have served to increase demands concerning the traceability of pharmaceutical and food products. Combined with ever more complex data flow, companies' willingness to protect themselves against fraud and theft is serving to generalise the requirement on the traceability and safety of goods. The different tracking and tracing solutions are thus being generalised via connected devices (RFID solutions – whose cost price is has fallen significantly over the past five years, miniaturised sensors, etc.).

In conclusion, digital technology is changing the world of logistics which, wrongly, is often not sufficiently perceived as a vector of differentiation and productivity by current managers. New opportunities are arising with an impact on service delivered, productivity, workstation ergonomics and traceability. Digital technology applied to logistics is still in its infancy, and many other applications may be conceived in the future via big data, the spread of connected devices or augmented reality. It is time managers acknowledged the opportunities.

The evolution of technology towards lighter mechanised solutions (palletizing robots and automated guided vehicles (AGV)) serves to reconcile productivity and flexibility.

	"Augmented" human	Robotisation	Connected devices	Big data
	Augmented reality glasses Grip support systems Exoskeleton	Automatic palletisers AGV Robotic gripper	RFID Connected containers Connected letter boxes	Warehouse simulation Individual tracking
Differentiation by service		●	●	●
Ergonomics	●	●	●	
Productivity and flexibility	●	●	●	●
Safety and traceability	●	●	●	

MAINTENANCE AND CONNECTED DEVICES IN THE MANAGEMENT OF INFRASTRUCTURES AND FLEETS

Arnaud Meunier, Director, Argon Consulting

Maintenance is an area in which the digital revolution is having a very strong impact. Whether for an infrastructure with extensive geographical coverage (railways, power distribution, etc.), a mobile infrastructure (fleets of rolling stock, etc.) or a fixed asset (factory production equipment, etc.), the rise of real-time information is a source of performance improvement. It enables cost savings in monitoring, remote diagnosis, technician tracking, etc.

All this is not new. Nevertheless, the Internet of Things, the Cloud, big data and mobile working are giving major impetus to these opportunities which, in addition to improving the efficiency of maintenance processes, are revolutionising business models. This is because equipment suppliers are becoming suppliers of solutions and uses. The crane seller will sell lifting and availability capacity. The equipment supplier will sell more operating and maintenance services.

If we integrate these new technologies, those related to information systems (including BIM – building information modelling), digitisation of technical documents (plans, ranges, etc.), drones and 3D printing, we can see the potential for progress facilitated for the entire ecosystem. This involves equipment suppliers, asset managers, service providers, operators, etc.

To those who may wonder which technological or process breakthroughs will help maintenance dust itself off, digital technology offers a very rich palette of potential levers. These opportunities should therefore be seized. This involves the identification of business, technological and economic impacts followed by the implementation of transformation, with the right level of support for stakeholders on the ground.

For SNCF, the specialist in remote industrial diagnostics Intesens joined the low-speed SigFox network in order to remotely monitor the rail network. Thanks to the Internet of Things, SNCF intends to improve maintenance while managing its costs. We met Xavier Lafontan, President of Intesens and Thomas Nicholls, Marketing and Communication Director of Sigfox.

What are the industrial applications of the Internet of Things?

Thomas Nicholls: applications connected to the low-speed SigFox network which are already deployed or in development primarily concern the traditional maintenance and predictive maintenance sector.

Xavier Lafontan: our client SNCF is seeking to make greater use of connected devices to cut the cost of operations performed manually on the ground. Indeed, be it to monitor switch lubrication or the power supply to level crossings, an engineer needs to be sent on site whenever equipment stops working to diagnose the problem. With connected devices, the SNCF network will now be able to analyse the situation remotely which make gains in time, money and responsiveness, while ensuring engineers are still available if required.

Which technological developments have allowed these devices to develop?

Xavier Lafontan: I think you need to distinguish between two major developments. The first is Moore's Law whereby the size of micro processers is halved every 18 months and, in turn, their energy consumption and their cost. Today, we are able to put the power of computers from the 1980s into very small packages. The second development is the emergence of low-speed communication networks with very low power consumption. Thanks to them, connected devices can work for several years without their batteries needing to be changed, unlike smartphones which use the 3G network. This autonomy is an indispensable criterion.

Xavier Lafontan
Intesens
President

Thomas Nicholls: for the low-speed network, it is essential to meet manufacturers' demand for quality and reliability. Unlike 3G, the network must in fact operate at 100% capacity with no drop in quality throughout the territory. This is a service Sigfox ensures to enable the Internet of Things to be used.

What is hampering the implementation of sensors in the maintenance sectors?

Xavier Lafontan: the Internet of Things is calling into question 40 year old working habits.
For example, to measure track sinkage in the ballast, SNCF network engineers used to take measurements along the tracks. Tomorrow, they will be asked to check a smartphone application directly linked to the network. Intesens also supports SNCF in training engineers to use these new technologies, which are to be deployed on a large scale after validation of prototypes.

How is the information gathered by sensors stored and processed by companies?

Xavier Lafontan: most major groups are now working to create databases fed by their information systems. This is of course the data collected by sensors connected and transmitted through the low-speed SigFox network, but also information from optical and cable networks. By pooling all these sources, it becomes possible to enhance them through big data.

Before then conducting predictive analysis?

Xavier Lafontan: we're in stage 1.0 of the Internet of Things. Today, companies are asking for very practical solutions and this is undoubtedly the best way for them to use connected devices with concrete results. However, we are approaching a second stage which I call 2.0, that is, the point when we're pairing data streams and combining them to predict, through big data, the best time to ensure maintenance. The objective will be to operate neither too early nor too late, to limit costs without compromising operations.

Thomas Nicholls
Marketing and Communication
Director of 16 Sigfox

A group of 260,000 employees, SNCF makes maintenance one of the main areas of focus for the digital transformation it initiated in 2015. Frédéric Burtz, Director of Technology and Innovation in the SNCF digital team, is at the forefront of this industrial change.

What role is digital management going to play in transformation and maintenance?

Digital transformation must meet real needs. Our mission is not to reinvent the upkeep of trains and tracks, but to improve processes already in place. We therefore bring work teams the tools they need based on the field expertise they are entrusted with.

> "Our mission is not to reinvent the upkeep of trains and tracks, but to improve processes already in place."

For example, through connected sensors to be installed on the network after validation, the monitoring done by engineers (tracks, signals, level crossings, etc.) will be greatly facilitated. Now they will operate only in case of emergency, in addition to safety related on-site visits which will still be required. This remote monitoring also covers stations where we can identify malfunctions more quickly and thus restore service more quickly, be it for disabled traveller equipment or a problem with platform lighting.

On what criteria do you judge the attractiveness of a project?

There are two criteria. The first consists in validating its technical feasibility. The second involves questioning if a project makes economic sense. For example, SNCF used to systematically check air conditioners on all its TGV carriages before the summer by sending them to a service centre. This generated significant maintenance costs when most air conditioners functioned very well. The idea of installing connected sensors has easily fulfilled the feasibility criterion. The criterion concerning economic benefit was obvious. As a result, we have cut the number of maintenance visits by two thirds by solely targeting carriages with air conditioners that show signs of weakness.

How do you use all the data collected by your connected sensors?

We pour all this data into data lakes (a comprehensive system for storing all a company's information). These data lakes allow us to conduct a predictive analysis in order to further improve maintenance. For example, over several months we gathered all possible information on the operation of carriage doors in the Paris network. After analysis, SNCF data scientists designed an algorithm to prevent breakdowns and repair a door before the problem occurs. This greatly improves the quality of service as a train with a broken door is a train which must be stopped on a track and which stops traffic.

"A first experiment in implementing connected sensors on carriage air conditioners has helped to cut the number of maintenance visits by two thirds."

Which skills have you chosen to keep in-house and how do you identify your partners?

In digital matters, SNCF relies on internal centres of expertise. The first one concerns the Internet of Things and comprises employees who carefully monitor the market and project managers who help business areas design the tools they need. The second centre of expertise is dedicated to big data. Meanwhile, SNCF has begun to set up five physical places which we call the 574 in reference to the world rail speed record: 574.8km/h. To speed up projects and identify the right partners and solution providers, the 574 bring together digital project teams of the SNCF group, incubators dedicated to start-ups and centres of expertise. Already set up in Toulouse, Paris, Lyon and Nantes, a fifth location will soon be opened in San Francisco, taking us closer to Silicon Valley!

Frédéric Burtz
Director of Technology and Innovation
SNCF Digital

FACTORY OF THE FUTURE: A MULTIFACETED REALITY

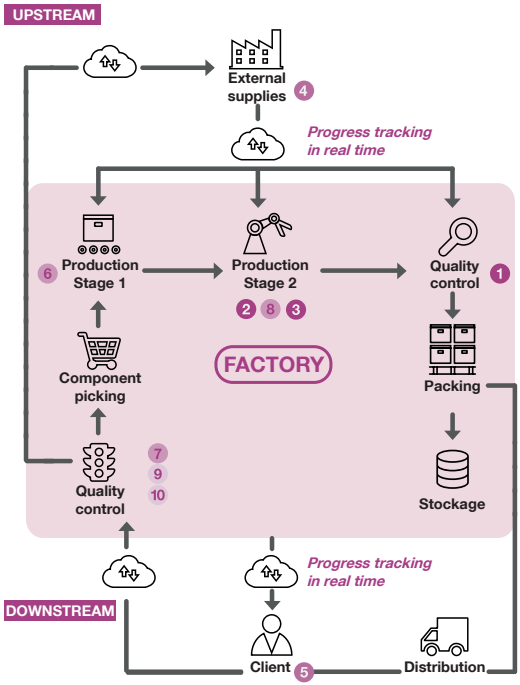
Jean-Baptiste Sebag, Senior Manager, Argon Consulting

Considered a genuine industrial transformation, the factory of the future is becoming an ever more tangible reality each day through the increasing accessibility of technologies. Figeac Aero, Daher, Claas and Air Liquide alone are themselves investing over €100 million over the next three to five years in future factory projects, thus giving credence to manufacturers' commitment to this new industrial revolution.

Faced with increased competition and tighter market conditions, manufacturers are looking for a new performance catalyst. But what does the concept of "factory of the future" cover?

Manufacturing analytics, IoT * and collaborative, ultra-automated robots are certainly examples of digital manufacturing but limiting oneself to a long list of technologies is too restrictive. The factory of the future is revolutionising the factory's very definition and must be thought of comprehensively.

* Internet Of Things



A high-performing, flexible factory

1. Google Glass for facilitating quality control: taking photos/videos and delivering data to the analysis centre (BMW, VW, etc.)
2. "Intelligent" robot and cobotics** to boost productivity and reduce the risk of waste/loss (Daher, Bosch, etc.)
3. Advanced sequencing software (big data) to personalise bottle packaging (Coca-Cola)

"Extended" factory

4. Connected devices to anticipate the need for spare parts or maintenance services (GE, etc.)
5. RFID and software for real-time communication on production progress to clients (Bosch, Azurea Technologies, etc.)

"Human" factory

6. Dynamic problem solving and machine learning software (Solvay)
7. Digitisation of production information: operator tablets, control systems, etc. (Daher, Siemens, Airbus, etc.)
8. Cameras to detect pedestrians on worksites through video processing algorithms (Vinci)

An eco-responsible factory

9. Analytic software (big data) for the energy performance of industrial processes (Energiency)
10. Analytical software (big data) for the fluid (water) performance of industrial processes (Aquassay): e-water mapping

A high-performing, flexible factory

The first ambition is obviously to increase agility and performance to meet ever-increasing market requirements and the ongoing need for competitiveness.

Digital manufacturing helps to:

- reduce industrial losses and non-conformities 1 2 in order to meet the growing demand for quality and profitability,
- reduce manufacturing times and more generally industrial cycle times, thus improving the overall lead time,
- increase manufacturing flexibility 3 providing the opportunity to change orders, customise products and so on; this facilitates, for example, the implementation of delayed differentiation without affecting industrial performance.

An "extended" factory

The first consequence of digital technology has been the facilitation of communication, particularly in our day-to-day lives. The increased opportunity to capture, process and transmit data is having a strong industrial impact, ultimately allowing the extended factory concept to be tested.

Through the digitisation of information, manufacturers can now address in real time the need for transparency vis-à-vis suppliers 4 but also customers 5, improving not only the customers'/suppliers' experience but also the overall performance of the chain of operations.

** Cobotics: emerging branch of technology at the interface of human assistance, biomechanics and robotics.

A "humanised" factory

Gone is the era of Taylorism where man is a resource serving productivity!
Man is at the centre of industrial productivity. Digital technology serves to strengthen his knowledge and skills 6, change governance procedures and communication/control processes within the factory itself 7 and ultimately "augment" man and protect him 8.

An eco-responsible factory

Today, it is hard to deny that respect for the environment has become a priority for manufacturers. Every day, manufacturers try to limit their environmental impact. Here again, digital technology provides a practical response to reduce energy consumption 9 10, for example.

Should a factory of the future necessarily cover all these aspects? Of course not. In fact, each situation has its opportunities and constraints. It would therefore be unrealistic to want to provide a general response to such a specific opportunity.

However, here are three key points to help you determine and trigger your own plan for a factory of the future:

1. adopt an holistic approach to the subject from qualifying the need to defining a business case and an implementation roadmap.
2. rely on business requirements but also on exisiting internal issues to identify priorities and ensure continuous production.
3. think in a cross-functional way and know how to mobilise the entire chain of operations from development to distribution of goods, because digital technology has a strong impact on interfaces between functions.

Increasingly numerous and accessible technologies which are having an impact on how factories operate

	Advanced software programming Sequencing software Optimisation algorithms Big data	"Augmented" human Augmented reality Exoskeleton Virtual reality	IoT & collaborative machines RFID Sensors and connected devices	Robotisation Cobotics, autonomous robots Remote operation	Analytics & simulation Predictive analysis Interactive simulation	Digitalisation Operator tablets Open data	3D printing development Additive manufacturing Digital prototyping	IMPACTS***
Losses & waste	●	●		●	●	●	●	-15 to -35% of costs
Maintenance costs		●	●		●		●	-7 to -20% of costs
Productivity		●		●		●		+20 to +40% of productivity
Direct work force		●		●				-5 to -15% of costs
Indirect work force	●				●			

*** Impacts noted or expected (source: Argon Consulting)

With each passing day the notion of digital technology is becoming increasingly real in the factory. What is behind this reality? How should this new industrial change be approached? Answering these questions is the ambition of Karine Gosse, CDO of the Fives group. A member of the alliance for industries of the future, Fives is an engineering group specialising in the development of machines and production lines. It uses digital technologies like the Cloud or big data at the heart of factories. Karine Gosse, its digital development director, highlights the challenges of this new industrial revolution.

What is "factory of the future"?

This is a more flexible, efficient and competitive factory thanks to digital technologies including big data, Cloud, predictive analysis, 3D printing, etc.

These innovations mark a real breakthrough in relation to the "robotisation" of the 1960s. Indeed, machines are now able to exchange information with each other in real time to streamline production and anticipate maintenance operations. In a Chinese steelworks Fives works for, we have therefore set up a fully reconfigurable production line quickly and centrally so as to manufacture different grades of steel and better meet the sometimes abrupt changes in demand. In the past, such changes required the chain to be adapted, machine by machine.

The industry of the future is rethinking the role of factories in their environment. How does it contribute to sustainable development?

I would take the example of the industry which Fives knows well. From the raw material that is sugar cane, we can of course produce sugar but also ethanol and electricity for the factory's own energy needs or those of neighbouring populations. There is thus a real circular logic of economy in a factory.

For one of its clients, Fives has created simulation software that optimises processes and makes them more flexible: it allows factory settings to be adjusted at any time to produce

Karine Gosse
Digital Development Director
of the Fives group

more sugar, more ethanol or more electricity based on prices, needs or even the quality of raw materials.

How should a company address this change?

We are living in an usual period; manufacturers have never had so many mature technological opportunities. These breakthrough innovations must still centre on the idea of continuous production because the objective is obviously not to get rid of machines which still work perfectly after 20 or 30 years of use. Manufacturers must therefore successfully graft these technological bricks onto an already high-performing industrial tool. And choosing the best adapted new technology takes time.

What are the success criteria of this transition?

It's primarily a question of organisation. A project's success derives from the involvement of all stakeholders, employees and team leaders. Bottom-up strategies from top-down hierarchies must be forgotten. Flexibility and agility must be demonstrated. SNCF uses a maxim which summarises this approach well:
"Try early, fail fast, succeed big".

What about the return on investment for industries which choose to innovate?

The overall equation remains difficult to resolve. We are seeing productivity increases related to new technologies and cost reductions related to digitisation. In my experience, the majority of companies which have invested in this transformation have benefited from a positive return on investment. However, I believe we have to consider things with greater objectivity. This technological revolution is an essential transformation that will enable French industry to keep its place on the international stage.

FIVES IN 5 FIGURES

1812
year of creation

8,000
employees

Operates in **30** countries

€1,560M
revenue in 2014.

€135M
EBITA in 2014.

HOW IS THE FORECASTING FUNCTION DEVELOPING AT THE DAWN OF THE DIGITAL REVOLUTION?

Benoît de Saint Victor, Director, Argon Consulting

Sales forecasting is a key performance opportunity for manufacturing companies, to both improve their service and reduce their working capital. There is still significant scope for progress in most sectors (60-70% forecast reliability at 3 months is still the norm). Conventional forecast improvement levers are well known by Supply Chain management, but how can digital technologies contribute to the operational excellence of forecasts?

For the forecast function, big data helps to deliver on the promises of an old concept: machine learning.

Machine learning helps to identify what successfully drives sales forecasting and to what extent. For example, it allows a company to predict the impact (positive or negative) of a “buzz” on the brand’s social networks, and on short and long term sales Machine learning also enables continuous enrichment in the quality of algorithms used to make forecasts.

What is machine learning?

Machine learning develops automatic procedures that highlight general rules on the basis of examples. The analogue capacity of the human brain is imitated to create artificial intelligence systems. This makes it possible to create and enhance algorithms that predict the value of a target variable using the explanatory variables for which observations are available.

Machine learning concepts have been known for years but require a big data environment to help them fulfil their power potential. Experience has so far shown that the professional expertise of a forecaster is more effective than machine learning for identifying good forecast drivers in a classical context (i.e. “small data”).

Furthermore, big data helps to continuously enrich data used for forecasting and thus improve machine learning capabilities (more data allowing more potentially relevant correlations, and therefore a better quality forecast). For example, you can retrieve and analyse the impact of competitors’ campaigns on demand or use personal data from connected devices. The options are as vast as the data available.

Big data technologies also allow the company to use data which has long been available in advance for forecasting but is not used sufficiently as it is too complex to archive or analyse. This data might be called “medium data”: for example, the detailed impact of weather on demand, of cannibalisation over the life cycle of portfolio products and of internal promotional campaigns on demand.

The application of these principles requires new skills within forecasting departments. The technological leap necessary to identify, retrieve and process data and the advanced algorithmic skills for machine learning fall within the remit of data scientists.

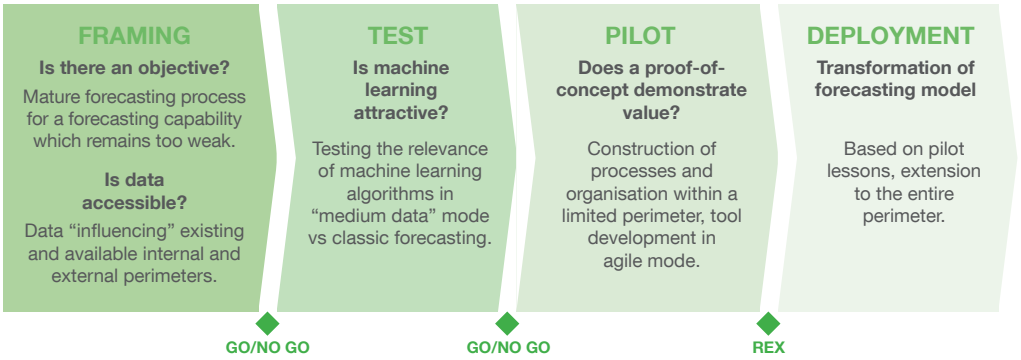
Data scientists are not, however, suitable to replace forecasters. Being scarce, expensive and highly skilled, they are unlikely to be used to handle the operational aspects of the forecasting process. They are therefore more naturally placed in an entity which generates forecasts.

The transformation of the forecasting function to a digital model is not yet a reality for businesses. As is often the case, technology offers potential and functional concepts are attractive, but business cases are uncertain.

Some sectors are, however, advanced in the implementation of these new concepts, but this currently involves only a small part of the market and rather specialised forecasting functions (e.g. product mix management in retail).

Nowhere is this low maturity better reflected than in the overview of editors on the market.

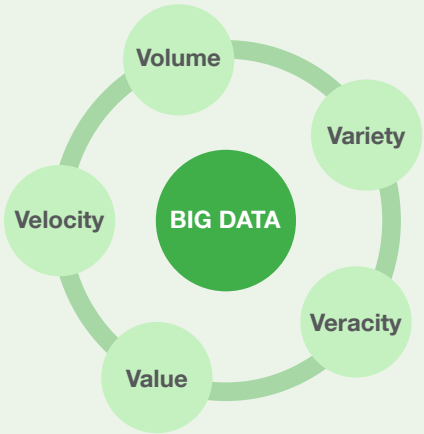
The supply is plentiful, but still very focused on the technological aspects of big data and on the algorithmic aspects of machine learning, more than functions typically associated with the forecasting process (visualisation of forecasts, implementation of collaborative forecasting or forecasting scenarios, etc.).



Big data today has only moderately affected the sales forecasting process. However, this is a subject which businesses should scrutinise, while recognising that the organisation's maturity is built by successive increments rather than a big bang.

Big data covers all technologies, professions and conceptual approaches which help to use, in near real time, a huge amount of data from multiple sources to derive hidden and valuable information (which was once impossible to deduce) through classic storage and data analysis tools.

The characteristic 5 Vs of big data



SHOULD R&D BE TRANSFORMED TO BENEFIT FROM THE MOMENTUM IN 3D PRINTING?

Jean-Louis Dropsy, Director, Argon Consulting
Jean-Pierre Pellé, Director, Argon Consulting

3D printing manufacturing is a unique opportunity to rethink the fundamentals of R&D organisations and design methods to confer added competitive advantage.

3D printing, also called additive manufacturing, is a booming industrial manufacturing process.

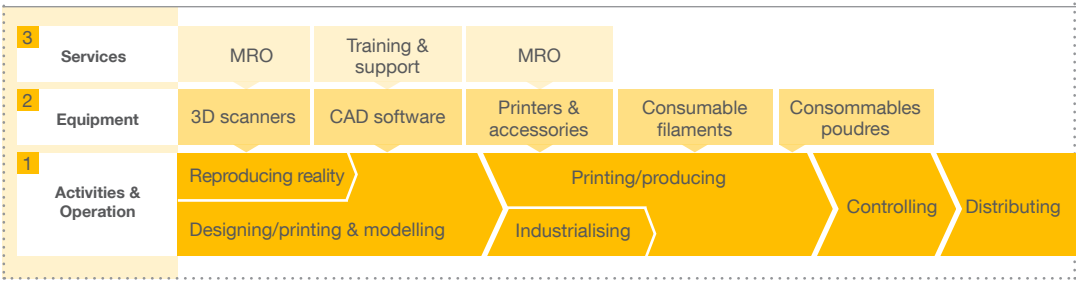
It allows an "object" to be produced by stacking thin layers of material (plastics and technical filaments, metal powders, etc.) from a model designed by CAD*. Its applications have now gone beyond the framework of initial design prototypes to address the completion of functional parts over the whole industrial cycle. This includes R&T demonstrators, rapid prototype development, industrial and consumable tools and even final parts and subassemblies in production. And they affect all sectors. Already used for medical devices, jewellery, watches, aerospace and motor sports, they are growing significantly in aeronautics, despite the certification constraints and the need to devise appropriate control methods (hidden defects). One exception is perhaps the auto industry, where production speeds are limiting the adoption of additive manufacturing for the moment.

* CAD: computer-aided design

Additive technologies are thus well poised to complement, supplement or even replace traditional machining and manufacturing of a "subtractive" nature.

A complete sector has developed, contributing to the rapid progress of recent years.

Value chain of those involved in additive manufacturing



New opportunities for performance, competitiveness, services, etc.

Additive manufacturing removes traditional machining constraints and offers new opportunities:

- **in design and creation:** it gives rise to the ability to create new shapes and use new materials such as blue, green or purple golds in jewellery.
- **in development:** new designs and topological optimisation reduce bulk and the number of parts required to assemble a complete product.
- **in production:** iso-design reduces production times and material losses. In addition, the performance of machines is progressing at a sustained pace.
- **new services** available. Customising a product at its point of sale or even its manufacture at a remote place of use is becoming possible, as shown by the experiment aboard the International Space Station in February 2016. Stocks and logistical flows are thus reduced.

Quickly and optimally exploiting the potential of these innovative industrial processes will require a transformation in R&D.

Many parts are still made without design changes, whereas they have been designed for subtractive manufacturing.

R&D must therefore revise its methods at the dawn of 3D printing, and in particular:

- **change and align historical development practices** (or professional charts and design rules) with industrialisation methods to draw parts suitable for 3D manufacturing (resistance, geometry, materials, etc.).
- strengthen the **use of topological optimisation tools** and link their implementation to development approaches at an objective cost and mass.
- practice **Design Thinking** by making use of the opportunities for design and ergonomics offered, as well as rapid prototyping to develop suitable products.
- **integrate new services from "concept paper" and development.**

Defining a product to industrialise and produce remains a basic element. However, it is now time to also consider items which can be customised by the client in the showroom or the provision of data models to enable a client to produce/repair a part in situ on request (on an oil platform, for example).

Additive manufacturing is a new knowledge area where developments are rapid.

To get ahead of the competition, R&D must create a culture of experience sharing and knowledge transmission which happens through three vectors:

- **individually:** creating personal "practice books" (or checklists, development practices, etc.) to identify new experiences in development.
- **by discipline:** three of them are actually evolving with 3D printing (materials science, metallurgy and mechanics). Strengthening the role of these disciplines' managers to integrate individual knowledge and share collective team knowledge is fundamental. One initial approach is to ensure that managers dedicate a significant amount of their time to knowledge sharing in a balanced way with management, expertise and improvement.
- **cross-functionally, between R&T, development, design and industrialisation.** Control over new industrial processes is evolving as much as control methods. Group workshops (or **Kaizen Engineering**) regularly ensure new experiences are shared and innovation is fostered.

MANAGING OPERATIONS: NEW ARCHITECTURES, NEW OPPORTUNITIES

Thierry Lucas, Partner, Argon Consulting

Over the last fifteen years, large-scale investments have been made in information systems (ERP*), often with the aim of homogenising and integrating practices. These implementations have largely been conducted as part of long, expensive projects with tentative ROIs and have often led to inflexible tools with a lack of added business value (particularly in terms of decision support tools).

The main consequence of that is well known to all companies: the proliferation of multiple Excel files. These office tools are appreciated for their flexibility and adaptability in the face of business problems. They actually help to:

- conduct factual analyses by manipulating the right level of data,
- adapt to new business demands,
- improve operating modes in an agile way.

* ERP: Enterprise Resource Planning

These benefits of course come with a host of problems: multiple, irreconcilable data sets, collaborative difficulties, heterogeneity of practices, inconsistencies, errors, hazardous maintainability, etc. But how, then, is it possible to progress, experiment and adapt swiftly to new environmental demands and developments? Thankfully, a third approach is finally possible! It relies on the new architectures available and helps to bring new added business value by rapidly developing tools:

- which are simple, focused on specific business problems,
- by relying on a shared data set,
- which are swiftly implemented, thus facilitating experimentation and appropriation,
- which ensure compatibility with chief information officers' maintenance requirements, by relying on now robust technologies that integrate natively into new architectures.

These new technological opportunities driven by digital technology are a real revolution for professions such as Supply Chain Management which, often more than others, have suffered from the cost and inflexibility of current information technology. Imagine management applications in your Supply Chain which gradually adapt to your operation based on:

- a robust, shared, universally accessible data base (one set of data),
- calculation and analytical web services specialised by problem and built gradually,
- a rich Windows type application for planners, facilitating decision making and collaboration,
- a digital interface for managers who are mobile, facilitating management (dashboards, alerts, etc.)
- a real-time connection to advanced reporting tools, etc.

These new opportunities have already started to actually bear fruit in several Supply Chain transformation projects which we support. They have also allowed us to offer new agile tools (Argon Business Tools™) such as:

- "Dispo component" which provides the missing link in industries like pharmaceuticals, cosmetics, luxury, aeronautics and assembly industries, etc.
- "Inventory policy", which locates and sizes strategic buffers,
- optimisation of production campaigns,
- quality of master data, etc.

However, to fully reap the benefits of these new opportunities, project steering arrangements should be revisited in depth. The design, development and implementation of processes and tools need to be both more collaborative and more rhythmical, while making IT-industry collaboration central to the success of these new transformation dynamics.

Coming from Romania with a few pennies in his pocket in the early 1990s, Christian Gheorghe has become a star entrepreneur of Silicon Valley. After creating OutlookSoft, he sold his company to the SAP group, where he became Chief Technology Officer in 2007. He embarked on a new adventure in 2010 by creating Tidemark, a solution whose architecture is natively based in the Cloud. He did this in order to make the best use of opportunities in terms of calculation capacity, flexibility of data models and mobility. We met the person who uses digital levers to revolutionise business management.

How has digital technology revolutionised EPM (enterprise performance management)?**

Digital technology has changed the way EPM is developed: data is becoming more accessible and can be processed in real time.
While traditional EPMs were built around the product and limited by computing constraints, the client and data are now at the heart of business problem solving. These digital innovations are mostly developed by the Cloud, which is used not only as a storage space but as a platform for data with high added value, enabling companies to process data and manage their business more proactively.

So we are moving from "analogue" technologies to "digital" technologies.

Indeed. And the main difference is that in a digitised world, information is to be found not only from a product but from a product's whole environment. New technologies can no longer be limited to analysing internal data, but determining correlations between company performance and data such as weather, GDP growth or customer satisfaction as it appears on social networks. This represents a paradigm shift for CFOs, who can thus allow managers to sharpen and improve the reliability of their decision making. Furthermore, data is now available in real time, thanks notably to the Cloud but also the use of mobile devices.

** Enterprise performance management (EPM) software combine performance management and business intelligence (BI) while supporting a wide range of strategic management, financial and operational processes.

Christian Gheorghe
Founder and CEO
of Tidemark

Are the breakthroughs you mention primarily technological or are they more profound?

A good technological environment must be centred on the client and strategy. The change we are involved in is disruptive. We want to improve business performance and change the way CFOs and, therefore, CEOs understand their work by democratising access to data and fostering collaboration.
Digital technology requires people to be reactive and control information so as to stay ahead of the game. Tidemark helps the CFOs of various sized businesses to transform so as to achieve their goals.

Why have you created Tidemark and not a revolutionary ERP which operates on the Cloud?

We initially created OutlookSoft, an EPM which analyses and plans financial data; this solution was acquired by the SAP group of which I became Chief Technology Officer.
With the advent of digital technology, we wanted to offer a flexible, collaborative tool which gives more information and adapts to a new lifestyle that's mobile and connected. This is why we created Tidemark, which helps to establish the link between finance and other departments.
With over 100 customers and 3 years of experience, I think we have managed to transform the world of EPMs.

What distinguishes you from existing solutions?

In addition to the features already mentioned, Tidemark has three key differentiators:

- analyses and data are continuously available and updated. In addition, adopting the software is a very fast process
- as all types of data, not just financial, are analysed and
- the integration of machine learning tools allows a predictive rather than simply reactive model to be built on.

> "A flexible, collaborative tool which gives more information and adapts to a new lifestyle that's mobile and connected."

What impact will Tidemark have on how financial departments operate?

Tidemark allows wider distribution and faster analysis, cutting back and forth trips between each service and top management. Transparency allows everyone to work in better conditions, but it fundamentally changes the job of finance teams who move from a specialist, expert role in reporting construction to a role which models and supports decision-making.
Moreover, their analytical scope is no longer just financial, but also covers operational areas.

Doesn't making information available to all levels of the company also upset the balance in the company?

Information has value only if translated into action. From this perspective, democratising access to information without allowing those on the ground to act on it is to miss part of the digital revolution's value.
It's obvious that these new technologies bring greater transparency within the organisation and this facilitates a jump in performance. The CEOs and CFOs who are behind this and encourage movement in this direction obtain the resources to make a successful transformation.

"Democratising access to information without allowing those on the ground to act on it is to miss part of the digital revolution's value."

Interview conducted by Argon Consulting:
Antoine Grenier, Associate Director
Cyril Capello, Director

HOW CAN OPERATIONS SUCCESSFULLY UNDERGO DIGITAL TRANSFORMATION?

In concluding this “abundant” ADD on new opportunities provided by digital technology to improve operational performance, we wanted – after asking “what?” – to ask ourselves “how?” Leaders with opportunities to transform their business often have the most difficulty answering this: what form of governance should they implement, what method should they use to bring out and deliver the right projects, and how can they manage risks?

Projects which are essentially very “profession-based”

By drawing a parallel with projects involving the transformation of processes and organisation linked to the difficult development of ERP-type information systems, one obviously common point is the absolute necessity of “picking” and piloting projects according to function rather than technology.

Moreover, this is even more true in the case of digital transformation, for at least three reasons:
- irrespective of the area of operations, and as illustrated by the examples given in this journal, there will often be a radical transformation of the processes rather than marginal adjustment.
- the (potentially questionable) argument in favour of limiting professional aspirations through compliance with the “standard” when an ERP system is implemented no longer applies to digital technologies, the opening and flexibility of which are disproportionate.
- finally, users are mostly made aware of some of these technologies in order to apply them in their everyday lives and are best placed to identify new uses with high added value.

Fabrice Bonneau
Managing Partner
Argon Consulting

The importance of the “terrain”

The digital revolution among the general public is a “usage” revolution. In a huge world of possibilities provided by technology, how can one create new uses and therefore new applications which transform everyday life in a positive way? Such an approach is virtually unknown in the business world where the changes made by information systems have always been very “top-down” and very techno-push.

A first step is therefore to create the conditions for a bottom-up expansion to generate opportunities portfolios. This will involve: creating an eco-system which includes both operators “on the ground,” workshop or warehouse managers, internal or external industry experts and technology providers; and relying on approaches such as Design Thinking, making it possible to “process” the emergence of new uses.

Likewise, the implementation of projects will be “flexible” and occur in successive stages, with end users heavily involved and sought after. Experiments will be conducted in parallel with development, both to demonstrate concepts, guide the design phase and facilitate boarding.

In the business world, the bottom-up approach is not enough, at least not yet...

While an application for the general public can be profitable even if used by only a small fraction of the population, a company’s performance can be achieved only by mass generalisation, requiring:
- strong sponsorship backing and a willingness to put resources on the table as long as business cases require them.
- a process which is by necessity ‘top-down’ and prioritises projects where the strength of these business cases will be the major decision criterion: What is the cost? What is the actual gain? What are the risks?

This will assume internal or external expertise for the construction of these business cases and a regular review of opportunities by an ad hoc committee.
- an entity which guarantees coherent architecture both professionally and technologically, which does not set a fixed five-year target but ensures that any new project can be incorporated with a view to ongoing development. Finally, key questions are being asked which require more strategic thinking, notably:
- who are the right partners to choose, specifically in the area of technology? This question has become almost trivial in the choice of an ERP system, but much more complex in a world where the best ones are perhaps the smallest and most fragile and the question of choosing the right technology, e.g. for connected devices, can be an act of faith.
- which skills should be internalised or externalised?

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