

Systems for the production of digitally printed short-run and tailored advertising

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Abstract: Personalization, tailoring and customization are options often mentioned in connection with digital printing. These concepts need accurate definitions to make sure that they are understood correctly. This paper describes the different ways to produce tailored, short-run advertising materials on demand by digital printing. The characteristics of the present technologies for the production of variable data and tailored printed products are reviewed and the most important shortcomings identified.

A case study in which business-to-business marketing material was created and tested in practice, using the existing tools, is reported. The efforts and costs needed to create a system (databases, tools and design practices) for planning and implementing tailoring, the limitations of the available technology and the attained benefits are evaluated with the advertising agency and the advertiser.

A prototype system was developed at VTT for tailoring shop advertising. A WWW-browser is used for storewise tailoring. The system has a repository of the available content elements (layouts, pictures, text) and these as well as the product type, such as a poster or a leaflet, can be selected therein. The final product is printed by the digital printing method.

Introduction

Digital printing is an interesting alternative in the new constellation of conventional printing, electronic off-line and on-line network communications. It opens up new

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customer groups, and permitting competition with user-profiled electronic communications. Also the rapidly developing information networks and digitized production processes, as well as new operations models can be put to good use in digital printing. In fact, traditionally printed products, digitally printed products and electronic network products will probably prove mutually complementary in the future, forming integrated wholes where the different components' roles depend on the applications.

According to our definition, *digital printing* (computer-to-print) is a printing method in which electronically made-up black-and-white or multicolored printed products are produced directly from the information system with a digitally controlled printing engine. The products may be different by sample or by page. A *complete digital printing system* has in-line finishing.

The essential elements of the definition are *directly from the information system* and *different by sample or by page*. This leaves out computer-to-plate-on-press and computer-to-cylinder-on-press systems as long as the information cannot be changed on the cylinder for each rotation. This also means that it is not possible to introduce electronic collation or variable-information printing for personalization or tailoring. Another essential term here is *printed products*, which sets the acceptable standard of quality at over 600 dpi, or the number of gray tones at a level required for a printed product. This level is also achieved with a resolution under 600 dpi, provided that the number of gray levels in the dot can be adjusted.

It is necessary to point out that our definition excludes low-volume printing at homes, schools or offices. Ink-jet printing is also excluded because of the limitations of either the quality or the capacity make it unsuitable for the production of printed products.

By printing variable information it is possible to bring out a printed product in which the contents of some or all of the pages are varied. This is indeed the most significant area of application for digital printing, opening up new and interesting opportunities. Variable information may also be used in many different ways. Table 1 gives an outline prepared by VTT to explain the terms in more detail. It is also important to point out here that the printing of variable information is not necessarily confined to short runs. And by printing variable information we can use so-called electronic collation, which means that, for example, all the pages of a book are printed in succession and the book is ready for binding.

Table 1. Definition of the terms relating to variable information

Term	Definition
Personalization	The printed product carries in one or several places the receiver's or addressee's name, or equivalent information (the other parts of the product remain unchanged from copy to copy).
Customization	The content of the printed product is designed specially for a defined target group or for a certain occasion. The target group may be large or small.
Versionization	Several different versions are made of the printed product in one or various production runs: one version is printed in several similar copies, i.e. they are not made for individual receivers but for a group of receivers.
Tailoring	A single design process produces the same message with several variations, typically to match the receiver's specifications or interests, and/or the same basic material is used at different times. Generally also personalization is used for tailored printed advertising.

The results reviewed in this paper were obtained in the project "Digital Printing as a Part of the Business Chains" (Lehtonen & al. 1995, Södergård &al. 1997, VTI/IT 1997)

Printing systems for variable information

There are two principal techniques for the production of documents with variable information:

- a separate PostScript file is made of each version, or
- an extended PostScript code is used to define every page as being made up of an invariable or constant part and of elements which contain variable information. These extensions are supplier-dependent and the RIP must be able to read the extension produced by the definition program.

The suppliers listed in Table 2 provide solutions for the definition of variable information. With these systems, every single page need not be RIPed individually because they rely on the separation of elements into a constant part and variable parts.

Table 2. Software for the definition of documents which contain variable information and the respectively controlled digital printing machines.

Manufacturer	Software	Controlled printing machines
Agfa	Personalizer-X	Agfa ChromaPress 32i ja 50i
Atlas Software	PrintShop Mail	Canon CLC1000, DocuColor 40
Barco	VIP Line, VIP Designer	Xeikon DCP/32D ja 50 D
ColorAge	DiamondMerge	DocuPress
IBM	MergeDoc	InfoColor 70
Indigo	Yours Truly	E-Print 1000
Scitex	Darwin	DocuColor 40
Xeikon	Private-I	Xeikon DCP/32D and 50 D
Xerox	Darwin	DocuColor 70
Varis	VariScript	Several single-colour digital printing machines

The parts of the document, which contain variable and constant information, and the sources from which the variable information is picked and entered in the specified fields are defined by a specially developed program or by a plug-in extension of the makeup software. This last mentioned is the most commonly used solution today. The programs differ from one another in that some of them permit a conditional definition of the content of the fields, while others only allow to run information - collected in a specific field of the database - into a certain place in the document.

The most advanced solutions permit conditional compilation. To achieve this with less advanced solutions, the information in conditionally variable fields must be prepared in advance, i.e. when the database is formed. Many of the programs have no longer restrictions on the number of variable fields per page. This is a result of the larger buffer storage between the RIP and the engine.

Figure 1 shows the various stages of the definition process in a document that contains variable information.

The trend is to use PDF and Extreme architecture also for documents with variable information, provided that the elements of invariable (constant) and variable information are first separated in the page. The invariable or constant element is RIPed once and integrated with the variable information in the page. New developments in this sector will probably be published during the year 1998.

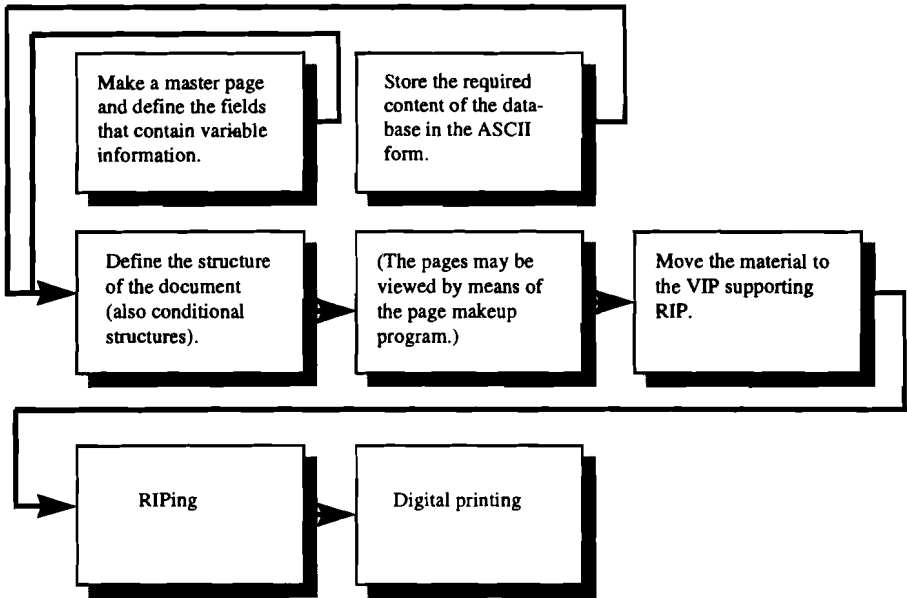


Figure 1. The work flow to produce a print job with variable information.

In addition to the easy and smooth definition of the documents and efficient RIPing, a third important factor in the comparison of production systems for documents which contain variable data is their capacity to transfer data from the RIP to the printing engine.

One question that is not quite solved yet is document verification. Many systems allow visual inspection in advance and some programs generate lists of suspect cases, for example if an element of variable information does not fit into the respective field. But it is laborious to inspect large sets of material visually, and the results are not too reliable.

If the variable information consists of pictures, the system for variable information must have OPI support and this is not yet available in all systems. Another problem is quality assurance throughout the chain: it takes a lot of work and increases the cost of the process.

Demand for variable information and operations models

According to a study made in Finland in the year 1996 (Sii 97), the biggest growth in advertising is forecast for the Internet/WWW and addressed direct mail advertising. The companies were asked whether they would be willing to pay more for direct-mail advertising material tailored to a customer or a group of customers. 30 per cent of the companies who responded were not willing to pay extra for direct-mail advertising material tailored to a customer or a group of customers. 50 per cent of the companies would pay up to 10 per cent extra and 20 per cent of the companies would pay in excess of 10 per cent extra. Figure 2 shows the willingness of different companies to pay for tailored advertising. Large companies are the most willing to pay some more, while medium-sized companies are the least willing to pay extra. Large service companies show the most interest and are also generally willing to pay for these services. Trade is the second potential sector, while industrial and multi-branch companies are more negative.

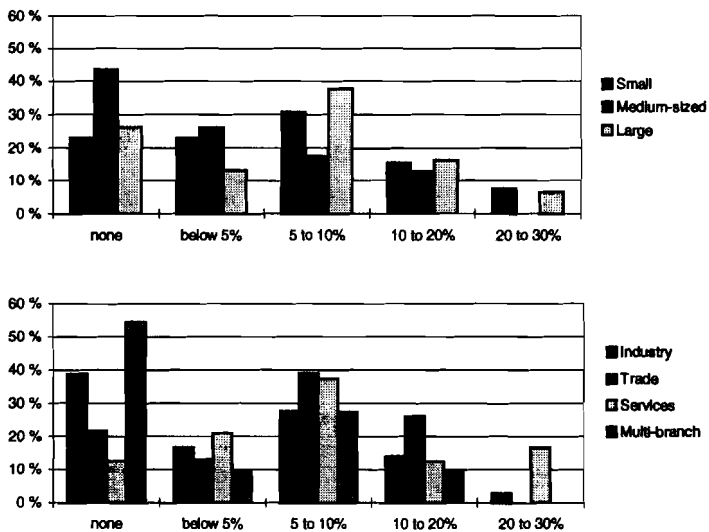


Figure 2. The willingness of different companies to pay extra for direct mail advertising materials tailored to the customer or to a group of customers.

Keen demand is forecast for the printing of variable information. But a technological solution alone is not enough here. The customer who orders a print job must also have a database that permits customization of the printed products. This is a new approach to the customers and may slow down the general advance of printing variable information. And, as regards the compilation and application of databases,

also the restrictions imposed by the Personal Register Act must be taken into account.

Major advertisers, such as retail chains, have already these databases as well as files on their regular customers. But their editions, also for target marketing, are so large that traditional direct mail advertising must be accepted as a competitive alternative. The final product is then collated from preprinted elements, perhaps partly personalized, and the elements of variable information are ink-jet printed on the same line.

Digital printing is a good choice for target marketing to relatively small groups, and in the event of no - or only very few - common standard elements.

Digital printing of variable information is most useful in the production of advertising materials. This presentation focuses on two different methods for tailoring advertising materials, i.e. the push model in Figure 3 and the pull model in Figure 4. Both these models may be applied in business-to-business marketing as well as in consumer marketing.

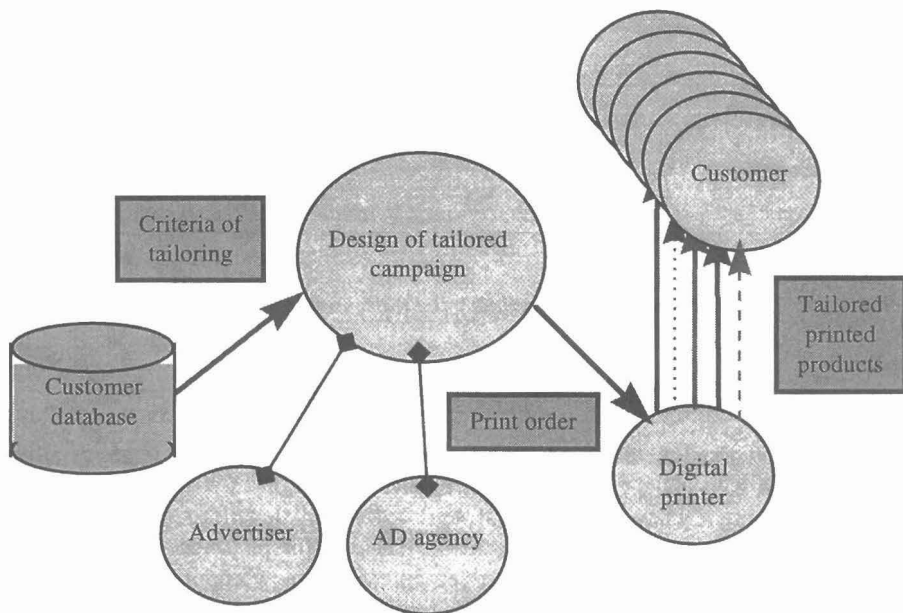


Figure 3. Tailored marketing materials - the push model

In the push model, the advertiser/advertising agency plans the content and defines the tailoring criteria on the basis of the information collected about the end customers, while in the pull model the client chooses among the offered alternatives the tailoring criteria for the compilation of the material and for the final printed product.

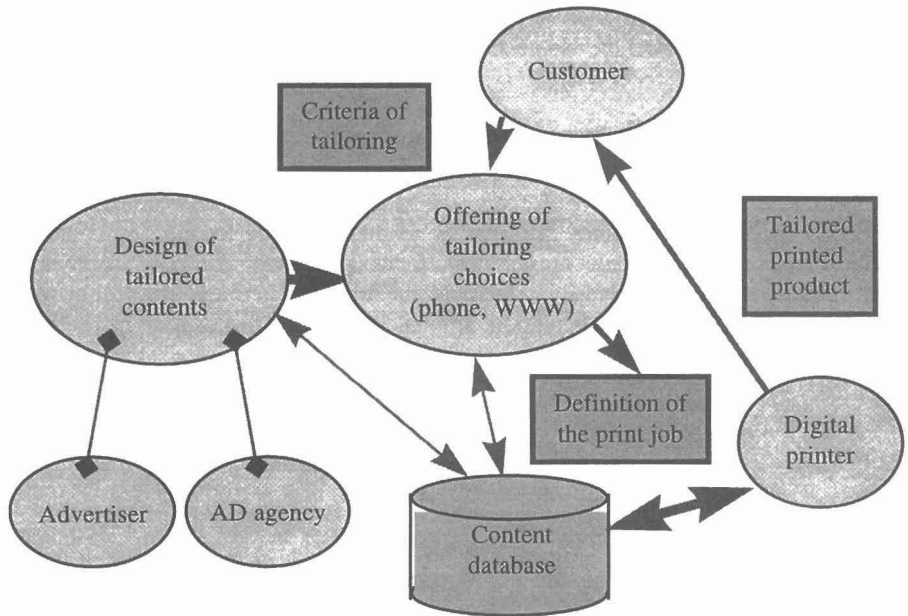


Figure 4. Tailored marketing materials - the pull model

A versionized marketing campaign

Basis: We worked with an advertising agency and its client, a pharmaceutical company, to gain insight into the planning and realization of a tailored campaign. The advertising agency and its client were interested in tailoring because direct mail advertising is an important marketing channel for pharmaceutical products. Tailoring and versionization seem to open up exciting new opportunities, ensuring better targeting and increasing the effectiveness of the advertising. The client was launching a customer database development project and the chosen printing plant had a digital four-color sheet-fed press.

The analyzed campaign was directed to 3,500 medical doctors. The options for tailoring were limited by the fact that only the names, addresses and specialties of the members of this target group were available. The problem with pharmaceutical

advertising is that the doctors are not the end-consumers of the advertised products and no information is available on the contents of their prescriptions. Lacking relevant information, it became obvious that the campaign could not be tailored in the actual sense of the word but it would be a versionized campaign with some personalization.

Planning and realization: In the first phase of the planning process, the advertising agency prepared, jointly with the client, a preliminary list of the elements which should be varied in the campaign materials, provided that there were no technical or financial limitations. The results of this planning phase are given in Table 3. This table also indicates the final content of the versionized campaign.

This content was chosen of the campaign for the following reasons:

1. The quality produced by digital printing was not regarded to be good enough for the high-quality brochure intended for use over a long period of time.
2. Digital printing was found to be very well suited for a direct-mail advertising campaign, especially with a small number of versionized items.
3. The size of the service card was changed to A5 for financial reasons. Non-standard sizes waste a lot of paper and increase the cost.

Results: The advertising agency found that the small sheet size (A3) of digital printing restricted planning and design, partly because the total printed area was so small and partly because the deviations from size A dimensions were relatively expensive. Also the selection of paper grades was considered rather limited. Besides, the agency felt that there was a risk of printing unevenly large surfaces with dark background colors.

The advertising agency was favorably impressed by the fact that a variety of approaches and messages with different contents could be used in the different segments.

Compared with an unversionized campaign, the advertising agency's planning work and costs increased as follows:

- Versionization of the letter + 66 %
- Versionization of the card + 35 %
- Versionization of the brochure + 29 %

*Table 3. Variable elements proposed for the printed products in the above mentioned campaign, provided that there were no technical or financial limitations. The elements actually included in the campaign are marked with an asterisk *.*

Printed product	Variable element	Description of the element
Cover letter ¹⁾ A4, 4/0, produced in 3 versions.	Text content *	Single-color text
	Advertising slogan	Colored text
	Salutation*	Collective or personalized salutation
	The receiver's name and address*	Personalization
Campaign brochure ²⁾ 4 pages, A5, 4/4, produced in 3 versions.	Alternative text*	Four-color text inset in the four-color cover
	The whole content of page 2	Single and four-color text and graphics
Service card ¹⁾ non-standard size, 4/4 produced in size A5 in two versions.	Alternative reply*	Single-color text
	Publicity picture*	Four-color picture at an angle of 40 degrees
Brochure for long-time use ³⁾ , 12-pages. A4, 4/4, (not produced)	Extra cover text	Four-color text inset in the four-color cover
	The whole first double page opening	

1) The variable elements are on the same side of the sheet (A3)

2) The variable elements are on different sides of the sheet (A3).

3) The variable elements are on different sides and different sheets (A3).

The total planning costs went up by about 40 per cent, compared with an unversionized campaign. Besides, about 20 per cent more time had to be spent on customer contacts and proofreading.

The print originals were created using standard page layout programs and only the personalization was created using software for variable data. For each version of the print job individual originals were created. The results show that is not easy to keep the costs at a reasonable level with this kind of an approach. The planning and design processes for variable information should be much more effective and the special programs created for that purpose hopefully make the process more efficient. On the other hand this process did not require intensive use of a database making it quick and easy in that respect. Both software and competence need to be developed and improved to make versionized and tailored printing process more efficient.

On the whole, the advertising agency and its client estimated the prospects for versionized direct mail advertising as follows:

- To keep their costs in check, companies segment their clients and customers more carefully, targeting their advertising more closely to the needs of individual customers.
- Target marketing to customers and, consequently, the need to differentiate and personalize messages will grow rapidly in the coming years.

The advertising agency thought that the following developments would be needed to make tailoring easier to apply and more generally accepted in applications like this:

- The quality of digital printing must be improved; it must be up to the standard of traditional printing methods.
- The possibility of collecting information from the customer's database by means of if-statements would afford more opportunities to use various data directly from the database.
- The majority of the pictures are still slides which the advertising agencies use to make low-resolution images for the layout presented to the client. Repro houses usually process the slides to produce high-resolution images for the final print. Advertising agencies should have the equipment to process the pictures ready for press.

A WWW-based system to compile and order tailored shop display materials

In order to use variable information in the pull model, the project team developed a system that allows to complement the prepared standard material by particulars of the ordered lot, and permits to place the respective order with the printing house.

Basis: The prototype system was applied in a set of shop displays to support the retail sales of a food manufacturer. The shop display package consisted of three printed products:

- a poster in size A 3,
- a price sheet, in size A4, to be placed near the promoted product, and
- a recipe card, in size A6, to take home.

The idea was that the producer's representative would choose, jointly with the local retail dealer, the campaign product and the respective recipe. It is an established custom with retail dealers to hand out recipes. But the novelty here was that the printed products would be tailored specially for each shop, using its logo and headlining the price sheet under the chosen theme. It is also new that the campaign would be carried out with due consideration of the shop's other goods, which would make it more effective from the dealer's point of view. The purpose of the large poster (A3) was to arouse the customer's interest and it should be near the place where the first ingredient of the recipe is found. The price sheet in turn was a reminder of the food producer's product and it must be near the respective shelf or stand.

The elements to be tailored were:

- on the poster: the store logo
- on the price sheet: the store logo, the price of the product, the headline
- on the recipe: the store logo

Requirements: To make the ordering and use of this marketing package easy and simple for all those concerned, the following requirements were set for the system:

- It should be easy enough for the sales representatives to determine the theme or the contents of the display package, as well as the elements to be included, and the items to be tailored in the printed products.
- A connection to the server should be provided through a mobile phone as well.
- The print originals should be compiled automatically according to the definitions.
- It must be possible to check the originals before printing.

Implementation: A WWW browser was chosen as the link-up for the sales representatives and a Mac was used for the automatic compilation of the print originals - the automatic control of the makeup software is easier in a Mac than in Windows-based systems. The WWW server was installed in the same Mac as the makeup software. PDF was the format for the inspection and transfer of the print originals. This means that, in addition to the browser, the sales representative's machine had to carry an Acrobat Reader. E-mail was the intended way of communication with the printing plant. The print originals could also be fetched

from the makeup server by the print shop operators, provided that the print shop has access to the server. Figure 5 shows the structure of the system.

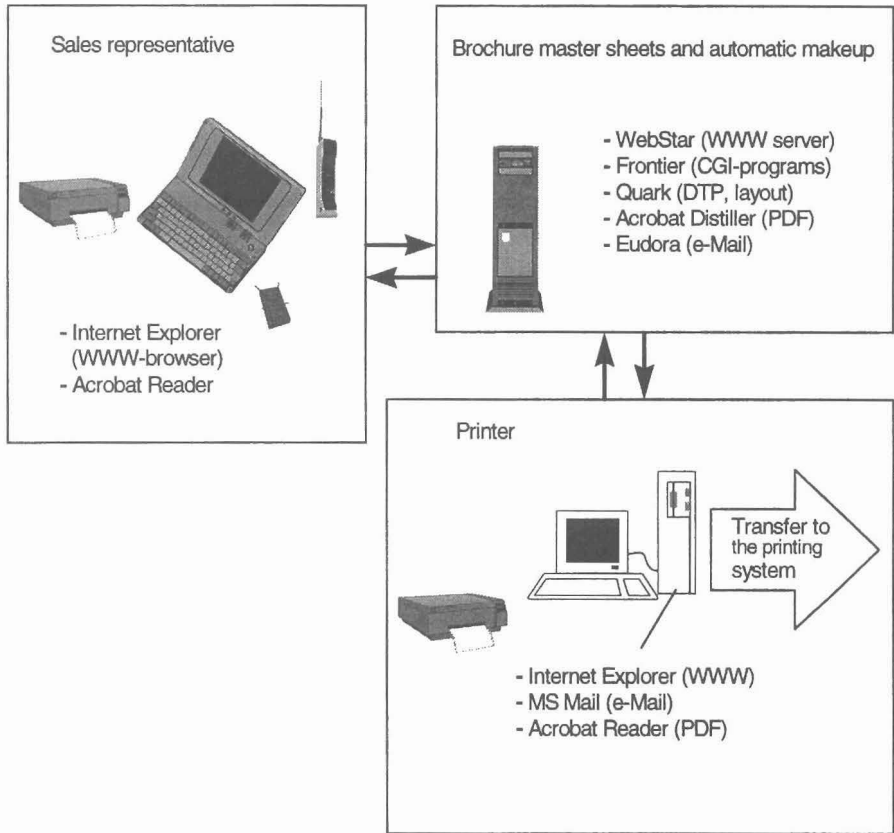


Figure 5. The structure of the system used for the compilation of tailored shop display materials; the definitions can be made through the WWW browser and the print original may be viewed in the PDF format by means of an Acrobat Reader; the contacts with the printing plant are provided by e-mail and WWW.

The implemented system is a prototype. It fulfills the essential requirements, but needs further improvement to be mature for daily operational use. For example it lacks easy-to-use automatic facilities for the complementation of the material.

The WWW server, where the brochure master sheets and the shop logos are stored and the automated page makeup software is run, may be installed either in the company using the system or the print shop. Perhaps the most convenient solution

for the user company is to have the server in its own network especially taking into consideration the complementation and management of the material. The required investment may, however, appear rather large if the system is not used intensively.

A print shop could offer this type of service to several customers making the economy of the system better for companies with less intensive use. The principle of the system is suited for various purposes and is not by any means restricted only to shop display material. Any company that needs small amounts of color prints with the same master content and with some customization or targeting could profit from this type of a system.

Practical experiences and the need for further development

The system was tried and tested in practice by the company. The following observations were made during the testing and they need to be addressed when the system is developed further:

- The automatic compilation of documents according to the order was a hard task because several different programs were needed to cooperate such as Quark v. 3.31 and Acrobat Distiller. The process was often interrupted by unexpected PostScript errors. When the page makeup software can directly produce PDF-files, some of these problems should disappear.
- It is a relatively slow process to produce the document in PDF-format (from 0,5 to 3 minutes on a 225Mhz, 125 MB Mac), which is usually too long for the user to wait for the results. The system should be configured so that the user may either choose to wait for the PDF-files to become ready or to be emailed when the files are ready and given the URL where she or he can check the results.
- When the system is used over a mobile connection (9600 b/s) the amount of data transferred between the server and the browser needs to be kept to a minimum. In such a case the PDF-files (>200 kB) are too large to be transferred in an acceptable time.
- Some developments in the user interface were requested regarding the different ways to access the system.
- Once again the format limits of the digital printing press were mentioned as a negative factor. Size A3 was considered somewhat small for the poster.

In some cases the sales representatives already carry a color printer with them and print single posters as needed in the retail shops. This is the most practical way to produce single or some few copies, if the paper size and the quality of the printer are adequate and no special finishing is required. The on-demand service of the digital print shop must be extremely quick and the quality of the printed copies must be high to keep it competitive against printing at the retail shops.

Conclusions

To make short-run printing cost-effective requires much more than only a digital four-color printer. If the planning and administrative processes are not changed the total costs become too high and hamper its usage.

The case study of the versionized advertising campaign showed that the first campaigns of this type is expensive even with a modest level of tailoring. Specialized software, client databases, know-how and a clear vision of the role of the variable data usage in advertising material is needed to make this systems effective as a whole. These elements can only be developed during a longer period of time. The good news is that the advertising agency and its client are convinced of the potential of this type of tailored direct-mail advertising. The printer should find long-term agreement with the company who wishes to use variable information in its marketing. Both parties must be committed to developing the required know-how and competence.

The prototype we developed addresses both the tailoring and the ordering processes. The project showed that a lot of effort is required to build up a system like this, particularly as long as the support for the PDF format is inadequate. This type of systems are, however, essential to make it possible for a large number of users in a company to make exactly such tailored material that they need. It is also necessary that the system is used intensively in order to get the invested money back.

The technologies must also be developed further. The design process of tailored advertising takes too much time and effort to be attractive. More sophisticated programs are needed to support both the layout design and the automatic makeup. Standardization of variable information processing is a very important requirement that should be solved in the future. And the whole chain of activities from the advertiser to the ad agency and the printer have to be planned carefully and the system must be developed jointly to include the communications, content management and storing, quality assurance and technical implementation.

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