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Content, Form and Expression in Electronic Media

Musica Scienza 2000, Rome: Centro Ricerche Musicali, 2000, pp. 1-9 (in press).

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1. Introduction

The creative arts entail an interesting paradox. While they are based on laws and rules which are generically applicable and thus universal, their ultimate expression is personal, unique and particular. In music, for instance, with respect to both composition and performance, there are clear laws of harmony such that one can state clearly that some notes are right and others are wrong. But while most persons may play the notes correctly, only one in a thousand will perform them in a way that is truly memorable. This phenomenon applies to all the arts.

Technologists have addressed this twofold nature of creativity with two separate and very different approaches. On the one hand, following a long tradition of theoretical literature concerning the arts, they have created software, which fixes objective dimensions in terms of generic solutions. On the other hand they have sought to record the unique aspects of performance in artistic and musical creativity. In music, this has led, on the one hand, to a music software industry and, on the other hand, to a recording industry (in analog vinyl records or videos, and more recently in digital CD-ROMs and DVDs, i.e. Digital Video Discs). In theatre, this has led to both audio recordings of great actors, videos and in rare cases films of their performances.

Seen from a global viewpoint several trends are discernible. First, there is an important development to separate form and content. Partly as a result thereof, there is a second trend towards ever more complex software to address generic routines of editing. Here the Internet is stimulating sales. Third, in the case of recorded examples of spoken words, songs and music, the advent of Internet technologies has led in some cases to decreased sales; is seen as a threat by many traditional music producers, distributors and broadcasters and is hence leading to a series of defensive measures. Fourth, there is as yet

almost no integration between the generic software solutions and recordings of unique performances. This is a desideratum and introduces new possibilities.

2. Content and Form

There is a general trend to make composition and editing less direct through a clear separation of form and content. This phenomenon applies equally with respect to words, objects, images, and sounds.

Words

With respect to word processing this is apparent in its most elementary form in packages such as Microsoft Word, whereby the process of entering content (by typing or in future by voice) is separated from questions of format such as adding bold, italic or underlined scripts, centred, left or right aligned scripts etc. At a high level this separation of content and form goes back to the 1960's when Standard Generalized Markup Language (SGML) was introduced.

The context of these developments was highly practical. The repair books for a large jet are so detailed that if loaded on board the plane could not take off. Those of an aircraft carrier are so enormous that if placed on deck the ship would sink. An electronic version thus became a necessity. There was a problem, moreover, that the basic information in these repair manuals frequently needed to be displayed in alternative forms for users at various professional levels and with different needs. SGML thus separated content from form in order to reduce the costs of printing different versions for various audiences.

In the eyes of the world, the introduction of Hyper Text Markup Language (HTML) by Tim Berners Lee (CERN) in 1980 marked a revolutionary step forward because it made the World Wide Web an almost instant reality. From a strictly technical standpoint it marked a step backwards inasmuch that it was an interim solution which re-conflated the functions of content and form. As a result any change in the form of an HTML document, required re-writing the entire contents of the document.

The earlier SGML remained valid and while perfectly suited to complex topics such as repair manuals for jets and aircraft carriers, it was far too complex for everyday use. The World Wide Web (W3) Consortium thus decided to produce a subset of SGML better suited to these everyday needs. This new markup language called eXtensible Markup Language (XML) was intended to provide a common denominator for regular use with respect to content, the assumption being that more specialized users could then extend its functionalities to meet their particular needs. More specialized markup languages such as Chemical Markup Language and Mathematical Markup Language soon emerged. In the meantime, there are a considerable number of these new markup languages (figure 1).

Bean Markup Language	BML
Chemical Markup Language	CML ¹
Document Definition Markup Language	DDML
Draw Markup Language	DrawML
Handheld Device Markup Language	HDML
Hypergraphics Markup Language	HGML
Java Speech Markup Language	JSML
Mathematical Markup Language	MML, MathML
Molecular Dynamics Language	MoDL ²
Musical Notation Markup Language	MNML
Ontology Markup Language	OML
Personalised Information Markup Language	PIDL
Precision Graphics Markup Language ³	PGML
Speech Markup Language	SpeechML
Speech Synthesis Markup Language	SSML ⁴

Figure 1. List of some of the specialized markup languages intended to complement the basic needs met by eXtensible Markup Language (XML).

To complement the content description provided by XML the W3 Consortium developed Cascading Style Sheets (CSS) as an interim measure to deal with different versions of a document, i.e. problems of different forms of expression. Subsequently, eXtensible Style Language (XSL) was developed to address this issue.

Theoretically this makes it possible to create software which could automatically generate passages in a Renaissance, Enlightenment, Romantic or post-modern style. One could even create a style reminiscent of Shakespeare using words of the bard. This general imitation can never be the precise style of Shakespeare. On the other hand, the publishing industry has done for words precisely what the recording industry has done for music. It has made available an immense corpus of unique writings. A challenge thus arises of linking the generic formulae with the specific, unique expressions. This is a fundamental point to which we shall return in section 5. In the meantime, both XML and XSL have become ingredients in a larger vision of Tim Berners Lee and the W3 Consortium to produce a Resource Description Framework (RDF) which will contribute towards the creation of a global reasoning web or global semantic web.

danger. If applied mindlessly all doors and windows would be alike which would result in a world-wide homogenization – which Barber¹² has called the MacWorld effect.

The richness of the architectural tradition lies precisely therein that the doors and windows of Michelangelo are different than those of le Corbusier or Richard Meier; that fifteenth century Florentine doors are quite distinct from those in Lucca, Pisa, Rome and other European cities. This immensely rich tradition is documented in publications and photographic archives. Again there is a challenge to link the generic software with examples of unique expressions. Hence if I were an architect in Florence, the software would not only provide me with basic facts about windows, but also specific facts about Florentine windows.

Theoretically it is possible to go much further. One could add knowledge of individual Florentine doors and those of all cities through local databases, which can be accessed by the software. As a result the software could provide me with both general properties of doors and detailed information about Florentine doors. In the case of an historic home or building of the fourteenth century this information could be so detailed as to provide me with the entire history of restorations which the building has undergone. In the case of Florence, there is an incentive to maintain the historical core. In more modern cities the exercise of design becomes even more interesting if I can call up experiences in other cities in order to arrive at new architectural forms. In other words the generic examples of intelligent doors in regular software can be greatly enriched by the particular, unique examples showing historical and cultural variants which can serve as a source of inspiration for new creativity.

Sound

In the case of sound, the first impact of technology was in the passive realm, allowing one to listen to music. Speakers were thus one of the earliest characteristics of early multimedia computers. This passive functionality was typically limited to playing music or a short voice clip. In the past decade there have been enormous developments in the field of speech recognition which have led both to new voice activated navigation systems and direct dictation through products by firms such as Lernhout and Hauspie, Dragon Technologies and IBM. One of the latest developments in the audio field is SpeechBot which: “listens to Web-resident audio programming, converts the sound into a textual transcript, and then indexes those words so that you can type in queries and receive "hits" -- not to pages of text -- but to the very section of audio that interests you within a long program.”¹³

The University of Bath’s Media Technology Research Centre¹⁴ is working on a Platform for Animation and Virtual Reality (PAVR)¹⁵ which includes sound and music, speech, vision and image processing. Companies such as IMAX are working on 3D sound to complement their Omnimax and 3-d IMAX films. The Thorn EMI, Creative Research Laboratories (CRL, Hayes) are also working on a combination of a High Definition Video Display (HDVD) image and Sensaura artificial head for 3D sound recording.

1	Logical	music	Somewhat like drama, but not like most other forms of art. More like the design of a bridge.
2	Gestural	performance	Can contain a lot of additional information
3	Timbral	sound	Overlaps with gestural
4	Visual	score	Contains all of the logical, and a lot more
5	Analytical	not part of music	meta information; Editorial information

Figure 3. Five basic aspects of music according to Alan Talbot. SDML addresses the logical, visual, gestural and analytical domains.¹⁶

Meanwhile, at the global level there are still debates about basic standards. The President of the World Digital Audio Broadcasting Forum (WorldDAB) favours Europe's Eureka 147 system which is competing with a series of other solutions by In Band On Channel (IBOC); Worldspace, the European Space Agency (ESA cf. DASA) and Inmarsat. With respect to content there is an International Association of Sound and Audiovisual Archives (IASA)¹⁷ and in Russia there is a fascinating Encyclopaedia of Sound.¹⁸ As part of the Distance Education and Learning¹⁹ (DELTA) programme there is an interactive learning platform on the Internet about the history of music.

There are also important projects such as Music Tagging Type Description (Mutated), which will be connected with MPEG 7.²⁰ Fundamental in this context is Standardized Music Description Language (SDML). Alan Talbot notes that music entails five basic aspects (figure 3) of which only the timbral is not being addressed in SMDL.

3. New Editing Software

A research project at the Fraunhofer Gesellschaft in Germany provides a virtual scene of different players in a quartet and permits their being repositioned in visual space with corresponding adjustments to the sounds in acoustic space.²¹

The past years have also seen an amazing number of off the shelf software packages for editing music. One of the well-known examples is called Band in a Box. This allows one to choose a given melody, adjust it, and then have it played by a number of different instruments in different styles. Hence, I could begin with a tune which Mozart wrote for a violin and request the software to play this tune on a clarinet, a drum, a trombone or even a jazz saxophone. Subsequently I could ask the software to play the same piece in accordance with different styles such as those of Eric Clapton or some other famous band. Although immensely impressive this entails the same dangers of a MacWorld effect discussed above in the case of architecture.

4. Defensive Measures in Recording

In 1998 the Internet accounted for .4% of all music sales. By 2005 this is predicted to increase to 11% of sales valued at \$5 billion.²² These predictions are complicated by an underground scene which is against copyright and which champions MP3 through companies such as Liquid Audio,²³ and non official sites such as MP3.com. Companies

such as Diamond Multimedia and Samsung are producing MP3 recorders such as the Rio and the Yepp. This scene includes the Internet Underground Music Archive (IUMA) and Napster, which has recently been sued by the Recording Industry Association of America. (RIAA).²⁴

To counter these developments, Leonardo Chiariglione, of CSELT (the research arm of Telecom Italia), has been developing the FIPA, MPEG 4 and 7 standards:

- (a) content providers must be given mechanisms to track the evolution of their content through the delivery chain;
- (b) service providers must be given the possibility to push content targeted to users' needs;
- (c) delivery systems providers must be given the possibility to charge the usage of their infrastructure depending on the quality of service requested by the service provider or consumer;
- (d) consumers must be given the possibility to pull content targeted to their needs.

In early 1999 he was also invited to lead a new Secure Digital Music Initiative (SDMI). This began as a group of fifty leading companies in the recording and technology industries and has since grown to 120 firms and is working on two tracks: "The first has already produced a standard, or specification, for portable devices. The longer-term effort is working toward completion of an overall architecture for delivery of digital music in all forms."²⁵ Meanwhile, the International Music Joint Venture (IMJV),²⁶ was founded by three music copyright organizations: ASCAP (USA), Buma/Stemra (the Netherlands) and the MCPS-PRS Alliance (UK) in order to: "to eliminate duplication in, and improve the accuracy of, common databases; reduce costs and improve efficiency, upgrade systems and embrace new technology."²⁷

A project of the European Commission (EC ESPRIT 22226²⁸) is working with the International Federation of the Phonograph Industry (IFPI) at Developing Digital Media Management, Signalling and Encryption Systems for the European Music Industry (MUSE). Another EC project (IMPACT project 4050) is working on Music on Demand- A European Interactive Music Information and Delivery Service (MODE).²⁹

At the same time major corporations are seeking independent solutions. IBM, for instance, has launched the Madison Project which includes a partnership of the "big five" in the sound industry, Universal, Sony, Time-Warner, EMI³⁰ and Bertelsmann; as well as British Telecom and Deutsche Telekom. Three of the big five (namely, Warner Music, Sony and EMI) have also joined with BSkyB to create Music Choice Europe. Meanwhile, AT&T is working with Universal (owned by Seagram) to create A2B.

5. Need for Integration of Generic Software and Unique Recording

Although the applications of word processing, computer aided design and music editing are vastly different, they share some uncanny parallels. They provide users with generically correct solutions, which lack the unique, particular qualities of the best historic examples available in different cultures. These unique examples have been the realm of study of scholars and artists the results of which made accessible by publishers

and recording studios in the form of books, records and more recently in the form of CD ROMs and videos.

In most persons' minds the products of scholarship are about (unique) content and very different from (generic) software applications. One finds content in bookstores and record stores. One finds applications in computer stores. Our suggestion is that the unique examples from the content industries could greatly enrich the generic examples of the software industry. Hence, the software would first provide users with general instructions about how to play a piece of music such as the *Cello Sonatas* by Beethoven. It would then permit users to hear how Pablo Casals, Mstislav Rostropovich and André Navarra each have their unique interpretations thereof. Similarly a multimedia edition of Shakespeare could provide not only the generic text of *Hamlet*, but also individual interpretations by Sir Lawrence Olivier, Kenneth Brannagh etc.

6. Possible New Markets

In the past one went to see a film in a cinema. Then came a stage when old movies appeared as replays on television. Video came as a next stage. Then came a further stage where the heroes and other aspects of films became franchised as an array of new products: Pocahontas tee-shirts, model figures, books, comics, and the like. Recently there has been a new development. In the case of *Star Wars* there is now a new kind of video game, which allows one to use the scenes from the films as a point of departure. In other words the original film serves as a starting point for one's own editing and creative play.

We noted earlier that the large recording studios and publishing houses are very concerned about their traditional products because in a world of digital copies the need for such traditional products could readily disappear. It is easy to copy individual texts, images, pieces of music and even films.

Individual items are easy. Contexts are difficult. Increasingly we are less interested in paying for individual items. This is a disappearing market. At the same time, in a world where thousands of individual pages are being added daily to the Internet, the value of context is increasing steadily. This represents new markets probably even more significant than the franchising or commodification of films mentioned above. The combination of generic software and specific recorded expressions is one important realm of context, all the more so because it can help to inspire new content in new contexts. Traditional publishers and recorders may thus find new markets for products which they thought were under siege.

For some time the advertising industry has assured us that it was not the product but rather how it was packaged that was important. In the new business model, advertisers may continue to claim that it is not the individual product but rather the product in context which sells. Hence, instead of fighting the loss of sales with respect to individual items, the challenge is to develop new markets by presenting these individual items in

new contexts. As long as it is less trouble to buy a set of contexts than to collect them oneself, this will remain a burgeoning market.

7. Conclusions

We are told daily that computers and the Internet are empowering and liberating instruments. Everyone is now free to write and edit their own texts, so everyone can be an author. The same applies to static images (as in paintings and drawings), moving images (as in video and film), the built environment (as with architecture) and to music. So everyone can be an artist, a film producer, an architect, a composer or a virtuoso player. Or thus the rhetoric. There is a copious amount of software in each of the creative arts. And yet not every author is a Shakespeare, nor is every would-be-composer a Mozart.

Professionally, one of the consequences of this trend is a conflation of what were once separate occupations. In the past an author was concerned with writing a manuscript, which a secretary typed and a layout person then worked with a typesetter and others in the printing shop in order to produce a book. Today one and the same author is also meant to be a layout person, a publisher and a printer. Often this is more hampering than liberating.

More significantly the software for words, images, (architectural) objects, sounds and music is still invariably linked with generic, universal solutions. For the publishing and recording industries linking such software with unique, particular examples, could open up new markets. For users this could open up whole new avenues of creativity and inspiration. What could be more important? We need less generic solutions and more unique examples at the level of a Shakespeare or a Mozart.

Acknowledgements

I am grateful to Professor Laura Bianchini for the honour of speaking at the Musica Scienza 2000 conference. I am grateful to my colleague Johan van de Walle and my doctoral student, Nik Baerten for kindly reading the text and offering suggestions.

Notes

¹ See Peter Murray-Rust, Henry S. Rzepa, and Christopher Leach.
Chemical Markup Language (CML)

See: <http://www.ch.ic.ac.uk/cml/>

² See: <http://www.acm.org/crossroads/xrds6-2/xml2b.html>

³ See: <http://207.82.250.251/cgi-bin/start>

⁴ See: <http://www-ai.cs.uni-magdeburg.de/~grote/Lehre/referate.html>

⁵ A slightly different arrangement is given by Rohit Khare, "XML. The Least you need to Know", at <http://www.cs.caltech.edu/~adam/papers/xml/tutorial:>

Syntax SGML

Style CSS/XSL

Structure HTML

Semantics XML

⁶ See: <http://www.oasis-open.org/cover/>

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- ⁷ For a basic list of geometry software
see: <http://forum.swarthmore.edu/dynamic.html>.
- See also Mathematica software at <http://www.wolfram.com/products/mathematica/>
- ⁸ See: <http://forum.swarthmore.edu/arithmetric/arith.software.html>
- ⁹ See: <http://monet.astro.uiuc.edu/~dguillau/these/>. See also software such as Astronomica at <http://www.astronomica.com/> is but one of a great number astronomy software packages. See: <http://www.physics.sfasu.edu/astro/software.html>. For further astronomy freeware see <http://www.cvc.org/astronomy/freeware.htm>
- ¹⁰ While the principles of the seven liberal arts can readily be traced back at least as far as Aristotle in the third century B.C., formal recognition of the seven liberal arts into a *trivium* (grammar, dialectic and rhetoric) of arts and a *quadrivium* of sciences (geometry, arithmetic, music and astronomy) appears in the fourth century A.D. in the work of authors such as Martianus Capellus. It is interesting to note that the history of the *trivium* was one of the starting points for the work of Marshall McLuhan in his doctoral thesis at Cambridge University on Nashe.
- ¹¹ See: <http://www.w3.org>
- ¹² Benjamin Barber, *Jihad vs. McWorld*, New York: Times Books, 1995.
- ¹³ See: <http://www.compaq.com/speechbot>
- ¹⁴ See: <http://www.bath.ac.uk/Centre/MEDIA>
- ¹⁵ This has links with the Limburgs Universitair Centrum (LUC) Diepenbeek.
- ¹⁶ Alan D. Talbot, SMDL - Ten Years Later, 8/21/96.
See: <http://www.hightext.com/IHC96/at13.htm>. Further discussions are found on websites of Steven Mounce at the University of Bradford.
See: <http://www.student.brad.ac.uk/srmounce/encoding.html>
And <http://www.student.brad.ac.uk/srmounce/smdl2.html>. Cf. Christopher R Baker, Music notation resources at: <http://www.hooked.net/~flubble/notation.html>.
- ¹⁷ See: <http://www.llgc.org.uk/iasa/>
- ¹⁸ See: <http://www.eltech.ru/hyper>
- ¹⁹ See: <http://imk.gmd.de/docs/ww/delta/projects.mhtml>
- ²⁰ See: <http://www.pads.ahds.ac.uk/carolaBcs990310Coll/html/sld029.htm>. For a more thorough list of music description codes
See: http://www.s-line.de/homepages/gerd_castan/compmus/notationformats_e.html#SMDL
- ²¹ See: <http://www.igd.fhg.de/igd-a9/research/audio/index.html>
See: <http://www.igd.fhg.de/igd-a9/research/audio/material/sig99paper.pdf>
- ²² See: http://www.emarketer.com/estats/112299_music.html
- ²³ See: <http://www.liquidaudio.com/>
- ²⁴ Alice Rawsthorn, "Big five shudder at digital jukeboxes", *Financial Times*, 13 January 1999.
- ²⁵ See: http://www.sdmi.org/public_doc/FinalFactSheet.htm
- ²⁶ See: http://216.32.180.250/cgi-bin/linkrd?_lang=&hm___action=http%3a%2f%2fwww%2esilicon%2ecom%2fa31923
- ²⁷ See: <http://www.imjv.org/>
- ²⁸ See: p. 83 of <ftp://ftp.cordis.lu/pub/esprit/docs/projmmms.pdf>
- ²⁹ Cf. SYGNA.
- ³⁰ EMI has since been acquired by Time-Warner.