

Issues and Topics to Consider for Information Management Research in eMedia Industries

Bjoern Stockleben
University of Applied Sciences
Magdeburg-Stendal
Breitscheidstrasse 2,
D-39114 Magdeburg
bjoern.stockleben@hs-
magdeburg.de

Artur Lugmayr
EMMi Lab., Tampere Univ. of
Technology (TUT)
POB. 553, Korkeakoulunkatu 1,
FIN-33100 Tampere
lartur@acm.org
+358 40 821 0558

ABSTRACT

The digital media industry produces vast data along the content value chain. Any interaction with digital media yields data, often in real-time, both on production and consumption side. This data can be turned to immediately available business information on the operational level, e.g. editors continuously tweak their workflows upon social media feedback. This questions the traditional distinction between organization levels, changing the role of strategic management in the media business and the kind of information it is acting upon. An integration of business information and content management systems throughout the whole value chain holds great potential for future business intelligence applications in the media sector.

Keywords

Multimedia, eMedia, Information Management, Information Systems, Multimedia, Media Technology

1. MEDIA IN THE CONTEXT OF INFORMATION MANAGEMENT SYSTEMS

In this article we discuss the significance of information management systems in the media industry. We understand media industry as companies that create content through narrative structuring of fictional or non-fictional events. The created content obviously has to be managed for proper distribution, yet this should not be mistaken for information management. Content management is indifferent to the information the content may convey, at least if we follow Gregory Bateson, who defined information as "a difference that makes a difference" [1]. A difference cannot exist independent from the subject that perceives this difference and the context in which it makes a difference. Thus, the information value of content can only be judged in relation to the individuals that consume this content in a certain context.

In contrast to content management systems, information management systems comprise the "process of managing information as a strategic resource for improving organizational performance [and involving] strategies and

[introducing] systems and controls to improve information quality over time" [2]. Information management always has to have a perspective, which is usually that of the related business entity.

Now when applying information management concepts in the media industry, the challenge is to examine the whole process of content creation, management and consumption from a viewpoint of organizational performance in order to discover information vital to the improvement of organizational strategy. The different parts of the value chain where this kind of information is generated are described in detail in [3]. Within this article, the basis for discussions is a generic value chain model considering the creation, management and consumption of content, which will be examined for its information potential. The primary question is whether the special nature of the digital product in the media industry does make a difference in the approach to business information management. In particular it has to be explored whether the fact that content is represented as digital data yields changes the quality of information and whether any business information can be inferred from the theme and genre of the content. If not, the product can be treated as a 'black box' and no special considerations are necessary to apply information management concepts to the media industry. If yes, media information management will likely see a continuous integration of content management and business informations systems. An architectural vision for this kind of integrated content and information system is the so-called 'Interactive Knowledge Stack' as envisioned by [4].

Slow Cycle vs. Fast cycle Media Products

The challenges to media business information systems differ depending on the type of content a media company produces. For this discussion, we introduce the terms of slow product cycle and fast product cycle media. Slow cycle media companies produce complex content with a high degree of collaboration in the workflow. The production flow is linear similar to industrial production and the cycles span from months to years, with customer

feedback cycles of similar length. Typical examples are movies, games and books. On the other hand, fast product cycle media companies produce small content units in cycles of hours to days. These smaller units may be fitted into a larger structure to form a marketable product, yet this structure changes slowly and is independent from the production cycle. A high number of pieces of content are produced in a parallel workflow in a very short time frame. Accordingly, the customer feedback cycle is short as well, giving feedback almost already during production. Blogs and online news services are examples of this kind of media companies.

Most other media sectors can be positioned in between these extremes. It should be noted that especially the relation between the production cycles and the feedback cycles are of interest. TV, for example, has long planning and production cycles for most non-live formats such as serials or documentaries, but real-time feedback. Due to this mismatch, a typical TV station cannot react as fast as e.g. a blog to the information gained through business intelligence.

The opportunities depicted in the following chapters refer largely to fast cycle media in this sense, the applicability to slower media varies.

Media Content Consumption

In this article we understand media consumption as the perception of and interaction with edited and distributed media content. This may involve creative acts such as commenting or remixing as a consequence, but not as primary intention of the consumption. Any media consumption invariably changes the consumer, regardless whether the content is enjoyed or despised. This may or may not trigger an observable behavior, which could be measured and captured as data. The fundamental change between analog and digital media is that any interaction with a digital artifact directly produces new digital data, which can be easily captured without the need of additional means of measurement. This allows for real-time tracking of user behavior, which can be analyzed to gain marketing insights.

However this data can inform about what the customers are doing, but it remains silent about why they are doing it. Only the interaction with the digital artifact is captured, but not the process of internal reasoning nor any other action triggered by the media consumption. It can be questioned whether the 'why' is needed at all in a real-time feedback loop (see [5]). That said, some secondary interactions can be captured, e.g. by the use of social media monitoring. Like any interaction with a digital artifact, social media interactions can be captured and be linked more or less directly to the observed behavior with the original media content. This generates more qualitative data, e.g. on user sentiments and sometimes about motives when those are

content of a social media interaction (for an overview of use cases see [6]).

Media Content Creation

Content production is sometimes regarded as a creative process that cannot be formalized and thus optimized as it is done with other production processes. Yet especially daily productions like news programs have established the need for more formalized routines in content production. On a more general level, paradigms like Design Thinking have shown the potential that lies in formalizing creative processes [7,8].

In fast cycle media, the media creation is tightly interrelated with media consumption. Social Media Intelligence allows for real-time feedback to the editors. This constitutes a disintermediation of the feedback process, i.e. social media monitoring tools extend the editor's capability to perceive the interaction with the user more closely than before. At the Huffington Post, the feedback process is already an integral element of the editorial workflow [9,10], with arguable success.

Yet the usage of editorial information systems should not be restricted to one perspective, even if it is that of the user/customer. In order to get a multi-perspective model, as argued strongly in [16], more data sources are necessary. These can be found by monitoring the media creation process itself, as well as the media management process. As both processes involve the interaction with digital artifacts, these interactions leave traces as well. But while tracking any click of the user is a common exercise today, there is no similar tracking of the users of the production systems inside the company. Depending on the production process, different information for different purposes could be generated this way. Monitoring a nonlinear editing or content management system might give valuable insights on workflows and how to improve them. Any GPS-enabled video camera gives information not only on the location of the pictures that were shot, but as well on the logistics of the shoot. However it is obvious that these issues touch sensitive privacy issues, which have to be considered when introducing such a kind of business information system.

Media Content Management

The term media content management shall refer to any act of aggregation and organization of content in the context of this article. This involves the editing of metadata, especially semantic content annotation. Any media company needs to structure the produced content for two main purposes, namely the internal organization of workflows and external distribution. Ideally the internal and external structure are congruent or at least complementary. A reference example of state-of-the-art media content management is dynamic semantic publishing as demonstrated by the BBC, e.g. during the London Olympics. Instead of statically mapping a produced content item to one or more pages, each item has to be annotated accordingly to a pre-defined ontology.

The editors may generate new thematic page views ad lib, describing the desired content semantically using the very same ontology. The editorial opportunities of this architecture have been well discussed in [11], yet the use of this structure as business information has not been considered so far. Doing so might answer questions like: which type of content is best fit for repurposing (i.e. fits into the widest range of semantic contexts) or does the organizational structure of the editorial room match the actual distribution of themes.

2. AMBIENT MEDIA PRINCIPLES IN MEDIA INFORMATION MANAGEMENT

The five principles of ambient media as developed in [12,13] describe the processes of enrichment and transformation of content due to a constant oscillation between the real and the virtual world.

Manifestation

The manifestation principle does mean that any data from the virtual layer can only be perceived by humans in a manifestation that is accessible to human senses. In the media business, this usually means image or audio rendering using media devices. However, ambient media encompasses also any other kind of rendering of data into objects or object behavior.

Morphing

The principle of morphing describes the necessity to define rules for the translation of phenomena in the real world into the virtual world and vice versa. In other words, it is about how data is rendered into a human-perceivable manifestation, the way that interactions with this manifestations are translated back into data and how this changes the original data. Any morphing operation yields data about the manifestation, as well as about the operation itself. The morphing principle is particularly interesting for the design of information systems, as it sees the content itself and the interaction with the content as part of the same entity. Both content and interactions would have to be processed by the same system, questioning the traditional separation between strategic business information systems and operational content management systems.

Intelligence

The principle of intelligence refers to the need of defining operations on the data in the virtual world. Intelligence does only work on the data available on the virtual layer. Any phenomena in the real world have to be converted to data by a morphing process – thus content can be seen as a specific process or phenomenon of manifestation of data form the virtual layer, following a certain smart ‘construction plan’. From a business intelligence point of view, the intelligence principle means to apply operations on data in order to gain information and using this data to enrich the original data, thus changing the possible manifestations of this data.

Collaboration

The term of collaboration addresses the fact that in ambient media, content is created and shaped through countless interactions on manifestations by users and on data by agents. Content evolves in a vast human-machine collaboration. In current content management systems we still need human actors to evaluate social media intelligence and change the content accordingly. A logical consequence of the ambient media collaboration principle would be to integrate machine actors into the editorial process, adapting not only content aggregation (as in recommender systems), but the content itself.

Experience

One aim of ambient media is to convey knowledge, not only information, in form of experiences by choosing suitable manifestations to be consumed by the user. An experience implies not only information one can interact upon, but as well the knowledge of the impact of possible actions following this information. Translated to the context of business information systems we could say that scenarios are the tool that comes closest to this quality of ambient media content. Scenarios take information on the current status and generate a contexts depicting possible consequences of decisions that can be derived from this information (see e.g. [18]). They allow a kind of pre-experience of a future status to decide whether it is desirable or not. In fast cycle media however, scenarios are likely to be replaced by the real experience, as real-time feedback cycles leave little time for lengthy considerations and the information on the status quo has to be a sufficient base of decisions to be taken.

3. IMPACT BY ORGANIZATION LEVELS OF INFORMATION SYSTEMS

Taking again the example of the Huffington Post, the discrimination between organization levels in information systems as described in [14] is not directly applicable to enterprises in fast cycle media. It relates certain types of information systems to different functional parts and levels of hierarchy within the enterprise. Yet audience analysis is about to become an integral part of an editor’s tool-set, i.e. what used to be a tool of the middle management and basis for mid-term decisions becomes a real-time tool influencing daily work. Due to the extreme short feedback cycles between content production and consumption, systems used by editors unite operational, knowledge and management level aspects.

Undoubtedly it took strategic foresight to empower an enterprise to be as reactive to its customers as the Huffington Post is. Yet it poses the question of what kind of formerly strategic decisions are now handled on the operational level and what strategy means in a market where the product adapts to its audience nearly in real-time. While strategy used to be developed in a top-down approach and provided the guiding frame for all employees, suddenly every employee has a real-time model of the

company at hand, which continuously challenges the viability of the company strategy. Editors become knowledge workers that are continuously analyzing the reception of their product and refine their workflows in real-time. The question is, how many room for strategic decisions remains in such a setting and in which way the data analysis in strategic information systems differs from the daily data analysis available to each employee.

Not all sectors of the media industry are affected alike. It appears that the length of the production cycle is the main determinant. Slow cycle media like cinema are more close to traditional linear industrial production (a parallel that is discussed in detail in [15]). Fast cycle media like blogs with text, image and short video content, distributed on interactive distribution channels are heavily affected by the rise of real-time information systems. The result is a recursive production process with a short initial creation phase and a longer refinement phase that embeds feedback information on the fly over the whole content lifecycle.

4. INFORMATION SYSTEMS AS DRIVER FOR CHANGE MANAGEMENT IN MEDIA ORGANISATIONS

Information systems create a dynamic model of the current state of an organization. This model depends on the measured data, i.e. what is not measured, has no influence on the model. In order to use such a model as a tool for change management, it is necessary to reach a common interpretation of the model. This can be achieved by providing a vision, i.e. an ideal that the model can be compared to continuously. The Balanced Scorecard [16] is a way to implement this; the relation between company vision and the choice of indicators and measurements is argued extensively in [17].

There is one problem in taking strategic decisions upon measured data: Only the present state of the company and its customers can be measured. The distinction between leading and lagging indicators made by the Balanced Scorecard even indicates that measurements often point to events way in the past. Yet strategic decisions will have impact only in a future context that is unknown at the time the decision is taken. Strategic foresight can be used to contain, but not eliminate uncertainties [18]. In order to make sensible decisions, business information systems have to provide relatively stable models. In practice this means that e.g. clicks to articles must be translated into more persisting concepts, such as general thematic interests of the users or types of media preferred. A lot of market research efforts is usually spent on this ‘know-why’ qualitative research. Insights on user motivation and needs is then in turn used to predict future user behavior. Recurring on the discrimination between fast and slow cycle media, all this holds true for companies in slow cycle media.

For fast cycle media, the case looks different. Given real-time production and feedback cycles, the user behavior measured in the presence is sufficiently close to the user

behavior in the next cycle to be used as a direct prediction. There is no need to take the long way by inferring user needs and motivations and then again deriving future user behavior. Thus, we argue that in fast cycle media the classical strategic planning is split into two parts: First there is a perpetual change process on the operational level based on the model of the present state (‘know-what’). Second, the strategic management ensures the adaptive capabilities of the operational level based on higher level analyses (‘know-why’). From a system theory point of view, the capability of monitoring and reacting to changes in the environment has become decentralized, with the strategic subsystem (the strategic management) of a company now monitoring and acting upon both changes in the environment and adaptation strategies of the production subsystems (the production departments). Formerly solely responsible for any adaptation to changes to the economic environment, the strategic management now becomes a second order observer (following the terminology established by [19] and others) of change processes within its company.

In media enterprises, especially those dealing with daily news and information, information management will likely establish a third layer of data on the content value chain. The first layer is content data, the second layer is content management data and the third layer is business information data, measuring each step in the value chain in real-time.

This business information data creates a dynamic model of the status at the various stages of the value chain. Expressed in the terms of ambient media, the primary challenge is now to select suitable manifestations for this data and to formulate a vision, so that employees at various positions will use it for the best possible adaptation of their workflows in the light of the aims of the company.

5. SCENARIOS FOR FUTURE INFORMATION SYSTEMS IN THE MEDIA INDUSTRY

The following scenarios suggest different directions for future research in information systems for the media industry.

Scenario 1: From Dynamic Semantic Publishing to Dynamic Semantic Business Intelligence

Dynamic Semantic Publishing enriches the editorial work in that the editor has to consider multiple contexts in which the produced content could likely be displayed. Simple tagging gives way to the creation of more general content relationships and rules. This is only one of many examples how more and more metadata is generated and used at different stages of content creation, management and consumption. The rich data usage data resulting from this development holds a vast potential for next generation media information systems.

Scenario 2: Business Information as Media Content

Business information systems can profit from ambient media content concepts. Business information as a whole creates a model of a company, but all too often it is considered sufficient to visualize numbers in order to generate an unambiguous representation. Yet if it is to be used as a tool in change management, much more attention has to be paid to the choice of manifestations in order to create the desired experience with the user, i.e. the company employee.

Scenario 3: Second Order Observation Tools

The availability of a rich real-time feedback empowers media company employees to directly take adaptation decisions within their field of responsibility. In order to gain a representative model of their company, the strategic management would need tools that dynamically observe these adaptations. Otherwise they are running the risk of taking decisions that run against bottom-up change processes based on a divergent interpretation of the first order observation of the environment the company is acting in.

6. CONCLUSION

The special nature of the digital product lets media business information management stand out as a special and demanding case of application of business information systems. This short paper has indicated the potential of integrating business information systems with the specific data generated along the media content value chain. Especially in the sector of fast cycle media, business intelligence is already applied at an operational level in the form of social media intelligence, but by far has not reached its full potential on the strategic level. The vast availability of real-time feedback data on all organizational levels calls for new models of strategic planning and supporting information systems.

REFERENCES

- [1] G. Bateson, *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology*, University of Chicago Press, 1972.
- [2] D. Chaffey, S. Wood, and G. White, *Business Information Management: Improving Performance Using Information Systems*, Financial Times Prentice Hall, 2011.
- [3] A. Lugmayr, "Brief introduction into information systems and management research in media industries," *2013 IEEE International Conference on Multimedia and Expo Workshops (ICMEW)*, 2013, pp. 1–6.
- [4] W. Behrendt, "The Interactive Knowledge Stack (IKS): A Vision for the Future of CMS," *Semantic Technologies in Content Management Systems*, W. Maass and T. Kowatsch, eds., Springer Berlin Heidelberg, 2012, pp. 75–90.
- [5] V. Mayer-Schönberger and K. Cukier, *Big Data*, Houghton Mifflin Harcourt, 2013.
- [6] H. Kasper, *Marktstudie Social Media Monitoring Tools: IT-Lösungen zur Beobachtung und Analyse unternehmensstrategisch relevanter Informationen im Internet*, Fraunhofer Verlag, 2010.
- [7] A. Lugmayr, "Applying 'Design Thinking' As a Method for Teaching in Media Education," *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*, New York, NY, USA: ACM, 2011, pp. 332–334.
- [8] R. Buchanan, "Wicked Problems in Design Thinking," *Design Issues*, vol. 8, Apr. 1992, pp. 5–21.
- [9] J. Pavley, "Sneak Peek: HuffPost Brings Real Time Collaboration to the Newsroom," *Huffington Post*, Aug. 2013.
- [10] G. Hamann, "Alle 56 Sekunden was Neues," *Die Zeit*, Oct. 2013.
- [11] J. Rayfield, "Dynamic Semantic Publishing," *Semantic Technologies in Content Management Systems*, W. Maass and T. Kowatsch, eds., Springer Berlin Heidelberg, 2012, pp. 49–64.
- [12] A. Lugmayr, T. Risse, B. Stockleben, K. Laurila, and J. Kaario, "Semantic ambient media—an introduction," *Multimedia Tools and Applications*, vol. 44, Sep. 2009, pp. 337–359.
- [13] B. Pogorelc, R.-D. Vatavu, A. Lugmayr, B. Stockleben, T. Risse, J. Kaario, E.C. Lomonaco, and M. z Gams, "Semantic ambient media: From ambient advertising to ambient-assisted living," *Multimedia Tools and Applications*, vol. 58, May. 2012, pp. 399–425.
- [14] K.C. Laudon and J.P. Laudon, *Management Information Systems: Managing the Digital Firm*, Pearson Education, Limited, 2010.
- [15] L. Manovich, *The Language of New Media*, MIT Press, 2001.
- [16] R.S. Kaplan and D.P. Norton, *The Balanced Scorecard: Translating Strategy Into Action*, Harvard Business Press, 1996.
- [17] P.R. Niven, *Balanced Scorecard Step-by-Step: Maximizing Performance and Maintaining Results*, John Wiley and Sons, 2010.
- [18] D. Mietzner and G. Reger, "Advantages and disadvantages of scenario approaches for strategic foresight," *International Journal of Technology Intelligence and Planning*, vol. 1, 2005, pp. 220–239.
- [19] N. Luhmann and D. Baecker, *Einführung in die Systemtheorie*, Carl-Auer-Systeme-Verlag, 2002.