GUIDE TO IMPROVING OPERATIONAL PERFORMANCE

lean&green

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Print Business Trends

Case Studies – Organisation – Competencies – Co-development

IDEP
Institut de développement et d'expertise du plurimédia

icmPrint

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Print Business Trends

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INTRODUCTION

Stimulating interest in tools, techniques and industry innovations is one of the principal goals of IDEP* and icmPrint* to help strengthen the printing industry. As production tools and technology have evolved, the printing industry has improved its productivity and quality, while at the same time diversifying its products and markets. However, it is the context and use of these technologies that significantly influences business success. For this reason we decided to look further into how these factors influence print business trends.

The starting point for this guide was a series of international case studies. We wanted to take an informal view of some current business practices and get some insight into their future evolution and needs. The participating companies represent a range of sizes and print market segments, providing a broad perspective of the industry dynamic while deliberately not being a statistically representative sample to avoid falling into an 'average' grouping.

Each of the companies selected has demonstrated innovation and or excellence in one or more aspects of its business. Unstructured interviews encouraged these printers to share their business experience with their industry colleagues. Their willingness to share their views is both important for this report (and much appreciated) and underlines 'openness' as one of their key characteristics.

The interviews sought to identify some of the key attributes that have contributed to their success. Information from different companies and associations were then reviewed and the combination of these sources led to this guide being structured to describe three principle trends:

1. Individual and Collective Competencies
2. Optimising Operational Efficiency
3. Co-development

We were not looking for recipes for success; rather, sources of inspiration that readers may be able to adapt and apply to their businesses. These include:

- What are the trends for future print segments?
- What are some of the attributes of successful companies?
- What external resources are important?
- Which competencies are needed in a company?
- How important is collaborative working — internally and externally?

This is the fourth in a series of guides that share generic international best practices in the printing industry. IDEP and icmPrint have again worked together to publish 'Print Business Trends' — the previous guide was 'Sustainable Printing Plants'.

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Executive Summary

The starting point for this guide was 17 case studies in six countries of companies that were identified as successful in their business. The use of unstructured interviews encouraged these printers to share their business experience with their industry colleagues. Information from case studies was structured into four broad performance attributes and each scored for its relative importance for 14 companies.

		Commercial Strategy	Organisation & People	Technology Application	Lean & Green
AGG Print/BeeBuzziness	France	●●●●	●●○○	●●●●	●●●○
ATC Group	France	●●●●	●●●○	●●●○	●●●●
Cloître Imprimeurs	France	●●●○	●●●●	●●●○	●●●○
Functional Print Cluster	Spain	●●●●	●●○○	●●●●	●○○○
Image Options	USA	●●●●	●●●○	●●●●	●●●○
Neo Printing	Korea	●●●●	●●○○	●●○○	●●●○
W2P printers (x4)	Europe	●●●●	●●●○	●●●○	●●○○
Premier Press	USA	●●●○	●●●○	●●●●	●●●●
Screentec	Wales	●●●○	●●○○	●●●○	●○○○
Skanem	UK	●●●○	●●●○	●●○○	●●●●
SunDance	USA	●●●●	●●●●	●●○○	●●●○

Poor ●
Average ●●
Good ●●●
Excellent ●●●●

Commercial Strategy
This essential attribute is achieved in many different ways.

Organisation & People
How companies are run and how their staff work together is a key attribute and point of differentiation.

Technology Application
The combination and use of equipment that is important.

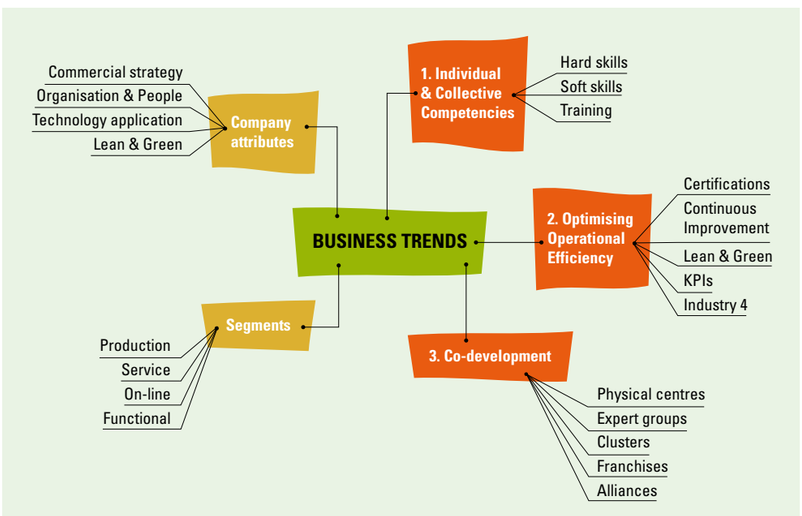
Lean & Green
Efficient working to achieve high economic and environmental performance.

Three main trends

Supplementary information from different companies and associations were then reviewed. The combination of these sources led to this guide being structured to describe three main trends:

1. **Individual and Collective Competencies**
2. **Optimising Operational Efficiency**
3. **Co-development**

These are addressed in separate sections. The key aspects for each were identified, and selected case studies included to illustrate them — in practice, the case studies are relevant to more than one trend.



Trend 1 Individual and Collective Competencies

The multi-faceted nature of the graphics industry is unlikely to change but its mutations will be profound. These will go beyond technology and will involve significant changes to markets, organisation and culture. The consequences will require the integration of new individual and collective competencies and new types of organisation.

The graphics industry is transforming into four principal segments:

- **Production printers:** Mostly mid- to large-size publication, packaging and label printers who will often be active internationally. Their priorities will be technical and economic.
- **Service printers:** Will specialise in permanent customisation. ¬They will require mastery of technical, economic and environmental aspects to support their clients, whose graphic competencies are mostly in decline.
- **Online printers:** A growing international segment. The mastery of the value cycle from marketing and order taking through to delivery is a key to success, along with multilingual skills.
- **Functional printers:** Companies who transition to printing industrial products using their technical competencies combined with their project and purchasing skills.

1 RELATED CASE STUDY

- **ScreenTec**
  Functional and decorative printing
- **Cloitre Imprimeurs**
  Service printer positioned as an expert
- **ATC Group**
  Strong environmental-innovation strategy
- **Saxo Print / Onlineprinters / Maqprint / Flyeralarm**
  Internet platforms

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Maqprint	France			●		20
Onlineprinters	Germany			●		20
Premier Press	USA		●			46
Saxoprint	Germany			●		20
Screentec	Whales				●	15
Skanem	UK	●				42
SunDance	USA		●			44

The case studies in this guide are drawn from across the four emerging segmentations.

Sources for differentiation

With some exceptions, the type of production equipment installed will no longer constitute a primary differentiation factor. The manner in which a company uses and combines different production resources and the ability to organise complete projects will become crucial. The primary source of differentiation in the future will come increasingly from a company's employees — the combination of their individual and collective competencies, hard and soft skills. ('Soft skills' is an umbrella term for personal career attributes that include flexibility, communication, use of project techniques and tools, team building and leadership.)

Changing competencies

Future types of jobs can be roughly classed into three families — data analysis, web and technology applications — that will require a greater diversity of skills. This will include working with 3-D products and functional printing for new applications and markets. The increasing requirements for multi-skilling and flexibility will give staff a more global vision to help develop more innovative working practices and products. These changes mean that the nature of individual competencies required by the graphics industry will evolve (increasing importance of marketing, IT, international commerce, project management) along with the mix of staff (age profile, gender, culture), all of which will require different management methods. Crucial to success will be the capacity of the CEO to manage and coordinate different teams and personalities in a flatter company structure with 'leadership' supplanting 'management'.

RELATED CASE STUDY 2

- **Skanem**
  High volume label manufacturer with strong focus on lean manufacturing.
- **SunDance**
  Provides exceptional customer service with lean and green operational excellence.
- **Premier Press**
  General printer, one-stop strategy, continuous improvement strategy.
- **Image Options**
  Innovative project management and production for retail and exhibitions graphics.

The latter three are based in the US and are registered Sustainable Green Printers active in Continuous Improvement.

Training

New ways of working will require appropriate and regular training for both traditional 'hard' technical skills and, increasingly, for complementary 'soft' skills. Training centres will need to evolve their teaching to be relevant to these conditions and the expectations of new generations. This is the epoch of agile companies. While it is important that the long and rich history and culture of printers should not be forgotten, it should not become an obstacle as the industry evolves.

Trend 2 Optimising Operational Efficiency

A wide range of external resources is available to help improve company performance. These can have a major impact on operating efficiency as well as having a positive effect on company culture for both employees and customers. These resources include Continuous Improvement techniques, certifications and registered labels. What these tools have in common is that they all bring a structured and cross-functional team approach to a company's operations.

Continuous Improvement/Lean (CI)

These are a valuable instrument to optimise quality, productivity, and environmental performance to reduce total costs and empower employees. The term Continuous Improvement (CI) is increasingly preferred to 'Lean', which has negative connotations for some people. It also better describes the on-going improvement of a process, product or service. (Both terms are used in this text and they are interchangeable.)

This approach typically combines cross-process teamwork with project working. It stimulates internal innovation and value stream analysis, and incorporates Lean & Green techniques. Structured tools are used to identify, monitor and minimise sources of waste and other inefficiencies. Improvements are achieved often without any capital cost and tend to increase profitability well above the industry average.

CI also builds competitive advantage by developing a culture of efficiency, quality and pursuit of customer value that cannot be easily replicated (whereas, differentiation by technology alone is more difficult to sustain and can readily be purchased by others). In addition, these programmes improve working procedures, plant layout, training, and commercial strategy, and they also encourage alternative methods of management and organisation.

Lean & Green

Jointly improving economic and environmental efficiency is a highly effective dual strategy. The principal driver of Lean/CI is the elimination of waste across the value chain. Waste is anything that does not contribute directly to adding value for the customer, including over-production, inventory, work-in-process, transportation, processing waste, motion, waiting and defects. Environmental waste is the unnecessary or excessive use of resources or substances released to the air, water or land that could harm human health or the environment. It includes over-production, unnecessary handling and transport, poor maintenance and poor waste disposal. There is one important difference between 'Lean' and 'Green': the former is variable and dedicated to the company implementing it; and while Green may have some variable components, it also has an obligatory regulatory compliance dimension.

The Lean & Green combination further builds competitive advantage by providing the company and its customers with products and services with lower environmental impact and reduced costs, while improving employee motivation and the working environment.

Minimising waste provides mutual economic and environmental benefits. Lean & Green is an operating philosophy that has been promoted by icmPrint for the past decade.

KPIs — Key Performance Indicators

Lean cultures thrive on making metrics visual with reporting by employees to help monitor and improve the work processes. KPIs need to be relevant and associated with monitored improvement actions for each one. Four sets of related indicators provide a complete view of the company's business — it is recommended to concentrate on a few of them that are most pertinent:

1. **Finance:** Commonly used indicators to monitor profitability
2. **Commercial:** Measure market performance of products and services
3. **HR and CSR:** Human factors
4. **Production e²KPIs:** Overall 'Lean & Green' combines efficiency and environment.

Industry 4.0 — Revolution or evolution?

The combination of automation, networking and data exchange technologies into 'virtual' or 'smart' factories will have an impact on printers' value chains, business models and productivity. Some current key issues include limited availability of common standards and a reliable broadband infrastructure.

Industry 4.0 will be an extension of technology for a printing industry that has experienced constant improvements for over 30 years such as: machine automation, pre-setting, closed-loop controls and standards (JDF, CIP4, JMF, XJDF, PDF, ISO 12647) and MIS systems. Many printers already have a culture of connectivity and Industry 4.0 is their next logical step. However, those without well connected manufacturing steps will be vulnerable.

Trend 3 Co-development

One of the printing industry's most valuable attributes is its agility — its ability to reconfigure and revitalise itself through a wide range of cooperative initiatives. Co-development is a major business trend of building alliances and ventures between multiple organisations that goes beyond working with external resources. This agility is very much related to the competencies of the leaders of generally small- to mid-size companies. The sharing of values and professional culture is generally critical to their success.

The role of industry federations is to provide information and services to members. In addition, they also often facilitate industry cooperation. Examples of collaborative working arrangements include:

Alliances, Clusters, Cooperatives, Environmental initiatives, Expert groups, Franchises, Environmental initiatives, Networks, Physical centres, Project alliance. Collaboration is the precondition to drive the transition from a traditional linear economy to the new circular economy.

Conclusion

Many business challenges can only be addressed collaboratively. New ways of collaboration are often closely linked to new models of company organisation. The company must have defined a clear strategy that will allow it to assess the value of such collaboration and potential risks. When a company is sure of itself, its identity and qualities, it will then be able to open itself to other organisations and to better understand that the collective interest of a network is a source of individual value creation.

The key to success is the human factor where leadership and team working are the fundamentals that ensure, for all stakeholders, continuous improvement, innovation, differentiation and motivation.

RESOURCES

Tools / Techniques / Labels

General applications

ISO 9001
Quality management

ISO 14001
Environmental management

OHSAS 18001
Occupational Health & Safety

ISO 26000
Corporate Social Responsibility

ISO 27001
Information security management

BRC
Food & packaging standards

Printing industry

FSC / PEFC / SFI
Sustainable forest management

ISO 12647/PSO/G7
Colour standard

SGP North America
Sustainable Green Printers

Imprim'Vert
Environmental compliance

ClimateCalc
Carbon footprint calculation

CI/Six Sigma
Continuous Improvement

RELATED CASE STUDY 3

- **NEO Printing Company**
  Packaging, commercial and publication printing in Paju BookCity.
- **Functional Print Cluster**
  Spanish printers working on new sources of business.
- **AGG Print / BeeBuzziness**
  Small printing and software companies providing an innovative international document handling services.

CHAPTER 1

Changing competencies

The rapid evolution of society, and the graphic industries and makes predictions difficult. Nevertheless, there are two points that can be identified with high probability: the first is that the graphic arts industry will retain its multi-faceted nature and not evolve into a unique model; the second is that its mutations will be profound — they will not just concern technology leaps, they will also see significant changes to its markets, organisation and culture.

These developments will require the integration of new individual and collective competencies and the implementation of new types of organisation. The future segmentation of the graphics industry will probably transform into four principal domains:

- **Production printers:** These will tend to be mid- to large-size publication, packaging and label printers, often active in international markets. Their priorities will be technical and economic. Never-theless, these companies will also be concerned with the concept of mass individualisation, i.e. the large-scale development of products customised to individual buyers.
- **Service printers:** Will specialise in a form of permanent customisation — the famous '5-legged sheep'. They will require mastery of multiple technical, economic and environmental requirements to support their clients whose graphic competencies will inevitably decline.
- **Online printers:** A progressively important segment that is already estimated to have a 20% share of the printing market, although its importance is underestimated in some countries. The mastery of the value cycle from marketing and order taking through to delivery is key to their success. Those operating in international markets require multilingual skills.
- **Functional printers:** Some printers will transition to functional printing using their technical competencies to transfer liquid films on to different substrates at high speed, along with their project and purchasing skills to manage the entire production chain.

With some exceptions, the type of production equipment installed will no longer constitute a primary differentiation factor. The manner in which a company uses and combines different production resources and the ability to organise complete projects will become essential. It is possible to imagine in the future that the primary source of differentiation will come increasingly from a company's employees — the combination of their individual and collective competencies, hard and soft skills.

Individual and Collective Competencies

Future types of jobs can be roughly classed into three families — data analysis, web and technology applications — that will require a greater diversity of skills. This will include working with 3-D products and functional printing for new applications and markets. The increasing requirements for multi-skilling will, in addition to flexibility, also give staff a more global vision to help develop more innovative working practices and products.

These changes mean that the nature of individual competencies required by the graphics industry will evolve (increasing importance of marketing, IT, international commerce, project management) along with the mix of staff (age profile, gender, culture), all of which will require different management methods. For example, the expectations of a 30-year-old IT specialist are not to the same as those of a 50-year-old press operator. A priority will be to provide them with a sense of value to their professional activity irrespective of the age or function of an employee.

Crucial to success will be the capacity of the CEO to manage and co-ordinate different teams and personalities in a flatter company structure. Evolving company culture is replacing 'management' with 'leadership' of employees, who are being given more responsibility and information to enable them to participate more fully in the company. Companies successfully implementing Continuous Improvement tend to have an open culture with empowered employees who participate more actively in the value stream, decisions are frequently delegated, and cross-functional teams are the norm.

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Skanem	UK,	●				42
SunDance	USA		●			44

The case studies in this guide are drawn from across the four emerging segmentations.

Training

New ways of working will require appropriate and regular training for both traditional 'hard' technical skills and, increasingly, for complementary 'soft' skills. 'Soft' skills, such as communication, use of project techniques and tools, team building and leadership, help optimise workplace performance. Training centres will need to evolve their teaching to be relevant to these conditions and the expectations of new generations.

Some university centres, like Grenoble INP - Pagora and WCPC at Swansea University, utilise new approaches to training and research, along with cross-industry projects.

Other case studies in this chapter illustrate how some companies, like Cloître Imprimeurs and ATC, are working differently and look at the developing domain of online printers — Saxoprint, Onlineprinters and Maqprint.

This is the epoch of agile companies. It is important that while the long and rich history and culture of printers should not be forgotten, it does not become an obstacle as the industry evolves.

A sheetfed press simulator being used at a packaging company in Shenzhen.
Source Sinapse Print Simulators

Individual competencies

OUTLOOK

Tomorrow's successful company must be agile to adapt to significant evolutions.

This agility can only be acquired through the development of multi-skilling of the participants, a global understanding of the company's activities, and the implementation of a new management structure capable of supporting these changes.

It is predicted that 30-70% of future jobs are unknown today. This means that up to 65% of today's school students could have a job in 2030 that is yet to be invented. Jobs in the foreseeable future can be roughly classed into three fami-lies corresponding to a particular sector.

- **Data:** These will focus on collecting information from clients and competitors, then to analyse and process the data to make a rapid and pertinent utilisation. Already some online printers use algorithms to consult the prices of their competitors and adjust their own prices in real time.
- **www:** Technical and marketing competencies will converge to ensure the visibility of an enterprise over the web in order to develop and maintain customer loyalty. Some traditional printers have successfully applied a strategy of natural referencing/indexing (instead of paid indexing) to make themselves highly visible on the web.
- **Technologies:** These jobs will be central to using the appropriate technology for a given project and to be capable of adaptation. This aspect can be seen in the Screentec case study where, to produce functional print products, up-to-date laser die-cutting is processing material printed on a 30-year-old screen press.

Technical skills will also need to evolve from mechanical to digital platforms. Source Premiere

Evolving groups of jobs: These will create both a greater diversity of required competencies and also their sources of training. Many cultures co-exist within a graphics company and everyone needs to learn, communicate and work within the constraints of increasingly multi-skill projects. 'Soft' skills are becoming increasingly important *(page 30)*. While today, with their frequently common training and experience, a shared graphics language exists between clients, printers and their suppliers, in the future this common language will become more difficult to establish. The goal of increased feminisation of staff in the graphic industries will need to be accompanied by an evolution of the current masculine industrial culture.

The evolution of métiers in the graphic industries is already visible. Some examples include:

- IT developers are particularly sought after to implement management of web-to-print to enhance client loyalty and manage post-printing services. They also help develop internal management systems (ERP and MIS). Some printers, like Maqprint *(page 22)*, have initiated a trainee programme to overcome shortages in this skills area.
- Marketing management is a job that has become widespread in the last decade and is frequently coupled with communication responsibility. This is a direct result of the transition by many printers to become service providers. Some online printers have marketing teams with over 30 members who manage digital marketing, defining efficient web strategies like natural referencing, social networking, space purchase and marketing automation.


Source Premiere

- Companies like Image Options *(page 50)* provide global communication solutions from creation, management, production, to installation for signs, retail display and expo stands.
- Some companies have made the transition from flat 2-D products to those with a 3-D rendering to manufacture functional products and display graphics. For example, ATC's *(page 18)* sign and event services have integrated dedicated engineers and designers to offer 3-D graphic products.

Existing skills will also need to evolve. In production areas, multi-skilling is becoming a dominant concept. Operator ability to move between machines is particularly important in the finishing area with the increasing diversity of postpress equipment. Companies like SunDance *(page 44)* invest in an eclectic range of finishing equipment, under a 'customer partnership' approach rather than a strict ROI, to provide one-stop shopping and to satisfy tight customer delivery demands. Multi-skilling also brings operators a global vision to help develop innovative products. This will be particularly important for companies entering markets like packaging, labels and functional printing.

Multi-skilling: Increasingly required to manage certifications and labels internally, along with their commercial impact. Some companies manage ISO 12647 through the prepress department, environmental certification by production manager, and chain of control certification might be through an accountant or supplier. Everyone with responsibility in this area needs a 360° vision of the certificates managed (organisation, commercial, production, economic aspects) and may need to develop new relationship competencies to fulfil the task. A knowledge and understanding of the complete production chain will be essential to meet new customer requirements for traceability, in addition to paper, ink and other chemical product requirements.

Teams: The tasks of commercial team members will also be modified. New marketing tools will need to be mastered along with a good understanding of all company activities to match the variable needs of different buyers and the value of certificates and labels to them.

These transformations will require a change in management methods: the pyramid organisation no longer being appropriate for many companies. A key success factor will be the capacity of the CEO to manage and co-ordinate different teams and personalities. *"The management team is transitioning from driving the bus to watching from the back of the bus as Premier drives down the road of business success. Instead of six members of the executive team solving problems, there's now over 120 employees solving the problems."* Chris Feryn, President of Premier Press (www.omep.org/success-story/premier).

Innovation Engineer

a profession of the future

Martinenq Imprimeurs is one of just a few French printers to have appointed an innovation engineer. The 83-employee Company specialises in sheetfed offset production of luxury, cosmetic and hightech applications. They define innovation as 'everything new to the Company', including both products/services and the application of new production processes.

The engineer's mission is to identify potential innovations, assess conditions for their implementation, and to test them. Innovation is seen as a collective discipline that requires strong technical and relational skills to facilitate interaction with all stakeholders from a variety of backgrounds. The role requires scientific skills to communicate with international source organisations; mastery of project management tools and the ability to capitalise on acquired knowledge; good print and finishing skills to work with production staff; and commercial skills to promote projects with customers.

Innovations generally require a medium to long term vision and while one year is too early to measure the effectiveness of this new post at Martinenq, several dormant projects have been reactivated, some of which have already been successful for example connected samples.

Key points

More diversity of competencies required

Increasing multi-skilling requirements

Commercial team member tasks being modified

Importance of 'soft' skills

Collective competencies

These changes require the development of the autonomy and confidence of each and every employee. The role of the management team will become comparable to sports coaching and their objective will be to develop the skills of each individual in order to develop the overall competence of the group. One case study example is Premier Press *(page 46)*, a family-run commercial printer in Seattle that has moved to a more distributed management approach: *"…Continuous Improvement has transformed our culture. All of our employees feel enabled, and are expected to find ways to improve our processes."*

Autonomy, constant research for improvement, and innovation are identified as cardinal opportunities for tomorrow's employees, underpinned with management's commitment to success. Providing a sense to work is a key to success according to the CEO of Cloître Imprimeurs *(page 16)* *"…allow people to feel that they do what they love and to love what they do."* Becoming autonomous requires the management team to develop confidence in their staff. The transition from a hierarchical management to one that is distributed and less paternalistic will require, in most cases, a rethink by the management team about how they function.

Develop effective teams

High functioning teams outperform individuals and, therefore, a major management task will be to develop effective teams. A first step can be to demonstrate a successful project with a team formed for the duration of a project — the project manager can, in some cases, be the person who has identified the potential source of improvement. Then demonstrate this 'island of success' as an example to teach and motivate other projects. In the same way, implementing an RSE project (described in section 3) with a manager running the project can facilitate change.

An open culture with cross-functional teams allows everyone to contribute their ideas to help improve operations. Source Skanem

The second part of this guide describes some different methods designed to improve collective work. Care needs to be taken with the term Lean Management, which is sometimes misused to describe a narrow focus on tasks and timing to reduce production times — this is a narrow and unsatisfactory approach rooted in 20th century Taylorism. Kevin Cooper 'Lean Printing: Cultural Imperatives for Success' defines *"Lean as a proven set of tools and techniques guided by well-defined policies and practices that, when implemented correctly, foster a culture that promotes a sense of pride, self-awareness and a desire to always look for a better way to do any task."*

The term Continuous Improvement (CI) is increasingly used instead of 'Lean' to overcome negative connotations, *(page 27)* for more information. Continuous Improvement originated from the Japanese term 'Kaizen' used by the Toyota Production System to take a global and systematic approach to improve work in all of its dimensions, including reducing waste from all sources, team working and job satisfaction through all business steps to achieve a clear competitive advantage.

Open culture with management leadership

Companies successfully implementing Continuous Improvement tend to have an open culture with management leadership of empowered employees who participate more actively in the value stream; decisions are frequently delegated, and cross-functional teams are the norm. This approach allows everyone to contribute their ideas to help improve operations and participate in their innovation.

Continuous Improvement requires measurement — Key Performance Indicators. These are tools to help manage the evolution of the company rather than performance control in the strict sense. *"Lean cultures thrive on making metrics visual. Highlight the value of simple, visual metric reporting done by employees to help monitor and improve the work processes they have control over, and that anyone walking by can quickly see if it is under control."* 'Lean Printing: Cultural Imperatives for Success' Kevin Cooper.

Self-esteem includes not only the understanding and sense of an activity, but also the safety and the conditions of the working environment. Society is less and less tolerant of work-related accidents and illness. All companies need to attain a high level of safety and ergonomics in the work place. This is also a precondition for hiring staff with new competencies, particularly when the graphics sector is in competition with other sectors to attract new staff. For example, the recruitment of a young IT development team may be compromised if their offices are exposed to solvent odours.

Human diversity is a source of richness in the workplace that may require the adaption of some work-stations. Investment in materials handling equipment will reduce physical stress and encourage more female staff to work in production zones, as well as benefitting senior staff. Employment of handicapped staff may require some changes to facilities.

The choice of chemical products used in the graphic industries is a subject of concern for staff as well as clients who need to reassure their consumers that the printed products they sell or distribute are harmless. This commercial expectation to reduce chemical risk at source also benefits production staff by lowering their exposure to them.

These approaches may appear to be theoretic but two things merit consideration:

- The 15 companies presented as case studies in this guide confirm the financial viability of alternative organisation and ways of working.
- Training centres must utilise teaching methods adapted to changing conditions and new generations. In the same way that pyramid management is being supplanted, so too are large passive lectures becoming inappropriate.

Without forgetting its history and expertise, a company should consider operational alternatives that improve its ability to take up innovations that present within the organisation, in techniques or in the market.

'Live My Life'
Projects

Some printers have put in place 'Live My Life' projects to improve team cohesion and to allow each member to understand the activities of the enterprise.

The project allows staff volunteers to accompany another staff member in his/her activities, generally for a day. For example, a press operator may accompany a sales person to understand the expectations of customers and the difficulties of negotiating with them; or a bookkeeper spends a day with someone in the prepress area.

This project allows participants to give/receive a sense to their activity and how it fits into the overall context of the company.

Key points

- Flatter company structure
- Autonomy, constant research for improvement and innovation
- High functioning teams
- Diversity is a source of richness

Training

The evolution of staff competencies and new ways of working require appropriate and regular training for both traditional 'hard' technical skills and, increasingly, for complementary 'soft' skills. 'Soft' skills, which include communication, use of project techniques and tools, team building and leadership, help optimise workplace performance and are a major differentiator for employability and success.

Teams generally outperform individuals and the development of employee members is a key to creating effective teams. A simple example is a French printer who explained that, in order to encourage employee participation in working groups, he provided them with training on how to speak in public. The training developed the self-esteem and confidence in production staff to express their innovation ideas.

Traditional print technical skills training is under challenge according to 'Strategic Needs for Training of Print Production Staff for 2020' (Intergraf/WPCF Sinapse): *"The continuing change to the printing and packaging industry from restructuring, new technologies and services is accompanied by the breakdown of traditional technical training structures in many countries, along with the massive loss of skills as the baby boom generation retires. Traditional printing processes are expected to decline only marginally to 67 % of sales by 2020. The availability of competent staff to operate traditional equipment is a strategic need for the industry."*

A press simulator at an Indian printing company. Source Sinapse Print Simulators

The report states that shortages of skilled staff are particularly strong in zones that are geographically isolated from training centres and are particularly severe in postpress, made more difficult by the widespread installation of more sophisticated and diverse finishing equipment. Many suppliers believe rising maintenance costs are the result of a training deficit in equipment operators. On the other hand, some unions are uncomfortable with operator training that is too specific to be transferable to other applications.

After a decade of decreasing apprenticeships worldwide, there are now some indications of a return to growth. Some countries, such as the UK and Holland, no longer have any print training centres; while in 2017 Australia, which was in the same situation, has opened the new Holmesglen School in Melbourne. Continuous training is expected to grow in keeping with new company organisation methods, new individual expectations, and the development of new training technologies (online, simulation, Augmented and Virtual Reality). In addition, industry training at universities is also evolving (see case studies for Pagora and WCPC). Three trends are emerging:

Distance learning: Online learning and supervision removes geographic, financial and economic constraints. It is particularly suitable for developing soft skills (management, sales, environment, software) and will be an increasingly important aspect of apprenticeships. Training centres will offer blended learning by combining on-site (at school) and off-site (at industrial site); examples include Amigraf in France and Holmesglen in Australia. Massive Online Open Curriculums (MOOCs) are generally aimed at university undergraduate level and are not for vocational training.

Simulation: Press simulation is a proven technique in teaching production skills with 'hands-on experience', allowing trainees to operate a virtual press and make mistakes without consumables costs or loss of production time. Simulation has been found to speed up training of new employees, improve problem solving and give a level playing field for worker evaluation that is well-accepted by unions. These systems are now available for distance learning over the Cloud via any computer. One example of on-site, self-directed, technology-driven training is across the 66 sites of the largest US printer; the company has integrated Cloud-based press simulation with online learning for soft-skills training together with production information and operating procedures.

Augmented (AR) and Virtual Reality (VR): Both technologies can help make hidden processes visible; for example, showing the paper path through a folder, or the interaction of ink train rollers. AR will expand rapidly because it is cheaper to implement and easier to integrate with existing practices than VR. These technologies are used for training in some sectors such as construction and nuclear power. AR can facilitate maintenance operations in real time; for example, spectacles that show repair procedures superimposed onto an actual part. In Germany, print students are testing Socially Augmented Learning (SAL) that shows 3-D press images on a tablet or smartphone when looking at the press.

Grenoble University

Grenoble INP-Pagora is the French engineering university for paper, printed communication and biomaterials. This international institution graduates about 60 engineers each year — 40% via an apprenticeship option. Graduates may undertake doctoral programmes in the internationally recognised LGP2 laboratory, where most of the schools staff and researchers work.

Today, Pagora faces three challenges:

1. Training engineers whose future occupations may not yet be known.
2. Transmitting knowledge of products and processes that will significantly evolve in their form and utilisation.
3. Adapting their training methods to meet new generational expectations.

360° Innovation

These challenges were identified about a decade ago and since then the school has implemented a strategy that is now bearing fruit. Until 2008, the school was called EFPG (École Française de Papeterie et des Industries Graphiques) dedicated to training engineers in the production, transformation and printing of paper. The school has since modified its approach, identifying basic knowledge that is relevant to other industrial sectors while remaining strongly attached to the graphic industries. As a result, the knowledge related to paper processes has become a key to the mastery of bio-materials in general and cellulose (in all its forms) in particular. Printing has is now seen as an industrial technique covering the application of a film of one material onto another.

This new expanded vision avoids locking students into processes that in the future are poorly defined; rather, it integrates them into a broad context where many segments have yet to be developed. Opening up new sectors like energy, medicine, construction and plastics* is crossed with work in the research laboratory LGP2 (Laboratory of Pulp and Paper Science and Graphic Arts). This CNRS joint research unit is staffed by researchers who are also active teachers. LPG2 is anchored to the industrial world and regularly obtains many patents each year and supports the development of start-ups. Pagora students are trained in this environment. Some of them will develop new processes in the lab that will influence future teaching curriculums. This close collaboration guarantees that academic staff are in an open environment and able to teach future engineers in other sectors and applications. It also makes it possible for the school to develop dedicated training on emerging themes like printed electronics. Of the 24 doctorates presented in 2017 at LGP2, only two were directly linked with the production or printing of paper.

This major change is now complete. It was accompanied by a teaching reorganisation in 2012 with teaching methods adapted to meet the evolution of student expectations and the accessibility of information — learning by problem solving, project team working *(see opposite)*, teaching in English, and apprenticeship training.

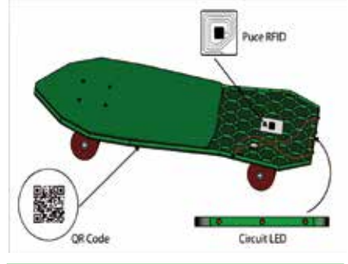
*An industrial chair dedicated to plastics was created in 2016.

Pulp and paper laboratory's mini paper making line is available for European research, development and training. Source Grenoble INP-Pagora

Challenge of DEEP

The 'Challenge of DEEP' (Défi d'Équipe d'Élèves de Pagora) comprises projects in which student teams focus on the design and manufacture of a product containing transformed cellulose materials. These projects can be made in partnership with industrial companies, research laboratories or other schools (architecture in particular).

The variability of the projects (that range from a biodegradable beach racquet, to ecological crop treatment, and the use of thermochromic conducting inks) helps develop interest from the huge diversity of sectors potentially interested by the competencies of engineers from Pagora.



Example of a DEEP project — a 70% biosourced skate board (injected green epoxy resin + 3D printing of lactic acid polyacid biopolymer) with 3 functionalities (QRCode + RFID chip + LED circuit). Source Grenoble INP Pagora

WCPC - Swansea University

Examples of printed conductive films. A roll of flexo printed conductive ink, with each band corresponding to a different anilox volume. Underneath is a screen printed component for an ultra-flat electric motor where the conductivity has been enhanced by bathless electroplating. Source WCPC

Web press for R&D, with 4 units, enhanced register control and image recognition developed for printing functional materials. Source WCPC

The Welsh Centre for Printing and Coating (WCPC) at Swansea University is one of the world's leading centres for research into and development of printing and coating processes. It was founded on the fundamental research into printing as a manufacturing process by Prof. Tim Claypole and Prof. David Gethin.

Since its inception in 1989, the WCPC has participated in hundreds of collaborative projects with companies, other academic institutions, and commercial and not-for-profit research organisations. Many of these partners have formed long-term relationships with the Centre and have partnered in multiple projects supported through public and private funding.

The WCPC operates in any field where materials need to be additively patterned or coated. Within its activities it has two key themes: graphics and functional materials. Graphics covers all aspects of colour printing and supports the worldwide printing industry. The task of the functional materials theme is broad and covers those applications where colour is not the imperative of the material being deposited; it includes printed electronics and photonics, printed bio-sensors or bio-materials.

The Centre has expertise in screen, flexographic, lithographic, rotogravure, digital, pad printing, roller coating and aerosol jet, both in the printing process and in ink formulation. WCPC is also experienced in modelling the print process, using techniques such as finite element, finite difference and statistical and neural networks.

WCPC is a research centre and part of the College of Engineering at Swansea University, South Wales. Its 25 strong multi-disciplinary staff include post-doctoral and PhD researchers from both industrial and academic backgrounds, together with support staff. The Centre's expertise in the fundamental science and its practical application to improving process quality and productivity is used to provide assistance in areas identified by individual companies, problem solving or developing specific courses for the transfer of information.

In 2015, it moved into purpose built laboratories and offices in Swansea University's new Bay Campus. The comprehensive laboratories are fully equipped for sample analysis and characterisation of material properties and have print and ink manufacturing from bench top to pilot scale production for all processes. In addition, partner printers like Screentec allow production to be scaled-up in commercial conditions. WCPC also has access to the extensive facilities within Swansea University.

Analysing an anilox cylinder using an Alicona precision optical 3-D profiler. Source WCPC

Screentec CASE STUDY

Screentec is an atypical printing company that has transformed itself over a 20-year period from a traditional local screen printer to a national supplier of diverse printed product groups that include:

- **Formed printed plastic products (folders, binders, clip boards, labels)**
- **Industrial functional printing / membrane control panels**
- **Display and point-of-sale graphics**
- **Commercial screen and digital printing — signs, labels and posters**

Products are manufactured from an eclectic collection of equipment ranging from old screen presses to new digital printing and laser die-cutting. An innovation-based approach combines using old equipment where appropriate and investing only in new machines when they bring clear benefits of productivity, quality and flexibility. The Company designs and makes cutting and forming tools for all types of products in-house that are available to customers from a database of templates to offer significant cost savings.

Screentec has grown its competencies through acquisition of small companies to expand its product range and customer base. It has avoided a change to digital-only production and an over-concentration on limited markets. About 25% of turnover now comes from its Internet shops — card/wallets, stickers and Real Estate sales boards. Repeat business is about 50% with 3% cost of sales.

A driving force behind the Company's diversity is a management team that employs innovative designers and tools to actively facilitate sales, and in some cases provide production back-up. The sons of the two owners served apprenticeships at Screentec and are now becoming a new generation of managers.

Commercial screen printing: A wide range of screen equipment allows production of low to high volume, single to multi-colour jobs, along with coating and die-cutting services for offset printers.

Folders, Binders, Labels: Ink jet or screen printed PVC plastics are die-cut, welded and formed into multiple products by welding-cutting machines with tools produced in house. Customers can select existing tools to minimise costs, or select new designs. Sales are mostly via the Internet.

Display and Point-of-Sale: Two large format flatbed Océ Arizona UV digital presses and a flatbed digital cutting table produce indoor and outdoor signs, graphics and exhibition displays on a wide variety of substrates. A smaller high precision Trotec laser and DYSS cutting table are used for low runs and making complex formes. A Roland large format ink jet printer/cutter prints self-adhesive materials. These facilities are mostly used for trade printing services to display companies (who often have only limited digital printing machines) along with internet clients.

Industrial Functional Printing: Specialist maker of control panels combining plastic sheets, typically with a graphic layer, a tactile screen, metal dome 'clicky buttons' and an electric track layer. Electronic circuits are screen-printed conductive inks that are sintered by infrared drying. The panels are assembled and tested in-house. Focus is on small volumes where technical competence, high quality and just-in-time production are key differentiation factors against outsourcing to Asia. In-house design and engineering is essential as supplied 'print ready' artwork often needs to be re-worked to deliver functional results. Sales are mostly to industrial companies in the UK and Europe.

Innovation with WCPC

Swansea University's Welsh Centre for Printing and Coating is an internationally recognised institution for printing science and functional applications. WCPC develops prototypes of functional products and then upscales to light industrial production with a local company like Screentec. The Company sees WCPC as an 'Aladdin's cave' of innovation and a source of expertise needed to correctly produce reliable printed devices. This provides it with a competitive advantage to expand sales through product innovation.

Example of a control panel combining a graphic layer, a tactile screen, 'clicky buttons' and an electric track layer. Source Screentec

www.screentec.co.uk

Location: South Wales, UK

Surface area: 1300 m^2 / 14 000 ft^2

Company created: 1996

Ownership: Blue Sky Enterprises Ltd, private limited company.

Principal products: Display, window and doors graphics; signs, stickers, folders; printed laser die-cut objects; functional electronics.

Primary clients: UK businesses of all sizes, international clients for control panels, direct Internet customers, trade printer.

Number of staff: 28

Shifts: Mostly 1 shift, occasional 2 shifts. Annual substrate consumption: About 25% of turnover.

Production equipment: Presses: SVEICA screen, Océ Arizona and Roland large format digital, diverse finishing including Trotec-laser cutting table, Dyss CNC digital router .

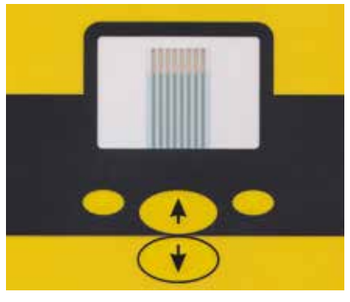
Company strategy: Diversification of products and customers, good value flexible print solutions, Internet shop, trade printer as a partner not competitor.

Principal KPIs: Net profit, ratio of new customers in all segments indicates company's future.

Certification: ISO 9001

	Strengths
Commercial Strategy	●●●○
Organisation & People	●●○○
Technology application	●●●○
Lean & Green	●○○○

Excellent ●●●●



Cloître Imprimeurs CASE STUDY

Christophe Dudit (second from left) and Cloître's management team. Source Cloître

www.cloitre-imp.fr

Location(s): Landerneau, Brittany, France and Paris (sales office)

Surface area: 5 000 m² / 53 800 ft²

Company created: 1937

Ownership: Private family company MD Christophe Dudit

Principal products: General printing

Primary clients: Diverse companies in West France and Paris regions.

Annual turnover: 14,5M€ (2016) (7% year growth since 2014)

Number of staff: 115 (22% sales, 8% admin, 70% production)

Shifts: 24/5 with 3 production shifts

Annual substrate consumption: 3500 tonnes (2016)

Production equipment: CTP Fuji Low Chem; presses 2 sheetfed Heidelberg (XL106 8-col), 3 digital HP Indigo; finishing includes folding, saddlewiring, section sewing, perfect binding, laminating.

Company strategy: Position as printing expert with highly competent staff.

Principal KPIs: Business/Production

Certifications/awards: FSC® et PEFC™, preparing ISO12647, Imprim'Vert, Produit en Bretagne, member of ImpriClub.

	Strengths
Commercial Strategy	● ● ● ○
Organisation & People	● ● ● ●
Technology application	● ● ● ○
Lean & Green	● ● ● ○

Excellent ● ● ● ●

The Company's primary objective is to perpetuate its activity as a printing expert. To reach this goal, the managing director, Christophe Dudit, has put people as the central resource of the Company where everyone should be able to "like what they do" and "do what they like", in a professional context. The dynamic of the Company is underpinned with a policy that is both open and shared to continually research new and innovative solutions. Staff participate in many regional and national events to ensure they maintain a high level of expertise and to learn from the experience of others.

Management has been transformed to take a collaborative approach with two decision levels replacing the previous four levels. The management team consists of the operational managers of finance, sales, marketing/communication, administration, and the managing director. Notably, there is no production manager. Company policy limits the highest salary to five times that of the lowest salary.

A project approach is used to communicate an understanding of an action and to motivate the teams involved. An objective is to generate confidence to stimulate new ideas. Sharing information and transparency are two essential principals of the chosen management method. A network of screens throughout the facility continuously communicates to all staff daily production (orders received, completed, turnover), safety messages, notification of visitors, and messages of appreciation from customers. The Company has a central meeting-information space where all staff gather several times a year. The annual highlight is the presentation of the financial results, next year's budget, along with an external entrepreneur who makes a presentation on the experience and vision of a different business situation.

While technical expertise is essential, the Company values highly the human qualities of its new employees and assures their training. The managing director participates in the process of hiring new staff. About 25% employees have joined the Company during the last five years, which has reduced average seniority from 22 to 17 years; the average age is 45 years. The Company has achieved a 50/50% management gender parity with a remarkable 56/44% male/female ratio overall. Currently, there are two apprentices in offset production. The Company has integrated an ESAT unit of seven handicapped people to given them a professional activity. This group are completely integrated into the Company with close relationships with all production staff. The group is particularly valued for its hand-work and to supply paper to the machines. The general management maintains continuous close links with all staff: for example, by memorising all staff names and greeting them on their birthdays.

Production optimisation

Management uses an information dashboard to monitor company performance — daily, weekly and monthly — number of customer orders, deliveries, cash flow, quotations, order size, turnover, production, plates produced, non-quality costs, paper waste and level of subcontracting.

Investment in new equipment in 2017 was targeted to improve both productivity and printing quality. Cloître was an early adopter of plates without development. However, it has now changed to low chemistry, which is less fragile, to reduce re-plating and improve makeready efficiency.

In 2011, Cloître had four offset presses from two suppliers, in two sizes, using two ink types. These were replaced in 2017 by two almost identical Heidelberg XL106 8-colour perfectors. Using the same format, configuration and traditional inks optimises production and maintenance while limiting the varieties of consumables and paper sizes. While the new presses have high levels of automation, their crew numbers remain constant to ensure high productivity for the ever shortening run lengths that make changeover times equally important as the time spent printing. The Company is one of the most important digital printers in West France with three HP Indigos that have allowed the development of products and offer format flexibility complementary to offset.

Cloître's significant diversity of postpress equipment allows it to finish most jobs in-house and control price, quality and delivery. Its priority is to fully employ staff (rather than high equipment utilisation) through multi-skills training to ensure flexible and efficient use of different machines.

The pressroom has two almost identical 8-colour perfectors with the same format, configuration and inks to optimise production and maintenance while limiting the varieties of consumables and paper sizes. Source Cloître

Clients

The Company is positioned as a general commercial printer and an expert in printed communication, capable of advising on all types of customer needs. It is dedicated to building long term partnerships with its customers from its consulting and follow-up activities. The Company has around 1500 active clients — over 65% in Brittany, 25% in the Parisian region and 10% elsewhere in France. The average order value is 1500. One of its commercial strategies is its physical location with membership of 'Produit en Bretagne' brand network. Regular client workshops run by staff in Brittany and Paris strengthen links with customers.

Suppliers & projects

Cloitre is a member of ImpriClub *(page 61)*, which gives it access to suppliers referenced by the alliance. Technology developments are monitored with all relevant staff, who are invited to supplier visits and exhibitions. This recognises their responsibility as well as developing their knowledge and motivation. Company-wide projects include:

DEFI 2016: Staff identified 200 actions to improve Company performance and expertise in printing manufacture in five groups: individual and collective performance, organisation, client relations, monitoring and integration of new technologies. The status of every project is distributed monthly to all staff.

DRUPA 2016: Over 80 staff members visited the exhibition with four groups studying different themes: Prepress, Digital printing, Finishing, Commercial/Admin. After the trip, over 30 ideas were identified and four selected for implementation by adhoc project groups.

Expert courses 1: Groups of 10 staff with different functions spend a day meeting each of the Company's service areas and lunching with the directors. This gives all staff a better overall understanding of the Company and to helps develop links between them.

Expert courses V2: A series of hour-long workshops from internal specialists for all staff on themes like web-to-print, social networks, safety, PSO Certification.

The manager

Christophe Dudit, 42-years-old, has managed l'imprimerie Cloître since 2011; he is also President of the ImpriClub alliance. After training as a mechanical engineer he became responsible for quality and IT in a printing company in South-West France. He is an ex-rugby player and convinced of the necessity to place people at the centre of a company.

A favourite quotation is of Ivan Illich *"For a person to grow he needs free access to things, places, methods, events, documents. He needs to see, to touch, to manipulate, I would say to seize everything from surroundings in a place that does not lack sense."*

Success factors

Cloître's financial results prove that management based on confidence, transparency and improving everyone's competencies is a source of profit. The reasons for success are multiple and inter-related:

The personality, values and openness of the manager to inspire staff and clients.

A clear strategy that places people at the heart of the company.

The local context of Brittany with a regional culture founded on confidence.

A commercial approach based on service delivered.

An expert approach of processes and technologies beyond simple competence.

Constant attention and market presence from participating in external events.

Creation of favourable conditions to help the emergence of new ideas (continuous training, regular exchanges).

Clarity of information distributed to all parties accompanied by coherent actions in a context of mutual respect.

ATC Groupe CASE STUDY

www.atc-groupe.com

Location(s): Rillieux-La-Pape,
sales offices: Paris & Annecy, France

Surface area: 3000 m² / 32,300 ft²

Company created: 1991

Ownership: Three owner-directors: Christophe Aussenac (VP FESPA International), Philippe Brocard, Robert Combes.

Principal products: Interior and external display graphics for vehicles, signs, expos, and events. Current principal applications are communication decor for buildings; and 3-D design and manufacture of point-of-sale, furniture, expo and display items.

Primary clients: Extremely variable from sport & art events, industry, retailers and public administration. Primarily large accounts in the Paris and Lyons regions.

Annual turnover: 7M€ (2016)

Number of staff: 60

Shifts: Two shifts 6:00 to 20:00
When needed 24 hour/day

Intensity: 500 orders per month

Production equipment: 9 ink jet presses in widths 1,6 to 3m; finishing: cutting tables, sublimation, plasticisation, encapsulation, etc. EFI-Vutek is a strategic supplier.

Company strategy: Differentiation based on innovation, creativity and sustainable development provides a competitive advantage for sales alongside comprehensive in-house production.

Principal KPIs: Gross margin. Recently, purchasing procedures were monitored and rationalised to improve financial conditions.

Certifications/awards: Imprim'Vert label, certified ISO14001. Colour conformity with ISO12647-2. Signatory to the Diversity Charter (commitment to fight against any form of discrimination) in 2011 and in 2013 the Charter of Responsible Supplier Relations (to adopt responsible purchasing practices). In 2016, won the Mactac Creative Awards (external decoration) and in 2015, the Fespa Awards silver trophy.

	Strengths
Commercial Strategy	● ● ● ●
Organisation & People	● ● ● ○
Technology application	● ● ● ○
Lean & Green	● ● ● ●

Excellent ● ● ● ●

The ATC Group has pursued innovation for more than a decade to develop its differentiation. One of its founders, Robert Combes, states, *"Competition does not frighten us, it enables us to be different".* Since its creation in 1991, the Company has continuously applied a strategy of differentiation based on creativity and has not hesitated to invest in new competencies to implement this strategy, even during difficult periods. A very strong environmental policy was one of the first differentiation factors, along with fostering innovation of products and processes (often in close co-operation with suppliers) and the creation of stimulating working conditions.

The Company recognised that its willingness to deliver complicated jobs represented an opportunity to extend competitive advantage and reinforce customer loyalty. Its initial commercial approach was to accept all jobs and to subcontract where needed, then to bring in-house new processes or services. The Company now only subcontracts some installation work.

From 2000, the group operated as two companies — ATC for digital printing and Goss Serigraphic (silk screen). However, when it moved to a new building in 2009 it decided to focus 100 % on digital printing. The Company had very strong growth 1991 to 2010. From 2011 to 2014 it was more complicated because of a general collapse in selling prices; the Company started to grow again in 2015.

Innovations

The position of Quality-Safety-Environment manager was created in 2008, to which CSR (Corporate Social Responsibility) was added when Martine Gay joined the Company. ATC's eco-attitude concept is a comprehensive and pragmatic approach to the environment. It is a key Company strategy that brought together environmental players and prospective customers at breakfast exchanges to help establish ATC's environmental image, identify improvement actions and attract new customers.

The use of solvent inks (emitting VOCs) and PVC was considered to be incompatible with the Company's environmental strategy and was phased out. It concluded that its environmental integrity also depended on those of its suppliers. Consequently, a research project identified technical solutions answering the Company's environmental expectations and there is now an ongoing sourcing review that supports durable relations with suppliers.

While the environmental was the initial reason for this sourcing policy, it quickly became apparent that this approach made it possible to closely follow market developments (such as the transition to larger formats and flat bed printing) and to grow creativity within the Company. The founder, Christophe Aussenac, states that, "all Company innovation comes from creativity". In addition, the technology sourcing review makes it possible to rapidly identify new products, for example Re-board®, and new applications such as communication decor for buildings.

This exhibition stand was printed, die cut and constructed by ATC using Re-Board®. Photo ATC

A third innovation was the integration of new competencies. The Company found that customer adoption of its new solutions was limited. In 2013, they recruited an art director to take a broader approach that does not simply work on the graphics but rather the flows of people to define the optimum communication conditions. Decorative graphics contribute to a building's ambience and the image desired by the customer is delivered by integrating design, aesthetics and protection.

3-D paperboard construction

A similar approach was taken to develop Re-board® applications by moving dimensions from working in 2-D to 3-D. Two designers were recruited in 2015, one specialising in expo stand modelling, the other in 3-D paperboard construction. These competencies enabled a new service to design, print and make furniture for exhibitions. The Company went beyond the simple use of a new material by imagining new conditions of production and use that correspond to its environmental strategy. (The mono-material paperboard can be assembled and dismounted without tools and recycled.) Dedicated sales staff have been recruited to commercialise these innovations. The company employs 60 people, 16 % in design and prepress, and 13 % commercial. Supervisory staff is split 62 % women and 38 % men.

The directors believe that the present Company size with 60 staff is ideal — sufficient to work with large accounts while small enough to ensure good flexibility and communication.

An important factor has been to create fertile working conditions. Indeed, many actions carried out within the framework of a strong CSR policy have made it possible to maintain the motivation of the teams and to give them a sense to their actions. Examples include an open management that encourages the circulation of information (including financial results), organising collective events to allowing the entire staff to see Company achievements (visit to Olympique Lyonnais), and the development of a positive image of the Company through its participation in local demonstrations like the Lyon biennial.

Re-board®

This patented paperboard has a fluted core that makes it extremely lightweight, yet exceptionally strong, rigid and flat. It can be digitally printed or laminated, and rapidly cut into any shape and assem-bled into 3-D objects such as point-of sale displays, furniture, shops etc, as well as classic 2-D signs and graphics.

The board provides thermal insulation and protection from different environmental conditions. A moisture barrier pro-tects the core and ensures its physical properties remain unchanged in humid conditions. It is durable, has a small CO_2 footprint, contains no harmful components, and its water-based adhesives allow it to be recycled in normal waste paper streams.

Good design needs to take advantage of the strength, flatness, rigidness, printability and workability. Re-board holds international workshops where converters share experience as well as training courses. Reboard®Technology AB became an independent company in 2017 (previously part of Stora-Enso).

Key points

Three principal reasons explain the successes of ATC's innovation policy:

1: The application of a clear and continuously maintained strategy of differentiation based on creativity. This includes environmental, product and service innovations.

2: The creation of fertile working conditions to maintain the motivation of the teams and to give sense to their actions.

3: A partnership policy with suppliers, like EFI-Vutek and Re-board®, based on loyalty and trust. This has contributed to the identification of new services and innovative products.

Online Printers CASE STUDY

Flyeralarm
www.flyeralarm.com

Maqprint
www. maqprint.fr

Onlineprinters
www. onlineprinters.fr

Saxoprint
www.saxoprint.fr

This thumbnail analysis is a general overview of e-printers to indicate relative importance of strengths.

	Strengths
Commercial Strategy	● ● ● ●
Organisation & People	● ● ● ○
Technology application	● ● ● ○
Lean & Green	● ● ○ ○

Excellent: ● ● ● ●

Online printing is a broad term to describe a print business model using an Internet platform to allow customers to order and manage their printing jobs. This guide broadly defines this activity into two types: Web-2-Print (Web-to-print) provides a service for an identified customer for whom the platform has adapted its offer (production, size, prices), whereas e-printing is addressed to any customer, known or not.

Web-2-Print describes the print business model using an Internet platform to allow customers to order and manage their printing jobs in both offset and digital production — usually from pre-defined specifications or templates. These services are offered by many printers and agencies for identified customers. Maqprint estimates that 50% of its turnover passes through its Web-2-Print platform. The advantage of this channel is that it facilitates processing of the customer's order, its centralisation allows traceability of orders and it limits inventory. This approach allows the printer to automate and manage workflows and build customer loyalty. The mastery of the value cycle from marketing and order taking through to delivery is key to their success. Prepress reviews can be done online, allowing a print house, a client, and possibly a graphic designer to create, edit, and approve computer-based online artwork.

On the other hand, **e-printing** is a service offered to any Internet user. The platform is the same for everyone. The user's IP address automatically directs them towards the national version of the platform; the language and the rates are modulated according to the country of the user. The client either sends their production files (upload and print) or creates new ones from a template library. Some sites offer online editing tools where buyers can alter the typeface, content and layout, then directly place the print job order. These products often include a library of templates for product types, such as post cards, posters, flyers etc. Many printers offer web shops and product catalogues for their customers. *(Screentec, page 15)*

Other online services like hosting, website design, cross-media marketing and distribution may also be available as clients seek a single service tool to manage all their marketing as well as print Customers may be B2B companies, organisations, design agencies or individuals.

International business model

This type of business is taking an increasingly important part of the print market — some estimates indicate a 20% share of the printing market in many countries, with participants predicting this will grow to 50%. The perception and acceptance of this business model still varies significantly between countries. For example, in Germany annual symposiums on e-printing have been held since 2013, whereas in France this sale channel is still often regarded as anecdotic. Initial development in Europe was complicated by citicisms for unfair practices and patent cancellations.

An e-printing characteristic is that it is dominated by large players that transcend national markets to work throughout Europe and elsewhere. Once a model is validated in the country of origin, generally Germany, it is then extended throughout Europe using the same data-processing structure. The platform is then duplicated into many versions, e.g. Onlineprinters manages 16 'country' platforms in 10 languages. Capital investment is very high, particularly in data processing and R&D, in addition to traditional printing material.

Confidentiality is another characteristic of e-printing, making it very difficult to rank participating companies complicated by their using multiple brand names from successive acquisitions. In Europe, leaders include Cimpress (Vistaprint, Exaprint, Pixartprinting…), Bregal (Helloprint, Onlineprinters, Solopress…), United Print (Print24, Easyprint, DDKPrintBig…) and FlyerAlarm. All of who have their own production units.

The following is a structured overview of some e-printers:

Website: Each company operates with several brands, so its multiple sites coexist. The customer's IP address automatically directs the inquiry to the site dedicated to its geographical zone. One of the challenges for online printers is the capacity to control natural referencing to be at the top of page of the search engines. A profound knowledge of these engines and the controls of Google AdWords are essential. Results for e-printing depend on the long run level of investment in these competencies and the cost of Google services. Without a clear strategy and the related investments, an e-printing service from a traditional printer will yield only a minor turnover increase.

Flyeralarm was created in 2002 and remains 85% owned by its founders Thorsten Fischer and Tania Hammerl.

The Maqprint Group positions itself where printing and the web converge. They manage production and distribution of all types of printing.

Onlineprinters has a single web site in several languages that is open to any potential buyer.

Saxoprint's broad product range includes almost 2000 articles including advertising textile products, expo stands, kakémonos, and printed objects.

Online printers dedicated to service trade printing and graphic agencies (for example Exaprint) tend to adopt a more discreet web communication to protect their clients' confidentiality.

Location(s): The dominant e-printers — FlyerAlarm, UnitedPrint, Onlineprinters, Saxoprint — have their production sites in Germany that service the whole of Europe.

Surface area: e-printers have very large production sites: Saxoprint 18 000m² in Dresden, Online-printers 39 000 m² in Neustadt an der Aisch, Unitedprint 10 000 m² in Radebeul, Flyeralarm 41 000 m² over 8 sites in Germany.

Company creation/ownership: e-printing began around the new millennium: 1999 for Cimpress, 2002 for Flyeralarm, 2004 for Onlineprinters. This service was either offered by an existing printing company (Onlineprinters and Saxoprint for example) or by an organisation created for this purpose (like Cimpress and Flyeralarm). On the other hand, Flyeralarm remains 85% owned by its founders Thorsten Fischer and Tania Hammerl.

Ownership: Generally held by large online sales companies like Brega for Onlineprinters, CEWE for Saxoprint, Cimpress for Vistaprint.

Broad printed product range

Principal products: The core business approach of these printers is to group multiple jobs (booklets, calling cards, brochures) on sheetfed offset and digital printing presses to minimise costs. All sites today have a sales strategy to offer a broad printed product range, including advertising textile products, expo stands, kakémonos, objects, etc. — Saxoprint offers almost 2 000 articles. Some companies will take responsibility to supply all products for marketing communication; Flyeralarm even makes advertising films. In addition, Unitedprint offers its partner printers the use of its own e-printing platform. This allows any printer to put their own brand (logos, graphic charter, etc) onto Unitedprint platform; they can reserve the products they want to print and call on Unitedprint to print all of the other products ordered.

Primary clients: Competence in big data management of the clients' online accounts is essential for e-printers as the number of customers is always over 100 000, and sometimes more than one million.

Contrary to some perceptions, online printing is not limited to simple jobs in low volumes. It is not unusual for example to produce a perfect bound 64-page book of 60 000 copies. In addition, 'premium' customers are separately managed with special price rates negotiated by a commercial representative.

Generally, e-printing platforms are open to all — large accounts, small and large companies, trade printers (who systematically get a white brand parcel delivery). The exception is Exaprint, which is booked to the dealers of printed products. Some printers create multiple brands targeted to different types of customers: Unitedprint offers Print24 for the graphics chain (printers, dealers, agencies), Easyprint targets small companies and individuals with TPE/Particuliers, while DDK Print Big is for purchasers of specialised printing. The market for e-printing packing production is currently under development.

10% annual growth

Annual turnover: These large e-printing companies generally have sales over 100 M € a year (Flyeralarm 330 M €€ Cimpress 1,8 M $ for example). The value of the e-printing market has a 10 % annual growth. In Germany in 2016, e-printing accounted for 25 % of the printing market. Some people estimate in a few years it will increase to 50 % of the entire European market.

Number of staff: e-printing companies have large numbers of staff (e.g. 550 at Saxoprint, 2 000 at Flyeralarm, 8 000 at Cimpress). The distribution of the employees between the various services constitutes one of specificities of these companies — the services for marketing, customers and data processing systematically count several tens of people. Where traditional printers gradually integrate marketing competences, for e-printers they constitute one of their spearheads.

Shifts: Offset printing sites generally run continuously (24 / 24). Tariff options vary according to the delivery required. Some printers even offer deadlines 'overnight' or 'overday'.

Annual substrate consumption: Because of variability of the products sold, paper quantity is not a good indicator. The number of orders and daily deliveries seems to constitute a more appropriate indicator — these companies generally process between 5 000 and 25 000 orders per day.

Flyeralarm prints several different jobs on the same sheet using large format presses, like this 1060 x 1450 mm Rapida 145. Source Koenig & Bauer

Production equipment: The most common equipment is sheetfed offset presses with 4, 8 or 10 colours with large formats, supplemented with digital machines. Some printers work closely with press suppliers to optimise the exchange of information between the e-printing platform and the presses (e.g. Unitedprint with KBA). Finishing operations are made in-house (folding, stitching, perfect binding). While the nature and quality of production equipment are obviously essential, there is a shift of strategic competences both upstream (presentation of the offer and workflow process) and downstream (packing/logistics). The management of several thousand daily orders and deliveries requires new resources. Some printers have optimised their logistics based on the practices of automobile subcontractors.

Definition of priority targets

Company strategy: The strategies of e-printers are obviously multiple and sometimes difficult to understand. Like traditional printers, they are faced with reduction in print runs, shorter deadlines, and increased customer tariff pressure.

It seems that an essential point lies in the flexibility of their offers, perpetual market scrutiny, and the ability to stick to the market. Strategic differences seem to be primarily in the definition of the priority targets. Some printers primarily target the dealer network (e.g. Exaprint in France), others remain open to any potential buyer while proposing only one site in several languages (Saxoprint and Onlineprinters), while others segment their customers and adapt their platforms according to each segment (Unitedprint).

All the sites permanently develop their product range to largely exceed printed paper communication paper, the origin of their activity. Finally, the majority of these companies endeavour to go beyond their dematerialised presence by emphasising that many men and women produce these products. They also provide service assistance and management in the language of each customer.

Principal KPIs: Primarily oriented towards customers: their number, purchases level, average order value and their loyalty. The level of satisfaction is also regularly measured. Generally, commercial KPIs are monitored daily by leadership teams, while production e²KPIs are followed monthly.

Certifications: Generally certified for paper chain of custody control (FSC® and/or PEFC™). While present over the whole European market, they also respond to expectations of certain specific customers, and to national recognitions; Saxoprint and Onlineprinters are thus certified Imprim'Vert, some sites are PSO certified, and many companies compensate for CO_2 emissions in the production and transport of the end product.

Key points

The e-printing market will continue to grow. This development seems underestimated in certain countries.

The e-printers manage a large number of client accounts.

Competencies have moved upstream (data-processing development, strong visibility on the web and automation of the order workflow) and downstream (management of the thousands of dispatched orders each day).

CHAPTER 2

Operational efficiency

Soft skills can have a major impact on operating efficiency, significantly improving productivity and profitability as well as having a positive effect on company culture for both employees and customers. This chapter describes some of the skills, techniques and external resources available to help company performance.

Soft skills

This term originated in the US Army in 1959, for job related skills involving actions with people and documents. It is an umbrella term for personal career attributes, people and social skills that complement hard technical skills for productive workplace performance.

Soft skills include flexibility, communication, use of project techniques and tools, team building and leadership, and are a major differentiator for employability and success.

A Harvard University study noted that 80% of incareer achievements are determined by soft skills and only 20% by hard skills.

- Resources include Continuous Improvement techniques, certifications and registered labels/symbols used by a company and on its products. Some of them are related purely to printing (e.g. ISO 12647, SGP), others address the complete supply chain (e.g. BRC, FSC,® PEFC™), and several apply to all operations of any company. A number include third party auditing. What all these tools have in common is that they bring a structured and cross-functional team approach to a company's operations.
- There is nothing revolutionary about Continuous Improvement. It is an approach relatively common in many countries. At the end of this section, case studies illustrate practical experience of these techniques in different printing markets.
- A related issue is the need to measure and monitor performance — which Key Performance Indicators to use? *(page 34)*
- The potential impact of Industry 4.0 as a technology evolution is also considered. The combination of automation, networking and data exchange technologies into 'virtual' or 'smart' factories will have an impact on printers' value chains, business models and services, productivity, quality and safety. *(page 38)*

Continuous Improvement (CI)

CI is a valuable instrument used to optimise quality, productivity, and environmental performance that will both reduce manufacturing costs and empower employees. This approach typically combines cross-process teamwork with project working. It stimulates internal innovation and value stream analysis, and incorporates Lean & Green techniques.

CI uses structured tools to identify, monitor and minimise sources of waste and other malfunctions. Improvements are achieved often without any capital cost and tend to increase profitability well above the industry average — 200 - 250 % in the UK. In the US, PIA studies show that top performers tend to have a CI/quality focus. They define profit leaders as the top 25 % of companies as measured by % profit margin. In 2016 these companies averaged 9,5 % vs 0,4 % for the other 75 % of companies — Premier Press is one such example case study *(page 46)*. CI also builds competitive advantage by developing a culture of efficiency, quality and pursuit of customer value that cannot be easily replicated (whereas, differentiation by technology alone is more difficult to sustain and can easily be purchased by others). In addition, these programmes improve working procedures, plant layout, training, and commercial strategy, and they also encourage alternative methods of management and organisation.

Selected Continuous Improvement techniques, tools, certifications and labels. (ISO: International Standards Organisation; OHSAS: Occupational Health & Safety Assessment Series; BRC: British Retail Consortium Global Standards; FSC®: Forest Stewardship Council; PEFC™: Programme for Endorsement of Forest Certification; SFI: Sustainable Forest Initiative.)

Tools	Activities	Characteristics	Application
ISO 9001	Quality management	Management system	Cross-company
ISO 14001	Environmental management	Management system	Cross-company
OHSAS 18001	Occupational Health & Safety	Management system	Cross-company
ISO 26000	Social responsibility sustainability	Impact on staff, environment & community	Cross-company
ISO 27001	Information security management	Evaluating how well system works	Cross-company
BRC Global	Food & packaging standards	Food, Packaging, Storage & Distribution	Supply chain
FSC® / PEFC™ / SFI	Sustainable forest management	Paper fibre source & traceability	Paper fibre chain
ISO 12647/PSO/G7	Technical colour standard	Print product quality	Print process
SGP North America	Sustainable Green Printers	Extensive system & continuously improve	Print process
Imprim'Vert	Environmental compliance	Pragmatic method to reduce enviro impact	Print process
ClimateCalc	Carbon footprint calculation	Print factory & product carbon footprint	Print process
CI/Six Sigma	Continuous Improvement	Collaborative & systematic techniques	Cross-company

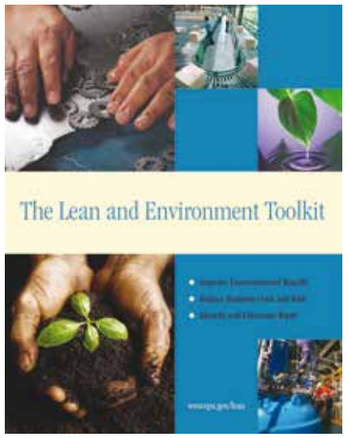
Lean

"The elimination of waste in every area of production, including customer relations, product design, supplier networks and factory management" — Massachusetts Institute of Technology. Waste is anything that does not contribute directly to adding value for the customer, including over-production, inventory, work-in-process, transportation, processing waste, motion, waiting and defects.

The term 'Lean' was created by the US authors of 'The Machine That Changed the World' to describe the Toyota Production System. However, the original Japanese term 'Kaizen' means Continuous Improvement (CI) and this title is increasingly being used instead of 'Lean' that has some negative connotations for some people. It also better describes the process of improving a process, product or service. Both terms are used in this text and they are interchangeable.

"Lean describes a proven set of tools and techniques guided by well-defined policies and practices that, when implemented correctly, foster a culture that promotes a sense of pride, self-awareness and a desire to always look for a better way to do any task. The journey to become a Lean enterprise has no end — it is a continuous commitment to customer value. Toyota, the founder of Lean, has been on this journey for decades. Its vision is to establish long term value, as defined by their customers, that is created through the efforts of their employees. It empowers employees to eliminate waste through all business steps to achieve a clear competitive advantage." — Kevin Cooper 'Lean Printing: Cultural Imperatives for Success'.

Lean management is focused on eliminating waste and ensuring efficiency. Another technique, Six Sigma, focuses on eliminating quality defects and variability. A Six Sigma process is one in which 99,99966 % of all opportunities to produce some feature of a part are statistically expected to be free of defects (see ISO 13053: 2011). It uses a set of quality management and statistical methods with internal certified experts. A hybrid Lean/Six Sigma methodology combines both disciplines to develop operational and quality excellence.



The EPA's 'Lean and Environment Toolkit' provides practical strategies to improve Lean results — waste elimination, quality enhancement, and delivery of value to customers — while achieving environmental performance goals. www.epa.gov/lean

Minimising waste provides mutual economic and environmental benefits. Lean & Green is an operating philosophy promoted by icmPrint for the past decade.

Lean & Green

Experience shows that improving economic and environmental efficiency jointly is highly effective. This combination builds competitive advantage by providing customers with products and services with lower environmental impact and reduced costs, while improving employee motivation and the working environment. The benefits of coordinating Lean & Green are identified by the US Environmental Protection Agency (EPA) in its 'Lean and Environment Toolkit' to include cost reduction, improved process flow and reduced lead times, lower regulatory non-compliance risk, meeting customer expectations, and improving environmental quality, employee morale and commitment. There is one important difference between 'Lean' and 'Green': the former is variable and dedicated to the company implementing it; and while Green may have some variable components, it also has an obligatory regulatory compliance dimension and may include voluntary environmental labels. There are also national regulatory restrictions on the veracity of claims that can be made with respect to Green, the environment and sustainability.

Environmental waste is an unnecessary or excessive use of resources or substances released to the air, water or land that could harm human health or the environment. It includes over-production, unnecessary handling and transport, poor maintenance and inadequate waste disposal practices. Lean & Green also provides good marketing opportunities by motivating clients, colleagues and suppliers.

Lean & Green improvements

May also include using more efficient new equipment with lower environmental impacts. For example, smart plate processors that can reduce chemical consumption by up to 75 %, or zero chemistry plates that are developed on-press.

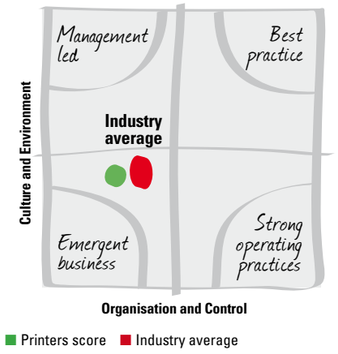
Other examples may be more nuanced, e.g. LED-UV curing is increasingly preferred to traditional UV methods because of its longer lamp life and 80 % reduced power consumption. However, there are some open questions on the impact of increased UV printing on paper recycling. Logistics technology is another source, where vehicle monitoring systems indicate driving methods that will reduce fuel consumption and carbon emissions.

Improvement sources

This domain is led by the US with Printing Industries of America's (PIA) Continuous Improvement activities along with the independent Sustainable Green Printing partnership programme, and in the UK by BPIF federation's Vision in Print with its Lean engineering consulting service. The case studies in this chapter come from these two countries.

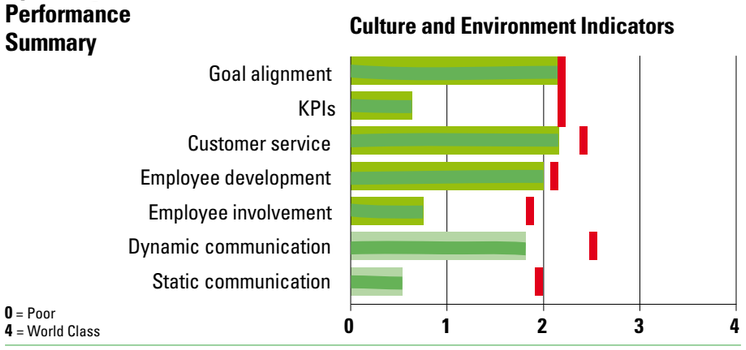
Vision in Print (ViP) has been applying Lean in the UK printing and packaging industry since 2003. Its specialist engineers provide support to printers implementing improvement programmes. To date, through these programmes several hundred ViP audits have identified significant cost savings and environmental improvements. Typical examples include makeready reduction of 28% for sheetfed presses and 23% for stitching lines, 20% improvement in on-time delivery, 5% reduction of materials cost, and environmental savings of 0,5 to 2,6% of turnover. ViP's Productivity Health-check is a rapid assessment of a company's nine key manufacturing areas benchmarked against over 500 printing companies. It reviews key factors affecting productivity, along with the potential and readiness for improvement.

Two ViP users were visited as case studies. The first, Impress Print, is at the start of a Lean journey, while the second, Skanem, is an advanced user. Both have projects to introduce a new Management Information System (MIS) and are taking a Lean approach to help implement the new system across the company. New generation MIS, JDF and digital prepress offer significant opportunities to implement a smoother, more productive and profitable process that will optimise the entire job workflow. ViP's office and prepress change cycle programme has helped companies reduce estimating lead times by over 20% and increase customer service capacity, with no additional staff. Success depends on a cross-functional team approach to improve process and value stream structures. The ViP process has three phases starting with envisaging the ideal future process, defining current practices, and designing a phased implementation programme.



This matrix plots a company's relative position for four operating criteria against the industry average. Source Vision In Print

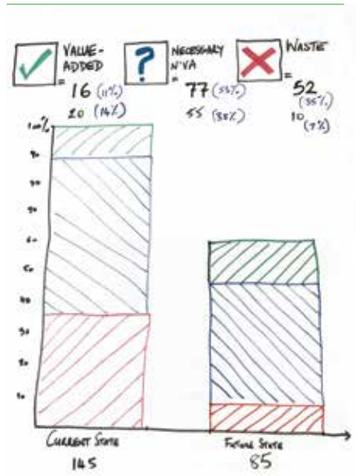
Operating Performance Summary



0 = Poor
4 = World Class

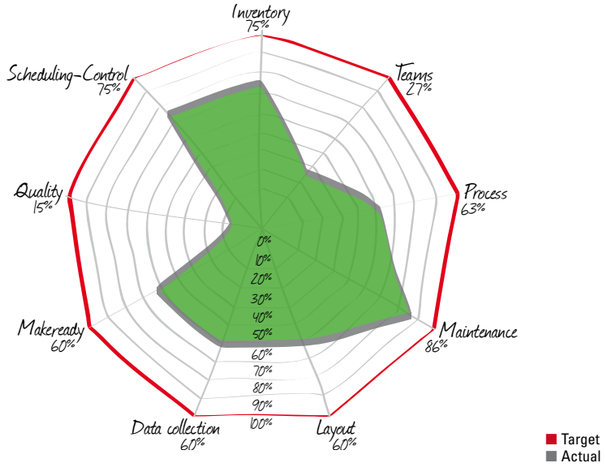
This score sheet summarises a company's assessed position (green) relative to the industry average performance (red) on a scale from poor (0) to best in class (4). Source Vision In Print

Value stream mapping team discussing process optimisation at Impress Print. Source ViP



Work sheet from MIS mapping team at Impress Print that shows the reduction of non-value added work and and waste as per the mapped steps in the future state. Source ViP

Process improvement profile



ViP's Productivity Healthcheck is a rapid assessment of nine key manufacturing areas benchmarked against over 500 printing companies. The printer must evaluate the relative strategic impact of each area to help establish priorities to build their operational competitiveness. Source ViP/BPIF

PIA Continuous Improvement. Its activities include the only annual print industry conference dedicated to improving operational excellence using CI concepts. PIA also publishes implementation guides, including Lean Manufacturing, Lean Printing: Pathway to Success, Setup Reduction for Printers, Total Production Maintenance, and webinars: The Lean Toolbox: 5S and Quick Changeover, Lean Manufacturing – TPM for the Printer. PIA provides its members with an online Lean Manufacturing Assessment Tool. This makes a quick assessment of a company's progress in implementing Lean strategies and tools; it is based on Iwao Kobayashi's '20 Keys to Workplace Improvement'. PIA is a founding partner in the SGP (Sustainable Green Printing) programme. In 2016 PIA introduced a new certification, Improvement Professional in Print, for individuals seeking to validate their expertise in helping companies achieve operational excellence using Continuous Improvement concepts.

Sustainability Studies in Print' PIA, Joe Deemer

IMPRIM'VERT® © 2017 - 5164

Imprim'Vert has several logos, one of which contains the code of the company concerned and the year of validity of its certificate.

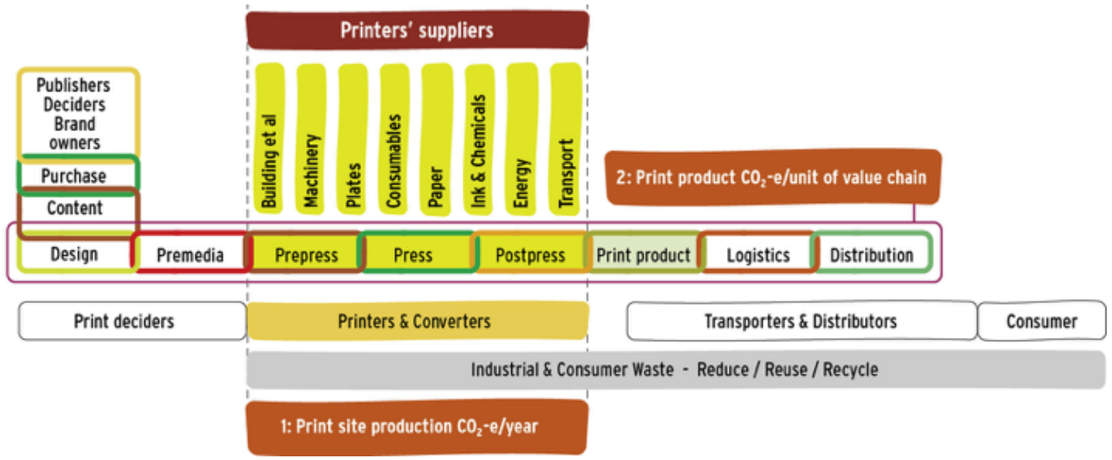
Sustainable Green Printing Partnership (SGP) is a North American programme directed to increase profits and efficiency in printing companies through sustainability certification. SGP is a non-profit organisation advocating best practices and innovation whereby the industry and its customers benefit from a more sustainable supply chain, reducing energy consumption and waste, increasing recycling, and implementing innovative practices for a greener printing process. SGP offers a multi-attribute certification, publicly vetted with strict criteria, that covers the entire print facility, its processes, products and communal areas. The benefits of sustainable practices are in cost and resource savings. Some members' examples: 10% reduced energy use, 30% reduced landfill, 59% less water use, plus significant substrate waste reductions, and lower greenhouse gas emissions.

Certification takes 6-12 months. Starting with the appointment of a sustainability champion and forming a team to develop a sustainability policy and management system, the continuous improvement project plan defines metrics, documentation for best practices, and conducts a series of audits. The three US case studies (Sundance, Premier and Image Options) are all SGP registered and their convergence with Lean is demonstrated by their attendance at the annual PIA Continuous Improvement Conferences. SGP is a resource intensive programme with about 100 registered users in North America. *(Note: The SGP system in Australia is completely different with three linked levels, the latter including ISO 14001.)*

Trends in continental Europe

In Europe, the approach is more broadly based around labels, standards and certifications.
The French **Imprim'Vert** label was created in 1998 and is now the world's largest graphic industries environmental qualification with over 2200 registered companies in nine European countries. Imprim'Vert is a commitment to results (whereas most environmental labels require companies to implement means). A network of 200 referral agents carries out onsite diagnosis, provides improvement assistance and confirms conformance. The strength of the label is its simplicity, clear engagement and its widespread adoption by printers, their clients, suppliers, and training centres. Access to the brand requires confirmed conformance to five criteria identified as priorities by the industry: implementation of correct dangerous waste management, secure storage of dangerous liquids, non-utilisation of toxic products, improving staff environmental awareness, and monitoring energy consumption. The label is valid for one year. The waste and energy criteria are checked annually remotely, while the others are checked on site every three years. Criteria are strengthened or new ones introduced to ensure continuous improvement of environmental requirements. *(page 62)*

Environmental and Lean manufacturing share the same Value/Process Streams. Mapping them helps identify the sources of CO2e, energy consumption and waste, and prioritise where improvements can be made. Source PrintCity



ClimateCalc is an online tool used to evaluate the carbon footprint of a printing site and all of its product. It was developed by an association of European printers federations and is used throughout Europe and in India. It helps user companies understand their carbon footprint to facilitate actions to reduce their emissions and measure improvements while providing an additional service to customers. Uniquely, this certification guarantees the quality of its calculations to ensure client confidence in it.

Other European labels that guarantee product attributes — like environmental quality, recyclability, origin of fibres — include the European Ecolabel, Nordic Swan and the Blue Angel. In addition, a number of ISO certifications are widely used in the paper, printing and packaging industries.

ISO 9001 and ISO 14001 certifications allow companies both to respond to a customer's purchasing conditions that can be imposed on all suppliers, irrespective of their activity or geographical location, and also to meet their individual specific needs. However, an environmental management system conforming with ISO 14001 adheres to relevant local environmental regulations, which may vary. This certificate is a commitment to ensure that adequate means are available to improve the performance of the company, rather than being a guarantee of specific results. In 2015, its focus added the necessity to take a life cycle approach.
In Europe, demand for ISO 14001 is increasing along with more specific quality management certifications like BRC, Security Printers, and ISO 12647, which are often preferred to ISO 9001.

ISO 26000 defines the key outcomes for Corporate Social Responsibility (CSR) that lead to an evaluation rather than certification. Specific evaluations are being developed for CSR implementation for the graphic industry. (*page 52)*

Case studies clearly show that the structured and cross-functional approach common to these tools can be applied to most operations of a company. The managers of some companies apply these leadership techniques informally — often they have had experience of them in previous positions. It is not essential to use any given tool, but in most cases they will provide structure and techniques to help drive success.

Effective monitoring (defining, methodology and timing) of Key Performance Indicators is a key success factor for improvement. *(page 34)*

Lean Global Network

LGN is a consortium of over 20 not-for-profit organizations dedicated to advancing lean thinking and practice throughout the world. Its education and training helps understanding of lean fundamentals and concepts with hands-on simulations and problem solving. LGN run on-site, or in-company, gemba-based learning activities, public workshops, webinars, and education programs for companies. Co-learning research partnerships are active with universities, other organizations and leading companies across all sectors. An online community of over 300 000 allow LGN members to gather the best in lean thinking and share it with the lean community.
www.leanglobal.org
www.greenit.fr

Lean IT

Lean IT ensures that the information processes (implemented or being improved) are fit for purpose by removing waste and improving speed. It is a quality system approach in which customer value, delivery time and costs are optimized. Kaizen (incremental continuous Improvement) is one of its principles used to eradicated 'dirty coding'. LITA is a not-for-profit association of accredited training institutions. www.leanitassociation.com.

Commercial 4.0

The traditional role of commercial staff has been to sell a given quality, price and delivery time. However, the increasing variability of technologies, purchase strategies and other customer requirements contributes to the need for expanding sales staff competencies.

This includes a good understanding both of the certifications and labels that are now an integral part of graphic industry services and of the added value derived from each certificate, label and methodology that the company invests in — and to communicate the benefits effectively to clients. Sales staff also need to better understand the needs and expectations of their clients to estimate the potential ROI of actions in these fields.

Regulatory requirements and/or a client's purchasing policy may make certifications or labels a transactional obligation, while other customers might request a certification or label without understanding its impact or cost. Sales staff, therefore, need to be able to explain the issues to the client and propose alternatives if appropriate. The relative importance of the customer will influence the company's response.

Key points

Continuous Improvement yields

- Combined Lean & Green benefits
- Empowered and motivated staff
- Competitive advantage

What is Continuous Improvement?

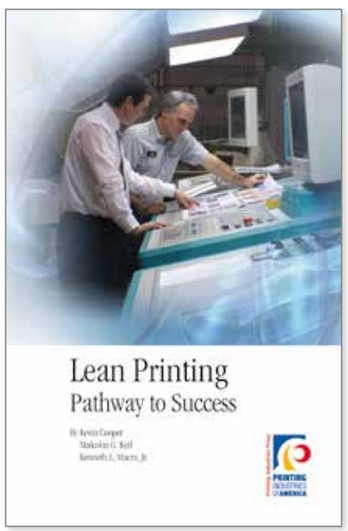
What is Waste?

Value Added: Any activity that changes the nature, shape or characteristics of the product to the customers requirements e.g. printing, folding, stitching.

Non Value Added: Any activity carried that is necessary under current conditions, but does not add value e.g. makeready, inspection, motion.

Waste: All other non-essential activities that can be eliminated. Source ViP

The 8 deadly wastes:



'Lean Printing: Pathway to Success' PIA Kevin Cooper, Malcolm G. Keif, Kenneth L. Maccro Jr. www.printing.org

Companies are traditionally organised around functional departments with multiple management layers where decisions are made downwards to employees, who are expected to conform by following established procedures. In contrast, companies successfully implementing Continuous Improvement tend to have an open culture with 'leadership' replacing 'management' in flatter organisations. Employees are empowered with responsibility and information, enabling them to participate more actively in the value stream; decisions are frequently delegated, and cross-functional teams are the norm.

Continuous Improvement (CI) is not a single technique or piece of software, and it is applicable to all facets of a company's operations. Many companies use Lean Manufacturing, Six Sigma and other techniques that are focused on eliminating process variability and optimising the value stream. Value stream describes all the separate activities involved in making a product or service; workflow focuses on process sequence. The value stream encompasses how one operation interacts with others and what happens between process steps — the flow of information and materials, WIP, waste.

CI uses many techniques and the following is an overview of some of them.

Waste: Broadly defined as any activity or process that does not add value to a product or service. The original '7 deadly wastes' is now extended to 8 by adding environmental waste.

1. **Underutilised resources:** Human or technical resources underused, excess machine capacity.
2. **Inventory:** Excessive raw materials, work-in-progress (WIP) and finished goods increase spoilage risk from deterioration or damage, and tie up capital, space, and people. Inventory is a major cash flow element that can be reduced with just-in-time (JIT) policies.
3. **Transport:** Unnecessary handling of raw materials, partial or finished goods. Inefficient layout, over-production and inventory add to transport needs and costs (waste, energy use, greenhouse gas emissions and needless packaging).
4. **Waiting:** Wasted staff time from late materials and/or delays in prior steps. Equipment incorrectly set-up, operated or maintained, leading to breakdowns. Missing data can delay deliveries and incur downtime costs.
5. **Motion:** Process flow needs to be smooth, without interruptions or bottlenecks. Poor layout, organisation and lack of teamwork lead to unnecessary movements to get tools, materials and information, and excessive movement of work into and out of storage. Materials and people should not move more than necessary in creating a product. Counting forklift trucks is often a quick way to get a sense of use of space.
6. **Over-processing:** Avoidable waste from exceeding the customer's job specifications, over-packaging, or producing more than is required for the next step in the process, or more than the customer ordered.
7. **Defects:** The traditional definition of waste. The further into the process defects are discovered, the more resources are consumed: from value already added (employee time, equipment, materials and energy), extra processing and disposal costs, plus extra resources used to rectify.
8. **Environmental waste:** Unnecessary or excessive use of resources, or a substance released to the air, water, or land that could harm human health or the environment.

Kaizen: This Japanese term means continual improvement of the process of making a product or service. It is based on taking something apart (kai), and understanding how it works so that it can be made better (zen). Kaizen events are a cross-functional team activity to eliminate waste and make rapid changes in the workplace by implementing Lean methods. They usually focus on solutions that do not involve large capital outlays, e.g. eliminating waste, improving productivity, and sustained continual improvement of targeted activities and processes. Kaizen is based on small, incremental changes regularly applied over a long period to build significant overall improvement. Kaizen is considered to be the building block of all Lean production methods.

Improvement Cycle: A discipline utilised to make problems visible and then resolve them using simple problem-solving techniques. Steps are indefinitely repeated until the root cause of the problem is corrected. Variations include: **Kaizen Improvement Cycle** — Analyse, Plan, Act, Verify; **PDCA** — Plan, Do, Check, Act; or **Six Sigma DMAIC** — Define, Measure, Analyse, Improve, Control.

Value stream mapping: Value stream mapping helps understand the sequence of activities and information flows involved in delivering a product or service. It visualises the big picture as a sum of the parts and how each fits into the overall production process. Everything that is not mapped as a value added operation is labelled as waste. This allows alternatives to be identified and the most efficient overall production plan to be selected. The power of value stream mapping lies in walking the plant floor (Gemba walk below). Analysing value streams can reveal opportunities to reduce costs, and improve production flow, environmental performance, and health and safety of the workplace.

Gemba walk: A regular factory walk by managers to better understand the value stream and build relationships with employees by asking them about their work, practical improvement ideas, and to identify problems (like safety hazards, waste, machinery condition). These walks help maintain the discipline and enthusiasm for Continuous Improvement and forge links between managers and production staff. Ideally, walks are daily and include staff from the management team. Skanem and Cloître are good examples.

Continuous operation flow: Operations should make a process step only when subsequent production steps are ready for it. Inventory of WIP or finished goods is a sign of waste that should be reduced or eliminated, along with associated materials handling; subsequent faster throughput provides customers with shorter lead times. JIT practices reduce raw material inventory, like paper, while the Kanban system optimises supply of other materials and consumables.
"The fact is, if an operation looks good to the trained eye, it usually is." 'Read a Plant ' R. Eugene Goodson, Harvard Business School.

Kanban: A visual pull signal to replenish inventory at the point needed. Develops the use of visual indicators for min/max levels, stock replenishment and WIP. Often combined with JIT systems. This requires working closely/in partnership with selected suppliers to make everyone more efficient.

Quality at source: Quality is a function, not a separate issue, of manufacturing and is a prerequisite for any manufacturer. Manufacturing quality can be determined by various metrics — reprints, not-right-first-time, customer complaints or material yield. Materials typically represent 30-40% of the value of an order, so material yield has a significant impact on costs, and it is an easy indicator to identify and benchmark. Standards and specifications help printers quantify process control and are a key to achieving good quality. Quality tools include process mapping, 5 Whys, histograms, control charts, process capability and scatter plots. CI techniques in this area include: **Jikoda** or built-in quality, that rewards employees who identify problems; **Andon** system so employees can stop production and automatically notify management and other workers of a quality or process issue; and **Poka Yoke** devices or methods that either make it impossible to make a mistake or that quickly detect mistakes before they become defects. **Six Sigma** is a tool dedicated to eliminate defects.

Visual management: Visual information includes production data, the location of tools and components, equipment condition and 'to do' actions. Making information rapidly available in an easily seen and understood form helps to identify problems and generate prompt action to improve work performance and motivation. The type of information and the method to communicate it needs to be defined. Selected Key Performance Indicators (KPIs) are commonly displayed to show progress and efficiency of work — for example Skanen displays its schedules, processing times, productivity, waste, and quality; while Cloître uses monitors to communicate the number of new jobs ordered and delivered, positive comments from customers, and events. Some companies use multiple large screen monitors throughout the plant to display information that can be viewed rapidly by everyone without the need to look at a computer. Other companies post graphs and notes in workshops, meeting areas and newsletters.

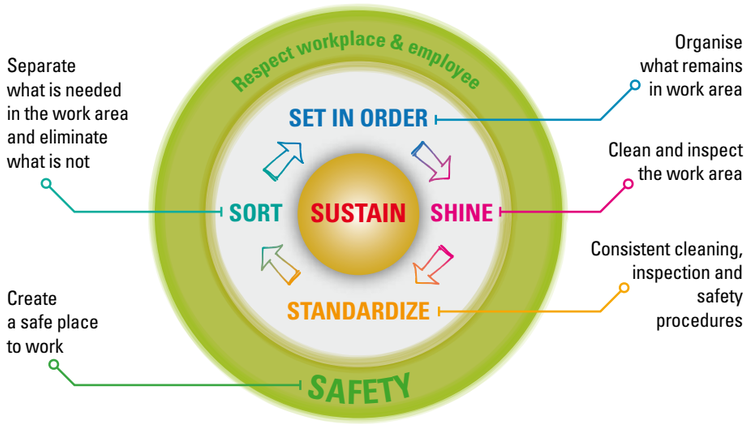
The Deming wheel also known as the Shewart improvement cycle. Source ViP

'Lean Printing: Cultural Imperatives for Success' PIA, Kevin Cooper. www.printing.org

Key points

- Leadership replaces management
- Cross-functional team working
- Optimise the value stream

6S fosters neatness, cleanliness, simplification and safety compliance that leads to a high performance workplace.
Source 'Lean and Environment Toolkit' EPA, www.epa.gov/lean



Applying 6S (5S+Safety): Often the first Lean method used because it fosters a culture of continuous improvement and employee engagement to help reduce waste, unplanned downtime, and in-process inventory. 6S is sustained by daily routines that show visible results to everyone on the production floor.

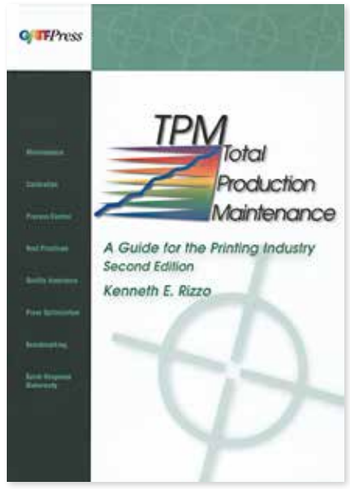
1. **Sort:** Remove items from the workplace that do not contribute to production.
2. **Set in order:** Organise all remaining items in visually designated areas. Make sure tools are easy to see and reach. Focus on motion activity. Mapping can help optimise.
3. **Scrub/Shine:** Clean and inspect the work area regularly for any faults. Develop a visual checklist of cleaning schedules of tasks and responsibilities. Daily audits are generally needed to help establish this culture. Working in a clean environment enables staff to notice malfunctions in equipment such as leaks, vibrations, breakages, and misalignments.
4. **Standardise:** Systemise consistent cleaning, inspection, and safety practices. Define task and describe how it should be done. Document and use visual management.
5. **Sustain:** Adherence to correct procedures is often the most difficult pillar to implement. It is a key 6S success factor that everyone understands and is committed to. Excellent plants are well lit; and signed, have floor and wall paint in top condition, with clean and tidy equipment,.
6. **Safety:** Eliminate hazards to create a safe workplace for employees.

PIA: Operational Excellence Series:
1 'The Shingo Model',
2 'Finding Printers' Hidden Wastes',
3 'Cleaning & Organising 5S for Printers',
4 'Pit Stop Maintenance with TPM',
5 'Quick Changeover for Printers',
www.printing.org

SMED Set-up reduction: Minimise makeready time and waste by analysing and modifying the current process set-up to reduce costs and increase machine capacity at no cost. The common analogy is to make a job changeover become like a Formula One pit-stop by using a 10-step methodology (Single Minute Exchange of Die — SMED) that originated in automotive manufacturing. The key element is to separate changeover tasks into (a) internal, those that can only be done when a machine is stopped, and (b) tasks that can be done while machine is running in order to identify which tasks can be made in parallel. A Kaizen team event initiates the task by questioning every step of how things are done, using charts, maps and film to identify root causes. The team will then analyse and standardise tools, fixtures and fasteners; define and document best practice techniques; and train all machine crews to implement them.

Changeover production time is often the first Lean event in many printing companies. It usually starts with the slowest machine changeover and results are often spectacular — 50% improvement is not uncommon. ViP identifies sheetfed offset benchmark as 6-12 minutes, depending on automation. An 'island of success' with one machine can then be used as an example for other machines. Equipment suppliers use SMED techniques to deliver a more productive internal and external makeready function to their equipment. Over the last 20 years, makeready time has dropped from 90 minutes to about 10, and start-up waste from 600-800 sheets to under 100. Nevertheless, even with highly automated equipment there are opportunities for improvement.

Total Productive Maintenance (TPM): A major cause of lost time and increased costs is through equipment failures — slow set-up and adjustment, idling and minor stoppages, reduced speeds, quality defects, and reduced yields (waste). The bottom line is that Overall Equipment Effectiveness (OEE) has much room for improvement. Printers who have introduced proactive maintenance systems report significant performance improvements with fewer unscheduled press stops and accidents, higher press net output, more consistent quality, and less waste. TPM was developed by Seiichi Nakajima and is widely used in many industries to achieve production at acceptable quality and at the full speed equipment is rated at all times. It integrates preventive, predictive, quality and autonomous maintenance. TPM works best in areas that have strong 6S routines. A Kaizen approach makes maintenance visual, regular, standardised and part of everyone's job; it empowers operators to maintain their equipment and avoid the 'spiral of breakdown despair'. Involving machine operators in structured regular maintenance yields high benefits — experience from ViP's 'Clean, Inspect, Lubricate' programme shows up to 75% reduction in machine breakdowns. This requires training in preventive and predictive maintenance, monitoring and sharing KPIs on machine performance.



'Total Production Maintenance', PIA Kenneth E. Rizzo. www.printing.org

Key Success Factors for CI

Success is related to how well CI addresses underlying principles of empowerment, training, defining long-term goals, and the focus on customer value. These factors include:

- Clearly articulated vision to all employees
- Change to 'leadership' as opposed to 'management'
- Empowerment, teams, training and culture
- Sustainability that builds on previous successes; start with 'pockets of readiness'; demonstrate 'islands of excellence' to teach and motivate other projects
- Focus externally with customers
- Drive waste out of the business
- Use KPI operational metrics
- Add a sense of urgency and crucial importance to the organisation
- Understand that effectiveness is built over time
- Focus CI initiatives on supporting corporate strategy

Teams are a core culture. High functioning teams always outperform individuals. Therefore, the ongoing development of employees becomes a major management task to create effective teams. Training is essential for issues such as how to hold and lead meetings, and how to implement the four team stages (norming, forming, storming and performing).

"Teams solve problems better than individuals and individual employees develop greater skills from being a part of a team." 'Toyota Culture: The Heart and Soul of the Toyota Way' Jeffrey K. Liker and Michael Hoseus.

"Failure is an opportunity to learn how to do something different or better. Not failing is an indication you are not trying enough, not experimenting enough, or pushing the boundaries of what you know and believe to be true. Key to all this is what management does when failures occur." 'Toyota Culture: The Heart and Soul of the Toyota Way' Jeffrey K. Liker and Michael Hoseu.
'Reward excellent failures. Punish mediocre suc-cesses' Phil Daniels, 2008.

Internal Project Marketing: Ensuring staff participation is a key to the success of improvement projects. Raise awareness by giving each project an appropriate name, distinctive graphics and clear communication. Equally important is information feedback on the efficiency of actions taken to implement a project. Effective internal marketing will recognise the efforts of staff involved and increase credibility for future initiatives.

Key points

- Quality is a function of manufacturing, not a separate issue
- Deliver defined quality at full speed of equipment at all times
- Regular, standardised maintenance is part of everyone's job
- Reduce machine changeover by 50%

KPIs
Key Performance Indicators

Structured data collection ensures that only defined and accurate data is gathered and that subsequent decisions are based on valid findings. Beware of becoming 'data-rich and information-poor'. Data needs to be of good quality and selected to meet the needs of the business. Key Performance Indicators (KPIs) need to be relevant to the company, and improvement actions should be defined and monitored for each one.

"Lean cultures thrive on making metrics visual. Highlight the value of simple, visual metric reporting done by employees to help monitor and improve the work processes they have control over, and that anyone walking by can quickly see if it is under control."
'Lean Printing: Cultural Imperatives for Success' Kevin Cooper.

Encourage localised, simple and 'vital few' measures for operators to monitor, with responsibility for implementing corrective actions to provide feedback at regular reviews. Develop effective routines with employees for reviewing quality, productivity and environmental KPIs. Prominently display KPIs to show trend data more visibly on key areas so to encourage local ownership and responsibility for reducing wasteful activities.

KPIs can be used internally to measure the efficiency of actions initiated. They can also be used externally to benchmark results with other companies, compare relative strong and weak points and better focus improvement actions. The analysis of KPIs does not usually identify a solution; their importance is to identify the right questions. It is not possible to follow every KPI with precision and it is futile to define and monitor a KPI over which the company has no influence for change. It is recommended to select around 20 that have a clear relevance to the company's operations. Four sets of related indicators provide a complete view of the company's business:

1. **Finance:** Commonly used indicators to monitor profitability
2. **Commercial:** Measure market performance of products and services
3. **HR and CSR**
4. **Production e2KPIs:** Overall 'Lean & Green' combines efficiency and environment

Printing Industries of America (PIA) Ratios

For more than 90 years printers have been using PIA Ratios to benchmark their financial performance against the rest of the printing industry. The dynamic ratios cover 114 items including operations, profitability and sales factors; cost drivers and expenses; balance sheet statistics; funding ratios; leverage ratios; liquidity and activity ratios; value-added analysis; basic payroll data; employee profiles; inventory turnover; and billing cycles.

Ratio analysis is a simple common-sense operation that allows managers to confidentially evaluate their company's operations and position against industry standards and profit leaders — companies in the top 25% of profitability). Different reports include:

- Trend analysis of the change in a company's ratios over a period of time.
- Comparisons to the industry standards, which represent the competition.
- Common size analysis expresses performance as percentages to monitor the relationship of the numbers, even when they are constantly changing.
- Integrated analysis to obtain a complete evaluation of the company's operations and financial position.
- Peer group allows a company to select its comparative group of printers.

The new web-based 24/7 Secure Interactive Dashboard provides printers with instant easy-to-understand information on industry financial and operating averages and profit leader benchmarks. The new shorter survey option allows printers to provide only 31 line items to participate — a 70% reduction in required information. However, to gain the most from the survey, peer groups are recommended to fill out the long version of the survey.

US printers have been benchmarking their financial performance for over 90 years using PIA Ratios. www.printing.org

1. Finance

These indicators have been selected from PIA Ratios that US printers have been using for over 90 years to benchmark their financial performance against the rest of the printing industry.

1. Before tax profit as a % of sales
   (sales minus all expenses before income taxes as a % of sales)
2. Before tax profit per employee (full time equivalent employees)
3. Sales per employee (full time equivalent employees)
4. Sales per factory employee (full time equivalent factory employees)
5. Value added per employee (full time equivalent employees)
6. Value added per factory employee (full time equivalent factory employees)
7. Value added as a % of sales
   (sales minus cost of materials and outside services as a % of sales)
8. Total factory cost of product as a % of sales (sales minus materials and outside services cost, factory payroll, and other factory expenses as a % of sales)
9. People cost as a % of sales
   (total wages, salaries, commissions, benefits, and payroll taxes as a % of sales)
10. Substrate costs as a % of sales

Cashflow should be monitored daily because it is so critical to running a business profit is sanity but cash is king. In Europe, some other financial KPIs include: Gross margin rate, Operating investment rate, Ratio of own funds, Balance sheet total.

Intangible Capital

A company's value does not reside only in its financial result, or its production assets, or its land and buildings. Other indicators should be considered to measure the overall strengths and weaknesses of a company — even if some may be difficult to collect. In France, a repository to measure a company's extra-financial value and intangible capital has been defined by the Ministry of Finance (Thésaurus-Bercy). This covers 10 domains, each of which represents a value: clients, human resources, organisation, IT system, knowledge, brand, partners, shareholders, social, nature. Each item is evaluated with qualitative (interviews with management team and staff are commonly made) and quantitative (performance) indicators.

2. Commercial

Relevant indicators should also accompany the transition from a production industry to a service industry. The managers of online printers interviewed *(page 20)* have the same priorities for the frequency to monitor daily commercial KPIs, whereas they review production performance monthly. Commonly used indicators include:

1. % clients that have only made a single order for the period (year)
2. % turnover from new clients
3. Customer loyalty
4. Average order: Turnover/Number of orders
5. Conversion rate: Number of quotations/Number of orders
6. % turnover from largest client
7. % turnover from five largest clients
8. % orders delivered on time and in full (OTIF)
9. Customer satisfaction: an evaluation should be made with clients to define this indicator
10. Net Promoter Score (NPS) customer loyalty correlated with revenue growth.

3. HR and CSR

Successful company performance in these areas is reflected in both HR and non-HR metrics. For instance, excellent hiring decisions will result in higher performing employees with lower turnover and better productivity.

1. **Staff turnover**
2. **Absenteeism:** % = Number of hours absence / Total theoretical working hours
3. **Equality male/female:** Number of female managers / Number of managers; Number of females / Total staff number.
4. **Training:** Number of hours training per employee = Number of training hours / Number of staff; and/or Number of staff trained in year / Number of staff.
5. **Accident and illness rates:** Work related days away from work.

Key points

KPIs need to be relevant and improvement actions defined
Lean cultures thrive on visual metrics
Select simple and 'vital few' KPIs
Combine environmental & economic metrics

An MIS system with a dashboard displaying KPIs. The data captured by a modern MIS must provide users with simple, relevant analysis and detailed measurement to keep the management team informed. This facilitates more effective decision making and strategic business planning.
Source Optimus

Overall Equipment Effectiveness (OEE)

An OEE score of 70% is very good, as it shows over 90% in each measure. The average for manufacturing industries is around 60%.

4. Production e²KPIs (Lean & Green)

These KPIs monitor both production efficiency and environment factors. They have been developed by icmPrint in partnership with other organisations for use in internal and external benchmarking. The EPA's 'Lean and Environment Toolkit' says that a simple way to understand how Lean efforts affect the environment is to add environmental performance metrics to evaluate and track the success of Lean implementation.

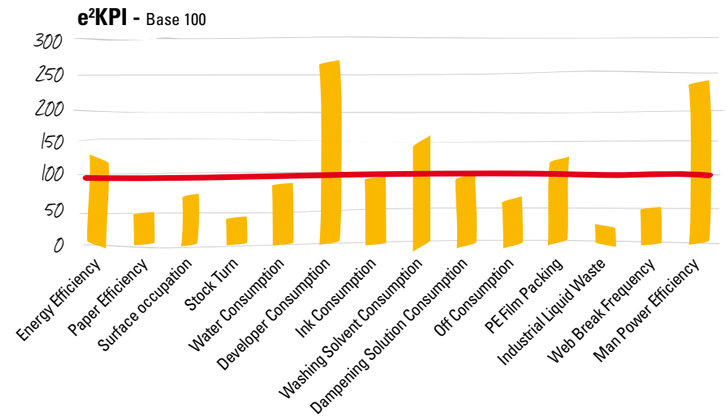
1. **Energy efficiency:** Energy / Paper delivered to customers *(kWh/Tonnes)*
2. **Paper efficiency:** Waste Paper / Paper consumption *(%)*
3. **Water consumption:** Water used / Paper delivered to customers *(Litres/Tonnes)*
4. **Developer consumption:** Developer / Plate consumption *(Litres/m²)*
5. **Ink consumption:** Ink / Total printed area *(Tonnes/m²)*
6. **Washing solvent consumption:** Washing solvent / Total printed area *(Litres/m²)*
7. **Dampening solution consumption:** Dampening concentrate / Ink consumed *(Litres/Tonnes)*
8. **Oil consumption:** Lubricating oil / Number of Printing couples *(Kg/Unit)*
9. **PE Film packing:** PE Film / Paper delivered to customers *(Kg/Tonnes)*
10. **Packing cartons:** PE Film / Paper delivered to customers *(Kg/Tonnes)*
11. **Industrial liquid waste generated:** Liquid waste (developer waste, ink waste, dampening solution waste, washing solvent waste and other hazardous liquid waste) / Paper delivered to customers *(Tonnes/Tonnes)*
12. **Waste:** Material yield ratio of waste to total substrate used on a job. Identify and reduce waste across the value stream — what is the value of a 1% improvement to material yield? This requires ownership and responsibility to resolve and eliminate causes.
13. **Spoilage rate:** Cost of spoiled materials + rework/sales for period. Costs should include costs of material and labour (many companies also include equipment time)
14. **OTIF:** Jobs produced On-Time-and-In-Full measures the customers' orders against actual delivery achieved *(% time and % quantity)*. This gives a good indication of how well customers' needs are being met. Use analysis of trends and the root cause of missed or incomplete deliveries to drive improvement.
15. **NotRFT:** Not right first time: Jobs returned, credited or reprinted — includes incorrect information. Analyse trends and use to drive improvement.
16. **Stock turn (inventory):** Measured in 'turns'. Definition: Annual sales divided by average value on hand; or Average paper stock / Total paper consumed. This ratio allows comparison of larger and smaller companies, it takes into account changes in annual sales volume and seasonal fluctuation and provides an overall benchmark. It will be influenced by paper suppliers' delivery conditions and purchase policies.
17. **People (manpower) efficiency:** Number of good products made in the number of hours available. Paper delivered to customers (hours/tonnes). This indicator is strongly influenced by the type of products produced and the printing process. It is useful as an internal measure but rarely suitable for external benchmarking.
18. **Production surface occupation (Floor space utilisation):** Total production workshop area (prepress, print, post-press, storage — paper, finished products…) / Paper delivered to customers (m²/Tonnes). This indicator depends on the history of the company. In some cases it also allows a better interpretation of 'Stock turn'.
19. **Makeready time:** Preferred definition is from last copy of previous job to first copy of next job.
20. **OEE:** Overall Equipment Effectiveness is a combination of Availability x Performance x Quality. It includes all reasons for failing to run at full rated equipment speed, producing unsaleable products, and downtime. OEE Causes can be evaluated with other indicators:
    - Average net copies per hour
    - Available press time for production
    - Non-scheduled/unplanned repair stops
    - Web break frequency (web printers only): Web breaks / 100 reels (%); this is a commonly used measure for web printers; it should include failed splices as well as paper breaks
    - % Downtime due to breakdown
    - % Re-work (a major cause is poor maintenance)
    - MTB Mean time between failures

An Indian benchmark programme using e²KPIs

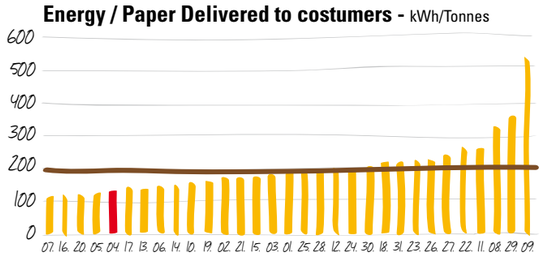
The 2017 WAN-IFRA manufacturing benchmark programme used environmental and economic metrics (e²KPI) at 31 Indian newspaper printing plants to help them assess their manufacturing efficiency, compare their performance with other similar production sites, and identify areas for improvement.

The 13 economic and environmental performance indicators (e²KPI) defined by icmPrint were used. Two others were added — web break rate and productivity (number of hours worked per tonne of paper delivered).

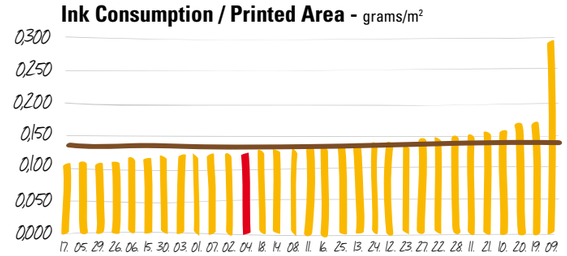
The external benchmarking programme allowed each participant to compare their own indicators with the averages of 31 sites, along with the best and poorest scores from all of the sites. As a result, each site was able to clearly identify their relative position and to select priorities for improvement.



Example of a comparative summary of e²KPIs with an average base of 100 — below 100 shows strengths, above identifies areas to improve.This site shows the success of improvement actions taken to reduce paper waste and web breaks, but also that it needs to carefully examine consumption of energy, plate developer, and cleaning solvents. Source Ecograf



Example of e²KPI. Each column represents a participating compnay site. Source Ecograf



Example of e²KPI. The energy efficiency of site 4 (red) is better than the average, while ink consumption was average. Source Ecograf

Industry 4.0

The term 'Industry 4.0' originated from a 2012 German federal government project to promote automated manufacturing.
It is often described as the 4th industrial revolution, although this term has been used since the 1970s. Industry 4.0 is a convenient name to describe the continuing evolution of technology.
While it is widely used as a commercial term to promote specific companies and their technologies, caution is needed to define what it may mean in a given context. Industry 4.0 can also be described as an initial approach to applying artificial intelligence.
Manufacturing can select from nine components to drive Industry 4.0:

1. System integration
2. Big Data and analytics
3. Simulation and virtualisation
4. Industrial Internet of Things (IoT)
5. Cloud computing
6. Cyber security
7. Autonomous robots
8. Augmented reality
9. Additive manufacturing

**The term Industry 4.0 describes the combining of automation, networking and data exchange technologies into 'virtual' or 'smart' factories.
This combination will increase integration of individual sites to allow intelligent networks to control different points autonomously to facilitate productivity and flexibility. It will impact on the value chain, business models and services, productivity, quality and safety. Companies that successfully embrace this approach are expected to gain a significant competitive advantage.
The availability of rapid, reliable and relevant data is also an essential building block for continuous improvement.**

Industry 4.0 is not a specific system but rather a unifying approach that connects information technologies, machines and businesses into intelligent networks across the value chain. It includes Cyber-Physical Systems (CPS), the Internet of Things (IoT) and Cloud computing that will allow diverse systems across the value chain to communicate and co-operate in real time with each other and with humans. The principle aspects of Industry 4.0 are:

1. **Inter-operability:** Connecting machines, devices, sensors and people via the Internet.
2. **Information transparency:** IT systems that enrich digital models with sensor data into higher value information.
3. **Technical assistance:** Either aggregates comprehensive information to facilitate decisions and problem solving by people or applies where CPS systems perform tasks that are unpleasant, exhausting, or unsafe for humans.
4. **Decentralisation:** CPS systems perform tasks as autonomously as possible, with only exceptional decisions referred to a higher level.

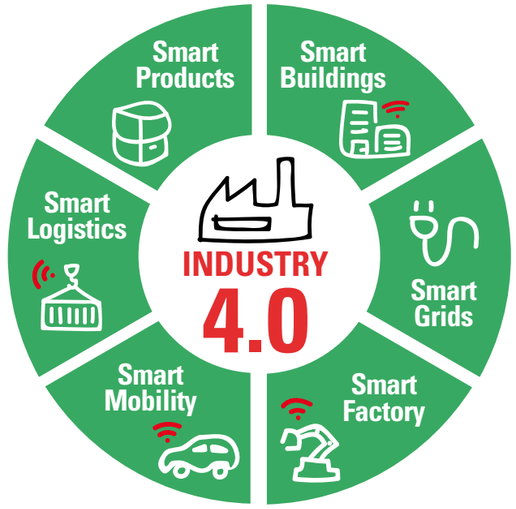
Cyber-Physical Systems (CPS) are smart machines, storage systems and production facilities that can autonomously exchange information, trigger actions and control each other independently. *"In manufacturing, the potential for CPS to improve productivity in the production process and the supply chain is vast,"* according to Markus Löffler and Andreas Tschiesner 'The Internet of Things and the Future of Manufacturing'. *"Logistics could be at the forefront of this shift, particularly in Lean manufacturing with short delivery cycles where CPS can locate every single unit at any given time."*

These dynamic processes will enable both last-minute changes to production and a flexible response to supply disruptions and failures. End-to-end transparency over the manufacturing process will provide new ways to create value and apply novel business models.

A consequence is that production and supplier networks will become far more complex. Big Data will need to be processed with advanced tools (analytics and algorithms) to provide meaningful information to help early detection of defects.

Data is currently used to increase the internal performance of a factory by providing information to improve its output and reduce waste. Industry 4.0 extends this as automation improves autonomous (self-) optimisation, configuration, diagnosis, cognition and intelligent support of workers in increasingly complex environments. This could include automatic initiation of just-in-time maintenance, materials supply and logistics, along with providing management with more insight on the status of the factory and their business.

Key success factors



'Recommendations for implementing the strategic initiative INDUSTRIE 4.0' in the 2013 final report* observes that the journey towards Industry 4.0 will be an evolutionary process. Current basic technologies and experience will have to be adapted to the specific requirements of manufacturing engineering and innovative solutions. Some key issues include:

- Availability of common standards and reference architecture to allow networking and integration of different companies through value networks.
- A comprehensive and reliable broadband infrastructure.
- The role of employees will change significantly in smart factories and will radically transform workers' job and competence profiles, requiring relevant training, continuing professional development and adaption of the work organisation.

A note of caution comes from Christoph Roser, author of 'Faster, Better, Cheaper', who comments that for Industry 4.0 *"the hardware is already mostly there… but the software systems that use these data are still far from their potential."*

While the use of Open API (Application Programming Interface) already allows different web based software to communicate, the deeper reference architecture, however, has yet to be defined.

* Recommendations for Implementing the Strategic Initiative INDUSTRIE 4.0: Securing the Future of German Manufacturing Industry; Final Report of the Industrie 4.0 Working Group, Henning Kagermann, Forschungsunion, 2013

Getting the most out of Industry 4.0

McKinsey have developed a Digital Compass to help identify promising opportunities along the links of the supply chain. They outline five pragmatic steps in 'Getting the most out of Industry 4.0':

1. Focus on a limited number of Industry 4.0 applications.
2. Use technology workarounds to begin implementing Industry 4.0.
3. Build a portfolio of integrated third-party technology providers.
4. Establish a dedicated cross-functional team with an open culture to capture value.
5. Start experimenting with new business models. Initially, most Industry 4.0 quick wins will be found in improving operational effectiveness.

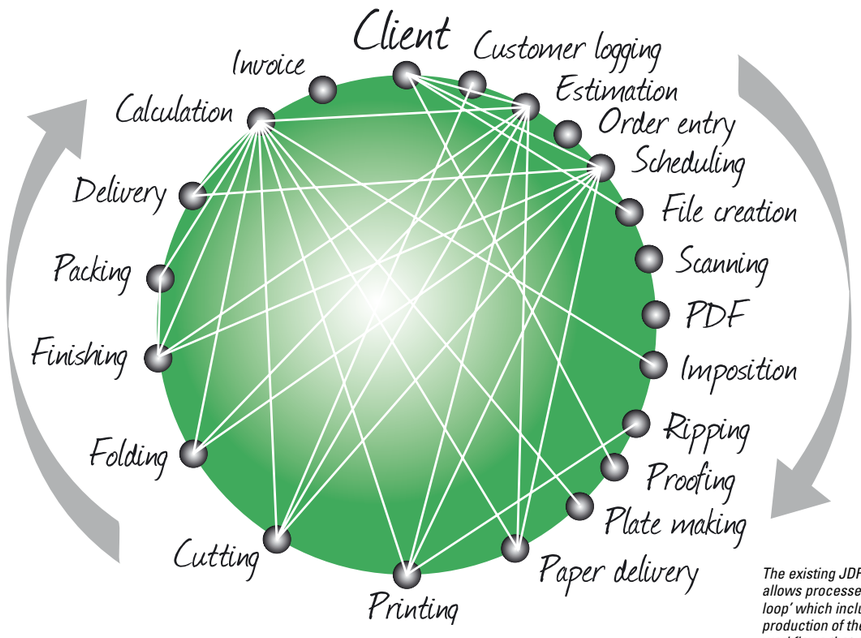
Industry 4.0 combines automation, networking and data exchange technologies into multiple "smart' applications that link factories, buildings, energy logistics, products.

Printing industry 4.0?

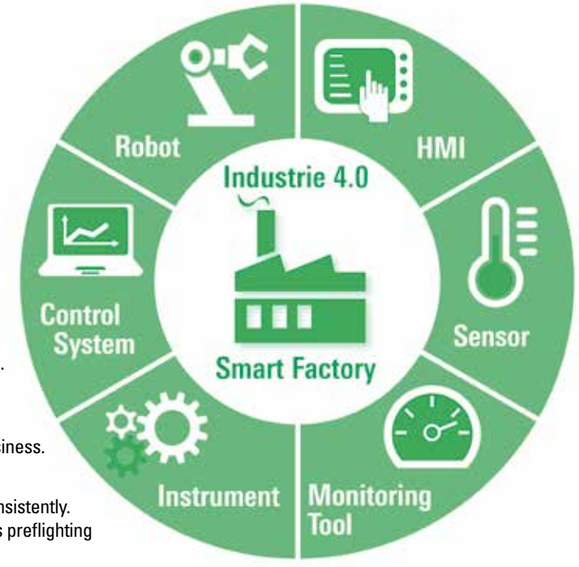
Over the past 30 years the printing industry has experienced a constant evolution of its technology for machine automation, pre-setting, closed-loop controls and standards that, collectively, provide a significant base to initiate an Industry 4.0 concept — JDF, CIP4, JMF, XJDF, PDF, ISO 12647, G7 and management and environmental tools like ISO 9000, ISO 14000, ClimateCalc and MIS. Many printers already have a culture of connectivity and Industry 4.0 is their next logical step. However, those with poorly connected manufacturing steps will be vulnerable.

The Industry 4.0 approach brings together isolated process steps into a fully integrated, automated and optimised workflow. Integration includes suppliers, customers and services to remove non-value added steps and to automate where possible. No single manufacturer can supply a complete Industry 4.0 system. Therefore, suppliers will need to provide components with stable machine-to-machine communication and compatible data exchange. This was demonstrated a decade ago with JDF using the CIP4 protocol to allow different systems to 'talk' to each other.

Many other components are already available to help transform current sites into smarter factories; some of the many examples include: Heidelberg's Prinect business intelligence platform that can evaluate a company's business and production functions. Its Smart Collaboration function connects over 10 000 machines and 15 000 Prinect modules — the analysis of this Big Data provides the base for predictive monitoring and performance improvement services. Another example is X-Rite Pantone, which applies Industry 4.0 to colour management workflow automation using a combination of technologies with Cloud-based storage to provide seamless communication and collaboration between multiple sites — many functions can be carried out without human intervention. Advanced MISs that can be fully integrated and configured to the broad requirements of a company's technologies and business operations already deliver high functionality and will facilitate the introduction of Industry 4.0.



The existing JDF-based workflow already allows processes to be executed as a 'closed loop' which includes the sequential physical production of the job accompanied by data workflows that can be non-sequential and parallel operations — both inside and outside the company — as a closed loop but in an open systems environment. Source PrintCity



Finishing 4 graphic This graphic represents how a finishing line can work within an Industry 4 smart factory. Source icmPrint-Idep

Getting Started

Implementation of Industry 4.0 will be a continuous incremental process. Start by:

1. Initiating a company team and strategy for Industry 4.0.
2. Ensure your MIS is of current generation reaching all parts of business.
3. Define the KPIs and objectives to monitor.
4. Examine all workflows and identify how to connectthem more consistently. Identify points where performance can be improved, this includes preflighting of incoming customer files and proofing approval. Identify how to improve the value stream.
5. Look for competent advice on how to collect and analyse the Big Data generated.
6. Ensure new production components are compatible to integrate into an Industry 4.0 environment, e.g. high levels of automation and JDF interface.
7. Ensure the whole production facility is as fully connected and optimised as possible.
8. Success will require adequate employee skills and the need to address concerns of integrity, confidentiality and threats of worker redundancy.

Irrespective of when a fully operational Industry 4.0 becomes a reality, these steps will improve the connected performance of a company. Workflow focuses on the sequence of a process, while the Value Stream is the activities and interactions across the process that can be optimised with Continuous Improvement techniques.

High levels of automation and JDF interfaces will facilitate Industry 4.0 bringing together isolated process steps into a fully integrated, automated and optimised workflow. Source Skanem

Key points

- An incremental process to connect diverse technologies
- Production networks will be far more complex
- End-to-end transparency over manufacturing process
- Many printers already have a culture of connection

Skanem AS CASE STUDY

www.skanem.com

Locations: 13 sites in 9 countries

Surface area: Liverpool 3400 m² / 36 600 ft²

Company created: 1905

Ownership: Family. Ole Rugland, Group President and CEO.

Products: Self-adhesive labels for consumer, pharmaceutical, automotive and industrial uses. Liverpool produces very high volumes of low-mid complexity labels for laundry products.

Primary clients: Multinational groups along with large national companies — 55 % of output is exported.

Annual turnover: 7 M€ (2016)

Number of staff: 66

Shifts: Press 24 / 6 — 4 x 12 hour shifts

Annual substrate consumption: 75 million linear metres

Production equipment: 5 Nilpeter narrow web offset presses (340 mm wide).

Company strategy: Integrate into customer's supply chain and continuous improvement.

Principal KPIs: Linear output/time, metres produced. Quality is a benchmark driver because the total cost of failure can be very high when including consequential losses.

Certifications/awards: ISO 9001, ISO 14001, BRC, Prints to ISO 12647 but not certified, BPIF member.

	Strengths
Commercial Strategy	●●●○
Organisation & People	●●●○
Technology application	●●○○
Lean & Green	●●●●

Excellent: ●●●●

In 2000, Skanem decided to focus on self-adhesive labels and to expand by acquisition from a national to an international business. It now has 13 production sites with over 1200 employees in Scandinavia, UK, Germany, Poland, Thailand, India and Kenya. The Company provides high quality label solutions from design to printing, stock management and logistics, using all print technologies (flexo, offset, letterpress, screen, gravure, digital, hot and cold foil). Continuous Improvement is central to the group's culture with a standardised approach at all sites to ensure continuity and on-time delivery to its customers. Liverpool's focus is on Lean techniques, empowerment and team working, and some of its initiatives are transferred to all group sites.

Logistics and Customised Solutions

Skanem Liverpool provides on-demand daily delivery to its multinational customers' sites in several countries. They must maintain adequate buffer stocks in nearside warehouses located within five minutes of their customer sites. Transfer of the goods occurs only when they are delivered and the key aspects of the supply contract are sophisticated stock management integrated with customer demand as well as an efficient delivery and storage system. JIT is also used for substrate supply with daily deliveries direct to the press that are processed within 24 hours — there is no intermediate storage.

Smarter labelling means working closely with customers to understand their needs to offer a cost efficient combination of design, printing process and materials. Regular customer workshops help the introduction of new techniques and designs

Production

Colour printing uses either CMYK plus spot colours, or a 7- colour fixed palette system. Die-cutting forms are manufactured and delivered as a set with offset plates to a staging area in the press-room. The five Nilpeter narrow web offset presses are 10 to 23 years old. All print UV inks in up to 7 colours; one unit can apply white flexo onto metallic or transparent substrates, while coating, and hot or cold foiling is available prior to re-winding. Presses have a weekly half-shift maintenance period and each is shut down every six months for four days maintenance by the press manufacturer's staff. Print speed is around 117 m/min with an output target of 75 - 80 % of available total press time (equal to 94 m/min). Makeready takes about 40 minutes divided into job changeover and then start-up to good copy.

Clean marked floor with WIO between press delivery and inspection-packaging. Source Skanem

The presses have an image scanning system to detect quality faults. After printing, rolls go to one of four inspection/slitting stations using the same scanning technology. This approach allows presses to run at maximum speed, while quality is ensured by a dedicated offline function combined with slitting and packaging into cartons.

Continuous Improvement

A primary focus at Liverpool is Lean techniques, empowerment and team working. The optimisation of tools, distances, time and waste has reduced material costs and increased output every year without changing production facilities and staff levels. An early Lean decision was to move the inspection machines into the pressroom next to the delivery end of the presses so that work would be moved only a very short distance. Each press is identically equipped, laid out and labelled. The floor is clearly marked for work-in-progress (WIP), work complete and aisles. Printed rolls are placed directly into the WIP area for the relevant inspection machines, and are then packed. Bins for cores and waste are clearly labelled and managed to minimise errors and maximise staff efficiency.

Daily production meetings on the factory floor began in 2013 with heads of planning, customer services, production, logistics and finance meeting around a large video display showing production data for the last 24 hours and jobs planned for next period. These meetings highlight positive results and do not focus only on negative issues. The meetings are followed by a set group walk around the factory to observe, be seen and to be available to staff. A second meeting in the office area reviews planning for the coming week.

Vision in Print (ViP)

While the Company management has a basic knowledge of Lean techniques, it was found that production workers' lack of knowledge was a barrier to further improvement. Therefore, ViP was bought in to introduce Lean concepts to all staff. Small groups received half-day basic awareness workshops and two projects were identified as examples of putting theory into practice.

1: Review new MIS needs. A key to overall group performance is to have common data from all sites using the same definitions and tools. The introduction of a new single supplier MIS to all sites provided the opportunity for ViP to facilitate mapping current and future needs with staff from planning, prepress and customer services who identified 300 improvement points.

2: Optimise rewind and quality inspection. Roll-to-roll production uses auto inspection to identify and mark poor print quality that is subsequently removed on a separate inspection-slitter machine. Inspection-slitter machine speed was around 50 % of press speed and was then doubled. However, increasing productivity further was difficult, hence the idea to bring in ViP, who took each shift through the project to give them a clear and common understanding by using videos, data and other techniques to achieve better performance. Specific targets to optimise makeready and waste were identified and a standard way of working was defined and recorded by three video cameras placed around the device. This ensures all operators on all shifts are trained using standardised techniques that will be regularly reviewed and improved as needed.

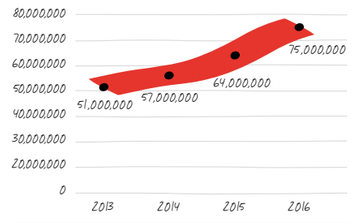
CSR and Sustainability

Skanem deploys CSR under the responsibility of a group board member with a representative at each location. Most sites are registered on the Sedex social responsibility platform for labour standards, health and safety, the environment, and business ethics. A web-based system (CEMAsys©) shares data on energy, travel, waste, water and carbon footprints.

Sustainability is a parallel issue. A range of materials from proven sustainable sources is available for customers with environmental priorities and certification can be provided for them. Waste reduction is a continuous programme working with supplier partners to audit and identify sources to reduce waste and its costs. Reduction of manufacturing waste is the first key step to reducing the impact of residual waste. Recycling to a valued waste is prioritised rather than incineration to generate energy, or worse, landfill. Sustainability also considers people as assets and business drivers. Selected staff attend expos and conferences; there are also frequent visits with suppliers and between sites, and an annual group workshop.

Morning management meeting in workshop. Source Skanem

Press hall. Source Skanem



The site developed its own Excel display matrix that shows KPIs of the day's jobs on a single screen (the MIS system can supply data but not the display format). Quality faults on press are identified for root cause, noted and analysed to optimise on press. This chart shows annual progression of average press speed. Source Skanem

Key points

- Continuous improvement central to group culture
- Optimisation of tools, distances, time & waste
- Daily production meetings and Gemba walk on factory floor
- Specific targets to optimise makeready times & waste

SunDance Graphics CASE STUDY

www.sundanceusa.com

Location: Orlando, Florida

Factory surface area: 4040 m² / 43 500 ft²

Company created: 2006

Ownership: Family company and partners

Principal Products: Business printing and promotional materials, direct mail, security printing, packaging, labels, large format, order fulfilment.

Primary Clients: Local and national businesses; market specific services for conventions, healthcare, tourism.

Annual turnover: U$10 million (2016); a 24 % compound growth rate attained since the Company was founded.

Number of staff: 46 (about 25 % in Sales), plus 15 in sister art publishing company.

Shifts: Double shifts; when needed 24 hours /day with 2 x 12 hour shifts.

Annual substrate consumption: 805 tonnes / 792 tons

Principal production equipment: Complete prepress; Offset press: 6-col Speedmaster CD 102, Quickmaster 2-col; Digital: HP Indigo, Scitex, Konica-Minolta; HP Large format flexible and rigid; Postpress: Comprehensive bindery and finishing, including foiling, die cutting, laser engraving and mailing lines.

Company strategy: Providing exceptional customer service and partnerships, Lean & Green operational excellence, and staff incentives.

Principal KPIs: PIA ratios labour to sales and cost of goods.

Certifications / Awards: SGP, FSC, 3M and FDA certified; in 2016 won 21 Florida PIA Awards and two Foil & Specialty Effects Association Awards; named by Inc Magazine as one of 5000 fastest growing private companies in America.

	Strengths
Commercial Strategy	● ● ● ●
Organisation & People	● ● ● ●
Technology application	● ● ○ ○
Lean & Green	● ● ● ○

Excellent: ● ● ● ●

SunDance was created 10 years ago by a family from outside the printing industry and has become Central Florida's leading commercial printer. The award winning company has achieved a compound annual growth rate of 24% since its creation. In 2015 it moved into a new factory triple the size of their first site. Using tools like Open-Book Management, Continuous Improvement and Sustainable Green Printing, SunDance has applied innovative solutions that drive business, eliminate waste and decrease environmental impact.

Profile

In 2004, John Ruggieri bought a small fine art publishing company and in 2006 launched into commercial printing. The goal was to become the leading commercial printer in Central Florida by providing exceptional customer service. The family used its experience from other manufacturing businesses to identify solutions that were the easiest, fastest and cheapest, while ensuring quality of product and service with environmental responsibility.

Customers are concentrated in central Florida, with increasing activity in some other States. The Company's focus is to develop powerful partnerships with its clients through having more sales staff than most of its competitors. About 25 % of SunDance's staff have sales functions and are underpinned by significant creative resources from a sister company. Finishing staff and designers regularly create samples to promote differentiated products as a tool for sales staff to work with customers. Customer education seminars are held for designers, buyers and marketers: recent half-day events looked at 'Haptic Brain / Haptic Brand' and 'Special Effects & Finishing'.

Product Differentiation

New product innovation comes from client demand and SunDance rarely says 'no' to customers with an unusual demand. The solution may require technology to be used differently, or the purchase of new equipment on a 'customer partnership' approach rather than a strict ROI. SunDance has invested millions of dollars to provide one-stop shopping for its clients and to satisfy their extremely tight time frames and high quality demands, to the extent that the manufacturing facility has an eclectic set of services and equipment for all types of printing, binding and mailing, including laser engraving, die cutting and foiling. Wide format printing was introduced four years ago and has allowed differentiation with signage and interior design décor — an interior designer has been hired to help sales staff and customers with ideas and applications.

Order fulfilment at Sundance, their extensive use of racking has added 12% to the factory area. Source SunDance

Innovation and Motivation

"What makes us different is our culture, people and processes; at every level we put the customer first and we train our staff to practice this on every project. We do not hesitate to partner with a client and take on a project that requires us to come up with an innovative solution. Our current clients value this and continue to push us to be better." says Managing Director JohnHenry Ruggieri.

They have created a culture of employee ownership and uses Jack Stack's 'Great Game of Business' as part of the Company's foundation. Open Book Management training has closed the gap between managers and employees by promoting transparency, consistency and alignment of core values. One result is the sharing of information on Company financial performance and to introduce profit sharing for all staff to encourage them help improve margins and reduce expenses. Everyone now has a stake in the continued success of a Company that has almost no staff turnover.

All employees contributed to optimising the layout of the new building. Source SunDance.

Sustainability

SunDance was Florida's first Sustainable Green Partnership commercial printer. *"Green is a belief that we must have a reasonable behaviour towards the environment and this is formalised by the SGP programme."* Innovation starts at shop floor. There is a formal Lean programme with a system that allows staff to submit improvements, with top ideas rewarded with a cash prize. The SunDance culture encourages 'continuous tinkering' to make things work better, faster and cheaper. Some SGP improvement actions include:

- Crushing cleaned ink cans to produce compact blocks that recyclers will now collect, rather than sending them to landfill. The waste ink is sold back to a supplier who uses it to make black news ink.
- Tracking raw material use to help identify where to reduce consumption.
- Eco-friendly product design using materials from renewable resources or with low environmental impact, taking into account recycling and recovery efforts.
- Use of low VOC solvents, vegetable-based inks, recycling of solvent, blanket wash, paper waste and plates.
- Reduction of offset makeready time by 35% using 70% less paper and ink.
- Digital printing to deliver to customers exactly what they need when they need it.
- Planned maintenance implemented by a staff mechanic with adequate spares and tools.

The benefits of Lean and Green working are achieved by staff participation and consist of many small ideas along with a few big things. When the Company moved into its new large factory two years ago, everyone contributed to optimising the layout. For example, all ancillary equipment was mounted on self-levelling wheels and stored in racks when not in use. The 9 m / 30 ft ceiling height allowed multi-level racking to add 465 m2 / 5,000 ft2 — nearly 12% — to the total factory area. Another idea was to move from 'hard' to 'soft' proofing by sending a team to the customer's design studio to profile, trouble-shoot and calibrate their equipment. This not only ensures high quality and reduces cost, it also reinforces a sense of customer partnership.

KPIs

Until recently the primary KPIs have been PIA ratios of labour-to-sales and cost-of-goods. Recently, a Tharsten enterprise MIS system has been installed to provide reliable management data while reducing clerical work and to improve productivity.

Heidelberg's client benchmarking showed that SunDance is achieving above average press results compared to similar companies. The press supplier also conducted an onsite workshop to identify where efficiency could be improved, highlighting the bindery and finishing areas as the biggest challenges to monitor and improve performance. Hand held MIS terminals are being considered to input data in this area.

John Ruggieri, President. and JohnHenry Ruggieri, Managing Director. Source SunDance.

Ancillary equipment is stored in racks when not in use to optimise use of floor space. Source SunDance

Key points

- Compound annual growth rate of 24%
- Develop powerful partnerships with clients
- Lean programme encourages staff to submit improvement ideas
- Profit sharing to improve margins and reduce expenses

Premier Press CASE STUDY

www.premierpress.com

Location: Portland, Oregon, USA

Surface area: 13 935 m²/150 000 ft² (internal area)

Company created: 1974

Ownership: Privately owned family company

Principal Products: General commercial, book, packaging, mailing and fulfilment, retail in-store marketing and large format graphics.

Primary Clients: Diverse multiple markets — including national retail, footwear, clothing, health care, sporting goods and insurance companies.

Annual turnover: $26 million

Number of staff: 150 (60% sales, admin, office, logistics, about 40% manufacturing).

Shifts: 24/5 with day and swing shifts.

Annual substrate consumption: 950 tonnes (1045 tons), plus plastics.

Production equipment: Prepress: Fuji CTP; Press: Sheetfed offset 2 Komori UV hybrid 6 and 8-col, Ryobi 2-col; Digital Komori Impremia IS29 29" sheetfed inkjet, HP 7500 Indigo, envelope presses; Finishing: full bindery, die cutting and mailing lines. Large format digital presses Vutex LXR, Durst 800 6-col, HP Latex 3000, plus cutters < 1,5 x 3 m (5x10 ft), laminator, welding.

Company strategy: One-stop supplier from design to delivery, accompanied by marketing project management. Integrated continuous improvement and sustainability policies.

Principal KPIs: Daily: Incoming sales; Weekly: Work efficiency (individual and overall employee utilization rate, overtime, temporary labour hours), Work-in-Process (labour and material), Rework %; Monthly: Financial Statements (profit and cost centres % of sales); Quarterly: Work centre hours and equipment use rate.

Certifications / Awards: G7, SGP, FSC Certified. Oregon Manufacturer of the Year 2015, PIA Benny Awards 2013 for Best Catalogue, 2015 Special Innovation Award-Printing.

	Strengths
Commercial Strategy	●●●○
Organisation & People	●●●○
Technology application	●●●●
Lean & Green	●●●●

Excellent: ●●●●

Premier Press is the largest commercial printer in Portland, Oregon — one of the world's most eco-friendly cities, a major port, a technology hub and manufacturing centre. The business is managed by two sisters of the second generation of the founding family. They have diversified the Company to provide a single source of multiple services from design through production to storage and fulfilment. They began their Lean journey in 2007, followed by the Sustainable Green Printer programme in 2008. In parallel, there was significant investment in new technologies. During the last nine years these factors have helped profitability to be consistently over twice the industry average.

Consolidation

IGrowth forced the consolidation of separate production and warehouse operations into a large single unit in 2015 to enable more efficient workflows, improve turnaround times, and allow room for new equipment and services. An existing building was purchased, gutted and remodelled with new features including sweeping stairways, a grand viewing area, library, large boardroom and an outdoor eating area. The integrated warehouse provides storage and fulfilment services, packing, kitting and complete mailing services.

Services and Markets

Premier Press is a single source print provider geared to ensure high quality and rapid delivery, and to enable innovation and creativity in handling complex projects. They use advanced technology operated by competent staff for every part of the process, from concept and colour control, to print, finishing and fulfilment. The diversity and combination of services are a key marketing strategy and include:

- **Printing & Finishing:** In-house offset and digital printing production using G7 colour quality management. Finishing includes bindery and mailing — added value growth comes from foil stamping, die cutting and embossing.
- **Large Format:** All resources for retail, exhibit, event, and promotional graphics — design, manufacturing, distribution, installation and project management — for window and wall displays, signage, posters, indoor and outdoor floor graphics on multiple substrates.
- **Fulfilment:** Online marketing solutions and logistics ensure on-time delivery, correctly packaged materials, and efficient fulfilment for cost-effective shipping. The Company's largest customer uses these services.
- **Online storefronts:** In-house design and development team.

Continuous Improvement

The Lean journey began in 2007 when the VP of Manufacturing attended a week-long workshop. The first initiative was in the pressroom, where crews used 5S and SMED set-up to reduce makeready time, ink and paper waste. The programme was then successfully expanded in 2010 to the fulfilment area. Continuous Improvement went company-wide in 2013, accompanied by the appointment of a co-ordinator and assistance from the Oregon Manufacturing Extension Partnershp (OMEP). Two years later, Premier was awarded the Oregon Manufacturer of the Year (100-500 employee category) by the 'Portland Business Journal'.

A large single site factory was opened in 2015 to improve efficiency by consolidating separate production and warehouse operations. Source Premier

"Continuous Improvement has transformed our culture. All of our employees feel enabled, and are expected to find ways to improve our processes," said Ted Waterworth, CI Coordinator, *"Although there was some initial resistance this was quickly overcome and early adopters helped create momentum."* CI is working to explore new processes and systems and is now moving to front office operations.

Sustainability

Portland is one of the world's most eco-friendly cities, adding to the context of the environmental commitment of Premier Press from its long-term strategies and practices that protect, sustain and restore the environment. These goals are seen as an opportunity, not a liability, and considered to be a key metric of company growth.

SGP (Sustainable Green Printing) started in late 2007 at a PIA sustainability conference attended by the Company president. The financial crisis made some time available to start SGP in 2008 and Premier Press was the first full-service printing company on the Pacific coast to be certified in 2009. SGP audits, documents, applies programme metrics, implements management systems, requires environmental footprint reduction, pollution prevention and monitors social and ethical aspects of a business. While most sustainability requirements were already in place, they were not well documented, but help from PIA and SGIA assisted overcoming these hurdles. There is also an external partnership with OMEP, a State not-for-profit consulting agency providing sound sustainability advice.

Auditors are very helpful. They alternate every two years between a remote data audit, and an on-site visit when they also look through plant and talk to staff and the SGP team.

The annual SGP improvement project is increasingly being driven by Continuous Improvement initiatives, and the duality of these two disciplines is a natural combination of 'Lean and Green'. For example, this year's project is war-on-waste to identify and reduce the eight sources of waste. Another project concerns 'smart talent' to develop effective training and knowledge improvement.

Project results are highlighted in social media, banners displayed in the factory, gold stars and employee cash rewards. Premier also encourages its customers to join in the reduction of the collective environmental footprint while enhancing the value and impact of products.

Chip Chipman, the purchasing manager, leads the Company's sustainability staff team that represents all departments to identify and improve sustainable practices. Achievements include: 100% wind-generated electricity; Scope 2 carbon neutral certified facility; energy-efficient lighting system with motion sensors to cut warehouse energy use by 50%; comprehensive recycle, reuse and repurpose programme for all materials; E2 printing inks, renewable vegetable oils, low VOCs; reduction of ink and paper consumables; and using blanket wash technology to reduce VOC emissions by 95%.

Being the only SGP printer in the State makes them a lone wolf. A better dynamic would be two to three certified companies competing with each other.

Culture

CI and SGP have helped establish an open team-based culture and the Company is very open to any source of innovation. Employee engagement is essential to capture feedback and engage in actions. The Company shares key metrics with staff at quarterly meetings, e.g. sales, spoilage rates, metrics compared to industry leaders (PIA Ratios).

Premier communicates community sustainability through training, promoting employee lifestyle — commuting by bicycle or public transportation, health and wellness — and continuously improving production processes with environmentally responsible business partners, buying local when possible. CSR is not yet important for most of its customers but SGP already provides many sources of relevant social and environmental actions.

"Sustainability is a top priority. We continually invest in new equipment and technology supporting sustainable process. We enthusiastically support the Continuous Improvement program and our team truly cares to operate sustainably," concludes Chip Chipman, Purchasing Manager & Sustainability Coordinator.

Premier is managed by two sisters of the second generation of the founding family Left to Right Juli Cordill and Joni Feryn. Source Premier

Joe Paz die maker. Source Premier

Kevin Andersen, wide format press operator. Source Premier

Key points

- Profitability consistently over twice the industry average
- Continuous improvement has transformed Company culture
- Environmental commitment is a growth opportunity
- Promotes community sustainability

Image Options Inc

CASE STUDY

www.imageoptions.net

Location: Southern California, USA

Surface area: 9 570 m² / 103 000 ft²

Company created: 1999

Ownership: Private company with four working partners.

Principal Products: Large display graphics for indoor and outdoor applications, including window and wall coverings, posters, vehicles, signs and displays. Project management of graphics for retail and exhibitions.

Primary Clients: National and international retail and corporate brands, events organisers, museums.

Number of staff: 112 full time + 12 temporary when required

Substrates: PTFE, foil, paper, glass, wood, tile, aluminium, textiles.

Production equipment: Digital presses: Large format EFI/Vutek with LED UV, Epsom, Klieverik, Graphtec, Mimaki, Richo; finishing: routers and cutting, laminators, welding, sewing and box making.

Company strategy: Exceed customer expectations with full in-house services from conception to installation of high quality graphics produced on advanced imaging technology combined with environmental responsibility.

Certifications / Awards: G7 and SGP Certified, 3M™ Materials Warranty Trained.

	Strengths
Commercial Strategy	● ● ● ●
Organisation & People	● ● ● ○
Technology application	● ● ● ●
Lean & Green	● ● ● ○

Excellent: ● ● ● ●

Image Options is a company specialised in all aspects of large format visual communications for retail and corporate marketing — from design to engineering, production, delivery and installation, accompanied by an open project management service. The Company's foundation is a strong management team of four working partners — president, chief executive, operating and technology officers — each with over 30 years' experience in the domain. They have evolved Image Options into a total visual service company supplying high quality products that are environmentally responsible.

The Company is now almost a creative agency; they provide 3-D rendering of proposed installations, as well as building expo booths, renting out frames and providing trade printing. Installation was recently bought in-house.

In 2012, Image Options developed a software management service for its customers that not only adds a new revenue stream but also reinforces the Company's competitive differentiation, while increasing partnership potential with their customers. They also share information on new materials, fabrics and production techniques to help customers make informed creative decisions.

Image Options is also part of an informal international network with similar companies in UK, Germany and Australia, with whom they exchange work and techniques.

Consolidation

In mid-2016 the Company consolidated its two sites into a single location. At that time they decided to close their screen printing business (acquired in 2010) because of the costs to transfer its processing systems, along with decreasing print run lengths and improved digital economic performance. In recent years, digital flat board production speed has increased from 20 to 100 sheets per hour, while screen printing origination and makeready continues to take about three hours — during which time up to 300 sheets can be digitally printed. The new factory has to conform to very strict Californian requirements for building energy and water efficiency — e.g. only LED lights can be used, sensors must be fitted, low flush toilets, 20% reduction in water consumption.

Services

Premier Press is a single source print provider geared to ensure high quality and rapid delivery, and to enable innovation and creativity in handling complex projects. They use advanced technology operated by competent staff for every part of the process, from concept and colour control, to print, finishing and fulfilment. The diversity and combination of services are a key marketing strategy and include:

- **Design/photography:** The subsidiary company, Refraction Group, provides strategic planning and expert design.
- **Project management:** IO View is an innovative proprietary platform that allows customers to easily collaborate on large format projects.
- **Production:** Consistent G7 certified colour printing is accompanied by continuing investment in advanced imaging technologies.
- **Installation:** An international network of planners, certified in-house installers and partners ensures seamless installation of graphics — from billboards to vehicle wraps.

Project Management Service

The motivation to develop a project management system came from the Company's retail customers, who have multiple sites (hundreds to low thousands and send Point-of-Sale and other graphics to all their stores: each retail unit being obliged to pay for them whether they were used or not. This process was poorly managed using spreadsheets that were neither centralised nor reliable. This inspired the development of IO View to provide an innovative high-value service to its customers by giving them seamless control of their visual communications throughout an entire campaign.

IO View is a Cloud-based project management system that reduces customer costs and business complexity, and improves efficiency in order to ensure that the right graphic always goes to the right place on time. The single portal provides up-to-date secure information from any source — image assets, interactive calendar, job status, tracking, installation photos, et al. The software's modules can also be user-customised to meet specific needs. The system is 'open' to all users and allows customers to work with other graphic suppliers, eliminating 'locked-in to single supplier' objections. In 2013 IO View was extended to the events management domain, where up to 10 000 graphics may be required for an exhibition in the hall, on stands, hotels, buses and poster sites.

Continuous Improvement

Image Options has innovated without a formal Lean strategy. However, the experience of its four working partners includes working with Continuous Improvement, Six Sigma, and other processes. Most importantly, the Company has established a team-working philosophy that drives them both to find better customer value solutions and to continually strive to improve and streamline their operations. This is described by the Chief Technical Officer as *"a team journey with a lot of collaborative work and not a top down approach from a single person. From concept to installation, we're always looking for new technologies and efficiencies to help us better serve our clients."*

Cross-functional working is commonly used to identify issues and solutions from the bottom up. Normally, decisions are data driven after the root cause of an issue is defined. A weekly meeting reviews projects with periodic goals. Currently, there is little training in teamwork. They are now considering a more organised approach starting with attending events like PIA's Continuous Improvement Conference. A source of thought and management process is Gino Wickman's 'Traction: Get a Grip on Your Business' that has helped transform the way the business is run. All managers go through Six Sigma training to yellow or green belt levels.

The Company has established an open collaborative culture, sharing information with its staff at quarterly meetings on top line financial revenues, growth goals, investment, etc. The Company and its staff members regularly contribute to charitable and community projects.

Sustainable Green Printers (SGP)

Image Options is one of only two SGP companies registered in California — less than 100 of the USA's 29 000 printers are SGP registered. An explanation is that certification requires a lot of effort and commitment to provide the precise documentation required, along with a collaborative company culture.

SGP streamlines the process of procuring 'Green printing' because it requires suppliers to meet stringent standards of environmental performance; it eliminates the need for proprietary 'Green' standards and checklists and therefore simplifies supplier selection. A condition of certification is that participating suppliers perform at levels that meet or surpass local, state, and federal regulations; who continuously improve over time; observe best industry practices; and share these practices throughout their own supply chains to help improve overall sustainability. SGP also shows a company's commitment to its customers, shareholders, employees and stakeholders.

One remaining challenge is the disposal of visual graphics at the end of their life cycle when the customer's campaign comes to an end. CSR is required by only a few large customers and being SGP certified helps answer some of their environmental and social requirements.

Image Options continuously works with all of its suppliers to identify new eco-friendly solutions to further improve operations, minimise environmental impact, and provide new customer products. This has led to the establishment of a materials testing database: when a new material is delivered to the factory it is entered into the database and assigned to a machine to test, the multi-criteria results are shared with the suppler — there are now over 600 tested profiles.

Key points

- Strong management team of four working partners
- Full service supplier of large format visuals campaigns
- Innovative project management system reduces customer costs and complexity
- Cross-functional working to identify solutions from the bottom up

CHAPTER 3

Co-development

One of the printing industry's most valuable attributes is its agility — its ability to reconfigure and revitalise itself through a wide range of cooperative initiatives. Co-development is a major business trend of building alliances and ventures between multiple organisations that goes beyond working with external resources.

This agility is very much related to the competencies of the leaders of generally small- to mid-size companies. Their collaboration brings together complementary resources — human, creative, commercial, technical and financial — to implement projects that no single organisation would be able to do on their own. The sharing of values and professional culture is generally critical to their success.

Collaborative industry initiatives are variable combinations of organisations in the value chain — printers, suppliers, associations, technical-academic organisations and clients. Some alliances provide their members with specialist resources not normally available to them; while others are formed to create new products or services, or address a specific market; and others enable environmental efficiency, share expertise and best practices.

The role of industry federations is to provide information and services to members, such as market and process developments, environmental issues and the evolution of regulations. In many cases they also facilitate industry cooperation. Corporate Social Responsibility (CSR) can be another dimension of these approaches to show the "equitable sharing of value".

OrganisationType of collaboration		Country	Printers	Suppliers	Clients	Assocs	Page
Paju BookCity	Book publishing & printing cluster	Korea	●		●	●	54
Functional Print Cluster	Functional printing cluster	Spain	●	●		●	56
Virtual library	Document network with customer	France	●		●		58
Imprim Luxe	Organisation of printing excellence	France	●	●	●	●	60
PrintCity VAP	Suppliers packaging sector organisation	Europe		●			60
ImprimClub/ ImpriFrance	Commercial printers' co-operative	France	●			●	61
Print Franchises	Franchise with independent operators	Global	●				61
ClimateCalc	Industry associations joint company/tool	Europe	●			●	62
Imprim' Vert	Industry environmental label	Europe	●			●	63
OPHAL	Cross-industry best practice group	Global	●	●	●	●	64

Collaboration between companies enables projects that no single organisation would be able to achieve on their own.

Examples of collaborative working arrangements

Cooperative purchasing: Cooperative programmes to reduce purchase costs include Printing Industries of America, which offers its members exclusive discounts on products and services; and the independent Graphic Arts Alliance that helps mid-sized printing and packaging companies access supplier discounts of up to $12 000 per year that are normally only available to large companies. In France, both ImpriFrance and ImpriClub were originally created as 'simple' purchasing groups.

Alliances: ImpriClub and ImpriFrance are two examples of independent printers working together successfully in professional cooperatives. These groups grew from purchasing platforms into other areas of common interest to provide their members (who are small- to medium-size companies) with access to developmental resources normally only available to much larger companies.

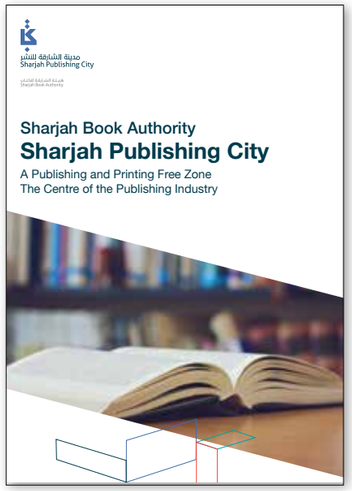
Franchises: Another form of collective organisation where the central franchise group provides a branded business structure and resources to enable individual store owners to concentrate on sales. Some franchises are sophisticated suppliers of communications services in addition to digital printing of documents, publications, large format displays and signs. In some countries more than 10% of printing sites are owned and managed by franchise holders.

Clusters: These are dedicated new business combinations of existing companies. For example, the Functional Print Cluster of northern Spanish printing companies was established to identify new sources of business where they could collaborate rather than compete. The cluster brings together 27 companies, a graphic association, university and multidisciplinary technical centres.

Commercial project alliance: These networks are facilitated by either the use of the same equipment (e.g. HP and Xerox user networks), or common procedures (like franchise or workflow networks). The ENGIE virtual library is a good example of new communication tools and longer-term collaboration between different players to print locally, avoid the economic and environmental costs of transport, and ensure worldwide ease of user access to virtual documents.

Expert groups: Organisations that share common interests take different forms. In packaging, the Imprim'Luxe association is limited to 50 French printing and packaging companies to promote their referenced competencies to the luxury goods market. While the PrintCity strategic alliance of packaging suppliers creates more attractive and functional products by combining their expertise. There are also cross-industry project collaborations. For example, 'Optimised Paper Handling & Logistics' (OPHAL) brings together over 30 industry organisations and companies to share expertise and best practices across the entire paper value chain.

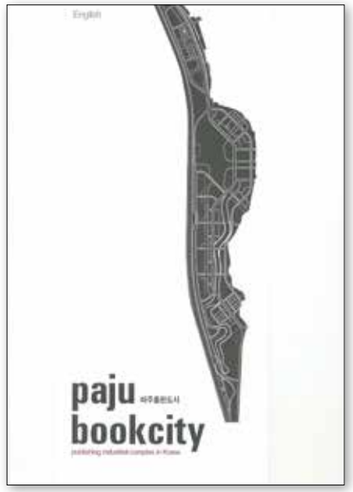
Physical centres: Probably the most outstanding example of collective development is Paju BookCity, which was conceived to reinvent Korean publishing, architecture and urban planning. The industrial estate is an exemplary architectural environment, often cited as an international role model of urban design, set within an eco-friendly cultural area. In the United Arab Emirates, the world's first tax-free zone for publishing and printing opened in 2017. In its first phase the purpose-built facility expects to accommodate about 150 companies. The annual Sharjah International Book Fair attracts over 1650 publishing houses from 60 countries, and the Emirate will be the UNESCO World Book Capital for 2019.



The Sharjah Publishing City will house publishers, distributors, printers, translators. The Arab book market is estimated to be worth US$1 billion per annum.

Environmental initiatives: These are by their nature collaborative. Some, like Sustainable Green Printer in the US, may be elitist due to their development requirements. Others, like the French Imprim'Vert, are more broadly based, aimed at reducing the environmental impact of the printing industry — Imprim'Vert is now the world's leading graphic arts environmental brand with around 2200 labelled sites. ClimateCalc is both a tool and an international association that illustrates the value of a collaboration between national graphic federations that resulted in the creation of a web-based tool used to calculate the carbon footprint of a print product.

Circular value chain: Collaboration is the precondition to drive the transition from a traditional linear economy to the new circular economy that requires exchanges between all value chain participants. This can be illustrated by the example of recycling newspapers and magazines printed with mineral oil based offset inks. Recycled fibre from these publications to be used for food packaging requires close collaboration between each stage of the linked value chains: 1. initial users (ink suppliers, printers, publishers); 2. recycled fibre and paper manufacturers; 3. users of recycled paper-board and public administrations. In the same way, the eco-design of a print product requires an effective dialogue between the graphic designer, printer, paper supplier and the client to help identify real environmental solutions and to avoid 'false' good solutions.



Paju BookCity is an outstanding example of collective development for book printing and publishing.

Collaboration potential

New ways of collaboration are closely linked to new organisational approaches. The company that is sure of its qualities is better placed to understand that the collective interest of a network is a source of individual value creation. Such companies are generally more able to assess the value of a potential collaboration and its risks.

CSR drives sustainability

Corporate Social Responsibility (CSR) is an international methodology that defines and evaluates a company's contributions to the social, economic and environmental ecosystem within which its services and goods are produced. It is a form of corporate self-regulation integrated into a business model that contributes to sustainable development by delivering benefits to all stakeholders. While it may be understood and implemented differently among companies and countries, its underlying purpose is to drive change towards sustainability. The recognised international standard for CSR is ISO 26000.

For many companies, CSR goes beyond a compliance and purchase criteria to become a key performance measurement that can be benchmarked and used for operational and strategic development. This approach positions the company within its own ecosystem to identify and evaluate its performance; a precondition for sustainability, then, is to listen to and consider the expectations of all stakeholders in that ecosystem.

Relationships between stakeholders

This is primarily a developmental approach that encompasses all the participants and environments of a value chain. Assessing the 'right' share of value created by the company requires building new relationships between stakeholders in which the interests of one stakeholder should not be developed at the expense of another.

CSR takes many forms depending on who is implementing it. It may be a purely marketing approach to meet the expectations of clients; it may only be integrated into the supplier selection process to ensure that responsible purchasing is considered; or it could be dedicated to meet purely a regulatory requirement. Generally, narrow motivations sterilise the CSR approach and do not allow the company to access fully the potential benefits to be derived from a comprehensive examination of the organisation, production methods, and the relations with its stakeholders. Alternatively, an in-depth approach that goes beyond narrow approaches (customer/supplier, employer/employee, cost-time-quality) can positively impact on all parties. This requires adequate time and the recognition that the strength of the value chain is determined by its weakest link.

Implementation steps

The first CSR step is to identify the various stakeholders — the individuals, groups or organisations involved in the business. Internal stakeholders include employees, managers and shareholders, while external stakeholders include customers, suppliers, subcontractors, public authorities, NGOs, consumers and local groups.

The second step is to identify the primary issues for improvement that the company must consider. The company needs to differentiate between issues on which it can have an influence, the issues it controls, and the other issues it faces. The ISO26000 standard defines seven issues:

1. Corporate governance
2. Human rights
3. Relations and working conditions
4. Environment
5. Fair practices
6. Consumer issues
7. Communities and local development.

Economics can also be added. All stakeholders are interviewed to identify, from their perspective, issues of importance. An issue will be prioritised if it is considered to be both important and in need of improvement. Stakeholders must cooperate and work together to allow the company to identify the items that need attention and to focus on key priority issues with a corresponding strategy. This includes monitoring and analysing indicators *(see KPIs page 34)* designed to measure the effectiveness of subsequent improvement projects.

For most companies, these approaches are relatively cumbersome, either due to the lack of internal resources or because there are many stakeholders. Supplier evaluation platforms (like Ecovadis and Sedex) are dedicated to overcoming this problem. Companies are usually requested by their customers to respond to a platform's evaluation questionnaire on their CSR actions. These answers need to be supported with supporting evidence. The questionnaire can also be complemented by an on-site audit. As a result of this evaluation, the company obtains a score and/or a sector ranking (bronze, silver, gold). The scores are recorded in a database that may be made available to other clients of the platform concerned.

This approach has a dual advantage. It allows large companies both to outsource the evaluation of its many suppliers and to facilitate a responsible purchasing policy based on platform scores. It allows a supplier (in theory) to be interviewed and audited only once and the results then become available to all of its customers using the platform. However, this remains theoretical because not all of a company's customers use a platform and/or the same platform. A drawback of these external services is that they can create a screen between the customer and the supplier that undermines the principles of the CSR collaborative approach.

The UK, Sweden, Denmark and France are the four CSR global leaders when compared to companies from OECD and BRICS countries, according to EcoVadis/Médiateur 2017 barometer (based on data from nearly 20 000 companies on 21 environmental, social and governance criteria).

Graphic industry CSR

Other approaches between stakeholders are being deployed in the graphic industry in parallel with these platforms. An early example is the Graphic Association Denmark *(opposite page)*. Another is the energy supplier ENGIE, which is active in 70 countries, and which defined its eco-publishing policy by initiating a stakeholder committee and working with its suppliers *(page 58)*.

The French printing federation (UNIIC) in partnership with employee organisations is initiating a framework agreement to engage the entire profession to implement CSR. A key to the success of such a project is the quality of collaboration between the stakeholders. For this reason, UNIIC helped create a steering committee representing all relevant stakeholders (printers, customers, suppliers, administrations, NGOs, etc.), the role of which is to identify issues that should be treated as priorities. These issues were identified based on the results from a widely distributed questionnaire to French stakeholders, combined with the experience and expectations of committee members. The recognition of priority issues by the entire value chain will eventually drive co-developmental projects to more effectively address them.

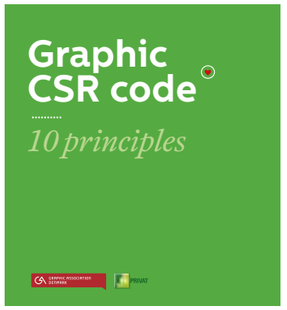
UN's 17 Sustainable Development Goals

These 17 goals that promote prosperity while protecting the planet were adopted at the 70th UN General Assembly in 2015. All governments have been asked to implement national frameworks to achieve these objectives by 2030. The experience from the Millennium Development Goals, adopted in 2000, has helped define169 associated targets and indicators. Public and private organisations will be able to select different objectives and measure progress by 2030.
www.un.org/sustainabledevelopment/fr/

Denmark
CSR code

In the printing community, the Graphic Association Denmark has been an early initiator by making available to its members a CSR code reflecting both employer and employee perspectives that interface with customers and suppliers. The code is published as a declaration on each company's website. In addition, there are documentation and control requirements.

For more information:
www.ga.dk/CSR
www.hkprivat.dk/csr



Paju BookCity CASE STUDY

Paju is an extraordinary cultural and architectural development. Source Ecograf

One of the most outstanding examples of collective development is Paju BookCity, which was conceived in 1989 as a centre to reinvent Korean publishing, architecture and urban planning. The industrial estate was initially created for and by companies involved in book manufacturing — publishers, printers, distributors — and now extends to include software consulting, development and distribution, as well as film and television broadcasting. Paju BookCity is also an exemplary architectural environment, often cited as an international role model of urban design, set within an eco-friendly cultural area.

In 1988, the publisher Yi Ki-ung and a small group of colleagues conceived Paju BookCity as a cultural and economic project to sustain a commitment to books and printing. They formed a cooperative that was joined by 360 companies to lobby the Korean Government to create a special economic zone for 'publishing culture and an information industrial complex'. The Government built most of the infrastructure, provided land at a discount, low-cost financing, a five-year tax exemption, and funded construction of the Asia Publication and Culture Information Centre. Paju is part of a Government effort to revitalise regions outside of the capital, while Seoul is encouraging printing companies to move out of the city centre, making the special economic zone an ideal location next to a main highway that is only 30 minutes from the capital.

Architectural gems

A design team of five international architects, led by Dr. Hwang Ki-Won of the School of Environmental Studies of Seoul National University, made the master plan for the urban wetlands city. It features innovative architecture by 40 prominent architects from Korea and other countries. There are strict planning guidelines to preserve the environment and maintain harmony with surroundings. Buildings cannot exceed five stories and must be constructed with eco-friendly materials.

All companies entering BookCity, and their architects, must conform to a contract that defines a design process informed by the values of communality and collaboration — 'environmentally friendly eco-city', 'diverse and complex three-dimensional city', 'self-sufficient', 'visibly slower-speed', 'city of beautiful landscapes' and 'a city that adapts to change.' As a result, BookCity boasts a string of individual architectural gems along its curved streets that have captivated the international design press. *"It is not hyperbole to claim that this is one of the most extraordinary and most unsung cultural and architectural developments in the world,"* design critic Edwin Heathcote observed in 'A City Dedicated to Books and Print' in 2009.

Multiple aspects

Stage one was completed in 2007 with over 100 buildings, principally for publishers, paper suppliers, printers, and book binders, along with a common distribution centre located at the city entrance. Around 10 000 people worked there on completion of this phase. Publishers can make their books more easily within a collaborative one-stop area from planning to distribution.

The second phase, completed in 2017 expanded employment to about 30 000 people working not only in publishing and printing but also in the film and media business, cultural events planning, museum, libraries, retail and workshops for about 50 artists.

Paju has multiple aspects. It is dedicated to modernising the industry while preserving its values, providing education, a showcase for innovative commercial architecture in an eco-friendly industrial zone integrated with natural wet areas, and to create a new urban community. Yi Ki-ung explains, *"This is no different [than] if we were editing a huge and beautiful book called 'BookCity' on a wide expanse of land."*

For the community, the BookCity Culture Foundation provides education, cultural and international events each year such as the Book Festival for Children, BookCity Forum, and International Symposium of East Asian Books, which help publishers sell their books. The range of activities for visitors includes workshops, recitals, a petting zoo, cafés, galleries, artists' studios and a mediatheque. The Moveable Type Workshop was opened in 2007 as a functioning print shop, classroom and museum of printing history. Print is an old technology in Korea where woodblock printing on paper dates to the seventh century, and metal (bronze) moveable-type was pioneered 200 years before Gutenberg to meet the heavy demand for religious and secular books in the 13th century.

Culture shopping

BookCity has had to negotiate between old and new media, old and new urban models, and old and new cultural values. It is the first Korean project to build a cultural city with outstanding architecture and art spaces in a natural setting. People can freely visit, read books, go walking or shopping. It has had a positive impact on Korean society and is a role model for cities and industrial complexes.

The development was driven by the private sector with Korean Government sponsorship. The key to its success was the strong vision and leadership of the Paju BookCity Cooperative led by Mr. Yi Ki-ung. He ensured strict principles, kept to the concept and worked closely with urban planners and architects.

The proposed Phase 3 is to develop a 'Book Farm City,' that would merge publishing, newspapers, film, broadcasting, software and other media companies with public facilities like libraries, educational resources and research institutes. 'Farming' is more than a metaphor because Yi and Kim Young-joon want to integrate surrounding rice farmland into the next phase. A city where both books and people are cultivated, or 'farmed'.

The vision of the Paju BookCity is to combine the whole bookmaking process including planning, designing, printing, and distributing. Pursuing development of the domestic publication industry, Paju BookCity will grow further into an international cultural hub through its merits of eco-friendly cultural space and an exemplary architectural environment.

People can freely visit and read books in Paju BookCity. Source Ecograf

NEO Printing Company CASE STUDY

"The primary reason to settle in Paju BookCity is that it is a very suitable site to locate a factory because it combines a reasonable investment cost with good shared services with other printers," comments NEO's manager, Yunjuf Shin. Their presence at Paju has helped them:

- Access specific markets from the proximity of book publication companies
- Share services with other printers — equipment, experience, purchasing
- Improve the company image due to the clean and unique environment
- Reduce costs, for example the exemption of corporate tax for five years
- Participate in monthly BookCity meetings of common interest with other companies.

From a printer's point of view he would advise organisations who would like to create a something similar to Paju BookCity that it is a great opportunity. *"Paju is now a famous city in Korea, not only for book publication and printing, but also for art and cultural events. It makes sense to build a city like this within 30 minutes travel from city centres to facilitate sales, marketing and logistics. It's beneficial for printing companies to move to a location like Paju because of its convenient facilities and partners."*

High quality working conditions at NEO's factory in Paju. Source Ecograf

www.neoprintech.com

Location: Paju BookCity, South Korea

Company created: 1996

Principal Products: Books, packaging, commercial and publication printing.

Number of staff: 82

Annual substrate consumption: 3 000 tonnes

Production equipment: Prepress; Presses offset <7-colour and Gumi digital; Postpress; book publications and related services.

Certifications: ISO 9001 and 14001, Excellent SME for Green Management, Yonsei Top Management Award winner 2013.

	Strengths
Commercial Strategy	●●●●
Organisation & People	●●○○
Technology application	●●○○
Lean & Green	●●○○

Excellent: ●●●●

Functional Print Cluster

CASE STUDY

www.functionalprint.com

Location: Pamplona, Spain

Company created: 2013

Ownership: Member companies

Principal Products: Functional printing for electronic, biotechnologies, packaging; and 3D printing.

Primary clients *(cluster's members)*: Industry, agribusiness, pharmaceutical.

Annual turnover *(cluster's members)*: 570 M€

Number of staff *(cluster's members)*: 4 000

Production equipment: Predominantly sheetfed offset, screen and inkjet.

Cluster strategy: Develop new functional print products and markets using the offset process. Monitor international developments. Develop sectoral and multi-sectoral exchanges and groups at a local level not exclusively composed of printers. Facilitate new joint venture companies.

Certifications/Awards: National Seal of Excellence for Innovation; application made for Cluster Management Excellence label as defined by ESCA (European Secretariat for Cluster Analysis).

	Strengths
Commercial Strategy	● ● ● ●
Organisation & People	● ● ○ ○
Technology application	● ● ● ●
Lean & Green	● ○ ○ ○

Excellent: ● ● ● ●

BRONZE Cluster Management Excellence STRIVING FOR CLUSTER EXCELLENCE

The European Secretariat for Cluster Analysis benchmarks clusters as an effective way to identify their potential and to make strategic recommendations for further development.
Source www.cluster-analysis.org

***"The Functional Print Cluster is the development tool for Navarra's graphic arts companies and a leading international reference for functional printing",* states Mar Gonzalez, Director of Functional Print. Navarre in northern Spain has around 200 print companies with a combined staff of 4 500 employees.**

The impact of the 2008 global financial crisis was particularly severe in Spain, and the effects were still present in 2011 when nine Navarre offset printers, concerned about their future, came together to identify new sources of business with the cooperation of the Association of Graphic Companies of Navarre (AEGRAN). These entrepreneurs wanted to know if functional printing could be produced using their existing sheetfed offset presses.

A privately financed research project was then launched. This led to the formulation and manufacture of special inks that were successfully tested for printed circuit board production.

The demonstration of this new market for offset printers led to the creation in 2013 of a dedicated structure — the Functional Print Cluster. This brings together 27 companies from Navarre, along with a professional graphic training centre (Salesianos Pamplona), a university (Publica de Navarra University), a multidisciplinary technical centre (CEMITEC), and AEGRAN.

Critical size

The official recognition of this cluster was made possible for three reasons: the economic weight of graphic industries that produce 3% of Navarre's GDP; the rapid achievement of critical size when the nine founder members were joined by 15 other companies; and the international character of the organisation. The cluster observes international developments and organises regular trips throughout Europe; it officially achieved a national scope in 2018.

The Functional Print Cluster operates in three business sectors: electronics, where large scale and low cost production of flexible electronic devices is important for industrial markets, renewable energy, home automation, and retail; biotechnology for printed single-use diagnostic tools and biochemical tests; and packaging, where functional printing brings both aesthetic enhancement (e.g. electroluminescent inks) as well as new security services, guarantee labels, and new functionality (see inset). In 2018, 3D printing is being integrated. The cluster facilitates cross-sector exchanges to enable sources of creativity (printing + agro-food, printing + industry). These exchanges are facilitated by Mar Gonzales, who coordinates the network of the 10 clusters of Navarre, RedNac.

Value chain collaboration

Only companies in Navarre with activities related to the printing sector can join the cluster. While printing is the main activity for most members, it may also be only an ancillary activity, for example the automotive supplier Antolin. The cluster brings together the entire Navarre graphic industries value chain and maintains close contact with suppliers of substrates (paper, cardboard, film), plates, inks, etc. Although member companies pay an annual contribution, the principal financing of cluster activities is provided by regional, national and European public funds. Clustered companies are shown to be more innovative, register more trademarks and apply for more patents.

The primary role of Functional Print is in identifying opportunities for new products that can be made by its members. It promotes innovation in business sectors with a high industrial growth perspective that require multiple applications and low production costs. Examples include printed electrodes for use as electrochemical sensors, electroluminescent decoration devices, microwave-safe grill packaging, flexible RFID alarms, and dot-blot cards. Many other projects are under development supported by Functional Print.

The organisation also supports members to create new companies. For example, Lan Printech was created by six members to specialise in printing electrodes for electrochemical analysis that detects organic substances in a drop of a solution for applications such as measuring blood glucose levels. The collaboration between these companies, which are competitors in the graphics market, was made possible because the new company is active only in other markets and products. The cluster broadly accompanies new projects including customer relations and even ensuring billing.

The underlying strength of this internationally recognised cluster resides in its initial approach dedicated to the offset process. The major economic difficulties faced by the region's printers provided the impetus for them to associate and think both collectively and imaginatively to develop offset products for the future.

Toasted in the microwave

A project to develop a new microwave oven packaging product was launched in 2015 by three cluster companies specialised in packaging. Flexography is used to deposit a metal (usually aluminium) in a defined pattern. This metal layer captures some of the electromagnetic waves and converts them into heat to warm defined areas of the product contained in the package. The result is that a portion of the oven's microwaves heat the inside of the food, while another portion externally heats the package to give the food a grilled and crunchy texture.

FUNCTIONAL PRINT CLUSTER

VISION

To become the developmental driver for the graphic industries in Navarra to become a global reference in functional printing.

MISSION

To build an association of companies, technologies and knowledge centres committed to promoting and developing functional printing in Navarra with the shared aim of promoting growth and competitiveness through cooperation.

Key points

- Collective business cluster
- Joint product innovation
- Central cluster resources
- International presence

Distributed library CASE STUDY

AGG Print

www.aggprint.com

Location(s): 4 sites in the Auvergne-Rhône-Alpes, region of France

Company created: 1980

Ownership: AGG Print Private company (Alain Gilles Group)

Turnover: 4,2 M € in 2016 (+ 16,6% from 2015)

Number of staff: 35

Principal products: Digital print of visual and corporate communications, signs, decorative and industrial printing. Customised software and secure services to manage documents, distribute and print them on demand.

Certifications/Awards: Imprim'Vert label, ISO14001, ClimateCalc, FSC and PEFC.

Bee Buzziness

www.beebuzziness.com

Location: Grenoble, France

Company created: 2001

Ownership: French Business angels, individual, Paragon Group.

Turnover: 1,5 M € in 2016 (+ 22,3% from 2015)

Number of staff: 45

Principal products: Software for document management and digital publications that digitalise, enrich, file, distribute and output documents. Its primary clients are large international groups looking for innovative document management solutions.

Awards: Topcom, XPloor France 2016, Digital Award 2016, Ekoburo Innovation Trophy.

Combined innovation profile AGG Print / Bee Buzziness

	Strengths
Commercial Strategy	● ● ● ●
Organisation & People	● ● ○ ○
Technology application	● ● ● ●
Lean & Green	● ● ● ○

Highest: ● ● ● ●

Two small printing and software companies combined their competencies to provide an innovative document handling service to a large multi-national company. BeeBuzziness had developed a virtual library service that integrates print-on-demand from AGG Print, which responds to the ENGIE Group's eco-edition policy to reduce the environmental impact of its documents. The three companies recognised they could jointly develop a single integrated solution that provides ENGIE with multiple benefits: simple global access to virtual and printed documents; easy ordering of print documents of the exact quantity and quality required; consistent, traceable and up-to-date documents; reduction in costs, waste, transport, storage; and improved environmental profile.

The French energy group ENGIE (previously GDF Suez) is active in 70 countries with 150 000 employees. In 2009, the Company implemented an eco-edition policy to reduce the environmental impact of its documents and to systematically promote uniform environmental labels and certificates for the choice of paper and other attributes. It published the 'Practical Guide to Eco-Publishing' in 2010 after analysing its process chain, making an assessment with its 550 worldwide print buyers and consulting stakeholders. This guide (in 18 languages) specifies seven criteria that must be respected from conception to delivery of all Group documents: selection of paper, printer, document design, recyclability, distribution conditions (print run length and delivery) and an imprint that shows that the print product conforms to the defined criteria.

ENGIE's corporate communication management decided to deepen this approach with a worldwide proposal to optimise document printing in three dimensions:

1. **Finance** – reduce total cost of document management (printing, paper and distribution).
2. **Environment** – ensure all printed products respect eco-publishing criteria.
3. **Organisation** – centralised document management and simplified user access and order procedures.

The project solution

A solution to ENGIE's requirements was proposed by the managers of BeeBuzziness, Pierre-Nicodème Taslé, and AGG Print, Guy Podvin, who have worked together for many years.

BeeBuzziness developed its virtual library software to allow ENGIE to make all of its publications available from a single Internet site (www.library.engie.com). The data quality of each new document is assessed and then converted to the required digital format before being placed on the library site. These documents can then be viewed on screen without special software or downloading. Paper versions can easily be ordered (at no charge) by using an integrated print-on-demand function from AGG Print.

In parallel, ENGIE audited its printing suppliers to ensure they would meet their environmental criteria and attain corresponding labels (e.g. Imprim'Vert) and certification (ISO14001, FSC®, PEFC™). This is referenced on a dedicated site (www.engie.com/liste-des-imprimeurs-partenaires-du-groupe/). These printers form an international print-on-demand and delivery network.

This solution provides ENGIE with a number of benefits:

Rationalisation: Only the exact quantities of documents required at a given time are printed. This reduces waste, environmental impact and total printing costs.

Practical access: All publications from ENGIE and its subsidiaries are available from a single point. The virtual library interface has nine languages and up to 24 different document language versions that are easy to consult. The distinction between internal and external clients ensures controlled access to documents. People with restricted vision have an accessibility function in the virtual library either to increase contrast and type size or to use automatic reading software.

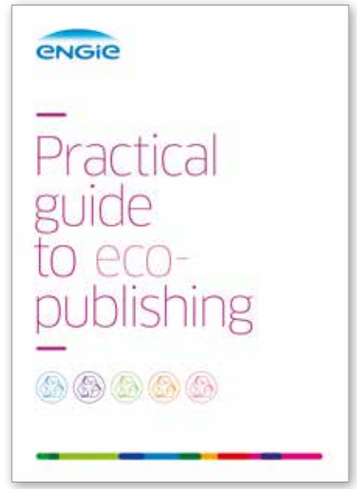
Uniformity: The single digital format ensures that a document can always be read irrespective of the device being used. The automation and centralisation of the print-on-demand service guarantees quality (version, colorimetry, paper selection) and consistency from proof to delivery (single workflow, printing, packing, delivery).

Elimination of hidden costs: No more costs from unused printed documents that are over-stocked or out-of-date (printing, transport, storage and management).

Transport and related impacts: A worldwide network of printers allows printing at the closest point to distribution to reduce transport costs, time and climate emissions.

Traceability: The library centralises print orders and makes them transparent (type, quantity, location). The number of digital readers can also be analysed to measure interest in published documents.

Environment: The primary benefit is from producing only the exact quantities of paper-based documents that are really used. Only environmentally certified printers following defined procedures and using referenced papers — recycled, FSC or PEFC — are used. Every print order is automatically calculated for its carbon footprint. The international printing network will eliminate the negative impact of airfreight.



ENGIE published this guide after analysing its process chain and it specifies seven criteria that must be respected from conception to delivery.

Where are the innovations?

The core of the project resides in the technical innovation by BeeBuzziness, particularly the software feature that ensures there is a single universal format to read the document, and its connection to print-on-demand. The project would not have worked if the participants were unable to overcome conventional wisdom to provide:

1. Digital print quality that would satisfy customer expectations.
2. A higher print-on-demand unit cost would lead to economies within the total cost of global document management.
3. It is possible to print less, yet supply a better service over the long term.

AGG Print considers that even if there was some reduction in print volumes, this was compensated by the stronger commercial relation with their client by their providing them with a complete communication solution. In addition, the internationalisation of other clients allows them to now propose a structured order solution based on a set of defined consistent printing competencies.

Key success factors include a shared long term vision by the participants, combined with a stable and confident relationship where each party was able to satisfy their own interests (technical, financial, organisational) from the project. The complementarity of competencies (communication, IT, printing) based on a common understanding of documents was also important. In addition, BeeBuzziness and AGG Print were willing to invest in the project even though the visibility of ROI was initially unclear.

AGG produces a wide range of digitaliy printed corporate communications and signs. Source AGG

The virtual library interface ensures there is a single universal format to read all documents. Source BeeBusiness

Key points

- A global approach to the problem
- Challenging technical convention
- Multi-disciplines of participants
- Technical competence and interpersonal abilities of participants

French Print

In 2015, France had around 4 500 graphic companies employing 53 000 people to transform over two million tons of paper per year.
The French printing market is a very open with competition coming from countries such as Germany, Belgium, Spain and Italy.

There are multiple collaborative projects in the French graphic industry. These national and international initiatives are principally driven by the national print federation UNIIC, and can be loosely grouped under the French Print promotional banner.

These include: Imprim'Luxe which promotes the competencies of the industrial packaging value chain that supports the major French luxury brands of worldwide renown. The Imprim'Vert environmental label is recognised by all French companies (customers, printers, suppliers, government) to improve the sector's overall environmental performance and its general perception. France is also a founder member of ClimateCalc, the European method to measure greenhouse gases to enable printing companies to reduce their emissions. These collaborative groups may be reserved for a limited number of companies (ImpriFrance, ImpriClub and Imprim'Luxe) or available for the whole sector (Imprim'Vert, ClimateCalc, CSR framework agreement).

The term French Print was proposed by UNIIC for Drupa 2016 to collectively promote these initiatives. It is also a 'best cost' strategic alternative to 'low cost' policies that can lead to the destruction of economic, industrial and cultural value.

There also company collaborative actions like those of ImpriFrance and ImpriClub. These organisations of small- to mid-size printers that were initially created to obtain better purchase prices but now share many other activities.

Imprim'Luxe

www.imprim-luxe.fr

The Imprim'Luxe association was created in 2013 in response to the French Ministry of Economy's call for collective actions to support the competitiveness of the luxury goods industry. The group is limited to 50 referenced French companies in the graphic sector (creation, communication, printing, packaging and converters).

The association has five priority objectives: Firstly, Imprim'Luxe and its members must be the reference in terms of expertise and graphic production for French luxury brands. Secondly, to valorise these graphic industry companies. The third and fourth objectives are to (re)locate print flows in France and to accompany the export development of its members. Finally, these four objectives must be achieved in accordance with the principles of sustainable development and a responsible business model.

There are two stages to achieve the Imprim'Luxe label. Firstly, the company must prove that it respects the five criteria defined by the association: human resources, service commitment, product design and manufacturing, safety of people and goods, and the environment. Conformity is confirmed by an on-site audit. The Board of Directors then reviews the application before granting membership of the association. Imprim'Luxe is a resolutely elitist association that limits its industrial members to 50 companies.

The association has a second group that brings together graphic industry suppliers. These partners bring their expertise, support, relational and financial resources to the association. A third group brings together the clients — the luxury brands most likely to use the services of labelled companies.

Imprim'Luxe organises many events to create links between its members, to develop their market knowledge and to promote the label to major luxury brands. Programmes include visits to companies, conferences addressed by industry leaders who present their experiences, expectations, and strategies, and participation in fairs (notably LuxePack). Each of these events brings together several dozen members. Pierre Ballet, the founding president emphasises *"the richness of cross-fertilisation and the proven effectiveness of hunting in packs".*

PrintCity is a strategic alliance of suppliers to the packaging industry. Its Value Added Packaging programme help make products more attractive and functional by combining the expertise and products of its members and partners. This 'El Drago' demonstration concept for luxury outer packaging uses self-adhesive paper labels with strong haptic and visual effects. Source PrintCity

ImpriClub & ImpriFrance

These two networks of independent companies bring together respectively 62 and 85 small- to mid-size printers. ImpriFrance was created in 1986 and ImpriClub in 1991. These networks were created as 'simple' purchasing groups to allow their members to obtain better purchase prices for their consumables (paper, ink, offset plates, etc.). This initial function has been significantly increased in scope.

Today, ImpriClub and ImpriFrance promote the exchange of experience between their members, both at the level of company directors and of employees. These exchanges take various forms including working groups, training, projects, conventions, and theme days for subjects like innovation or lean management. These network exchanges are a source of inspiration as they stimulate participants to develop their competencies, encourage co-contracting between members, and to develop a common culture.

Members are drawn from all over France, and for ImpriClub also from Spain. Companies are selected on various criteria: size, financial status, and in particular the personality and ethics of the manager. In addition, all members sign a charter that guarantees their performance, financial strength and environmental commitment. Both organisations decided to limit the number of members to better develop trust and networking between members and maintain a common culture.

The two networks are not competitors and collaborate on different themes. Recently, they made a joint FSC® and PEFCTM chain of custody multi-site certification for their members. This approach facilitates the daily operations of companies by offering individual assistance and by sharing some of the constraints imposed by this type of certification. In addition, multi-site certification significantly reduces the total costs when compared with individual certification.

ImpriFrance assists its members to define and implement their CSR strategy. Each year members can work on themes covering environmental, social and economic domains. ImpriFrance defines a specific indicator for each theme to facilitate benchmarking. This allows members to measure the effectiveness of their actions and the evolution of their overall performance in relation to the entire network.

ImpriClub provides financial benchmarking. An external accounting company regularly reviews the economic results of all members. A barometer gathers different KPIs together to better display their evolution. An intervention group is alerted if a member falls below a critical negative level of one of these indicators. The group consists of a member of the accounting company and two or three printer members who work with the company concerned to help determine corrective actions.

Both ImpriClub and ImpriFrance are aware of the need to promote the profession, particularly with young people. They both award annual scholarships to students from vocational and graphic arts BTS streams who have persevered in their studies and shown their willingness to surpass themselves and overcome difficulties.

ImpriFrance members at their annual general meeting in 2017. Source ImpriFrance

IMPRICLUB
LE GROUPEMENT DES IMPRIMEURS
www.impriclub.biz

imprifrance
La garantie de l'excellence
www.imprifrance.fr

Print Franchises

Franchise printing chains are another form of collective organisation. The central franchise organisation centrally provides key business functions to support store marketing, production, purchase, IT, recruitment and training. This allows the store owner-manager to focus on developing their local business.
Often classed as simple 'copy shops', franchises are increasingly sophisticated suppliers of broader communications services in addition to digital printing of documents, publications, large format displays and signs.

Franchise printing chains are extensive in some countries like Australia, where there are about 500 print franchise stores that represent over 10% of all printing companies. The leader, Snap, is a local company with around 150 sites followed by three US Franchise chains with about 200 stores.

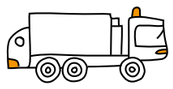
The Snap Australian network has over half-a-million clients, with a turnover of around 90 € M. Its dual strategy targets (a) small businesses as a complete communication services provider; and (b) larger corporate clients as outsourced document centres. Most stores provide websites, design and marketing as a complete service provider. In-store printing focuses on short-run digital, while more complex work is produced either at a group offset hub or is outsourced. IT is a key group infrastructure that allows production at multiple sites and helps penetrate corporate accounts by leveraging its national digital printing network.

Environmental leadership

www.imprimvert.fr

IMPRIM'VERT®

Attribution requirements



1: Good management of hazardous waste (e.g. offset plate developer, fountain solution, cleaning solvents).

2: Ensuring the secure storage of hazardous liquids (cleaning solvents, mineral oils, dampening additives, liquid waste).

3: The exclusion of all toxic products.

4: Ensuring the environmental awareness of personnel.

5: Regular monitoring of energy consumption.

Source Imprim'Vert

Imprim'Vert was created in 1998 as a pragmatic method to reduce the environmental impact of the printing industry. Today, it is the world's leading graphic arts environmental brand with around 2200 labelled production sites in nine European countries.

The Imprim'Vert label is awarded for one year to graphic production sites that prove their compliance with the brand's specifications across five criteria:

1. Good management of hazardous waste
2. Ensuring the secure storage of hazardous liquids
3. The exclusion of all toxic products
4. Ensuring the environmental awareness of personnel
5. Regular monitoring of energy consumption.

European location of Imprim'Vert labeled sites in 2017.

To maintain Imprim'Vert for the following two years, the company has to send information online to prove that they adhere to the specifications. After three years a new diagnosis is undertaken for the next three-year cycle.

The success of Imprim'Vert's development in France was made possible from the simultaneous creation of multiple networks. The national driving force behind the initiative is the French graphic industries federation, UNIIC, which partnered with a network of regional Chambers of Trades and Crafts, and Chambers of Commerce and Industry. The participation of these commercial chambers has helped establish a network of nearly 200 referral agents who cover the entire country. The Imprim'Vert referral agents are trained in the graphic industry and environmental issues. They make on-site diagnoses of printing plants wand help companies present their applications to one of the 22 local attribution committees. This organisation ensures that all French printers can easily access resources to initiate an Imprim'Vert application.

In parallel, awareness-raising activities were made to print customers — nationally by UNIIC, and locally by the referral agents. This key strategy presented the value of Imprim'Vert's environmental interest to clients so that they could benefit from it as print buyers. The objective was that these customers would ask their print suppliers to obtain the Imprim'Vert brand.

Another essential network is comprised of training centres that include technical high schools, apprentice training centres and engineering schools — about 15 institutions are involved in this process. The aim is to present Imprim'Vert actions to students, either by the referral agents and/or their teachers, so that students can in turn promote the concept to the companies that host or hire them. All French training centres with printing equipment hold the Imprim'Vert label and all graphic arts students are familiar with the brand.

A network of suppliers was created and informed of the Imprim'Vert approach. This allows them to highlight products that meet the label's specifications, as well as sharing the spirit of the brand.

The network of printers was encouraged through this organisation. The benefits for the industry's value chain in the Imprim'Vert brand has been clearly demonstrated, and about half of all French printers are now labelled.

The establishment of these networks allows Imprim'Vert to:

- Broadly improve the sector's environmental performance because it is a commitment to achieve results that ensure environmental priorities are respected.
- Be technically and financially accessible to all businesses, regardless of size, printing process and geographical location.
- Be managed by the not-for-profit Amigraf / Imprimerie Innovation Centre that belongs to the graphic sector.

Climate Collaboration

ClimateCalc
www.climatecalc.eu

ClimateCalc is both a tool and an international association. The alliance illustrates the value of collaboration between graphic federations of several countries who share the same objective.

In 2010, the European graphic industries employer federations became aware of the need to reduce greenhouse gas emissions. This interest was based on both environmental and commercial considerations. Some customers, especially publishers, questioned the level of emissions generated by their printing and actions needed to reduce them.

To answer these concerns it was necessary to measure the carbon footprint of a print product. However, this depends on the perimeters considered, the choice of certain methodologies and emission factors. It was, therefore, important to agree on a common evaluation method to ensure the consistency of assessments between countries and underpin fair competition. The environment committee of Intergraf (the European confederation of graphic industries) defined 13 variables to be calculated when assessing the carbon footprint of a print product. These variables relate to the printed product (type of paper, amount of ink consumed, and finished product transport) and to the printing company that produces it (energy consumption, staff commuting).

Several European graphic federations then joined forces to create an evaluation tool based on these recommendations. The initial member federations came from Belgium, Denmark, Finland, France, Holland and UK, and were later joined by those from Norway and Portugal. They created an international association to develop and manage the tool.

Today, all European (as well as Indian) printing companies have a specific partnership that allows them to use the same emissions evaluation method. These companies can both identify their main sources of greenhouse gas emission reductions and pass on qualified information to their customers about the products they deliver to them. In addition, magazine and newspaper publishers can assess the carbon impact of the media campaigns of its advertisers.

This collaboration between federations offers many advantages over an individual approach. The first is technical. The calculation tool was built from feedback from several countries — this pooling of knowledge has made it a robust and scientifically sound tool. The financial benefit is evident from a fair distribution of costs between the federations. In addition, this shared financing has made it possible to offer extremely low costs to users.

The collective approach also adds to the credibility of the device. The fact that eight European countries and India share the same method and apply the same procedures has developed a high level of trust in both the users and their customers. In addition, this collective approach demonstrates the cooperation of the graphic sector at a European level, giving it greater influence with national and regional governments.

Cross-industry collaboration

The 270-page guide is available as a free e-book (from www.ophal.info) because the participating organisations believe that price should not be a barrier to access best practices.

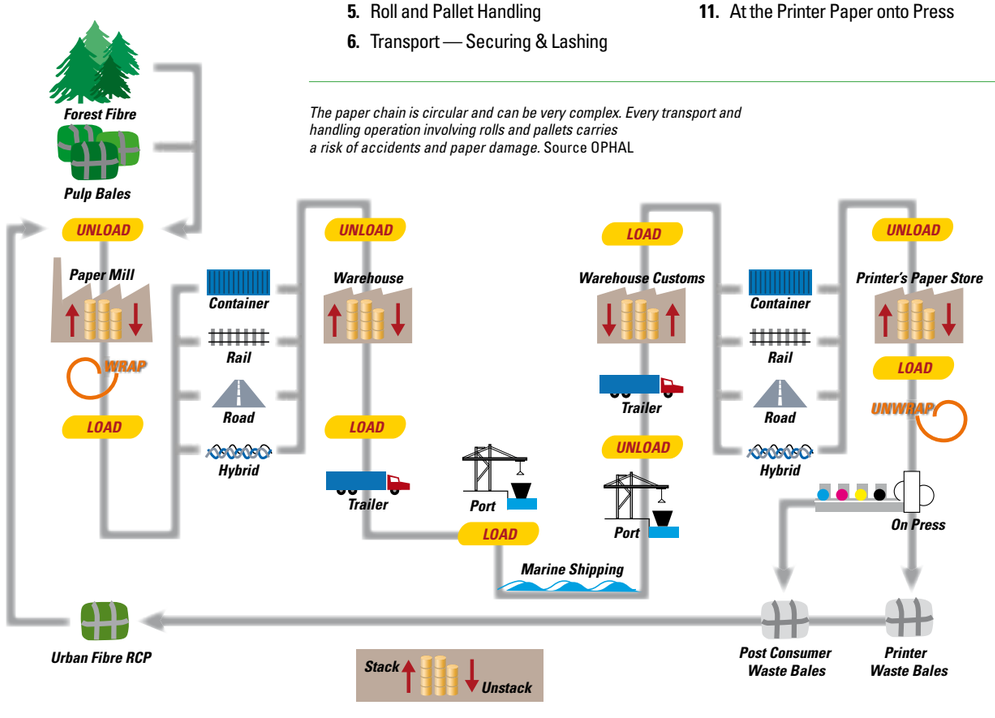
A significant cross-industry collaborative project was recently completed under the Lean & Green banner. It brought together expertise from across the entire paper supply chain from the mill, through transport, storage, handling and printing. The result is the OPHAL guide, a common generic best practice tool that is a global reference for suppliers, transporters, converters and printers to improve their efficiency.

"Optimised Paper Handling & Logistics" (OPHAL) offers a comprehensive view across a value chain that is both complex and global: which no single company, organisation, or region can adequately address. The guide was produced by over 30 international companies and organisations including ERA, Idealliance, icmPrint, NOPA, WAN-IFRA.

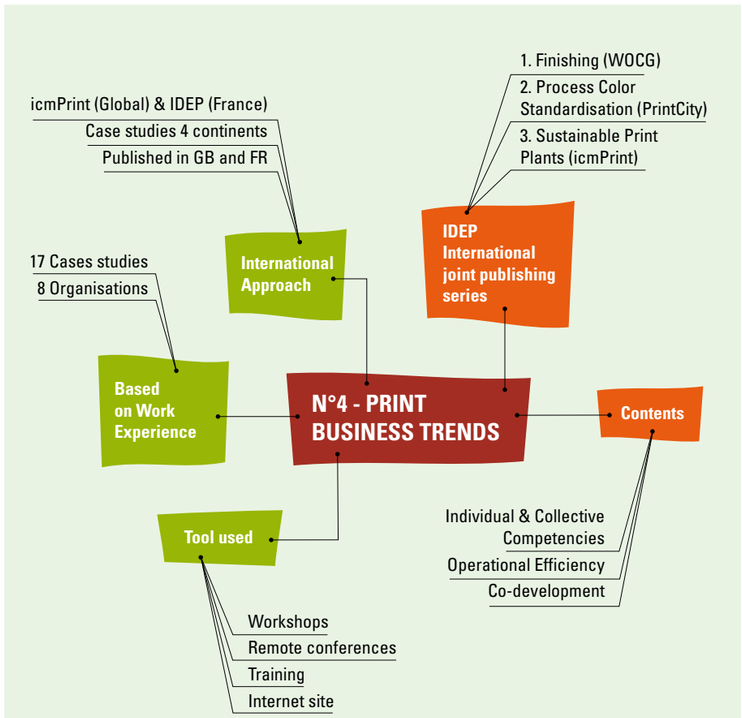
Paper is handled 10-20 times from when it leaves the paper mill to when it is put onto the press. Every operation involving rolls and pallets carries a risk of accidents and damage. Paper is a demanding cargo with a high economic unit value, requiring specialised and correctly maintained techniques, tools and facilities for handling, logistics, storage and preparation for printing. The OPHAL Guide covers paper and board in rolls and sheets used for publishing and packaging applications for major printing processes. It is a tool dedicated to reducing the risks of accidents and economic and environmental degradation across the paper value chain.

The guide is structured into 11 easy-to-use modules to better understand how best practices are a tool to improve performance and trouble-shooting for everyone — whether they are supervisors, operating staff, suppliers or supply chain managers.

1. Paper & Cores - Wrapping & Pallets
2. Inspect, Report, Evaluate & Repair
3. Warehouse and Paper Store
4. Paper Handling Equipment
5. Roll and Pallet Handling
6. Transport — Securing & Lashing
7. Road Transport
8. Rail Transport
9. Transport Containers
10. Transport Maritime Shipping
11. At the Printer Paper onto Press



The paper chain is circular and can be very complex. Every transport and handling operation involving rolls and pallets carries a risk of accidents and paper damage. Source OPHAL

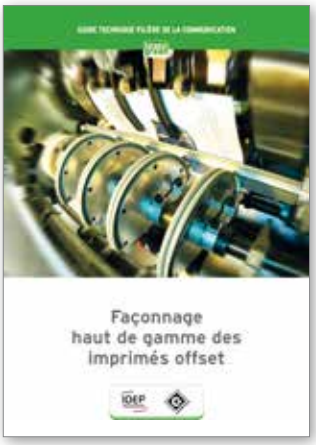


The European Secretariat for Cluster Analysis benchmarks clusters as an effective way to identify their potential and to make strategic recommendations for further development. Source www.cluster-analysis.org

icmPrint — The International Centre for Manufacture by Printing — brings together two industry organisations to create a single not-for-profit resource centre for best practices, technical advice, underlying science, and training, along with innovation development for products where printing plays an essential role in their manufacture. icmPrint, brings together **Print Process Champions** (PPC/WOCG) generic best practices platform with the **Advancing Printing Network** (APN) created by the **Welsh Centre for Printing and Coating** (WCPC) within Swansea University's College of Engineering, UK. Their scope includes all printing processes for applications ranging from publication, packaging, security, fabrics, ceramics, polymer electronics, biosensors, etc. www.icmPrint.com

IDEP — Institute de développement et d'expertise du plurimedia — is a resource for multimedia professionals in France. The first of its kind, this bipartisan industrial organization takes a holistic approach to identify solutions that impact a company's development strategy in evolving markets. IDEP develops a multi-disciplinary expertise in different fields such as economics, technologies, environment and training. It also encourages and supports common projects between different industry participants. In addition, their national network of project managers distribute its tools, organise conferences and workshops, and help strengthen competitiveness across the domain. www.com-idep.fr

OTHER GUIDES AVAILABLE



Lean & Green manufacturing improves economic and environmental performance while optimising the consumption of raw materials and energy.

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icmPrint

IDEP and icmPrint work in association to co-edit cross-industry best practice guides for the graphic industry. They are designed as a common tool for managers, supervisors and operators.

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