

The Picture to Print Value Chain

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Abstract

This paper describes the changes in the value chain from taking the picture to displaying it. In the days of analogue imaging, there was only one option for displaying images after they had been taken; developing the film and prints. Nowadays the consumer has various display possibilities that do not necessarily include tangible products. Possible integrations and real data of consumers' behavior while ordering tangible products are presented and analyzed.

Introduction

Digital photography is maturing with respect to picture taking. More and more images are taken using digital still cameras and mobile phones. Even digital camcorders offer adequate image quality for stills. Conversely, the act of transferring these pictures into tangible products is still not, and might never, following the growth rate of image taking. This paper describes what compelling offers should look like to address that challenge. Starting from product presentation on the Internet, delivering an integrated software to order a huge number of different products and tools required to support the ordering and creation process, the whole value chain from picture to print is analyzed in this paper.

Change in the value chain

Obviously there was a huge change in the value chain caused by the switch from analogue picture taking to digital. In analogue there was the clear defined process starting with purchasing a camera, then buying several rolls of film per year and developing these films and ordering prints, either at retail or in wholesale labs partnering with retailers. In these times printing even exceeded image capture due to the re-ordering [1]. The end of the value chain has now changed from printing images to displaying images, where tangible products or only one of many possibilities. The main possibilities are illustrated in Figure 1:

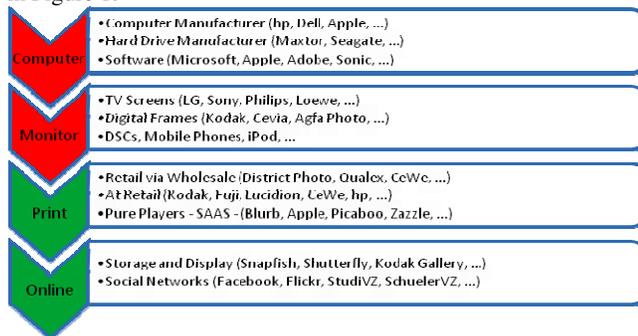


Figure 1: Consumers' display choices

It is obvious that many more manufacturers are offering services for displaying and storing images and therefore are giving the consumer much more choice for viewing images than ever before. It is now more complicated and, marketing wise, more expensive to address consumers as a pre-defined starting point for displaying no longer exists. In addition, the consumers' preferences are largely influenced by the equipment and/or methods they use to display images. The industry is faced with a marketing dilemma and the consumer is confronted with too much choice [2].

Consumers' challenges

The consumer still has a lot of challenges to resolve on his/her own while working with digital images:

- Archiving the images using tools designed to assist with speedy retrieval once the images have been stored
- Long term storage of images
- Selection of the most the relevant/best ones for archiving and display
- Communicating and telling compelling stories with the stored images
- Interaction between all hardware available (computer(s), online solutions, TV screens, digital frames, mobile devices, ...)

There are several suppliers who offer perfect solutions for one of the challenges mentioned above. There are very few who address two or more successfully. The dominance in the former analogue value chain of market leaders such as Kodak and Fuji is gone, newer relevant players are addressing special target groups. Looking at the display choices and the related variety of technologies it becomes quite obvious why they do this. There are too many different skills required to control all the manufacturing challenges in digital display technologies in as competent a manner as, e.g. Kodak did extremely well in analogue photography.

In the following sections we will describe an existing solution for supporting the user generating a huge variety of tangible products while helping in image finding and selection, automated annotating for future usage and mainly supporting the consumer in artistic design. Leveraging images stored online (private and public ones) and textual information such as, e.g. provided by Wikipedia is shown as an integrated solution in the order software described below. This solution is of course "only" addressing the print and online portion as described in Figure 1. Additionally, user behavior is described by data retrieved from order files without the means to match these data with the users' profile information.

Evaluated data from consumer behavior

In [3] an evaluation based on millions of images in CeWe Colors' production has been presented. The analysis helps to define what can typically be considered to be important image content for those ordering tangible products and what supporting tasks might help the consumer with the selection and design process. The three portraits categories in Table 1 have not been subdivided into indoor or outdoor motives.

Group portraits	36,3%
Children	16,9%
Single portraits	15,1%
Landscape	5,5%
Architecture	5,4%
Urban areas	3,4%
Animals	3,3%
Plants	3,1%
Sports	1,9%
Indoor	1,5%
Food	0,8%
Night images	0,3%
Others	6,6%

Table 1: Typical Scene types in CEWE PHOTO BOOKS (n=10.000 images) [3]

We also know from our CRM data that more than 63% of the consumers producing a CEWE PHOTO BOOK have previously ordered prints from digital files. The relevance of images taken by mobile phones is still low, but rising. Slightly less than three percent of the images printed are generated by mobile phones as shown in Figure 2. Images containing geo data coded in the Exif header are even more seldom; 0.6% of the analyzed images had valid information based on the position where the image was taken.

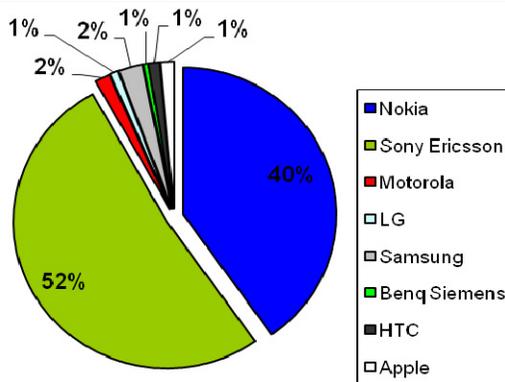


Figure 2: Repartition of images generated by mobile phones

With our customers in central Europe pick-up, at retail after ordering via the Internet is the most successful path. Nearly 80% of our digital orders were processed in 2008 in this manner.

Integrated software solution for ordering

We prefer desktop application for more complex products. The consumers can take their time and the number of sessions used to generate calendars and/or photo books is theoretically unlimited.

User behavior generating CEWE PHOTO BOOKS

The average number of sessions used to generate a photo book by our customers is 4.86, the median is 3. The real session distribution is illustrated in Figure 3.

The average time spent in generating the product is 2.81 hours, the median is 1.89 hours. The diagram in Figure 3 shows the time spent without including pauses of less than 10 minutes.

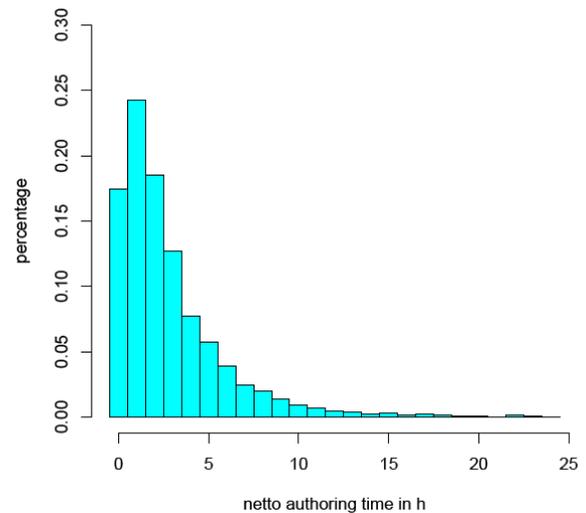
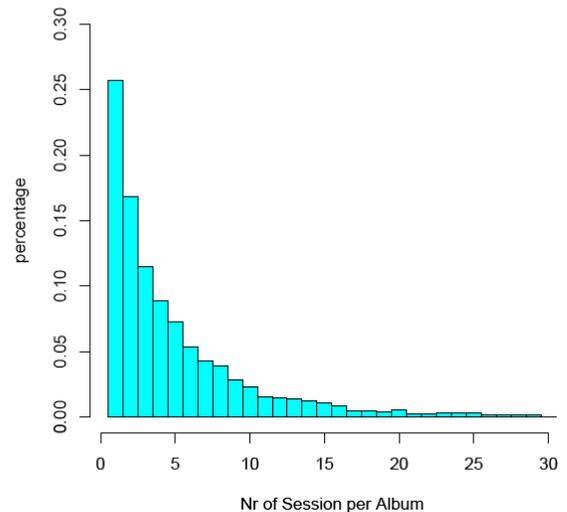


Figure 3: Number of sessions per CEWE Photo Book and time used generating it

While in the US the challenge is to get consumers to complete compilation and then place orders, in Europe the challenge is the conversion from downloading and installing the application to order placement. But the European ratio is significantly better than the non-completion rate of

approximately 30% in the US for online photo book applications as published by [4].

Integration of images stored online

Of course there is the huge benefit in generating photo books at places where the consumers' images are stored. To overcome that disadvantage we have the possibility to integrate private and public images from online communities as illustrated in Figure 4. Nearly 10% of all users have tried at least once to access these communities or external textual information sources.

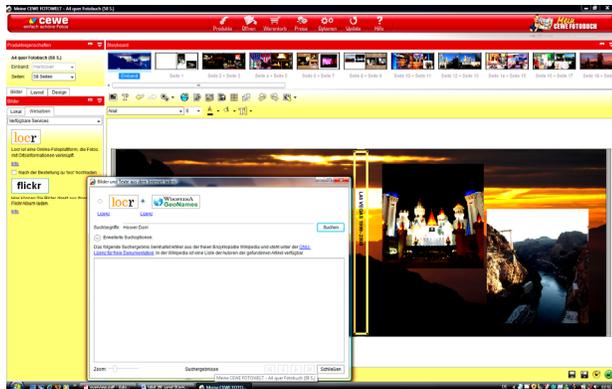


Figure 4: Integration of online communities and Wikipedia

The images stored online are downloaded to the computer running the application and can therefore become involved in the process of analyzing the relevance of images and automatically selecting the best ones as described in [5] and [6]. In addition, there is the possibility of adding text from interesting data sources as delivered by, e.g. Wikipedia. 30% of the pages included in CEWE Photo Books contain at least one text box.

In the case of the online community loqr (see Figure 4) the images are geo-coded (see www.loqr.com). It is also possible to search for pictures that have been taken at a specific location and later stored online by third parties. The images can also be uploaded from the application to this community for future private or public use.

Results of consumers usage of the assistant functionality

The use of this feature results in books that are richer in content and contain a larger number of pages. Figure 5 shows the behavior of the consumers after using the CEWE Photo Book Assistant. The assistant is used by nearly 60% of all our consumers. The assistant aids the user to select the best and relevant images and in designing the CEWE Photo Book. The functionality is described in [7] and [8]. Most consumers add pages to the suggested number evaluated by the software. This evaluation is indicated with 0 in Figure 5 where the number of images finally ordered by the consumer minus the number of images selected by the assistant is displayed.

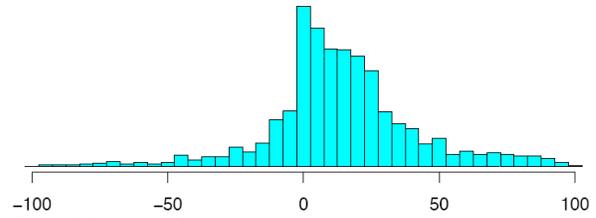


Figure 5: Number of pages ordered relative to assistants' suggestion

The assistant and its default settings also support users in generating more compelling results. One of the main advantages of the assistant's default settings is that they prevent the consumer from placing too many images on a single page. Overcrowded pages result in photo books that are boring for third parties to look at (similar to slide shows which contained too many slides in the days of analogue photography). Figure 6 shows the redistribution of the number of images placed by the consumer per page.

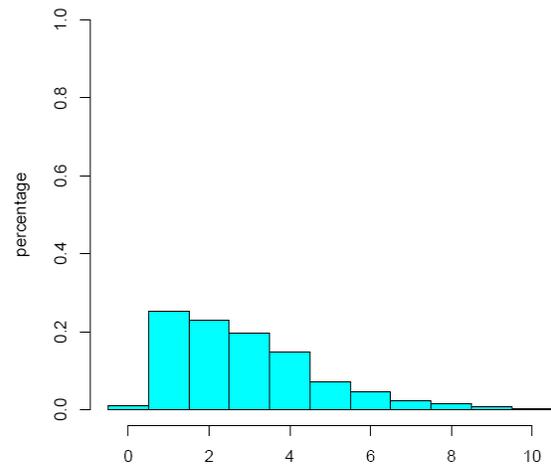


Figure 6: Number of images per page

This knowledge used in supporting consumers in image selection and artistic tasks can be applied to nearly all products. Therefore an integrated software solution offering these features is the obvious step forward. One can even say that the developments for photo books are now supporting "older" digital products and even prints are becoming more fun to order.



Figure 7: Start screen of integrated software solution

Conclusions

It is more and more complicated and expensive to induce the consumer to order tangible products from his/her digital files in order to display and archive them. If one has attracted a potential customer it is essential to offer compelling solutions to bind the consumer to the brand and also to cross-sell to products they were initially not considering.

Display is no longer necessary in the value chain as a tangible product. In the main, computers with online or desktop solutions offer divers possibilities in addition to the capturing devices themselves. If we want to sell tangible products in the future it is essential to analyze consumers' behavior and offer solutions tailored to the consumers. The entire process from looking for, or being interested in, a product in a retail store or increasingly via the Internet until after sales with customer care (CC) and CRM defines the success of the efforts made attracting and paying via search engine marketing (SEM) and optimization (SEO) for the consumer. This process is illustrated in Figure 8.

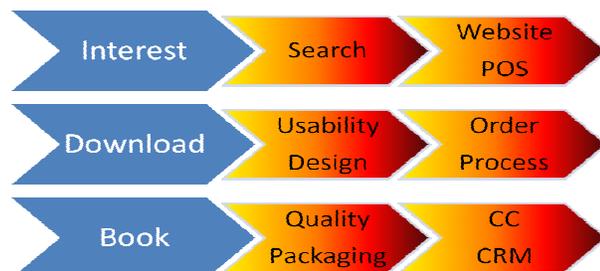


Figure 8: Product is more than the ordering software

The goal is to offer applications that relieve consumers from several tedious and time-consuming tasks such as sorting and selecting their photos [9]. If the applications are nearly as seamless as the simple display on non tangible products consumers will jump at the offer as they become more and more aware of the challenges of finding and archiving images on a purely digital basis.

References

- [1] PMA Market Research 2006
- [2] Wulf Schmidt-Sacht, *Printing and Non-Printing Business*, PMA Orlando, 2005
- [3] Dietmar Wueller, Reiner Fageth, *Statistic Analysis of Millions of Digital Photos*, Digital Photography IV, Proceedings of SPIE, Volume 6817, Electronic Imaging 2008, San Jose, CA
- [4] 2008 PMA Camera/Camcorder, Digital Imaging Survey
- [5] R. Fageth, S.Boll, *Image selection – No longer a dilemma?*, Color Imaging XII, Proceedings of SPIE, San Jose, CA 2008
- [6] Reiner Fageth, Wulf Schmidt-Sacht, *Wholesale Finishing Fulfils Consumers' Expectations*, International Symposium on Technologies for Digital Fulfillment, Las Vegas, NV, 2007
- [7] Susanne Boll, Philipp Sandhaus, Ansgar Scherp, Utz Westermann, *Semantics, content, and structure of many for the creation of personal photo albums*, ACM Multimedia 2007, Augsburg
- [8] Reiner Fageth, Wulf Schmidt-Sacht, *The perfect photo book – hints for the image selection process*, Color Imaging XII, Proceedings of SPIE, San Jose, CA 2007
- [9] Philipp Sandhaus, Sabine Thieme, Susanne Boll, *Processes of Photo Book Production*, Multimedia Systems, No. 14, Vol. 6, 2008, Springer Verlag, Berlin

Author Biography

Reiner Fageth received his diploma. in Electronic Engineering from the University of Applied Science in Heilbronn, Germany (1990) and his Ph.D. in 1994 from the University of Northumbria at Newcastle, UK in the field of industrial image processing. Up to 1998 he worked with the Steinbeis Transferzentrum BMS on designing inspection systems for process automation mainly in the injection molding and bottling industry. He joined CeWe Color in 1998 and is since 2007 serving as CTO.

Philipp Sandhaus received his diploma degree in computer science at the University of Oldenburg in 2006. Since then he is working as scientific assistant at the R&D Institute OFFIS on a project together with CeWe Color to find new and innovative ways to enhance digital photo services. Currently he is also working on his PhD Thesis in the context of semantic understanding of personal media from media usage.