

**An analysis of productive user
contributions in digital media
applications for museums and
cultural heritage.**

by

Lars Wieneke

Table of Content

1. Introduction	1
2. User contributions in new media environments	6
2.1 Characteristics of user-created content	6
2.1.1 User-created & user-generated content	9
2.1.2 Trivial & non-trivial content production	10
2.1.3 Crowd Sourcing, user contributions & context independent production	11
2.1.4 Application of the characteristics	11
2.2 Classification and Ends of user contributions	13
2.2.1 Substitute or supplement for conventional content production?	16
2.2.1.1 Computer game modding	18
2.2.1.2 Implications for research: ucc as a supplement for produc- tion resources	22
2.2.2 User-Created Content and Innovation	22
2.2.2.1 User-innovation	26
2.2.2.2 Innovative uses	29
2.2.2.3 User created content as innovation and basis for innova- tion	30
2.2.3 User contributions and engagement	31
2.2.3.1 Commons-based peer production	33
2.2.3.2 Producers	34
2.2.3.3 Convergence	36
2.2.3.4 Perspectives of engagement in user-created content	38
2.2.4 Aims of user-created content and implications for use	40
2.3 Organization of user contributions	40
2.3.1 Participation and Participation Inequality	41
2.3.2 Content Production Environments	49
2.3.2.1 Threshold and content production	49
2.3.2.2 A review of content production environments	60
2.3.2.3 Techniques of threshold reduction	65
2.3.2.4 Conclusion Content Production Environments	78
2.3.3 Management of contributions	82
2.3.3.1 Integration of contributions	82

2.3.3.2 Incentives for contribution	86
2.3.3.3 Management of contributions	92
2.3.4 User contributions in new media environments	97
3. Visitors and users in real and virtual museum environments	99
3.1 Media in museums and cultural heritage	103
3.2 From visitor to user: the virtuous circle	104
3.3 Visitor and user contributions in the museum environment	110
3.4 Virtual worlds in Museums and Cultural Heritage	117
3.4.1 An introduction into virtual worlds	117
3.4.2 Museums and cultural heritage in Second Life	121
3.4.2.1 Features of Second Life	122
3.4.2.2 Development and sustainability of Second Life	129
3.4.2.3 Museums and user contributions in Second Life	131
3.4.2.4 Conclusion	139
3.5 Challenges for user contributions in museums and cultural heritage	139
4. A framework for building, maintaining and influencing user contributions	142
4.1 Towards a design for contribution	142
4.1.1 Usability, task-efficiency and information design in the context of user contributions	143
4.1.2 Formats for contribution	147
4.1.3 Participation inequality and design for contribution	151
4.1.3.1 High/low-level interfaces	152
4.1.3.2 User progression	153
4.1.3.3 Flow and auto-telic activities	155
4.2 User and contribution management	158
4.2.1 Practical challenges for ucc in museums and cultural heritage	159
4.2.2 User activities and filtering	160
4.3 Exploration	164
4.3.1 Userette	165
4.3.1.1 Interaction concept and content format	165

4.3.1.2 System architecture and components	168
4.3.1.3 Review of the experiment	171
4.3.2 Questalicious	175
4.3.2.1 System architecture	175
4.3.2.2 Connecting real and virtual environments	176
4.3.2.3 Contribution formats in Second Life	179
5. Conclusion and suggestions for future research.....	188
I. References.....	I
II. Glossary	X
III. Abstract German/ Zusammenfassung	XI
IV. Curriculum Vitae	XX
V. Declaration.....	XXIII

Figures

[1]	<i>Comparison between production in conventional content production and user-created content environments</i> source: author	2
[2]	<i>Extended taxonomy of user-created content</i> source: author	10
[3]	<i>Participation Rates and Publication Productivity [Nielsen, 2006]</i>	42
[4]	<i>Corporation–Content–Audience</i> source: author	48
[5]	<i>Corporation–Content–Audience–Productive Users Constellation</i> source: author	48
[6]	<i>Comparison between different workflows to publish a video on the InternetActivities with a green background (Nr.1 for Youtube and Nr.1-3 for the Custom Server Setup) are required only during setup</i> source: author	50
[7]	<i>Relationship of threshold, ceiling and design/solution space</i> source: author	55
[8]	<i>Content pyramid. Content production in game environments according to [Koster, 2006]</i>	57
[9]	<i>Areas of training provided by current.tv</i> source: http://current.com/producerResources.htm referenced 16.09.2008	66
[10]	<i>User points as feedback indicators in a SFZero praxis. Basic points are given for the fulfillment of a task while user assigned points are given by users</i> source: http://sf0.org/completedTasks/?order=score , retrieved 20.09.2008	67
[11]	<i>Encountering quality assessment thresholds in current.tv. What makes up good storytelling?</i> source: http://current.com/make/training?section=storytelling retrieved 16.09.2008	68
[12]	<i>Task assignments in current.tv</i> Assignments,source: http://current.com/make/podIt Happened Here , source: http://current.com/topics/88798134_it_happened_hereboth retrieved 20.09.2008	69
[13]	<i>Task assignment in SFZero</i> Task overview, source: http://sf0.org/tasks/ retrieved 17.09.2008 Task details, source: http://sf0.org/tasks/Reverse-Shoplifting/ retrieved 17.09.2008	70
[14]	<i>Dialog to create a pinball game through The Wizard interface in SimsCarnival</i> source: author according to http://www.simscarnival.com/wizardtool , retrieved 18.09.2008	71
[15]	<i>The Game Creator development environment, emphasis added</i> source: http://www.simscarnival.com/view/create/gamecreator , retrieved 17.09.2008	74
[16]	<i>Combination of content environments with different thresholds, ceilings and design/solution spaces in SimsCarnival.</i> source: author	76
[17]	<i>Separation of user and corporate contributions</i> source: author	84
[18]	<i>Integration of user and corporate contributions</i>	

	<i>source: author</i>	85
[19]	<i>Embedded user contributions in a corporate environment</i> <i>source: author</i>	86
[20]	<i>Entanglement of production, management and engagement in user-created content environments</i> <i>source: author</i>	97
[21]	<i>The virtuous circle according to Barry</i> <i>source: figure by author according to [Barry, 2006]</i>	105
[22]	<i>Timeline of virtual worlds based upon the work of Koster and extend with further information. Diagram by author, see text for other sources.</i>	118
[23]	<i>User hours spend in Second Lifesource: data – http://static.secondlife.com/economy/stats_200808.xls, graph – author</i>	131
[24]	<i>Passive and Interactive Attention versus Interactive Production. Diagram according to [Screven, 1999] extended by the author</i>	148
[25]	<i>Activities and Interfaces for different levels of complexity</i> <i>source: author</i>	153
[26]	<i>User progression between different levels of activity</i> <i>source: author</i>	154
[27]	<i>Flow as a balance between anxiety and boredom</i> <i>source: author according to [Csikszentmihalyi, 1990]</i>	156
[28]	<i>Modified embedded user contributions strategy for the museum environments</i> <i>source: author</i>	160
[29]	<i>Group relations in SF0</i> <i>source: http://sf0.org/groups/, retrieved 5/08/2008</i>	163
[30]	<i>Levels as symbolic representation of user activities in current.tv</i> <i>source: http://current.com/users/, retrieved 12/10/2008</i>	164
[31]	<i>Content access in userette</i> <i>source: author</i>	166
[32]	<i>Content production process in userette, MMS</i> <i>source: author</i>	168
[33]	<i>System architecture userette</i> <i>source: author</i>	170
[34]	<i>Questalicious architecture</i> <i>source: author</i>	176
[35]	<i>Connection between the 4D cinema and Questalicious</i> <i>source: author</i>	178
[36]	<i>Interaction diagram in the re-enactment experiment</i>	185

Pictures

- [1] *Interface of the Nintendo DS. Besides a conventional interface (red outline) inherited from predecessors like the Nintendo Gameboy, the DS introduced touchscreen interaction (green outline) to mainstream computer gaming*
source: *Wikimedia Commons, Image taken by Havoc* 25
- [2] *Ticket for the Ice Station Antarctica exhibition at the NHM, London. Barcode and Registration number are in the upper right corner.*
source: *image taken by author* 106
- [3] *Certificate of Graduation from the Ice Station Antarctica. Incentive provided on the website.*source: *www.nhm.ac.uk/ice-station-antarctica*
retrieved 17.07.2008 108
- [4] *The Mini Saga project in the British Galleries 1500-1900 of the V&A, London.*
Image taken by the author 112
- [5] *Screenshot of Habitat (Lucasarts, 1985)*
source: *[Morningstar and Farmer, 1991]* 120
- [6] *Chatting in Second Life. Image taken at the International Spaceflight Museum.*
source: *author* 123
- [7] *Content creation with primitives in Second Life.*
source: *author* 125
- [8] *Parametric modification of the avatar.*
source: *author* 125
- [9] *Map view of a part of Second Life.*
Image taken from *http://slurl.com/*, retrieved 08/11/2008 127
- [10] *Exchange Rate of the Linden Dollar against the US Dollar*
source: *data – http://static.secondlife.com/economy/stats_200808.xls,*
graph – author 128
- [11] *Dresden Gallery (left) and Gemäldegalerie Alte Meister in the Sempergalerie at the Zwinger in Dresden, Germany (right)*
source: *author* 132
- [12] *The viewer is rotated in a chair in this exhibit of the SPLO environment of the Exploratorium in order to experience the changing nature of perception.*
source: *[Rothfarb and Doherty, 2007]* 133
- [13] *View upon the rocket ring at Spaceport Alpha in the International Spaceflight Museum*
source: *author* 135
- [14] *Outside view of The Tech virtual*
source: *author* 136
- [15] *The exhibit design tutorial in The Tech virtual provides an overview about more abstract concepts that make up a good exhibit.*
source: *author* 137
- [16] *Wall of Music Buttons (left), the real world implementation of Wikisonic (right)*
source: *The Tech* 138
- [17] *Become a secret agents, an example for user roles in Club Penguin*source:

	<i>www.clubpenguin.com, retrieved 23.11.2008</i>	162
[18]	<i>html interface of userette. User contributions can be browsed according to the time of publication on the left side and based upon the location of the contribution on the right side. source: author</i>	166
[19]	<i>Screenshot of the WAP interface of userette. source: author</i>	167
[20]	<i>userette poster and localization component source: author</i>	171
[21]	<i>userette flyer (left) and chewing gum wrap (right) source: author</i>	172
[22]	<i>'Space flight' example quest card source: author</i>	177
[23]	<i>Screenshot of the preparation of the re-enactment of Las Meninas source: author</i>	182
[24]	<i>Enactment of Las Meninas at the Creative Tinkering workshop, reLive08 source: Jos Boys</i>	186

Tables

[1]	<i>Comparison of production processes according to the taxonomy of user-created content</i> <i>source: author</i>	12
[2]	<i>Comparison between related concept in user-innovation and innovation in new media</i> <i>source: author</i>	28
[3]	<i>Levels of innovatory use according to [Haddon, 2005]</i>	30
[4]	<i>Preconditions and Key Principles of Producersage [Bruns, 2007]</i>	34
[5]	<i>Participation Inequality in selected applications according to [Nielsen, 2006]</i>	42
[6]	<i>Matrix comparison of contributions in terms of supplement-ability and rivaling contributions</i> <i>source: author</i>	150
[7]	<i>The quest format in relation to rivaling and supplement-able solutions</i> <i>source: author</i>	180
[8]	<i>Characters backgrounds and goals in the 'Las Meninas' re-enactment</i> <i>source: author</i>	184

1. Introduction

In a historical perspective, the relationship between digital media and the museum environment is marked by the role of museums as example use cases for the application of digital media. Today, this exceptional use as an often technology oriented application has changed and instead digital media have turned into an integral part of mediation strategies in the museum environment. Alongside with this shift not only an increasing professionalization of application development but also a growing demand for new content can be observed.

Comparable to its role as the main cost factor in the media industry, the production of content rises to a challenge for museums. In particular small and medium scale european museums with limited funding and an often low level of staff coverage face this new demand and strive therefore for alternative production resources.

While productive user contributions can be seen as such an alternative resource, user contributions are at the same time a manifestation for a different mode of interacting with content. In contrast to the dominantly passive role of audiences as receivers of information, productive contributions emerge as a mode of content exploration and become in this regard influential for museum mediation strategies. As applications of user contributions in museums and cultural heritage are currently rather seldom, a broader perspective towards user contributions becomes necessary to understand its specific challenges, opportunities and limitations.

Productive user contributions can be found in a growing number of applications on the Internet where they either complement or fully substitute corporate content production processes. While the Wikipedia¹, an online encyclopedia written entirely by a group of users and open to contributions by all its users, is one of the most prominent examples for this practice, several more applications emerged or are being developed. In consequence user contributions are about to become a powerful source for the production of content in digital media environments.

Such productivity outside of the work domain is not an entirely new phenomena as interested individuals and groups have published content also in the world of analogue media. It will be argued in the following thesis that the new quality that is associated to user contributions lies not within the independent production of content for example by *bloggers*² but instead in the integration of users and productive indi-

1. <http://www.wikipedia.org>

2. The term *blogger* is used to describe the author of a *weblog*, a software environment used to produce and publish mostly written content on the Internet.

viduals or groups in the production workflows of institutions and corporations.

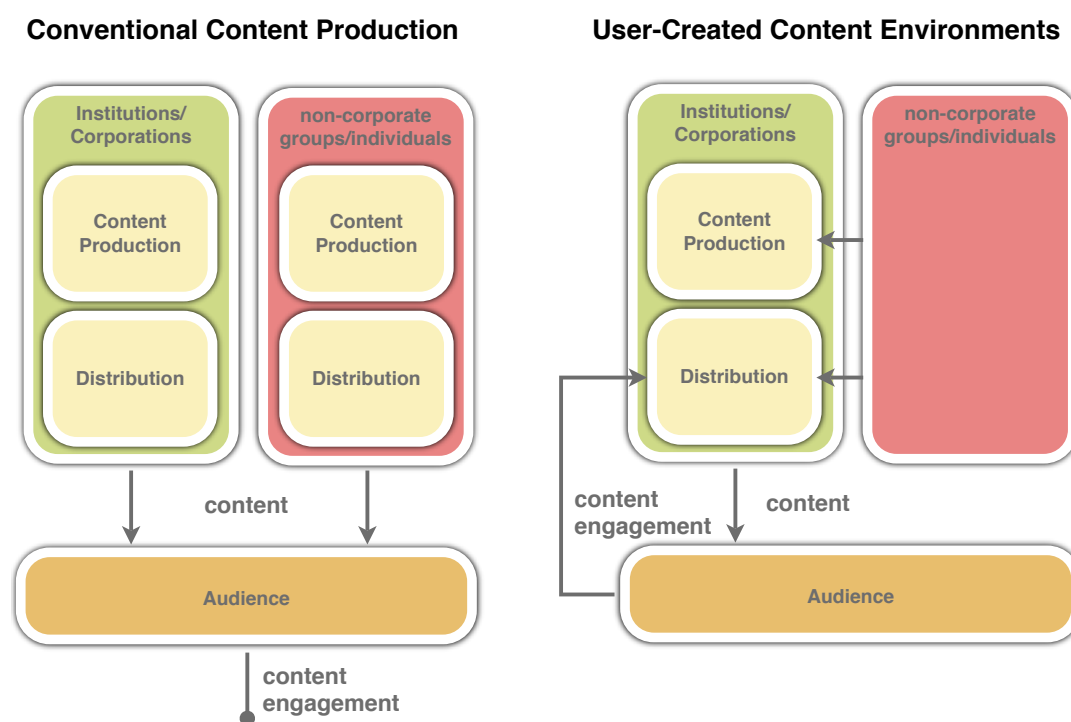


Figure 1: Comparison between production in conventional content production and user-created content environments
source: author

Figure 1 illustrates this new relationship between corporations/institutions and audiences as well as non-corporate groups and individuals: whereas conventional content production is marked by a strict separation between corporate and non-corporate production, user-created content environments can provide interfaces for external content sources and integrate these production resources not only to create new content but also to extend the relationship with their audience.

The following thesis will discuss this model and analyze to which end, under what conditions and by what means users become part of such content production processes. Nevertheless it has to be mentioned in advance, that user contributions are not a *silver bullet* and therefore not a universal answer to the challenges introduced by the demand for new content. At the same time an analysis of user contributions as it will be given in the following thesis will fall short in providing step by step guides or recipes to the successful application of user contributions. Instead of a master-plan for the construction of user contributions as generic templates, the following thesis highlights strategies that enable users to contribute and foster their engagement.

Despite the growing relevance of productive user contributions as well as its popularization in public discourse by concepts like *web2.0* it became apparent in the preparation of this thesis, that a significant research deficit exists in relation to the

design, development and organization of content production environments that implement user contributions. In comparison to the concept of participation in social sciences or in political theory a comparable engineering oriented perspective towards user contributions hasn't emerged so far, neither in relation to user contributions in general nor in reference to its application in museums and cultural heritage. Therefore this thesis commences in chapter two with a review upon the conditions of user contributions defined by the features of new media before a definition and classification of user contributions is introduced. Based upon this fundament, different perspectives towards the uses and applications of user contributions are reviewed whereby in particular the productive and innovative potential of user contributions as well its role in the creation of continuous engagement are analyzed.

In reference to these theoretical uses of user contributions, practical implementations of user contribution environments are reviewed in order to generalize concepts and challenges. To this end, a descriptive model of production processes in user contribution environments is developed and applied to a set of case studies. Chapter two finishes with an analysis of challenges to the management of contributions, ranging from a review of different strategies for the integration of contributions to incentives for contribution and finally practical elements of management as rights management, inherent conflicts between productive users and institutions/corporations as well as the filtering of contributions.

Chapter three builds upon the principles developed in chapter two and extends these through a specific perspective upon user contributions in museums and cultural heritage. Besides an introduction into the general context of digital media use in the museum environment, the chapter highlights the strategic connection between real and virtual environments in the engagement of visitors with the museum. In particular this relationship between on-site and off-site interaction emphasizes the role of the museum as a provider of information in physical and virtual spaces. Founded upon this aspect, examples for the application of user contributions in the museum environment are reviewed and put in the context of the classification scheme for user contributions developed in the previous chapter.

In order to provide a deeper understanding for the impact of user contributions as well as the emerging challenges introduced by them, a more narrow focus is put upon museum uses of virtual worlds. Virtual worlds provide not only emerging environments for mediation but are at the same time environments that rely to a large extend upon user contributions and offer therefor a multitude of content produc-

tion tools that can be used by museums. The chapter concludes with a review of lessons learned in this environment and the identification of specific challenges for user contributions and museums in virtual worlds.

Based upon the previous findings, chapter four introduces the development of a framework for user contributions. The chapter begins with a review of different theoretical approaches in the context of interface design and design for interaction and underlines the shortcomings of these theories in relation to user contributions. Derived from this, the concept of a design for gaps and productivity is exposed in the discussion of formats for contribution. Subsequently, strategies facing the impact of participation inequality are introduced and discussed. As user contribution environments show a significant disproportion in the distribution of productive and passive users, productive users become a scarce resource. In order to cater for different levels of user activity and to allow for a sustainable relationship with the application, different interfaces for simple and complex contributions are discussed in relation to the design of such interfaces as well as in the inter-relation between the different levels leading to a concept of user progression and contribution careers. As a guiding principle for simple contributions, the concept of flow and auto-telic activities is reviewed. Chapter four continues with practical consequences for the management of user contributions and describes new approaches towards the filtering of contributions. Finally chapter four describes two different experimental environments have been developed in order to review the applicability of the previously developed theories.

In chapter five, a conclusion towards the previous analysis of user contribution is drawn both in its general application as well as in the specific use in museums and cultural heritage. The chapter provides implications for the design of applications that incorporate user contributions and gives an outlook upon future research challenges. In particular the concept of participation careers, the combination of engagement based and outcome related content production environments in the same application, aspects of initial and sustainable motivation as well as new formats for participation will be suggested as future research topics.

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2. User contributions in new media environments

User contributions have played a role in conventional media, but by far not to the same extent as they do now in new media environments. This relationship between user contributions and new media can be traced back to the principles that define new media. According to Manovich, new media are characterized by five principles [Manovich, 2002]:

- I. Numerical representation of content,
- II. Modularity,
- III. Automation in the creation and modification of content,
- IV. Variability and
- V. Transcoding.

In particular the first two principles, which can be identified as core axioms of Manovich's concept, play a significant role in the relationship between user contributions and new media. As content in new media is stored in a digital format, it becomes subject to algorithmic manipulation in various forms. Therefore, as Manovich puts it, "media becomes programmable" ([Manovich, 2002], page 27). This programmability of content forms the basis for the connection between media and computer technology. In terms of modularity, Manovich points out that every new media object consists of a manifold of other media elements as for example images, shapes, sounds, etc., which in turn consist of collections of discrete samples. In the combination of these elements into larger objects, each element maintains its independence and can therefore be manipulated independently from the other elements that form a specific new media object. As a consequence, new media environments allow users to create or modify particular media elements within media objects and therefore the creation of new content without the need to produce all of corresponding elements of the object themselves. By combining the programmability of new media with its modularity, this process of creation can be supported by software and algorithms, which allows for automation of certain parts of the production process.

2.1 Characteristics of user-created content

Concepts like user created content, user generated content, participation, web2.0 and the like are influenced by a very lively and ongoing debate that happens in the same medium it tries to explain. While this concept of discourse allows for a flexible and extendable definition driven by a constant flow of new applications and ap-

proaches, it also leads to a use of terms as containers which hold, depending on the author and his intentions, concepts that are on close sight only loosely connected with one-another. Regardless of the benefits of this approach, such a plethora of terms does not provide a basis for a detailed analysis of user contributions even though, user contributions are influenced by processes that are still ongoing and therefore shaped by practices that evolve from within their practical application. It is therefore too early to *pin down the butterfly* and provide a lasting definition, as relevant factors might just emerge. Nevertheless, the term user-created content (ucc) has been chosen from the wide variety of terms to describe the phenomenon in question. Although other terms are used as synonyms, ucc gained wider acceptance within the limited range of existing research publications.

As it had been mentioned, so far no widely agreed definition of *ucc* has been established. Instead, different characterizations of ucc try to lay the groundwork for such a definition and will be reviewed in the following.

Popular discourse, characterizes user-created content often through the use of different applications. In this regard, any content that is produced within weblogs, wikis and the like is regarded as user-created. Such classification falls short when these applications become used in different contexts. A weblog can be used as a simple content-management system for a private diary but also as a marketing instrument in corporate communication. Consequently, an application based perspective upon *ucc* does not provide significant characteristics that would distinguish *ucc* from other concepts.

In a recent approach, Wunsch-Vincent and Vickery developed a framework for analyzing *user-created content* based on a group of characteristics. Their main incentive to develop this set of characteristics was both the lack of a general, accepted definition as well as the inability of existing definitions to provide the basis for a "[...] solid understanding of user-created content" ([Wunsch-Vincent and Vickery, 2007] p.18). According to their approach, user-created content is characterized as

- I. content made publicly available over the Internet,
- II. which reflects a "certain amount of creative effort" and
- III. which is "created outside of professional routines and practices".

[Wunsch-Vincent and Vickery, 2007] p.18

Wunsch-Vincent and Vickery identify the characteristics of ucc in three dimensions: first in relation to the availability of the content, second, in regard to the qual-

ity of the content and third, in terms of the context of production. While the first criterion is a generic postulate for any kind of content in the dominating distribution system available (the Internet), the latter two provide a deeper insight into the subject matter.

By stating that a "certain amount of creativity" is mandatory the authors exclude concepts which produce content in automated or semi-automated ways, for example by analyzing and aggregating user interactions through collaborative filtering. Similarly, the digitization or copying of already existing content does not cross the minimum threshold of creativity according to the authors.

In the third criterion Wunsch-Vincent and Vickery relate to the organizational context of production by excluding content that is produced within "professional routines or practices". These routines and practices are marked by two aspects: first, the existence of an institutional or commercial market that provides a context for production ([Wunsch-Vincent and Vickery, 2007], page 18) and second, the expectation of "remuneration and profit" (Ibid.).

According to the authors, these characteristics can be regarded as a work in progress and are given to identify the spectrum of user-created content ([Wunsch-Vincent and Vickery, 2007] p.18). In fact, the presented set of characteristics faces contradictions when applied to practical use cases.

Concerning criterion two, the existence of a "certain amount of creative effort" is a condition which is hard to assess and formalize. While the assessment of creativity itself is complex, though sometimes feasible (see for example the "Consensual Assessment Technique" as applied by [Piller and Walcher, 2006] referring to [Amabile, 1996; Amabile, 1983]) an evaluation of creative effort is subjective, depending upon a particular content instance and in the end vague, as Wunsch-Vincent and Vickery do not provide clear and unambiguous features. Furthermore several popular applications, as for example "tagging" or "ranking", need to be excluded from the concept of user-created content as they offer only a limited potential for creative effort.

The criterion of production "outside of professional routines and practices" contains significant limitations as well. In a reflection of their own model Wunsch-Vincent and Vickery identify three main problems. First the observation that some applications start to remunerate their users for the creation of content. Second, that some users become "professionals after an initial phase of non-commercial activity" ([Wunsch-Vincent and Vickery, 2007] p.18). Finally, that users that contribute

can be professionals in an area that is related to the content they produce but do so outside of their professional activities. In this case, the authors lack coherence in the critique of their own model: even within the limits of their own characteristics as stated before, the occupation of a user does not play a role if the content is produced outside of these professional practices.

Wunsch-Vincent and Vickery's concept of characteristics provides a first step towards a general definition of user-created content. Nevertheless, their characterization excludes several applications without providing an alternative categorization. Furthermore, their definition of creative effort remains too vague and is hardly applicable to existing applications. Last, their perspective on the organizational context lacks coherence, especially due to their exclusion of a temporal development of the user and the context of the practices conducted by the user, thus limiting the applicability of their characteristics as a useful tool for the analysis of *ucc*.

Building upon Wunsch-Vincent and Vickery's concept, the following model displayed in figure 2 has been designed to allow for the categorization of a wider range of existing applications.

2.1.1 User-created & user-generated content

As a first step in the development of a working definition of user-created content, a general distinction between user-created content and user-generated content is made. User-generated content is defined as content that results from automated processes which analyze the interaction of users with a media environment and generate content from these interactions. Examples for this approach are book recommendations based upon similar shopping patterns between different users but also automated rankings and in general content that is generated by technologies like collaborative filtering³. In this context the term "generated" refers to the automated nature of the process and the implicit production. In contrast, user-created content is content that is produced in an explicit action by users that don't have any formal obligation to create content.

3. For an introduction into collaborative filtering see for example [Segaran, 2007]

Content Source	user-generated content	user-created content	
	<ul style="list-style-type: none"> • implicit production 	<ul style="list-style-type: none"> • explicit production • created by users without any formal obligation 	
Nature of the production process	trivial production		non-trivial production
	<ul style="list-style-type: none"> • low engagement • low-complexity of production & publication • limited complexity of created content 		<ul style="list-style-type: none"> • high complexity of production & publication • highly complex content
Context of the production process	crowd sourcing	user contributions	context independent
	<ul style="list-style-type: none"> • Content is produced in exchange for monetary rewards • Produced according to the demands of a company/institution • similar to outsourcing 	<ul style="list-style-type: none"> • Produced according to the demands of a company/institution/ community 	<ul style="list-style-type: none"> • Independent of quality standards and goals • <i>Platform strategy</i>

Figure 2: Extended taxonomy of user-created content
source: author

The concept of "formal obligation" had been integrated in order to exclude concepts like outsourcing or professional work in general. Besides this, it allows to express a change of context: once a user starts to turn his publications into a profitable business venture, he becomes obliged to publish content. Therefore his publications can not be regarded as user-created content anymore.

2.1.2 Trivial & non-trivial content production

In order to avoid the definition and assessment of a qualitative concept like creative effort, user-created content is described within this thesis in relation to the production process as either trivial or non-trivial user-created content. Trivial⁴ user-created content is content that is explicitly created but requires only limited engagement from the user. Tagging or ranking applications are examples for this category: the time needed to understand the requirements towards content, the concept of the production process and the production tools used to create such content is, even for new users, considerably low and in the range of a few minutes between first contact with the application and the publication of new content. Non-trivial contributions are, in contrast, characterized by complex expectations, conceptions and tools, resulting in the creation of complex content and the demand for collaboration between users as well as long-term sustainable engagement and motivation of the users.

4. The dichotomy trivial and non-trivial is related to Yochai Benkler's description of trivial web applications where in his point of view motivation becomes trivial once the time to learn a tool becomes negligible for the user. [Benkler, 2006]

2.1.3 Crowd Sourcing, user contributions & context independent production

As a third level of characterization, the context of the production process is applied and related to the concepts of crowd sourcing, user contributions and context independent production. Crowd sourcing describes in this classification scheme the outsourcing of different tasks in exchange for monetary rewards (see [Brabham, 2008]). An example for this approach is Amazons Mechanical Turk⁵, a web-site that allows users to complete simple tasks in exchange for smaller amounts of currency. User contributions on the other hand describe content which is produced according to specific goals and quality standards, defined by a community, an institution or a company without direct monetary compensation for the user. Instead, rewards are given through other means, for example by social acknowledgment. This is the case in environments like the Wikipedia⁶, where content is produced according to quality standards that emerged and are actively discussed within the community of wikipedia authors but in general without monetary compensation. Context independent production as a third category is related to a production context without any or only limited explicit influence of companies, communities or institutions. Such processes include platforms as for example the video sharing site Youtube⁷: besides general guidelines⁸, Youtube does not influence the nature of the content but provides a generic platform for publication.

2.1.4 Application of the characteristics

Table 1 illustrates the combination of the different categories in the analysis of different production processes.

It has to be noted, that real world environments often make use of different applications at the same time. The video sharing website Youtube provides an example for this process as shown in table 1: While a user-created video could be considered as non-trivial content, the rankings users can conduct are trivial content according to

5. Amazon Mechanical Turk: <http://www.mturk.com/mturk/welcome>

6. Wikipedia: <http://www.wikipedia.org>

7. Youtube: <http://youtube.com>

8. YouTube Community Guidelines: http://youtube.com/t/community_guidelines

Name	user-created content	user-generated content	trivial production	non-trivial production	crowd-sourcing	user-contribution	context independent
Wikipedia Article	X	-	-	X	-	X	-
Youtube Video Content	X	-	-	X	-	-	X
Youtube Ranking	X	-	-	X	-	-	X
Youtube Text Comment	X	-	X	(X)	-	-	X
Mechanical Turk Task	X	-	X	-	X	-	-
Amazon automatic book recommendation	-	X	-	-	-	-	-

Table 1: Comparison of production processes according to the taxonomy of user-created content
source: author

the definition. In the case of text comments on Youtube a clear distinction between trivial and non-trivial content gets however more difficult: although the design of the interface to create comments is trivial, the production of content could reach a higher complexity on a conceptual level when users produce more sophisticated responses. This ambiguity of content production processes will be further investigated in the context of solution space⁹.

2.2 Classification and Ends of user contributions

In the traditional value chain of media content, the end-user, or in the context of conventional media, the viewer/recipient, have always played a significant role as the main target of the process. While this principal setup dominated for several years – and still does so in some areas of media production – the strict institutional border between author and user begins to blur in new media environments. In contrast to analog television or radio, where technologies for content production have been in magnitudes more cost intensive, therefore far less spread, the technology to produce content in new media environments is in principle identical to the technology used to receive it.

With the wide spread use of this technology and the ubiquity of the Internet as a channel for both distribution and communication, a technical foundation has been laid that allows in principal every user of the Internet to produce and publish content. While several theories predicted or desired¹⁰ this development in the past, usage data of current applications that apply *user-created content* shows¹¹ that although the prohibitive technical and financial thresholds start to disappear, the general distinction between author and user still remains intact. Instead of an equilibrium between authors and users – where every user becomes an author – the constellation of one talking to many prevails with the decisive difference that more authors are enabled to reach an audience. A different perspective to these findings might emerge out of the concept of *social-software*. Dron describes social-software as an ap-

9. the concept of *solution space* is used within this thesis to describe the diversity of potential results which are created with a certain production tool. Textual input shows thereby a very large *solution space*, as text can be used to communicate a wide variety of concepts, ideas and information. For a more in-depth discussion of the concept see chapter 2.3.2 *Content Production Environments*

10. It would go beyond the scope of this thesis to provide an introduction into the different theories that proclaimed the disappearance of a distinction between author and reader/user . See for instance [Brecht et al., 1992] and chapter 3. *Visitors and users in real and virtual museum environments* for the relevance of participation in museum and cultural heritage policies.

11. see also chapter 2.3.1 *Participation and Participation Inequality*

proach that "[...]treats the group as a first class object in the system." ([Dron, 2006]) and describes it furthermore, similar to the general use of user-created content, as a concept with no established definition. Instead of an explicit focus on content as in user-created content, social-software relates to an equilibrium of communication between members of the community and analyses the communicative interrelations between the different actors of a computer mediated social group. An analysis of this new kind of setup is not within the scope of this thesis, but social relationships and actions play a role in user-created content and will be further investigated in the following chapters.

As discussed before, the emergence of user-created content is related to technological as well as social developments. Rationales for this development can be found in

- the proliferation of computer technology and the Internet in general,
- the increasing relevance of these environments in everyday life,
- lower thresholds for content production by advanced authoring systems that focus on the demands of laypersons instead of professionals,
- public adoption of basic media production technologies like digital cameras and recording devices as well as
- informal online communication environments and learning resources.

According to [Wunsch-Vincent and Vickery, 2007] social drivers of this development also include an increased demand from the audience to extend their engagement with particular media environments by becoming more active. Furthermore, different drivers for this development can be also found in economic as well as institutional and legal developments. In terms of economic drivers, the availability of venture capital for emerging companies that provide services and platforms for user-created content and the declining costs for Internet access have become highly influential. Legal and Institutional drivers of this development are the adoption and availability of licensing schemes that provide a higher flexibility for licensing and reuse of content (see [Wunsch-Vincent and Vickery, 2007] p.24).

Despite the impact of these technologies on the adoption and acceptance of user created content in new media, it has to be noted, that the content consuming recipients of classical media like television or radio, prominently illustrated by the phrase *couch potato*, haven't been as passive as often characterized. Besides call-in shows that operate directly with the reaction of viewers and their active participation, cinema, television and radio have always been media that viewers engage with, especially in the active appropriation of content as described for example by [Hall, 1997] and

[Du Gay, 1997] in the context of Cultural Studies. While these processes of appropriation lead to consequences in everyday life rather than to new content, examples like fan-fiction [Jenkins, 1992] show, that even in the world of analogue media and high costs for content production and distribution an audience exists that appropriates and actively creates new content.

Nevertheless, the adoption of computer and communication technologies in households significantly widens options for participation and the production of content.

This trend also provides the basis for two further developments:

- I. the creation and distribution of media content outside corporate and institutional structures and
- II. the combination of corporate and institutional structures with user-created content.

In relation to point I, the concept of user-created content becomes an alternative to corporate content production and is opposed to established institutions and corporations. In this context, user-created content is connoted with concepts like participation or democratization and used in an ideological context. Tavares [Tavares et al., 2005] and Pearce [Pearce, 2002] for example put their analysis of user contributions in computer games and its consequence towards the author/consumer perspective in the tradition of political projects like emancipation (Tavares) or revolution against hegemonies (Pearce). This argument continues a train of thought that appears as well in Jenkins earlier analysis of fan culture, where "Fandom generates systems of distribution that reject profit and broaden access to its creative works" ([Jenkins, 1992]). It would go beyond the scope of this thesis to retrace the intellectual history of this concept as well as its moral impetus and goals, but it is well worth noticing, that this political perspective limits the analysis of user contributions and its impact. As such, these ideas have not only affected scientific analysis, but also influence user attitudes and expectations, as will be discussed later in this chapter¹². While this politically influenced perspective towards fan and user contributions dominated the social science discourse for several years, an interest in finding alternative interpretations to the deadlock situation of a binary opposition between user and corporation emerged in recent years. Jenkins describes this as

The old either-or oppositions (co-optation vs. resistance) which have long dominated debates between political economy and cultural stud-

12. see 2.3.3 Management of contributions

ies,[sic] approaches to media simply do not do justice to the multiple, dynamic, and often contradictory relationships between media convergence and participatory culture.

[Jenkins, 2003]

In combination with corporate and institutional production, user-created content is also associated with the term "prosumer". In its first emergence, the portmanteau prosumer had been defined by Toffler [Toffler, 1980] as a combination of producer and consumer. Being a futurologist, Toffler's account is more speculative in nature, but gained wider popularity, especially in mass-customization (see for example [Bandulet and Morasch, 2003]).

Instead of discussing the resistive and cooperative potential of ucc with an equal emphasis, the combination of ucc and existing institutions will be further investigated. In particular as this thesis focuses upon museums and cultural heritage sites which form institutions but also because an intense discussion of the resistive potential of ucc can be found elsewhere¹³.

In the context of institutions and corporations non-trivial user-created content shows a potential that goes beyond a purely ideological impetus and can be categorized in three domains:

- I. as a substitute for conventional content production,
- II. as a means for innovation and
- III. as an engaging process.

The following subchapters provide an overview about the impact of user-created content in these particular domains. Besides examples of existing applications, related theoretical approaches from different scientific areas will be discussed.

2.2.1 Substitute or supplement for conventional content production?

Content is the main driver of media economies. It not only creates interest and thereby stimulates demand for a specific media product, but it is also the main cost factor in production. In traditional media publishing, the cost to produce an additional copy of the same media content is marginal compared to the cost of producing the first copy (see [Shapiro and Varian, 1998], page 20) This feature of media publishing, also described as first-copy costs, appears in digital media as well, with the significant difference that the cost for additional copies is significantly lower

13. For an introduction into user-created content, participation as well as related concepts like empowerment and citizen journalism, see for example [Dan, 2006]

than in analogue media and can converge due to the nature of digital processing and copying towards *zero* cost (Ibid.). With the diversification of media offerings, the emergence of new distribution channels and increasing competition between market actors, the demand for content increases. Conventional production methods however provide only limited means to cope with this demand on a large scale due to their high costs. Therefore, significant amounts of research have been conducted to cope with these challenges in particular within two main directions:

- I. by lowering the cost of content production through advanced authoring systems as well as content reuse and
- II. through means to extend the revenue generated by the content produced. Approaches like cross platform publishing and content management fall into this category and are discussed in detail elsewhere¹⁴.

Despite this effort in cost reduction, the principal institutional distinction between author and receiver/user lowers the impact of such approaches. Even with improved means for the creation of new content and the ability to reuse previously existing content in new combinations, the overall available personnel resources remain limited. User-created content creates in this context through the integration of an external personal resource – the users – an expectation of corporations and institutions to provide a means of production that could significantly lower first-copy costs. Amazon.com shows an example for this approach in its integration of user reviews: instead of testing every product that is available through the online reseller, users of Amazon are enabled and encouraged to create reviews of products and publish them online, thereby providing other users and potential buyers with more information about a product.

Even though, the Amazon example provides a popular use case for the integration of user-created content in a corporate/institutional environment, the impact of user-created content as a supplement or even substitute for content production is within the corporate/institutional environment relatively limited.

Outside of existing corporate and institutional structures on the other hand, the implementation of ucc is more common. In this case however, the application of ucc does not refer to existing corporate and institutional structures but operates in its own frame of reference: organizational procedures that exist for example within the

14. See[Mauthe and Thomas, 2004] for Authoring systems and asset reuse, and [Müller-Kalthoff, 2002] for revenue extension.

Wikipedia, as described by Bryant [Bryant et al., 2005], are the result of processes within the Wikipedia and do not refer to an adoption of existing corporate policies. This distinction between emerging organizational forms and existing structures given in a corporation or institution is crucial and has significant impact for the management of user contributions as well as concepts like content quality, performance expectations or engagement and will be discussed later in this chapter¹⁵.

Other examples for the successful integration of ucc like Youtube or Flickr¹⁶ also provide only limited insight into the interfacing of institutions and corporations through user-created content: according to the classification scheme developed in the previous chapter, they relate to non-trivial user-created content in a context independent mode of production and follow therefore a platform strategy, where with the exception of usage policies no further influence on the content is provided. As these platforms do not provide content on their own user-created content provides for them also not a substitute or supplement to conventional production processes but rather than that the only available mode of production.

Models for the combination of user-contributions and corporate content can be found however in a different field: namely in the context of computer games and in particular, but not limited to, in the genre of first-person shooters¹⁷.

2.2.1.1 Computer game modding

Up to the mid 90s of the last century, computer games did not provide a platform for the production, distribution and use of new content. Notable exceptions and early experiments in this area are games like Lode Runner (Broderbund, 1983), Pinball Construction Set (BudgeCo, 1983), Boulder Dash Construction Kit (First Star Software, 1986) and Shoot-Em-Up Construction Kit (Sensible Software, 1987) (according to [Sotamaa, 2006]) which combined a game with an editor or turned the editor into the game itself as in the ...-Construction Kit series of games.

In this line of games, Lode Runner was the first to extend the use of the game by providing a level editor and at the same time incorporated the contributions of users. In a 1984 competition announced by the magazine Computer Gaming World [Computer Gaming World, 1984], readers could compete for a price of 50\$

15. see 2.3.3 *Management of contributions*

16. see <http://www.flickr.com>

17. A further discussion about the moral implications of this genre, which could be described as the simulation of symbolic carnage in virtual environments would go beyond the scope of this thesis. In defense of the genre it is worth remembering, that the relationship between symbolic actions and actions in *reality* is more complex than a cause/effect interpretation suggests.

by sending in discs with levels they created in the Lode Runner level editor. Besides being a pioneer work in the integration of user-contributions, this example also illustrates the problems that early approaches to user contributions were facing: in the pre-Internet era, contributions had to be exchanged through physical transfer of storage media. This led to a longer time frame of exchange (the competition lasted for three months, winners were announced another three months later and a floppy disc with the award winning levels was published in an issue of Computer Gaming World) and increased costs¹⁸ for both parties. Also the producer/publisher of Lode Runner benefited from the contributions only by proxy, as the distribution of the winning levels was conducted through Computer Gaming World and didn't become part of the product sold by the publisher. Nevertheless, the Lode Runner case can be considered as one of the earliest examples where a computer game was turned into a content platform and users were encouraged to contribute content that increased the value of this platform for other users. This strategic approach differs from the unauthorized modification of existing games, described by Sotamaa [Sotamaa, 2006] as "hacking", which was performed without the approval of the game producer.

A major breakthrough for the concept of user contributions in computer gaming took place with the publication of the first-person shooter *Doom* (id Software, 1993). The producers of *Doom* enabled the contribution of new content on a technical level by externalizing the game data from the engine, thereby providing a setup that allowed the integration of new content without modifications of the core [Sotamaa, 2006]. Cook describes this approach in [Cook, 2005a] as data-driven development, where an engine is established as a middleware that allows the externalization of content. In contrast to Lode Runner, an editor itself was not included in the initial *Doom* package but several editors were released by external parties later on. As a consequence, users contributed and still contribute¹⁹ content, thereby significantly extending the lifetime and impact of the original game [Mäyrä et al.]. As *Doom*, like every other modern computer game, forms a bundled media product that consists of different media types like visuals, auditive elements and game logic the contributions created by users are diverse. Primarily these contributions consist of

18. Computer Gaming Magazine mentions that the floppy discs on which the levels were sent in would be returned after the competition. A concession to the high price of these storage media.

19. Though the release of the original *Doom* happened several years ago, a fan community continues developing modifications at the time of this writing. See for example <http://www.wadsinprogress.info>

avatar skins, modified antagonists and new layouts of the environment as well as combinations of these elements.

In terms of distribution, bulletin-board systems and personal exchange of physical storage media dominated in the beginning. Later on these distribution systems were replaced by third-party web sites that provided an aggregation of modifications. As narrow-band access to online resources prevailed during the peak of Doom modifications (between 1994-97) third-party providers as well as iD software itself offered bundled collections from these user-contributions on CD-ROM for off the shelf sale [Kushner, 2004].

According to the previously developed classification of user-created content, most Doom modifications can be classified as an example for non-trivial, context-independent user-created content. Although iD Software later on switched its policy with the sale of bundled modifications to a user-contribution model of user-created content, its initial approach is comparable to the previously cited platforms Youtube or Flickr. Similarly to these, iD Software defined a single constraint towards user-created content: "the user-created modifications must only work with the retail version of Doom" [Mäyrä et al.]²⁰. In contrast to Flickr and Youtube, the user-created modifications formed a supplement to corporate produced content and both extended and diversified the lifetime of the Doom platform significantly [Mäyrä et al.].

While Doom created one of the earliest, successful implementations of user-created content, other approaches with an even tighter integration emerged afterwards. Examples for these approaches can be found in particular in the video games series The Sims (EA Games, 2000-) and Trainz (Auran, 2001-).

Being so far the most successful video game series of all times with 100 Million copies sold up to April 2008²¹, The Sims is set in a different genre than the previously mentioned games. Indeed, a classification into conventional computer game genre is difficult [Pruegl and Schreier, 2006]. Rather than being comparable to other games, The Sims forms its own category, described by Nutt and Railton as Real Life [Nutt and Railton, 2003]. In The Sims, the player creates autonomous virtual agents in an environment that recites elements of suburban lifestyle in the twenty-first century and influences their individual character and environment in order to

20. This approach to manage user-created content through a structural separation of user-created and corporate content will be discussed later in this chapter.

21. see <http://thesims2.ea.com/100million/index.php>, visited 28. of June 2008

make them reach goals of personal development [Pruegl and Schreier, 2006].

The Sims significantly extended the concept of content for computer games, by allowing different forms and formats of content for users to create and publish. While simple modifications of existing content are possible within the game environment (change of color etc.) external tools are used to create new designs for objects or even objects that have no counterpart in the original game [Pruegl and Schreier, 2006]. With the introduction of The Sims 2, content creation became even further diversified by the introduction of new designable objects and the integration of motion picture recording functionality which fostered the production of machinima²². From an organizational point of view, the integrative approach of the producers of The Sims which combines user contributions within producer controlled online repositories as well as external sites will be discussed in a later chapter. Overall, content production processes within The Sims can be categorized as non-trivial, user contributed user-created content. As Pearce points out, the openness to user-created content exhibited by EA in The Sims "perpetuated that brand's longevity to historical levels" [Pearce, 2006].

Auran, an Australian game producer went even a step further in the development of a train simulator software called Trainz. With several consecutive releases, Auran established and deepened its relationship with fans and followers of the game through a tight integration with an online platform. Auran opened the production pipeline [Banks, 2005] using different measures: in the first step, users were enabled to exchange content on the online forum. This content consisted mainly of new train models, rail track layouts and track environments with different object models. After successfully engaging users, Auran extended the platform by providing a market based model that allows users to publish and sell their creations to other users. During the development of Trainz Railroad Simulator 2004, analysis of economic key data for current version of Trainz showed that the estimated financial goals were not achieved, which in consequence jeopardized the production of the successor. In order to continue the project nevertheless, Auran decided to fully outsource its art department to members of the productive user community that had developed over the previous years [Banks, 2005]. As Banks points out, this decision led to several problems and increased tension in the cooperation between Auran and the Trainz community (Ibid.) and provides at the same time a case study for prob-

22. the term "machinima" refers to the creation of movies through the use of 3D environments and in particular computer game engines see for further information [Berkeley, 2006]

lems related to the management of users and their contributions²³.

2.2.1.2 Implications for research: ucc as a supplement for production resources

Overall, users provide a potential resource for the production of content. Nevertheless, the incorporation of user-contributions also raises several questions that will be discussed in the upcoming chapters. In particular issues on conflicting concepts of content quality have to be discussed: Do users and corporations share the same concept of content quality? What makes up good content for a user and similarly what are the criteria for a corporation? What kind of conflicts emerge when quality agendas collide?

From a technical perspective, content in new media consists of different modularized media elements like sound, text, graphics, animations, video, code logic etc. How can corporations influence persistence of these elements as well as bug-free operation of the new media objects?

Since in the case of the Doom modifications users can contribute large amounts of new content, who filters the content and according to whose criteria?

When content is produced by anonymous users online, content liability becomes relevant: corporations face legal constraints when they distribute content that makes use of copyrighted materials. Hence, how can corporations provide clearance for content produced by users? If user-created content becomes incorporated to replace conventional corporate content production, can corporations trust that their users do have the necessary licenses to publish content? Even when using open licensing schemes, the problem prevails: is the background music used by user *steve_777* for sure content that is published under an open licensing scheme like Creative Commons or is it copyrighted material?

Users are volatile and have no obligation to do what they might promise to do. How can corporations sync their production facilities with users that do not need to obey deadlines?

2.2.2 User-Created Content and Innovation

Besides the potential of turning user-created content into a substitute for or supplement to conventional content production, user-contributions can become a means of innovation in new media environments. Innovation is in this context understood as the application of an idea into practice [Fagerberg, 2005] and affects new media

23. This will be further discussed in chapter 2.3.3 *Management of contributions*.

in two different ways: First, due to the close relationship of new media as programmable media with computer technology²⁴, new media become a target for technological innovations. This happens for example in the application of new interaction technologies like multi-touch screens, sensory input devices [Cook, 2005b] or eye-tracking but also in terms of presentation technologies like 3D graphics engines. Second, new media products themselves demand for innovation in content, either to leverage the potential of a technological innovation or to extend the audience of a new media product. While audience extension can be considered as a general demand for all kinds of media, the demand for content innovation due to technological innovations is a particular challenge for new media production.

In general, the application of technological innovations in relation to content can be described under two premises:

- either as a transparent substitute for existing technologies therefore enabling the use of pre-existing content or
- as a new platform with a demand for specific and initially unexplored forms of content.

The main challenge of developing such new content is related to the nature of content as a social product: although new media content is stored, transmitted and experienced through technological means, it is not purely defined by technical parameters, but also shaped by social practices. These practices can influence content in different ways, for example through the context of reception/use, the expectations regarding structure and presentation or – in particular in new media environments – through concepts of interaction. As such, content for a specific new media platform is constantly shaped by social processes and therefore in a permanent process of development. Similar to the semiotic analysis given by Kress&Pachler for the concept of learning in mobile learning [Kress and Pachler, 2007], the production of new media content can be described as a process of shaping and re-shaping: e.g. when playing a computer game, the player gives the game a certain meaning. As he starts to build a new game as a producer, he relies on these experiences but through the act of production he alters the existing body of computer games, therefore shaping and modifying existing concepts of computer games. Gee describes this process of mutual influence as modifications to the internal and external design grammar: while players and critics shape through their ongoing social interactions

24. see Manovich's concept of new media objects in chapter 2. *User contributions in new media environments*

the external design grammar, which defines from a meta-perspective the features of a certain game genre, producers and developers shape through the act of creating or modifying games the internal design grammar of games (see [Gee, 2007], pages 28-31).

With the introduction of technological innovations, this frame of reference does not exist in the very beginning, but is shaped in the process of new content production. Therefore the design of new applications depends to a large degree on speculations about how the new media product will be adopted. Due to the high costs of content production, speculative production is rather seldom found in established new media environments, as it involves potential failure and therefore a loss of investment. In new media environments that incorporate technological innovations, this risk has to be taken in order to establish a frame of reference and to prove the additional benefit, that such innovations offer for the user.

An example for this challenge of new media development can be found in corporate production environments in the context of computer games and in particular in the strategies executed by the Japanese hard- and software developer Nintendo. With the introduction of the Nintendo DS, a hand-held computer game platform, Nintendo combined several innovative technologies such as dual-screen display, wireless networking and touch-screen input. While touch screens have been widely adopted as a substitute for mouse input – in particular in the personal digital assistant (pda) market – the design of new content, in this case computer games, that made use of the particularities of touch screen input for gaming, became a major design challenge.

Nintendo responded to this challenge by emphasizing the touch-screen option in its market communication as a unique selling point and by fostering the production of content that made explicit use of these new input facilities through in-house production [Cook, 2005b]. Such explorative strategies, that involve the risk of failure and require experience in the respective market as well as intensive user evaluation are only feasible for commercial players that are able to sustain high financial investments with consequential risks. In the context of smaller corporations or institutions as well as in research the same demand for innovation in content exists but no alternatives to the cost intensive mode of trial-and-error evaluation have been developed.

In this context user-created content offers an interesting alternative for the exploration of new media platforms. Such an exploration thereby happens in two ways:

either the user-created productions become an inspiration for the designers in the development of new products or such productions turn into marketable products themselves.

User-created productions as an inspiration for design can be traced back to the first-person shooter *Doom*, where user-created modifications became an inspiration for the designers of the sequel (see the anecdotal description in [Kushner, 2004]). Besides being an inspiration, such productions also allow for better communication between designers and users of a new media product. By allowing users to create what they like, designers become enabled to understand different perspectives upon the emerging practices that evolve around a specific media platform and therefore participate in the process of shaping and re-shaping.



Picture 1: Interface of the Nintendo DS. Besides a conventional interface (red outline) inherited from predecessors like the Nintendo Gameboy, the DS introduced touchscreen interaction (green outline) to mainstream computer gaming source: Wikimedia Commons, Image taken by Havoc

User-created productions that provide innovation in the exploration of new media platforms as marketable products can be found as well in the context of computer gaming. *Counterstrike* (Minh Le, Jess Cliffe et.al., 1999), a modification of the first-person shooter *Half-Life* (Valve Software, 1998) was developed by a group of users and introduced a new concept of collaborative team-oriented game-play that turned *Counterstrike* into one of the most popular online games today and significantly influenced the development of the genre of first-person shooters²⁵ as a whole

25. It would go beyond the scope of this thesis to discuss the ethical and moral implications of *first-person shooters* in general and *Counterstrike* in particular. Nevertheless, it has to be pointed out, that the *simulation of killing* which is performed in such games deserves a critical reflection by the reader. See

[Ondrejka, 2004].

Similarly Banks provides evidence for the impact of user-created productions in the development of the previously mentioned *Trainz* simulator. In the case of *Trainz*, a user created in an informal cooperation with members of the original development team a new feature of assets: The simulation of steam which allowed the integration of steam-trains into the game and lead in consequence to far higher demand for the original game [Banks, 2005].

2.2.2.1 User-innovation

While the previous examples for innovation in new media platforms provide rather anecdotal evidence than structured scientific research, the theory of user-innovation analyzes innovation processes conducted by users from a scientific perspective. Although originally situated in the context of new product development (npd), user-innovation has been identified in the context of new media as well.

The core principle of user-innovation refers to the observation that in some industries like printed circuit CAD software, pipe hangers and library information systems (see [von Hippel, 2005], page 20), users of technology and not manufacturers drive innovation and new product development [von Hippel, 2005]. In contrast to the concept of user in this thesis which relates to a single private person with no formal obligations to produce content, a user in user-innovation could be both an individual as well as a corporation. According to user-innovation theory, these entities are regarded as users as they expect a benefit for themselves from an innovation they create in contrast with a manufacturer who innovates as he wants to profit from selling or licensing the innovation [Piller and Walcher, 2006]. Nevertheless, these user-innovations can be beneficial for manufacturers as well, as they allow for an improvement of manufacturer based npd.

The main challenge of npd relates according to von Hippel et al. to the problem of sticky information. Stickiness of information is thereby defined as "[...] the incremental expenditure required for transferring a certain unit of information to a specified locus in a form that is usable to the information seeker" ([von Hippel, 1994] and [Ogawa, 1998] cited by [Piller and Walcher, 2006]). In the context of manufacturers and users this information stickiness can be twofold: users have better information about their demands and needs than manufacturers. Besides other factors that influence stickiness of information, these information tend to be implicit or

also footnote 14.

tacit. Tacit refers in this context to Polanyi who describes information as tacit because "[...] the aim of a skilful[l] performance is achieved by the observance of a set of rules which are not known as such to the person following them." ([Polanyi, 1974] cited in [von Hippel, 2005]). Users can therefore perform actions in a "skillful" or satisfying way but without being able to fully describe them in a formal manner. As such, need information tend to stick with the user and a transfer of this information to the manufacturer becomes difficult and expensive.

On the other hand, manufacturers have information about the peculiarities of the manufacturing process or some specific know-how required for production that they cannot communicate to their users or only under high costs [von Hippel, 2005]. In the context of user innovation such information is referred to as solution information.

In general stickiness of information is also influenced by the capacity of an institution to absorb information. von Hippel illustrates this case with a problem in circuit engineering: a company that wants to create its own circuit designs might need to absorb a significant amount of basic information in order to acquire solution information for advanced techniques in comparison with a company that already uses advanced techniques. Therefore the specific information stickiness becomes higher for the first company ([von Hippel, 2005], p.68).

Instead of directly developing solutions for customers, some manufacturers have started to provide toolkits to their users which these can apply to explore solutions for their own specific demands [Piller and Walcher, 2006]. Such toolkits try to encode the required solution information in software environments which allow users to experiment and to explore their needs within a certain solution space defined by the toolkit. Once the users finishes a design, the production instructions are transferred to the manufacturer who produces the product and delivers it to the user.

Von Hippel underlines the importance of this approach in some industries in particular in the semiconductor industry (see [von Hippel, 2005], p.16). Toolkits are therefore especially useful in industries where standard products won't fulfill the highly heterogeneous needs of users [Pruegl and Schreier, 2006].

Another finding in user-innovation theory is the concept of "lead-user". Lead-users are users that encounter needs before the majority of the market is confronted with those needs. They try to find solutions for their own needs as they will significantly benefit from a solution [Piller and Walcher, 2006]. Toolkits can enable these users not only to identify needs but also to provide solutions that have a significant im-

pact on the new product development of the manufacturer if their solutions can be generalized for the needs of other users. In order to foster lead-users and their engagement, user-innovation also analyzes user communities and the impact of these communities upon lead-users and their innovations.

User-innovation	Innovation in new media
need information	shaping & re-shaping of new media content
solution information	know-how about the integration of technological innovations
toolkits	editors & authoring tools
solution space	scope of authoring tools
lead-user	productive users
production	publication

Table 2: Comparison between related concept in user-innovation and innovation in new media
source: author

Research on user-innovation is driven by a demand to enable users to develop innovations for their specific needs with toolkits and by enabling manufacturers to discover lead-users and their innovations for new product development. In the context of user-created content in new media the user-innovation approach provides both a vocabulary and an approach for analyzing innovations conducted by users. Table 2 provides a comparison between related concepts in user-innovation and their counterparts in innovation in new media.

The concept of need information as it is applied in user-innovation theory shows some interesting parallels with the concept of shaping and re-shaping in new media environments. Both concepts refer to the use of a product or new media content that is not defined by technical features alone, but the result of a social process of adaption and shaping. Similarly the problem of solution information applies to content innovations in new media as well: the application of technological innovations requires specific know-how that has to be absorbed by the producers of content and communicated to users that want to produce specific content. In this case, toolkits or editors and authoring tools become useful to transfer these solution information to users. The different techniques and approaches applied in the context of new media production will be discussed in a following chapter also with a reference to the concept of solution space²⁶.

26. see 2.3.2 *Content Production Environments*

The concept of the lead-user provides an interesting perspective upon the analysis of participation rates in user-created content²⁷ in particular, as this concept refers to an asymmetrical distribution of productive users in contrast to the evenly distributed concept of participation in democratization²⁸.

A decisive difference between user-innovation and content innovation for new media is found in the nature of the final product: while user-innovation emerged from new product development and therefore refers to physical products that need to be produced by a manufacturer, new media content doesn't require a physical production process but instead a publication process.

A generic point of critique towards user-innovation also applies to innovation in new media: the nature and extent to which users innovate is subject to controversial discussions. Piller & Walcher refer in this regard to Bower and Christensen who "[...] have argued that manufacturers should not listen to their present customers as these may show a tendency of repeating old procedures rather than looking for radical innovation" ([Piller and Walcher, 2006] referring to [Christensen and Bower, 1995]). In Piller and Walchers estimation, this account applies to a majority of users and scenarios, but doesn't hold for the lead-user approach as these users transcend due to their interests and innovativeness common user innovation patterns ([Piller and Walcher, 2006], page 311).

2.2.2.2 Innovative uses

Nevertheless, the later argument raises questions about the quality of innovation. The generic definition of innovation as the application of an idea into practice²⁹ provides a rather limited ground for differentiation and struggles at the same time to clearly distinguish between innovation and improvement. Therefore a more detailed perspective becomes necessary. Such perspective is provided by Haddon in his analysis of innovative use in information and communication technology (ICT) [Haddon, 2005]. While user-innovation theory is rooted in economics, Haddon takes a social science point of view and discusses the concept of innovatory use from a less purpose oriented perspective. In the context of ICT, Haddon points out that innovatory uses refer in practice not necessarily to breakthrough innovations which influence the development of a whole industry³⁰ but more often relate to a set of

27. see 2.3.1 *Participation and Participation Inequality*

28. compare with 2.2 *Classification and Ends of user contributions*

29. see beginning of this chapter

30. see the example of Counterstrike given before

processes that are far less obvious but not less important for the acceptance of a specific ICT. To categorize different levels of innovative use, Haddon proposes a scheme with four distinct levels that show intersections at the borders between adjacent levels [Haddon, 2005] (see Table 3).

The first two levels of Haddon's scheme refer to innovative uses that could be also described as inventions or even breakthrough inventions conducted by technologically affine enthusiasts or lead-users. In contrast to this, the later two levels refer to more widespread innovative activities which are conducted by less-elitist users. Nevertheless, these activities are innovative, at least in retrospect, but at the same time rather exceptional ([Haddon, 2005] page 59).

Types of Innovation	Examples
Enthusiasts designing and re-designing ICTs, improving existing or developing new applications	Technical hobbyists and early microcomputer projects, including the role of amateur enthusiasts in writing early games
Enthusiasts developing new practices using ICTs, creating new content or establishing new patterns of interaction	Early radio broadcasting by radio hams; on-line communities or other grassroots initiative
The more widespread emergence of creative design and content	Club and personal web-pages
The emergence of new patterns of use or new practices within the wider public or subgroups of it	Using the early telephone for social purposes; the practices emerging around SMS

Table 3: Levels of innovatory use according to [Haddon, 2005]

In contrast to these overall less spread but obviously innovative activities, Haddon also underlines the importance of creativity and innovative use of ICT in everyday life and in particular in the process of making sense of media. Both aspects of Haddon's theory show some interesting parallels with the concept of shaping and re-shaping new media.

2.2.2.3 User created content as innovation and basis for innovation

The examples provided in the context of computer games illustrate that user-created content provides a duality as both an innovation in itself – through the integration of *ucc* in computer games – and as an enabling technology that provides the basis for innovation.

In general, user contributions do play a significant role in the exploration and shaping of new media environments as user contributions can lead to innovations but also shape practices of everyday use. However, the impact of user contributions on innovations demands for a critical review. Most evaluations on the impact of user contributions on innovation and in particular in new media environments apply

qualitative methods. While this approach allows the identification of interesting and relevant phenomena, it does not provide sufficient material to estimate the overall impact of user-innovations on the industry. A notable exception to this is found in Prügl & Schreiers analysis of lead-users and toolkits in content production for *The Sims*³¹. According to the authors, the toolkit approach applied in *The Sims* is highly successful as the content produced gains high demand from the overall user base. Although the authors underline their findings with quantitative data and show that the most popular files of 53 innovative users led to 3.12 million downloads, they do not provide comparable data for not-user created content [Pruegl and Schreier, 2006]. Even in this example, user-created content can be regarded as relatively successful, but again a reference value that would allow an estimation of the overall relevance is missing. Therefore, it can be argued that users and their contributions benefit innovation in new media, but few data currently exist that would allow the estimation of the relative impact of user contributions in comparison to corporate innovations.

Furthermore, innovative uses discovered by users do not always benefit corporations or institutions. As Haddon points out, innovative activities can also include the "creative development of computer viruses" ([Haddon, 2005]) or the deactivation of digital-rights management systems, activities that can be regarded as creative and innovative but not necessarily beneficial for corporations. Alternative uses of toolkits can also conflict with the intended uses defined by corporations as it will be discussed in the following chapters³².

2.2.3 User contributions and engagement

The previously discussed functions of user-created content as means of production and innovation operate within the classical model of content and content distribution. As content is regarded in this perspective as a commodity which the audience demands for, production facilities tend to be organized according to a Tayloristic ideal of optimization that aims for an efficient and optimized process of production. In this model, the production of content is the main cost driver and a relative minority of authors produces for a relative majority of readers. The support, supplement or substitute of core corporate functions like production or innovation through user contributions updates this model with new resources but does not

31. see chapter 2.2.1 *Substitute or supplement for conventional content production?* for a description of *The Sims*

32. see chapter 2.3.3 *Management of contributions*

change its fundamental concepts.

Besides this productive role discussed before, user-created content also offers a different perspective to this model: with the proliferation of production equipment in everyday life, the availability of computer and networking technologies as well as accessible or codified knowledge about equipment use, not only resources of production have turned from scarcity to ubiquity but also the focus of interest has started to shift. Users start to engage with media not only to experience predefined content but also to engage in the process of content production. As Sotamaa points out in his analysis of computer game modders, some users who started to build new levels and assets began to prefer the process of building to the act of playing the actual game ([Sotamaa, 2006], page 115-116).

Similar concepts drive content sharing sites like Flickr³³. Content, in the case of Flickr mainly photographs, is presented to an audience to be experienced. At the same time Flickr also provides a place of exchange for amateur photographers who can use it as a showcase to display and discuss their latest creations. Flickr therefore applies a strategy that combines an audience which expresses demand for content with groups that show strong preferences in the production of content.

With the inclusion of groups and the interactions between members of these groups, the concept of communities comes into play. While a general definition of the term community depends upon the actual context of use and can vary between different disciplines, the concept of communities of practice according to Wenger provides a useful point of departure to describe communities in the digital domain: "[Communities of practice are] groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" ([Wenger et al., 2002]). In the case of online communities, these groups interact through online environments.

In popular discourse, communities and user-created content are sometimes treated as synonyms. Indeed, both concepts can be highly entangled with each other: on the one hand, content creation could become a goal of online communities as for example in modding communities or in the Wikipedia. In the case of the Wikipedia which describes itself as "the free encyclopedia that anyone can edit"³⁴ content production forms the basis for community related interaction. As Bryant et. al. point out, process and standards of content production in the Wikipedia are highly

33. see <http://www.flickr.com>

34. Pitch of the Wikipedia, see http://en.wikipedia.org/wiki/Main_Page, visited August 6, 2008

related to community structures. Users perform both production and community related functions and become in this process a "Wikipedian", thereby adopting and accepting the procedures, organizational structures and expectations that emerged in the community [Bryant et al., 2005].

On the other hand, communities can provide a social bond that creates sustainable interest in a subject, thereby benefitting user-created content approaches that need to sustain the interest of users.

Despite this intense relationship, both concepts can be treated as separate phenomena: user-created content might benefit from productive communities but it does not depend on communities or collaboration. Users can publish content regardless of procedures, organizational structures and expectations of a community.

Nevertheless, the productive relationship of user-created content and communities gave birth to three different theoretical models that will be discussed in the following sub chapters.

2.2.3.1 Commons-based peer production

In his concept of commons-based peer production (cbpp) [Benkler, 2002] Benkler refers to a combination of user-created content and communities which offers several advantages over existing modes of production as it provides an improved "identification and allocation of human creativity" [Benkler, 2002]. In his review of cbpp, Benkler analyses the organization of task assignment and individual motivations as well as incentives³⁵ but also refers to the organization of content production. In the context of CBPP, projects benefit from modularization and granularity of contributions (see [Benkler, 2006], page 100). Whereas modularization refers to the potential of a given project to be disassembled into subtasks which can be solved independently from each other, granularity describes the time and effort these modules require to be solved. In the context of this argument, Benkler also develops the previously cited concept of trivial contributions where the time to perform a certain contribution remains below "five minutes" and is therefore significantly lower than more work intense tasks like the development of open source software modules which are counted in hours rather than minutes. Granularity also influences the number of people who are able to contribute with a given amount of time they can invest (see [Benkler, 2006], page 101)³⁶.

35. A more detailed introduction into Benklers model will be provided in chapter 2.3.3 *Management of contributions*

36. The concepts of granularity and modularization will be further discussed in chapter 2.3.2 *Content*

2.2.3.2 Produsage

According to Bruns, produsage is "[...] the collaborative and continuous building and extending of existing content in pursuit of further improvement" [Bruns, 2007a]. In this concept, the role of producer/consumer is replaced by the produser, who continuously alternates between production and consumption of content. In contrast to conventional production processes, produsage deals with artifacts that are in a constant state of flux rather than conventional products which are "self-contained, unified, finished entit[ies]" [Bruns, 2007a]. Produsage also happens predominantly within content creation communities. In this context produsage is at the same time about developing and treating the subject matter as well as creating and sustaining social structures that support this development process [Bruns, 2007a]. The emergence of produsage is defined by four key principles that refer to four preconditions (see table 4).

Preconditions	Key Principles
Probabilistic, not directed problem-solving	Open Participation, Communal Evaluation
Equipotentiality, not hierarchy	Fluid Heterarchy, Ad Hoc Meritocracy
Granular, not composite tasks	Unfinished Artefacts, Continuing Process
Shared, not owned content	Common Property, Individual Rewards

Table 4: Preconditions and Key Principles of Produsage [Bruns, 2007]

The four preconditions of produsage break down into the first two which are related to the organization of contributions while the last two describe features of the content itself. Probabilistic, not directed problem solving describes a mode of organization, where every user has the ability to identify problems that need to be solved. This model of organization contrasts with classical top-down organizations where problem solving is controlled through directed instructions. In contrast to conventional approaches, this allows according to Bruns for exploratory trial-and-error based approaches to problem solving.

As a second precondition, the concept of Equipotentiality refers to the ability of every user to start to solve a specific problem. In contrast to hierarchical organizations, users are not bound to specific functions in which they are required to perform but are free to choose their tasks. According to Bruns, this Equipotentiality provides significant benefits compared to hierarchical systems, as users can allocate

themselves according to their abilities and interests.

The precondition of granular, not composite tasks describes the same concept that Benkler refers to in his usage of granularity which has been discussed before. The condition of shared content refers to the ownership of the content produced. As content in produsage remains in a permanent state of flux, users can not own content but share the content that they create and manipulate [Bruns, 2007c].

Out of these conditions, Bruns develops four key principles of produsage. In his account, produsage is directly related to open source software development which he regards as one of the first instances of produsage.

The first principle, open participation and communal evaluation, describes the improvement of quality of content based on the number of iterations and users that are capable of modifying the content. Bruns derives this concept of iterative improvement from the open source motto "given enough eyeballs, all bugs are shallow" (cited in [Raymond, 2000]). Contributions conducted by users are evaluated and filtered by other members of the community. This cooperative social filtering fosters according to Bruns useful and relevant contributions. Contributors that provide non-useful contributions are driven to the outside of the community and become thereby marginalized while the creators of worthy contributions receive social capital [Bruns, 2007b]. The evaluation concept of produsage allows every user "to see and evaluate everyone else's contributions" [Bruns, 2007c] and enhances the socialization of community members.

The principle of fluid heterarchy refers directly to the previously described precondition of equipotentiality: users might not have the same abilities and skills, but they have equal abilities to conduct contributions. According to Bruns, this system allows for a high flexibility in the choice of roles users take. In combination with systems that reflect social standing, a high degree of dynamics is achieved. Similar to roles, social reputation gained in produsage is flexible and might diminish over time.

In the principle of unfinished artifacts and continuing processes, Bruns refers to the nature of content in produsage as "permanently unfinished" [Bruns, 2007b]. Content is created, edited and modified permanently and due to these dynamics, a permanent stable state is neither achieved nor it is aspired to. This concept of unstable content also refers to the concept of cultural products which Bruns introduces according to Eno (see [Kelly]). Cultural products are thereby works of art and permanently unfinished. In Brun's perspective, this concept can be extended to include a wide range of cultural products which are treated as finished and closed

products and projects in the conventional mode of production due to a legacy of distribution rooted in a industrial, pre-network imperative [Bruns, 2007b]. As an alternative to this mode of production, the concept of produsage could be extended and gain relevance in this area as well.

In the last principle of produsage, Bruns refers to the ownership of content. He thereby identifies that ownership in a produsage project is not only shared between all producers but that this concept of sharing also influences the motivation of users to contribute. As producers create content for a communal purpose, any appropriation of this content can lead to resistance of the produsage community and should be therefore avoided. While producers do not receive compensations for their actions, they collect social capital within the community.

2.2.3.3 Convergence

The concept of convergence relates according to Jenkins [Jenkins, 2006] not only to technological distribution of the same content over a single medium to a wide variety of output devices (see also [de Sola Pool, 1983] cited in [Jenkins, 2006], page 10) or the distribution of a wide variety of content in different media to a single output device (see [Research, 2002] cited in [Jenkins, 2006], page 15) but also to a process of change in the relationship between "existing technologies, industries, markets, genres and audiences" ([Jenkins, 2006], page 15). Jenkins points out, that while the process of convergence is happening in this very moment we are unable to fully understand its consequences and its impact on the reception and production of content. In particular the role of consumers has changed significantly with technological innovations providing consumers with the ability to "archive, annotate, appropriate and recirculate media content" ([Jenkins, 2006], page 18). These abilities, in combination with media content performing on different channels, allow and demand for new approaches in the relationship between producers and consumers. Instead of developing a new paradigm for this relationship, Jenkins analyses different examples for this development based on several case studies.

Jenkins refers in his analysis to the concept of collective intelligence as it had been developed by Lévy [Lévy, 1997]. According to this concept "[virtual communities have the ability] to leverage the combined expertise of their members" ([Jenkins, 2006], page 27). Therefore such knowledge communities not only refer to knowledge that is shared by all members, but provide a new body of knowledge which consists of the total sum of all information every individual in the group holds. With the Internet as an enabling factor that allows the formation of such communities, a

new mode of reception emerges that significantly alters existing patterns. Lévy argues that under the primacy of collective intelligence, "the distinction between authors and readers, producers and spectators, creators and interpreters will blend" ([Lévy, 1997] cited by [Jenkins, 2006], page 95). As a consequence, a process emerges, where communication is sustained and kept in perpetual motion by all the actors involved. The role of the original artwork thereby changes into a "cultural attractor" ([Lévy, 1997] cited by [Jenkins, 2006], page 95) that according to Jenkins drives the engagement with the media product and encourages processes of decipherment and interpretation. The nature of this process demands a design that aspires sufficient depth of material in order to prevent closure from happening too early [Jenkins, 2006].

Jenkins illustrates this concept in the analysis of transmedia storytelling strategies applied in the movie trilogy *The Matrix*. He argues that the story of the three movies which form the series is unfolded not only through the movies themselves but through a combination of different media products. Starting with the second part of the trilogy, *The Matrix Reloaded*, this relationship to other media products had been incorporated in a strategic way as parts of the story-line refer to a computer game, *Enter the Matrix* and a program of animated short-movies entitled *The Animatrix*.

The movies as well as the game make intense use of intertextuality, thereby citing and referring to other movies and books, concepts, ideas and religious beliefs. Jenkins supposes that this concept of cross referencing forms a strategy that makes it "nearly impossible for any given consumer to master the franchise totally" ([Jenkins, 2006], page 99). By applying this strategy, consumers are invited to analyze *The Matrix* cooperatively by seeking hints in the different media products and discussing their relevance with other consumers online. In consequence, this approach leads, according to Jenkins, to new experiences for consumers while providing at the same time new points of entry into the franchise (see [Jenkins, 2006], page 105). Strategic approaches to media franchises, as in the case of *The Matrix*, therefore lead to a more sustainable and intense engagement of consumers by making the active appropriation and decoding of media content a part of the whole product.

Nevertheless, in the case of *The Matrix*, significant critique had been put forward: while the concept proved to be successful for some parts of the audience, it overburdened larger groups of both consumers and critiques who didn't expect or want to take part in a story told across different media (see [Jenkins, 2006], page 104).

While approaches as conducted in *The Matrix* provide a new perspective upon sto-

rytelling across different media as well as towards the incorporation and participation of consumers, such experiments still leave room for improvements.

2.2.3.4 Perspectives of engagement in user-created content

Both Benkler's concept of *cbpp* and Brun's concept of *produsage* refer to an analysis of open-source software development. In particular the concept of scalable improvement as expressed in Raymond's essay "The Cathedral and the Bazaar" [Raymond, 2000] under the concept "given enough eyeballs, all bugs are shallow" or "Linus's law" is referenced by both authors. In short, this concept describes the effect that a significantly large group of users is capable of identifying and correcting bugs in an open-source software project where each activity can be handled by different users. In the context of content development for new media environments it can be argued that a universal application of this principle might not be feasible. While software development in general relies on the formal description of tasks and the modularization of solutions, the production and in particular the design of content is far harder to formalize.

Furthermore, it can be questioned whether all sorts of content would benefit from continuous changes or, as Bruns describes it in *produsage*, improvements. It would go beyond the scope of this thesis to discuss this question in the necessary length, but it can be argued that the term improvement is closely related to the concept of progress which influences rather the scientific discourse than the arts. Taken to extremes, a baroque painting is not better or worse due to its materiality than a movie, whereas technological developments become optimized towards specific goals and therefore improve.

While a concept of improvement requires further review when applied to content, the ability of content to change and alter over time is a feature that increasingly more content formats, as for example articles in the Wikipedia, incorporate. The constant fluctuation of content in concepts like *produsage* is not only a feature of the content, but also a necessity as this ability to change and alter content plays a significant role in the operation and social cohesion of productive communities³⁷. While Benkler and Banks refer in their analysis to content that is solely produced in community environments, Jenkin's analysis of transmedia storytelling illustrates a concept that combines both professionally produced and closed content formats –

37. The ability of different content formats to perform in such a way will be further discussed in chapter 2.3.2 *Content Production Environments*.

in this case *The Matrix* trilogy – with user contributions³⁸.

Overall Benkler and Banks tend in their description of user contributions and productive communities to lead to a concept that reminds on the description of revolutionary changes which promises to provide all embracing solutions to virtually all fields of content production. While we begin to understand the benefits of user contributions and their fruitful application, an exaggeration of their effects and a proclamation as salvation to a variety of problems does neither lead to additional scientific insight nor does it provide trust in the critical reflection of the authors.

Benkler's concepts of modularity and granularity raise some concern regarding their practical use. Similarly to the argument raised before against the universal application of improvement of content, both terms show significant limitations when applied in a universal way. Chapter 2.3.2 *Content Production Environments* will therefore reflect upon the concept of modularity and granularity and discuss the ability of different content formats to be modularized. As Benkler discusses the problem of motivation for participation as well as the sustainability of engagement his arguments will be also discussed in chapter 2.3.1 *Participation and Participation Inequality* in conjunction with Bruns concept of incentives through rewards and social capital.

Bruns' concept of produsage provides a perspective to communal production processes. In particular his concept of control through community provides relevant points of departure for the organization of content evaluation and filtering and will be further evaluated in chapter 2.3.3 *Management of contributions*. Overall his attitude towards the normative effect of communities is however characterized by a positivistic point of view. In contrast to this perspective, the question needs to be raised whether a community based decision making process should be regarded as universally superior to individual decisions. Decisions made by a group can be better for the group but are not necessarily the best possible way of decision making. To put it bluntly with the use of a related concept in popular discourse, the "wisdom of the crowds" [Surowiecki, 2004] can also turn into the terror of the crowds³⁹. Nevertheless Bruns' emphasis of group dynamics in decision making provide a perspective to management of contributions and in particular for situations where decisions and attitudes of groups collide with practices of corporations or institutions. This perspective will be further analyzed in chapter 2.3.3 *Management of contributions*.

38. This approach that will be further highlighted in chapter 2.3.3 *Management of contributions*.

39. The title of Surowiecki's book is used in this context solely to emphasize an argument against approaches that apply a virtually critique-free adaption of communal decision making processes.

Also Bruns concept of equipotentiality demands for a critical review. While his arguments in favour of equipotentiality and the ability of users to choose their field of action sound reasonable in large productive user communities, it is doubtful that this mode of production can be regarded as superior in other circumstances. In settings that raise less interest and therefore possess fewer active users, a free selection of activities might lead to deadlock situations where certain tasks are not performed as nobody is interested in doing them.

A further difference between the engaging nature of ucc and its role in innovation and content production is the explicitly process oriented nature of this approach. Instead of focussing upon a final result that can be treated like a project with a defined beginning and end, process orientation leads to a perpetual activity that is in principle not limited by the creation of a specific result.

2.2.4 Aims of user-created content and implications for use

The previous analysis on the aims of user contributions provides a survey of different theoretical perspectives related to the ends of user-created content. Two main conclusions shall be drawn from this analysis:

User contributions provide a useful tool in the exploration of new media environments. By enabling users to produce content, corporations can gain a deeper understanding about the demands and needs of their customers. Furthermore contributions of users can gain relevance for other users and thereby significantly benefit new media environments.

Also, user contributions provide a new perspective upon content and content usage. While in conventional approaches content is regarded as the central good of interest, the production process itself gains relevance and raises user interest in applications that incorporate user contributions.

2.3 Organization of user contributions

While the before mentioned theoretical approaches provide an overview upon the impact, ends and implications of user contributions for new media environments, the following chapter discusses the particular challenges that emerge in the practical application of user contributions. As an introduction, the characteristics of participation rates will be discussed.

Although most new media environments that incorporate user contributions apply policies that provide few or even no restrictions upon initial contributions and therefore allow in principal every user to participate, only a fraction of the total user base of these environments participates in the production of content. As it will be

shown, the interpretation of these effects can lead to different conclusions that will be discussed in detail. Nevertheless this effect highlights, that free access and the ability to publish content is a *conditio sine qua non* of user-created content but not the only influencing factor to the successful implementation of user contributions. Grounded upon this discussion of participation rates, a qualitative analysis of productive users will be proposed and the questions raised of how users become productive users and how this process can be encouraged. Based upon these questions the concept of user progression will be presented and related to challenges in the design of content production tools. In particular the accessibility of such tools through the concept of threshold and their extent or scope through the concepts of ceiling and solution space will be discussed in the context of different dimensions and illustrated by several existing applications. In chapter 2.3.3 *Management of contributions* means to encourage and sustain user interest will be presented and reviewed. Furthermore the challenge of filtering user contributions and the emergence of conflicts upon diverging quality standards between the involved stakeholders will be discussed.

Alongside these arguments overlaps and connections with other scientific domains such as human-computer interaction and interface design or computer supported cooperative work will be shown. Besides similarities also differences between the respective approaches in these domains and the particular challenges of user contributions will be highlighted.

2.3.1 Participation and Participation Inequality

Most applications that incorporate user-created content do not provide conditions for contribution that limit the right to publish to a certain minority or elite. Therefore all users have in principal an opportunity to produce and publish content. Despite this equality, an analysis of contribution figures shows according to Nielsen [Nielsen, 2006] that only a minority of users takes an active role in the contribution of content. Nielsen describes this phenomenon as participation inequality (ibid.). Nielsen grounds the development of this term in a historic perspective upon user contributions in the Usenet ([Hill et al., 1992] referenced by [Nielsen, 2006]) but also traces similar patterns in current applications on the Internet. According to these patterns he develops a model of participation that is based upon three groups of users: lurkers (passive users), intermittent users and heavy users that "contribute a lot and account for most contributions" (see [Nielsen, 2006]). Nielsen develops the hypothesis that these groups are distributed in the user population of a given appli-

cation with a ratio of 90/9/1.

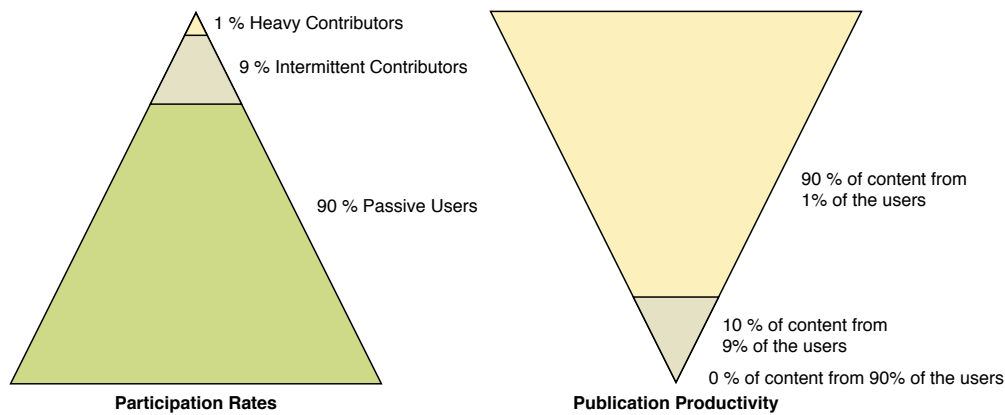


Figure 3: Participation Rates and Publication Productivity [Nielsen, 2006]

Therefore 90% of the users remain passive and do not contribute content at all while 9% contribute from time to time and 1% of the overall user population provides the majority of contributions (Ibid.) (see Figure 3: *Participation Rates and Publication Productivity* [Nielsen, 2006]).

Based upon these assumptions, Nielsen furthermore develops a reciprocal relationship in regard to publication productivity, which leads to a share of 90% of the content produced by 1% of the user population. To prove these assumptions, Nielsen provides two examples (see table 5) that show even larger differences in user productivity and participation.

Application	Total User Base	Active Users	Highly Active Users
Weblogs	1.100.000.000	55.000.000	1.600.000
	100%	5%	0.1%
	<i>total user base of the Internet</i>	<i>users that have weblogs according to Technorati</i>	<i>daily postings, user number includes multiple daily postings</i>
Wikipedia	32.000.000	68.000	1000
	100%	0.2%	0.003%
	<i>unique visitors in the USA</i>	<i>active contributors</i>	<i>1000 most active users that account for 2/3 of overall site edits</i>

Table 5: Participation Inequality in selected applications according to [Nielsen, 2006]

While the direct conclusions that Nielsens draws from this data will be subject for further discussion, it has to be noted that the significance of his analysis is limited by methodological constraints.

First his analysis lacks a description of the methodology used to gather the data as well as an account about the reliability of both data and source. Second his categorization of applications lacks in coherence. In his analysis of Weblogs, Nielsen re-

lates to the frequency of publication in terms of daily updates. In contrast, the example of the wikipedia refers to active contributions or the activity of a small subset of users defined by a quantitative range (top 100 contributors). Furthermore, the total user population of the Internet can be hardly considered as the audience of blogs as not every user of the Internet necessarily reads Weblogs. Besides that, the quantitative approach applied by Nielsen doesn't discuss automatized processes, like mass edits conducted by programs (bots) although such programs perform a majority of edits at least in the Wikipedia⁴⁰.

In terms of publication productivity, Nielsen implicitly suspects a relation between the volume of publications and the relevance of this content for the audience. While a minority of users might produce the bulk of content (1% of users produce 90% of content, see above) a superficial quantitative analysis does not suffice in understanding whether these contributions have relevance for a larger audience. Although one might suppose that the highly active group of users produces content that is relevant for the majority of passive users, the data provided by Nielsen gives little evidence for this assumption. Equally it could be argued, that the 90% of content that is produced by 1% of the users forms irrelevant *noise* with no importance to the majority of users.

Despite these limitations, evidence for the existence of participation inequality can be found in other evaluations as well (see also [Mason, 1999]). Hitwise analyzed Youtube, Flickr and Wikipedia as examples for applications that make intense use of user contributions [Tancer, 2007]. The results of this evaluation support Nielsen's hypothesis in general. While referring to a comparison between edits and visits, the report shows a share of 0.16% video uploads in comparison to total visits for Youtube, 0.2% of photo uploads in comparison to total visits for Flickr and 4.59% of entries to total visits for the Wikipedia (all data from Ibid.). Again, a methodological basis for these results is not given, therefore the significance of this data remains limited. Furthermore, the data provided is given for edits and not per user, therefore the report only supports the general trend of Nielsen's hypothesis rather than providing a proof of his theory.

Even with the given evidence, the general assumption of a split between passive users and active contributors is plausible in the general context of media production. In fact, this split as a distinction between producers and audience, allows me-

40. see for example the discussion about *bot* edits on the Wikipedia statistics page: http://en.wikipedia.org/wiki/Wikipedia:List_of_Wikipedians_by_number_of_edits, opened 5.09.2008

dia companies to generate revenue which enables them to cover the cost of production. Other authors also point out, that the passive audience (lurkers) performs a significant role within a specific environment. Either in referring to them as mass media, as Soroka and Rafaeli underline by stating that "Without a mass audience, the mass media function would be incomplete." ([Vladimir and Sheizaf, 2006], page 164) or in regard to the role of passive users in the Wikipedia which Bryant et.al. describe as "without information consumers, creating an encyclopedia is a meaningless act"([Bryant et al., 2005]).

Nielsen's use of the phrase "participation inequality" for the interpretation of the results leads to the negative connotation of inequality, which automatically raises the idea of a bipolar relationship between equal and unequal, into a different line of thought. Implicitly, Nielsen relates the concept of user contributions to an ideological perspective and thereby raises expectation towards user contributions as a concept of political⁴¹ expression in the context of democratization. Similar concepts of participation have been expressed by Tavares, Pearce and Jenkins in the context of fan production and modding as an opposition towards conventional production⁴².

While equal participation can be considered a relevant goal from a political or ideological point of view, it has to be emphasized that it is not a necessary condition in the production of content. From a content related perspective the split between contributors and passive users expressed by participation rates does not provide a relevant measurement for the success or impact of a specific application, as a minority of users can provide sufficient relevant content to keep a larger audience interested. However, the relevance of participation rates changes when a process oriented approach like the one described by Bruns in the previous chapter becomes applied⁴³. Due to the relevance of the production process for the cohesion of productive communities, participation rates can provide a significant figure that reflects the performance of a particular environment. Nevertheless, a proper application of these figures demands for further research and definition of standards in the evaluation of data to enable comparability. Other than that, it can be concluded that a simple optimization strategy that aims at increasing participation rates is from a content based perspective not necessarily relevant and might not directly

41. Nielsen also uses a modified citation from George Orwells book *Animal Farm*, a satire upon totalitarian government, that illustrates the political context he refers to ("some users are more equal than others" [Nielsen, 2006])

42. see chapter 2.2 *Classification and Ends of user contributions*

43. see chapter 2.2.3 *User contributions and engagement*

lead to increased attractiveness of the media product.

Nielsen raises a relevant concern for the content perspective in his argument that due to participation inequality, the significance of user contributions as representations of user interests and attitudes is limited [Nielsen, 2006]. As the majority of contributions is conducted by a relative minority of users, site owners can get a biased impression about the interests of their user base rather than a neutral overview. This aspect affects in particular the use of user contributions as a means for innovation. Even if a particular innovation takes place, its emergence provides no hint upon its attractiveness for other users.

As it has been pointed out so far, a quantitative perspective towards user participation as conducted by Nielsen leads to some insight into the nature of user contributions. Nevertheless it should be argued that in particular in regard to non-trivial, complex content production processes that are in the focus of this thesis, qualitative evaluations of user contributions have been neglected so far. Despite the weak scientific evidence of the referenced quantitative analysis, a general conclusion can be drawn from these results: a minority of productive users provides important services to a majority of passive users.

However, a thorough understanding of the processes between productive and passive users hasn't been developed so far. As such it is currently uncertain, whether an interaction between highly active, intermittent and passive users takes place and to what extent this interaction affects production as well as user motivation and also how these processes can be influence or fostered.

To gain further inside into the nature of user contributions it is therefore necessary to transcend concepts such as highly active users, which are imposed upon the discussion by the dominant quantitative perspective towards user contributions. The point in this case is not to deny the relevance of quantitative methods but instead to show that a category like highly active users has significant shortcomings when applied to a complex concept like user contributions. To illustrate these shortcomings, different questions can be raised:

- Why do users participate in different ways?
- What are their motivations and concerns?
- Can we identify criteria that prevent users from contributing content and to what extent can we influence this in the design of applications?
- Is contribution continuity a goal that application designers should follow?

- Do user contributions change over time?
- Do users contribute different kinds of content or is the nature of their contribution not related to a particular kind of content?

From a slightly different angle in reference to the nature of individual contributions:

- What do users do in an environment?
- What relevance do their contributions have for the overall user base?
- Who produces what and where do these users come from?
- Are users that create highly relevant content users that started with basic contributions and developed in their contributions over time to more complex content formats or do different users produce different content?

Finally in relation to their activities within the production process:

- Are there patterns in user activities that would correspond to particular roles which users take?
- If such roles exist, what is their impact upon content creation, should these developments be fostered and if so, how can this be achieved in the application design?
- Do these roles change over time?

Overall, a fixed classification of highly active users is an inadequate means to provide a significant perspective upon user contributions as it

- a. blurs out the process of how users turn into active contributors – therefore their interaction history, their development over time,
- b. the relevance of these contributions for the majority of users, quantity refers in this case not necessarily to quality and
- c. their role within the overall process of production.

An approach that provides a qualitative perspective upon the previous questions is given in an analysis of contributions and user interaction histories in the context of the Wikipedia [Bryant et al., 2005]. According to this study, users become Wikipedians (Ibid.) in a process of interaction where they adopt practices and conventions of a productive community thereby changing the nature and direction of their contributions while interacting with the environment. The main tool for analysis in this approach is the concept of legitimate peripheral participation (lpp), where small initial contributions allow users to take part in productive communities and to extend their contributions over time. The concept of lpp derives from re-

search in communities of practice (cop) formed for example by tailor and butcher apprentices [Lave and Wenger, 1991]. Lave and Wenger identified in these cases, that apprentices are introduced into the culture, values and techniques of a particular community by initially performing minor contributions that allow them to understand common practices (Ibid.). Bryant et al. transfer this concept to the analysis of contributions in the Wikipedia and thereby identify similar structures which suggest that users transfer from passive users to novice users by initially making minor changes to articles in the corpus of the Wikipedia ([Bryant et al., 2005]. In their analysis, the possibility to include such minor contributions that nevertheless benefit the overall goal of the application play a significant role in the transformation process from passive users to contributors.

This transformation process shows different levels of engagement according to Bryant et al. which are classified by the authors as passive user/consumer, novice and "Wikipedian" (Ibid.). During this development, users change not only the nature of their contributions (from minor changes to an article to the development and quality control of different articles) but also their interests (from interest in a particular subject area to an interest in the development of the Wikipedia as a whole) as well as their engagement with the technical environment. In particular this later aspect gains significance in the context of new application development. To describe the changing use of the interface, Bryant et al. introduce the concept of zone of proximal development (zpd) according to Vygotsky ([Vygotsky, 1978] cited by [Bryant et al., 2005]). *zpd* was developed by Vygotsky in the context of child education and learning as a concept to illustrate the differences between development and learning processes (see [Vygotsky, 1978], page 90). As such *zpd* describes the difference between the actual development level and a potential level that children cannot reach on their own yet but only with the support of their peers or adults (Ibid. page 86). In relation to the Wikipedia, Bryant et al. argue that the tools embedded in the software environment provide users with the ability to manage activities within their *zpd*. These tools also become apparent to the users only, once their *zpd* extends to a certain point and not from the very beginning of their engagement with the environment. An example for such a set of tools are the discussion pages in the Wikipedia, that are referred by advanced users but don't play a significant role for initial contributors [Bryant et al., 2005]. In contrast to Vygotsky's approach, the relevant support is thereby embedded and encoded in the environment and not in another person. Furthermore, Bryant et al. discovered in their evaluation of the Wikipedia different roles that users take, as for example as caretakers, who monitor

specific pages in the Wikipedia and react upon changes of these pages or as members of a "Welcome Committee" which greet new users (Ibid.).

Based on these findings it can be argued that users develop their engagement and their contributions over time. In this case, a further understanding of *user progression* could enable the development of career paths that provide a better fit to the demands and interests of users and allow them to find a suitable activity that not only satisfies their productive interests but leads also to the creation of new content which benefits the overall application.

Despite the previous critique upon Nielsen's perspective towards participation inequality, his account also leads to a general difference between user contribution environments and conventional content distribution platforms. While in conventional content distribution platforms, institutions or corporations provide content to their audience (see figure 4), this relationship gets more complex in environments that incorporate user contributions. In the later case, institutions or corporations provide not only content, but at the same time tools and workflows to create content while retaining to some extent editorial responsibility and an interest in keeping their audience attached to the platform.

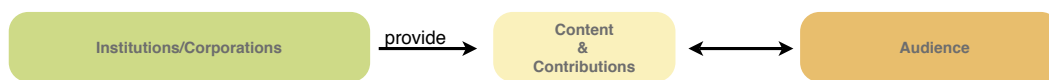


Figure 4: Corporation-Content-Audience
source: author

Furthermore, institutions and corporations deal not only with a relatively passive audience⁴⁴ alone but also productive users and their contributions through a content production environment and the management of contributions. Figure 5 illustrates this crucial relationship in user contribution environments.

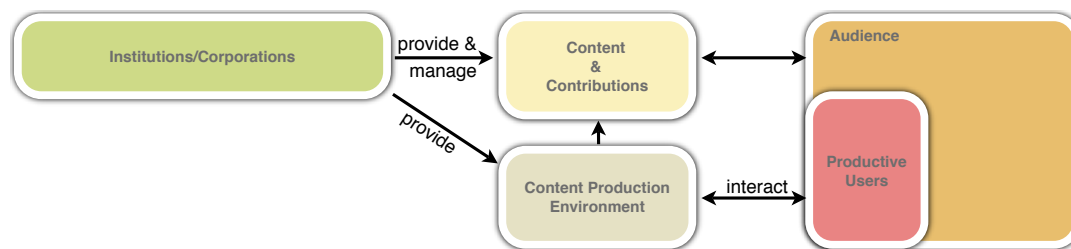


Figure 5: Corporation-Content-Audience-Productive Users Constellation
source: author

As the interests and demands of productive users can differ from those of the pas-

44. As it had been pointed out before, the audience of a particular environment is never completely passive (see the discussion of *participation* in chapter 2.2 *Classification and Ends of user contributions*). Instead users actively engage with the content provided but play only a minor role in the creation of new content.

sive audience, corporations or institutions need to find ways to manage these interests and to combine them with their own expectations in particular in regard to the content quality they expect. The following chapter will present examples and strategies from different case studies that illustrate the challenges of managing user contributions. Furthermore it will be discussed, how the organization of content production and the tools used in this process can be applied to steer contribution quality and to encourage user contributions.

2.3.2 Content Production Environments

As pointed out in the previous chapter, content production environments provide the organizational and technical interface between corporations/institutions and productive users. As such, they can relate to different functions:

- As tools and workflows that enable, support and advice users in the process of content creation
- As means to influence the quality of the content produced by users
- As environments that allow users to contribute on different levels according to their abilities and interests

In the context of user contributions, content production environments perform furthermore the important task of combining the output of productive users with the demands of the passive audience that expects a certain kind of content as well as a certain level of content quality. Content production environments therefore also act as an interface towards the different interests of the user groups involved.

However it shall be shown, that the central task of content production environments in user-created content applications is to enable, support and advice users in the process of content production and distribution. To clarify this role and to point out mechanisms and techniques that are applied for this purpose, an example will be analyzed. For the sake of clarity, this example is rooted in content distribution rather than production, but it will be shown, that the main principles can be transferred to content production as well.

2.3.2.1 Threshold and content production

Applications that provide a platform for users to publish videos on the Internet have gained widespread acceptance. One of the major players in this sector is Youtube⁴⁵, an environment that will be used here due to its popularity and its ap-

45. see <http://www.youtube.com>, it shall be noticed in advance, that the commercial success and the widespread acceptance of Youtube today not only relates to the production process, but also to factors that are outside of the scope of this analysis (e.g. the use of the ADOBE/MACROMEDIA

proach towards the publication of user contributions as an example for publication processes that focus on user contributions. As such it can be argued that the main service provided by Youtube is defined by a simplification of the task of video publishing.

In principle due to the availability of resources online, every user who wants to publish a video on the Internet is capable to do so without Youtube. Nevertheless, the steps required differ, as the sample workflow in figure 6 illustrates.

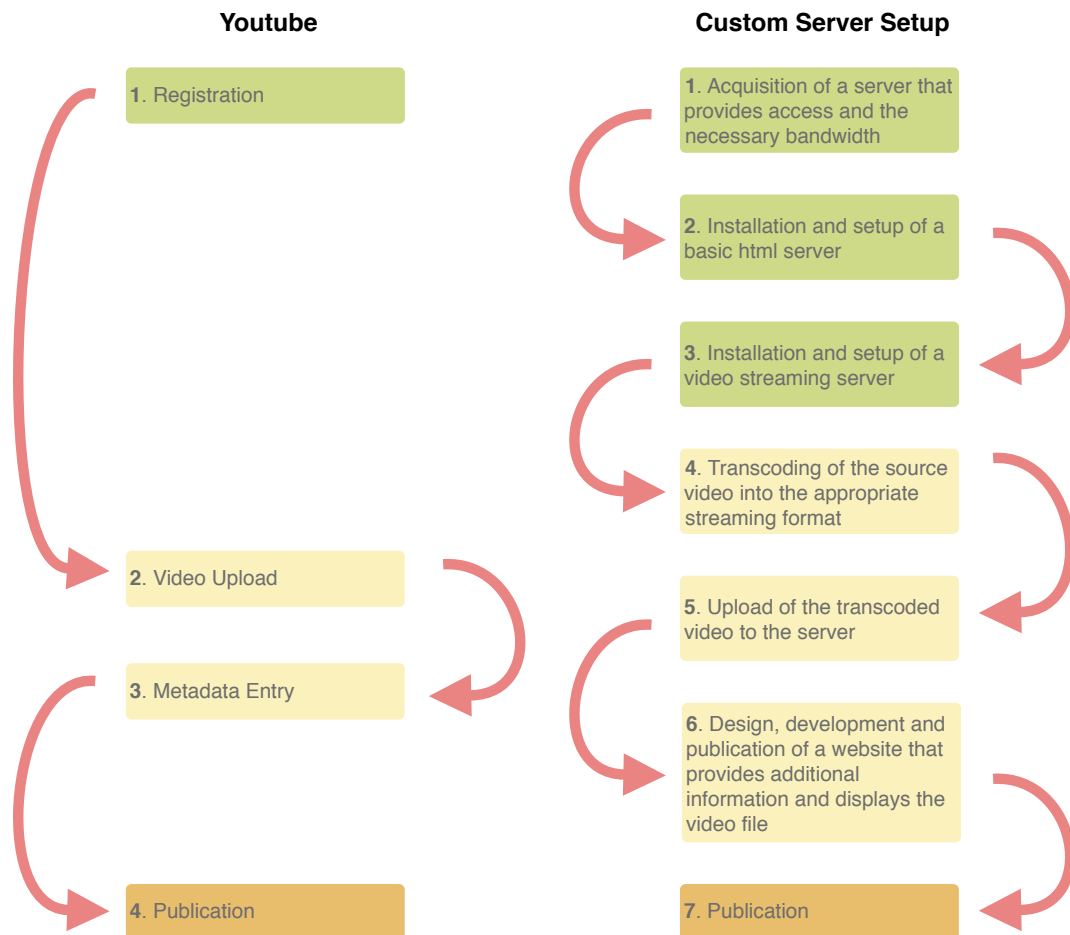


Figure 6: Comparison between different workflows to publish a video on the Internet Activities with a green background (Nr.1 for Youtube and Nr.1-3 for the Custom Server Setup) are required only during setup source: author

The details of a workflow described here for a custom server setup are given as examples. Depending on the software components used, the steps might differ in detail, but the general pattern remains and allows the primary differences between these two workflows to be amplified.

In direct comparison, both similarities and differences between the workflows be-

Flash player for content presentation as well as maybe a special attitude towards copyright infringements which resulted in the Viacom/Youtube trial. see for example <http://news.bbc.co.uk/1/hi/business/6446193.stm>, referenced 13.09.2008).

come apparent: In general, both workflows lead to the same result, therefore they are in principle interchangeable. Both processes however differ on closer sight, first in relation to the quantitative difference in the number of steps required. The workflow for a custom server setup involves more steps than the Youtube publishing process. Second, a qualitative difference becomes apparent: not only the activities that need to be performed are different, but the required steps also show differences as activities in the custom server setup require a different level of proficiency in the use of computer systems.

To capture and qualify these differences, a methodological point of departure becomes necessary and can be found in the concept of threshold and ceiling as described by Myers et. al. Threshold thereby refers to the difficulty of learning to use a system ([Myers et al., 2000], page 6), while ceiling describes the scope of the system, "how much can be done using the system" (Ibid. page 6). Threshold and ceiling are not defined by absolute measures that would allow a generic classification of a certain task for example by a quantitative relation (e.g. task x scores a difficulty of 100 and is therefore ten times more difficult than task y which scores a 10) but provide a model which allows to discuss and compare the difficulty of a certain task and its scope from a more abstract perspective. Threshold depends also upon a cultural context and relies upon preexisting knowledge of the specific user, describes therefore how much more a user needs to know in order to use a system.

I Threshold

When applied to the previous example workflow, it can be argued that the *threshold* for video publishing is lower in the Youtube workflow than in the custom server setup as not only the number of tasks but also the knowledge required to publish a video is reduced significantly. In this particular case, a reduction of the required knowledge is achieved through encoding of knowledge into the application. While such optimization strategies are generally discussed for example in the field of Interface Design as activities that "minimize skill and personnel requirements and training time" ([Shneiderman and Plaisant, 2004], page 12) it should be noted that the impact of such optimization can differ depending upon the context of its use. While in a work related context, a higher threshold of a particular application results in increased training time and expenses, its effect within non-work related environments can be more severe: Users outside of the work domain and in particular in user contribution environments have no obligation to perform a certain task⁴⁶ in contrast

46. see chapter 2.1.1 *User-created & user-generated content*

to users in the work environment. Therefore, *threshold* in user contribution environments effectively defines whether publication takes place or not. It is therefore not a matter of efficiency alone to design an appropriate interface but a necessity as "human creativity, time and attention" ([Benkler, 2006], page 107) are a scarce resource in general (Ibid.) but also in particular, when motivation and commitment instead of obligation influence action.

Due to this severe impact of threshold upon contributions, a lower threshold could be regarded as a main goal of development. However the reduction of threshold is limited by its impact upon the ceiling as it can be shown in the Youtube example.

While users in the custom server setup workflow are enabled to control associated parameters, as for example video size, resolution or compression, a similar level of control is not provided in the Youtube workflow. Control about parameters that influence the output is handed over to a predefined set of parameters in favour of a lower threshold. In case the quality achieved in this process doesn't match the expectation of the user, the effects of a reduced threshold are rendered useless as the user is not satisfied with the result and may therefore not use the environment anymore. Similarly, a pre-definition of parameters is often not accepted in professional production environments where control about the output – for example due to a demand for reproducibility of results – is favoured over a lower threshold.

A particular challenge of threshold reduction refers to the process of finding a balance between reduction and its counter effective impact upon the ceiling. As it becomes apparent, this issue depends upon the expectations of the user base in terms of content quality. It becomes therefore necessary to identify these demands in order to adopt them in the design and development of a content production environment.

This demand for identifying accepted quality can be positioned in the context of a wider history of research and engineering efforts motivated by technical constraints. Examples for these can be found in TV signal processing, where high bandwidth constraints lead to the development of different sampling parameters for different colour channels. As such the standard for component signals (YUV, luminance and colour components) limits the amount of information transmitted for the red and blue channel in favor of the green channel (see [Schmidt, 2008]) based upon a higher sensitivity of humans for green colours. Similarly, the development of the

MPEG-1 Audio Layer 3 compression format⁴⁷ for digital sound data was aimed at providing high-quality sound under significant bandwidth constraints while implementing a lossy compression format that takes into account different parameters of human hearing [Pan, 1995]. In contrast to these traditional approaches which refer to properties of the human perception system, quality demands in new media and online environments are not solely defined by such perceptual properties but also by social factors of acceptance. Again, the Youtube example becomes useful in this context as the absolute quality of the output – in relation to both resolution and visible compression artifacts – is far lower than for example in PAL television transmission. However, users seem to accept the quality offered by Youtube as it has become a reference environment for video on the web⁴⁸. From the point of view of engineering, the development of tools and toolsets which would allow to evaluate quality expectations could provide a significant advantage for the design and development of new environments. However, the author is at the time of writing not aware of any such tool that would allow an evaluation of the social acceptance or an ongoing survey about the emergence of quality standards based upon social acceptance.

In the context of content production environments another challenge arises out of the impact of related media products: special effects in motion pictures as well as commercial computer games continuously push the boundaries of content quality thereby raising user expectations towards the presentation of commercially produced media content. The impact of this process will be further discussed in the context of digital media usage in museums and cultural heritage⁴⁹ but it can be supposed that a higher average quality of commercially produced content will also show an impact upon expectations towards user contributions. However, the nature of this relationship hasn't been evaluated yet and it might be supposed, that the acceptance of a lower production value in the context of user contributions is influenced rather by categories such as *authenticity* which could benefit from lower production values than by quality references towards commercially produced media.

47. also known under its file extension mp3

48. The concept of quality expectations in the technical domain as a social construct is also underlined by the recent move of Youtube from low-resolution videos to higher resolution videos which support the assumption, that quality demands are flexible and change over time but also depend upon the hardware on the user side. see <http://www.youtube.com/blog?entry=ponKL3LTyr0>, referenced 24.09.2008)

49. see chapter 3.1 *Media in museums and cultural heritage*

II Ceiling, design- & solution space

In the context of user innovation, ceiling is referred to as the scope of a toolkit, and differentiated in low-end and high-end toolkits which allow for different levels of customization and innovation [Pruegl and Schreier, 2006]. Pruegl and Schreier also identify a relationship between threshold and ceiling, but regard this relationship as fixed by defining high-end toolkits which have a high ceiling as expert toolkits operated by users with higher skills and vice-versa low-end toolkits with lower threshold and ceiling as basic toolkits that can be operated by "almost all users" [Pruegl and Schreier, 2006]. While this concept of high-level and low-level toolkits provides in general no further extension to the previously defined concepts of threshold and ceiling, the concept of *solution space* as described by von Hippel in [von Hippel, 2005] introduces a concept for external limitations that influences the potential creations that can be performed with a toolkit.

As ceiling refers to a description about "how much can be done using the system" ([Myers et al., 2000], page 6) it defines a design space within which all potential creations exist. However, the amount of accepted or acceptable creations is smaller than the actual size of this design space due to external constraints and can be described as *solution space*. von Hippel's concept of solution space is rooted in the context of mass customization, therefore such constraints refer to limitations in the ability of manufacturers to produce the designs created by users (see [von Hippel, 2005], page 156). In content production, limitations in the reproduction of content exist to a far lesser extent, as content is – within certain limits – reproducible on other devices. However, other external influences, such as norms or policies exist that define acceptable contributions. Therefore the concept of solution space is adapted in content production environments as a signifier for contributions that follow such policies and norms.

Figure 7 illustrates the relationship between the different elements in the threshold, ceiling and design/solutions (tcds) model. It has to be noted, that this model for content production in content production environments does not per se provide an insight into the result of the production process, as the constellation of the different elements shows a potential and not a guaranteed result. Furthermore content produced in environments that apply high threshold and ceiling does not necessarily make use of the full design space and leads therefore automatically to "better" content. Depending upon the complexity of the environment, ceiling is also not always well defined and therefore resembles a virtual barrier that can be also crossed

by alternate uses⁵⁰.

In contrast to the above referenced notion of low-end and high-end toolkits by Pruegl and Schreier, the relationship between threshold and ceiling is not necessarily fixed. Under certain conditions and influences, content production environments can provide a low threshold but offer a high ceiling at the same time. This happens for example in environments that apply text entry: text entry is by no means a simple concept of content production, but an approach that is highly supported at least in the cultural context of western societies where the ability to read and write is trained in several years of education. As the ceiling of text entry can be extended to cover both simple inputs and highly complex content, both low threshold and high ceiling are therefore combined through a reference to pre-existing knowledge.

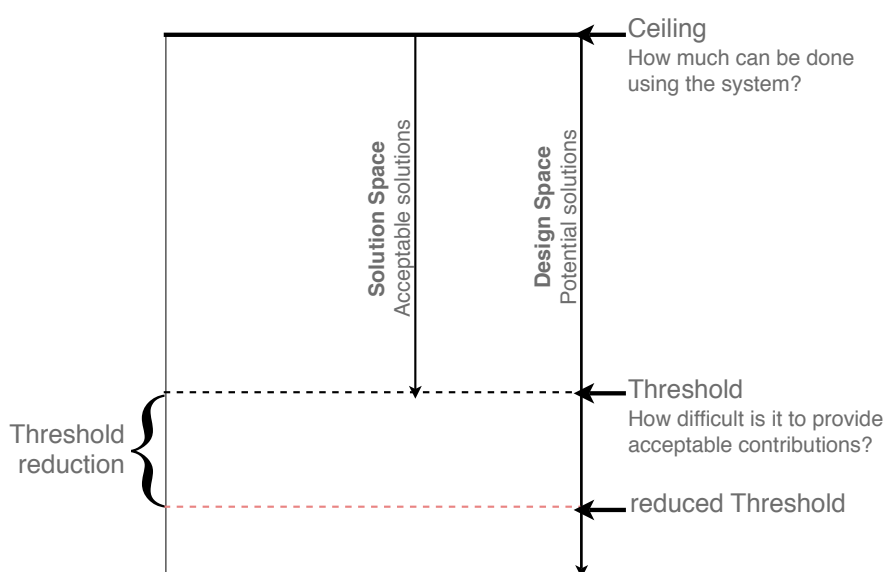


Figure 7: Relationship of threshold, ceiling and design/solution space
source: author

Content production environments not only enable the production of different kinds of content but apply also different thresholds within a single environment by offering different means of achieving a certain result or by enabling users to achieve more advanced results. Such happens for example in end-user oriented development environments like Hypercard or MACROMEDIA/ADOBE Flash. In the case of Hypercard, a popular hypertext development environment designed by Bill Atkinson for Apple Computer, Inc in the late 80's of the 20th century (see [Nielsen, 1990] and [Salomon, 1990] for application scenarios and further discussion) users engaged at first with a set of cards in order to develop applications but were enabled to use a scripting language (Hypertalk) to extend their developments. As such,

50. see also chapter 2.2.2.2 *Innovative uses*

a content development environment like Hypercard shows different thresholds depending upon the level of engagement. A similar approach can be found in MACROMEDIA/ADOBE Flash, where users can engage with the animation abilities of the environment without engaging with the scripting language (Actionscript). In consequence, the combination of such thresholds will be described as the depth of a particular content development environment.

III An extended concept of threshold

Besides a reduction of threshold in a technical context as described above, a reduction of threshold can also relate to other areas. In order to identify these domains, a model for user-created content in computer gaming (see figure 8) developed by Koster [Koster, 2006] becomes useful.

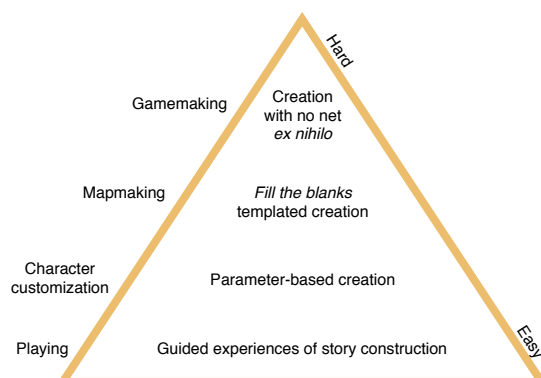


Figure 8: Content pyramid. Content production in game environments according to [Koster, 2006]

Koster's content pyramid shows different levels of complexity in comparison to the relative number of people who are capable to perform these tasks. While playing is an activity that can be conducted by a wide base of users, mapmaking and template based creation or the development of a completely new game from scratch are activities that limit due to their complexity the number of potential users. In relation to the previously referred concept of technical threshold, Koster's model provides an interesting extension by referring to both technical and non-technical activities.

Parameter-based creation and templated creation are both activities that can be put in the context of a classical Interface Design perspective: a particular task is broken into activities and the information required to perform these activities is encoded in the interface.

Character customization, mapmaking and gamemaking on the other hand are activities which are out of the scope of this classical perspective, as they refer to the problem of "what a user can or should do" with a certain set of tools; a challenge that refers to creativity and not task performance. As Shneiderman points out in [Shneiderman and Plaisant, 2004], this problem is not within the scope of the classical perspective to interface design and provides new challenges in the design domain (see the discussion of exploratory, creative and collaborative interfaces in (Ibid.)).

However, Shneiderman's argument also leads into a different direction as he suggests that "[i]n these systems, the user may be knowledgeable in the task domain but novices in the underlying computer concepts", (Ibid.). In regard to the example

provided by Koster, we can argue, that users are not only novices in computer concepts but furthermore novices in the tasks when they need to identify what they could or should do.

Concepts like computer games which Koster refers to, handle this problem by embedding content creation processes into the context of a specific environment, thereby providing clues that users can identify for themselves as tasks for a creation process. As the leading question of "What could/should a user contribute?" clearly stands out from the question of "How can a user contribute?" which has been defined for the technical thresholds, this concept of threshold will be further referred to as conceptual thresholds.

As soon as contributions are put into the context of other contributions or measured against the expectations of corporations/institutions or an audience, a third dimension of threshold emerges: the problem of identifying these expectations towards the quality of content. Benkler refers in his analysis of commons-based peer production to a similar problem by discussing mechanisms that provide productive communities with the ability to associate relevance and accreditation to a contribution (see [Benkler, 2006], page 75-81). In this context, relevance and accreditation as a sign for content quality are the result of processes that take place within a particular community. Similarly, the transition from content consumer/passive user in the evaluation of Wikipedia contributors by Bryant et al. [Bryant et al., 2005] can be described as a process of adopting quality expectations.

When users want to contribute to a particular environment, it can become difficult for them to understand preexisting quality expectations. In the context of this classification scheme, such thresholds will be referred to as content assessment thresholds under the question "what makes up a good contribution?". A particular challenge in this domain arises according to the accounts of Benkler and Bryant due to the fact that such quality expectations are often intangible and expressed in an implicit way.

This analysis upon thresholds for contribution allows three different dimensions of threshold to be identified:

- Technical Thresholds

Thresholds that emerge due to the difficulty of a task from a technical perspective. In particular related to the knowledge required to create or publish content and the steps involved in this process.

- Conceptual Thresholds

Thresholds which relate to the question what a user can do within a specific environment

- Content Assessment Thresholds

Thresholds that relate to the expectations of other stakeholders

These dimensions provide a point of departure to illustrate differences between existing applications and to work out particular challenges for the design of new applications.

IV Modularity & granularity

A further dimension of analysis besides the concept of threshold emerges from Benkler's concept of modularity and granularity. As it had been pointed out before⁵¹, modularity refers in Benkler's notion to the extent in which a particular project can be separated into entities which can be treated independently by different users (see [Benkler, 2006] page 100). Granularity in turn refers to the size of these modules and therefore the amount of "time and effort that an individual must invest in producing them" (Ibid. page 100). Together, both aspects take into account that the size and complexity of a particular content entity influences the time of required engagement and thereby show an effect upon the necessary user effort. Benkler provides two different examples for the application of this concept.

In the case of NASA clickworkers⁵² users were enabled to identify Mars craters by clicking on an image of the Mars surface. Initially, this task was conducted by trained researchers but a comparison showed, that the aggregated and processed results of different user inputs provided comparable results to the work of the specialists. The NASA clickworkers project is therefore an example of a task with a high level of modularity, as the overall project of mapping Mars craters was subdivided into different images of the Mars surface. Due to this modularity, a high number of users was able to identify craters on individual images separately. At the same time, the task showed a high degree of granularity, as the time required to treat a single entity was within the range of a few minutes.

Benkler compares this success with the Free High School Science Texts initiative, a South African project that tries to cooperatively build free science text books. According to the founder of the project, as cited by Benkler (Ibid. page 101), the project got less momentum, due to constraints upon the fit of the textbooks to gov-

51. see chapter 2.2.3.1 *Commons-based peer production*

52. see <http://clickworkers.arc.nasa.gov/top> for further information about the initial project conducted in 2001, referenced 25.09.2008

environmental requirements towards content and form. In consequence, individual contributions of users were bound to a high level of abstraction, therefore demanding more time for a single contribution from the user with the result of a lower granularity of contributions.

Overall, the concept of modularity and granularity allows content production processes to be classified according to the context of time and effort in contrast to the impact of threshold which refers to the actual act of production. Although the amount of required effort does not necessarily predefine the acceptance of a particular content production environment, it allows to analyze different strategies.

2.3.2.2 A review of content production environments

In order to use the previously identified concepts of threshold, granularity and modularity in the analysis of real world environments, a set of cases has been selected and will be discussed in the following. As content production environments are embedded in applications, further contextual information about the cases are provided in regard to the target audiences and the overall context of the applications. The survey will also review to what extent a surplus for passive users is gained from the contributions of the productive users.

The general rationales for the selection of the particular examples were:

- I. The production of non-trivial content.
Every single one of the environments in this selection focuses upon the creation of content that is complex, therefore requires a user engagement which is significantly higher than for trivial content production environments
- II. Engagement and incentives.
All environments presented in this selection apply different strategies of engagement and sustainable user involvement.
- III. Variety of threshold reduction techniques.
The selected use cases offer a variety of content production environments that show different strategies in the implementation and selection of threshold reduction techniques.

I current.tv

<http://www.current.tv>

All links retrieved on 12.09.2008

Claim

Current is about what's going on in your world: all the things you and your friends are actually interested in -- that you won't find on any other news site or cable TV channel.

source: <http://current.com/>

current.tv is a TV-station that is distributed both online and via satellite in the USA and the United Kingdom. Its main target audience consists of young adults and the station claims a close connection to its audience through a tight integration of user contributions. According to current.tv, about 1/3 of the program consist of such contributions entitled by the company as viewer created content (V2) "pods"⁵³. current.tv's approach to include user contributions to a large extent is particularly interesting, as the production of TV quality material provides a very high threshold for user contributions due to the complexity of production. As the production process relies upon the use of tools that are external to the web site, such as cameras, microphones or video editing software, a reduction of threshold is only feasible through support of the process. As both granularity and modularity of the dominant content format ("pods") are low, contributions require a significant amount of effort and time. According to the classification given in chapter 2.1 *Characteristics of user-created content* current.tv the main format of contribution ("pods") can be classified as non-trivial user-created content based on a mixed crowd sourcing / user contributions strategy. Besides "pods", users can also provide minor contributions such as links to other websites, content rankings and different forms of feedback⁵⁴. current.tv's crowd sourcing strategy involves monetary compensation for user contributions as soon as these have been selected by voting mechanism based upon user rankings. In any case, the final editorial decision about airing a particular "pod" is made by current.tv⁵⁵. In case of online-only distribution, users receive no monetary compensation. However, users accumulate representations of social status⁵⁶.

In general, contributions have to follow specific guidelines for publication⁵⁷. Contri-

53. see <http://current.com/s/about.htm>

54. see http://current.com/s/faq.htm#What_types_of_activities

55. see http://www.newassignment.net/current_tv_interview, interview with Robin Sloan, Online Studio Futurist at current.tv

56. This will be further reviewed in chapter 2.3.3 *Management of contributions*

57. see http://current.com/s/community_standards.htm

butions that want to be aired on TV also need to follow formal constraints that relate to established constraints in television production such as the necessity of signed release forms by people depicted in the "pod". current.tv applies a review process based upon a late verification of constraints, where productive users publish their pods online first and only once the "pod" is selected to be aired get involved with clearance activities⁵⁸

As user contributions in current.tv play an important role in the content production process, these contributions can be considered to be at least a partial substitute of conventional production processes. The emphasis upon the role of the productive user as contributor for content which is relevant for other members of the target audience (see claim above: "[...] all the things you and your friends are actually interested in [...]") also shows patterns of user innovation where current.tv gains an insight into topics that are relevant for its audience through user contributions.

The implementation of low-level contributions such as links and voting mechanisms as well as the usage of social capita mechanisms in current.tv lead to the conclusion, that current.tv also aims in establishing a productive community that tries to provoke a higher commitment of its web audience.

II SFZero

http://sf0.org	<i>All links retrieved on 12.09.2008</i>
<p><i>Claim</i></p> <p>SFZero is a Collaborative Production Game. Players build characters by completing tasks for their groups and increasing their Score. The goals of play include meeting new people, exploring the city, and participating in non-consumer leisure activities. We are still in beta, any and all feedback is appreciated...</p> <p>source: http://sf0.org/</p>	

SFZero takes a game inspired approach to user-contributions by integrating a system of levels and points which reflect social capital and is influenced by the contributions of users. The main form of contribution is the documentation of completed tasks, referred to as "praxis"⁵⁹, which users conduct outside of the web-site environment in the real-world. From a formal point of view, these contributions consist of images as well as written text. Other formats for contribution are the tasks themselves, which can be provided by users but are filtered by the site maintainers before publication in contrast to "praxis" which are published directly⁶⁰. Depending upon

58. see http://www.newassignment.net/current_tv_interview, interview with Robin Sloan, Online Studio Futurist at current.tv

59. see <http://sf0.org/about/>, section Proving You Did It

60. see <http://sf0.org/about/>, section Adding Tasks

the task, the modularity of the "praxis" is low, as tasks can not be split up. However, depending upon the given "praxis" the granularity of contributions can be both low and high depending upon the involvement a user shows.

In the context of the proposed classification scheme described in chapter 2.1 *Characteristics of user-created content*, SFZero can be regarded as non-trivial user-created content based on a user contributions strategy. A gratification of user contributions happens through the accumulation of social capital⁶¹. In comparison to other environments, the distribution of capital not only relates to automated processes which provide points based on specific actions in the system (e.g. the publication of a "praxis") but also on peripheral contributions, points given by other users/players to the author of a "praxis", thereby providing a ranking as well as reward system.

In comparison to other environments like current.tv, tasks in SFZero are not exclusive, thereby allowing different competing solutions. Active contributors become members of particular groups which follow a specific, predefined agenda, comparable to political parties and organizations in real life⁶². The thereby created constellations have implications upon tasks as well as the cooperative solution of tasks.

Furthermore, tasks and group activities as well as agendas are embedded in a time related concept of "Eras"⁶³ which modify the context of tasks and provide additional fluidity to the game play.

Due to the relevance of user contributions in the environment as well as the intense use of social capital it can be argued that SFZero aims in establishing a productive community of users. From a methodological point of view, both the concept of tasks and its integration in threshold reduction measures as well as game related concepts that allow a high sustainability of engagement can be considered as a distinct feature of SFZero in comparison with other environments. Furthermore, the minimalist approach towards contributions in terms of the technical format (pictures and written text) is remarkable in relation to the level of depth that these simple means evoke. Based on the data available on the website, no further notion is given, whether the creativity expressed by the productive users is used for other means as for example the evaluation of user innovations. However, the activities of the users/players show a high level of innovative or alternative use⁶⁴.

61. This will be further analyzed in chapter 2.3.3 *Management of contributions*

62. see <http://sf0.org/about/>, section Groups & Grouposis

63. see <http://sf0.org/about/>, section Eras

64. See the discussion in chapter 2.2.2.2 *Innovative uses*

III SimsCarnival

http://www.simscarnival.com/	All links retrieved on 14.09.2008
<i>Claim</i> The Sims Carnival is a new online community and gaming experience from The Sims that makes game creation and sharing more accessible and fun than ever before. The introduction of this new creative endeavor from The Sims is designed to convert millions of players into game designers - no programming skills required! source: http://www.simscarnival.com/view/news	

SimsCarnival is part of the highly successful Sims franchise referred to as an example for game based user contributions in chapter 2.2.1.1 *Computer game modding*. In SimsCarnival, users have the opportunity to create their own computer games. For this purpose, SimsCarnival applies a staged model of different content creation environments (The Wizard, The Swapper and The Game Creator) that allow the creation of simple computer games. Games created by the users are the main format of user contributions. Other content formats are provided in the creation of feedback and through simple rating and ranking mechanisms.

In the process of game creation a rudimentary level of modularization of content production is applied. Even though some of the creation processes could be modularized in principle, the environment does not explicitly make use of this feature. All in all, game creation in SimsCarnival differs in regard to both granularity and modularity depending upon the content production environment used. Whereas The Wizzard and The Swapper provide a high granularity of tasks, the granularity of The Game Creator is lower.

Based on the classification scheme given in chapter 2.1 *Characteristics of user-created content*, the games published by users are mainly non-trivial user-created content managed under a user contributions strategy. Besides the integrated frameworks, SimsCarnival also provides a licensing scheme where users that integrate the Carnival Highscore API in their MACROMEDIA/ADOBE Flash based games participate in a sponsorship program that provides a payment to the users⁶⁵. Depending on the environment used, design and solution space of the integrated content production environments are limited.

Besides these intrinsic limitations, SimsCarnival provides guidelines for the creation of content that exclude certain forms of content. As such content that depicts pornography, hate speech, intense/sexual violence, realistic blood and gore or

65. see http://www.simscarnival.com/flashprogramsignin?sourceid=flapi_ip_310_home

strong profanity⁶⁶. Furthermore all contributions need to be original works of the users who contribute or the user has been given all necessary rights to publish the content (Ibid.). In-game advertisement is also prohibited.

SimsCarnival provides an example for lowered threshold in the production of highly complex content formats such as computer games. However the strategies applied illustrate also the tradeoff that a lowered threshold demands upon the ceiling of a production environment and the thereby inherent limitations for innovation. All in all, SimsCarnival refers to the engaging qualities of the process of game creation rather than being a substitute for conventional production.

2.3.2.3 Techniques of threshold reduction

As it had been pointed out before, two general principles of threshold reduction can be identified:

- either threshold is reduced by increasing the knowledge of the user to perform a certain task or
- this knowledge is embedded in the software environment.

Approaches that aim in an increase of knowledge on the user side are thereby often separated from the production process and only support the process while knowledge embedded in the software environment becomes a part of the production process and thereby alters the process itself. Six different means of threshold reduction will be discussed in relation to the three case studies:

- I. Resources for learning,
- II. Feedback,
- III. Examples and guidelines,
- IV. Templates,
- V. Embedded constraints and
- VI. Staging & Interfacing

I Resources for learning

current.tv provides extensive resources for learning about the production of web and TV based video content in several sections.

The information covered therein relate to basic information, as for example the selection of the necessary technology for production but also planning and pre-

66. see http://eacarnival.custhelp.com/cgi-bin/eacarnival.cfg/php/enduser/std_adp.php?p_sid=E9LRCSdj&p_accessibility=0&p_redirect=&p_faqid=19164

production as well as production, post-production and marketing. current.tv provides resources with a high production value, implementing a wide use of animations, voice annotations, video clips and downloadable illustrated guides (for an overview about the different domains see figure 9).

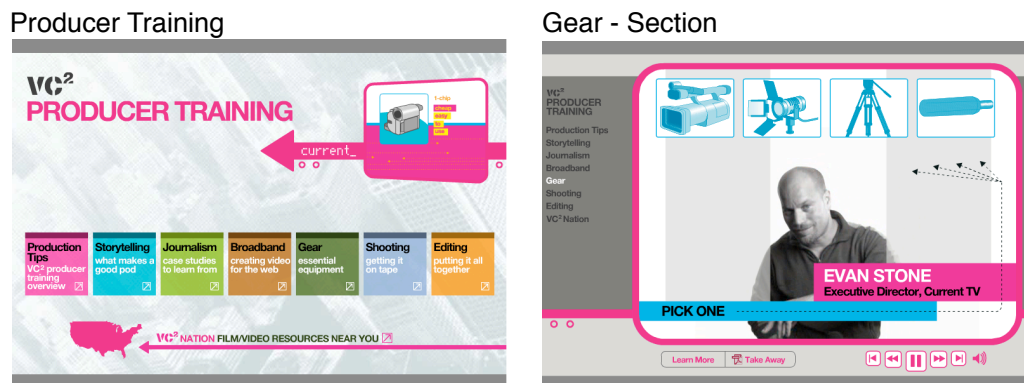


Figure 9: Areas of training provided by current.tv
source: <http://current.com/producerResources.htm> referenced 16.09.2008

Learning material in current.tv is provided in order to lower the technical threshold of content production. In the context of current.tv, such a reduction of technical threshold becomes necessary as the process of video content production includes the use of tools which are outside of the application itself like cameras and microphones and can be therefore not altered.

II Feedback

SFZero allows users to grant points to contributions by other users. This concept of feedback is used as a signifier in two different domains:

- The amount of points given to a particular contribution becomes a signal for the content author that his contribution gained acceptance in the user community.
- Higher scores of user distributed points also reflect the popularity of a contribution in the context of all other contributions, therefore providing clues to the audience about which contributions can be considered particularly relevant (see figure 10).

The point feedback systems in SFZero therefore provides feedback to content authors towards the expectations upon content by other users of the environment. In this regard, the feedback mechanism provides a means to reduce the *content assessment threshold*.

Praxis (Completed Tasks)

Genuinely free, self-conscious, authentic activity as opposed to the alienated labour demanded under capitalism.



— Basic Points + User assigned points

Figure 10: User points as feedback indicators in a SFZero praxis. Basic points are given for the fulfillment of a task while user assigned points are given by users
source: <http://sf0.org/completedTasks/?order=score>, retrieved 20.09.2008

Besides the formalized concept of user points, other feedback formats are found similar to those in SFZero. This includes comments towards user contributions where users can exchange best practices of production or discuss a particular contribution. In the first case, feedback through comments be regarded as technical threshold reduction while it refers in the later case again to content assessment threshold reduction. Similar uses of feedback through comments are found in current.tv and SimsCarnival as well.

III Examples and guidelines

current.tv makes use of examples and guidelines in particular in the communication of abstract concepts as in the discussion of storytelling. Following the leading question of "What makes up a good pod?"⁶⁷ questions about storytelling are discussed within three section:

The Screening Room in the Storytelling section provides a selection of user contributed "pods" with an offscreen commentary by a member of the current.tv staff. The examples are discussed alongside different categories and presented as prototypes for particularly good contributions.

67. see <http://current.com/producerResources.htm>, referenced 16.09.2008

Another format of examples is given in the Story Approaches section, where examples for the development of a story are given.

Finally the site presents in the On Storytelling section accounts by directors and other filmmakers that express their ideas towards storytelling (see figure 11).






Figure 11: Encountering quality assessment thresholds in current.tv. What makes up good storytelling?
 source: <http://current.com/make/training?section=storytelling> retrieved 16.09.2008

This application of examples in the context of storytelling in current.tv can be regarded as a means to lower the threshold of content assessment. By discussing different examples for good contributions alongside the expectations of other "peers" users can gain insight into the particular expectations towards storytelling qualities. A different use of examples or guidelines within current.tv can be found in the assignment section (see figure 12): Besides allowing users to contribute freely, current.tv offers in this section a selection of assignments where subjects or topics are listed that users can take as inspiration or directly as an assignment to complete. The integration of assignments allows the reduction of conceptual threshold as it provides users with a more or less detailed description for activities. Besides the role of these assignments as a means to reduce conceptual thresholds, assignments also

allow current.tv to influence what users contribute⁶⁸.

Assignments

	MAKE A POD ■ ■ ■ ■ What are the hottest styles on your street? Show and tell the fashions that make your street the new runway.	lifestyle & culture	108 days december 31, 2008
	MAKE A POD ■ ■ ■ ■ Make a Pod. Get it on TV. And Get Paid. Take your passions and turn them into pods. Make TV you'd want to see.	lifestyle & culture	109 days december 31, 2008
	MAKE A POD ■ ■ ■ ■ It Happened Here Historical locations surround us. Pick one near you and make a pod about...	lifestyle & culture	109 days december 31, 2008

Assignments - It Happened Here

make tv pods

[upload your video](#)

one of [many ways](#) to get on tv

It Happened Here

Historical locations surround us. Pick one near you and make a pod about what it was and what it is now.

\$\$\$ PAID ASSIGNMENT ▶ VIDEO SUBMISSIONS ONLY ENDS: 12/31/2008 09:00 PM

more info

Wherever you live, in whatever part of the world, there are places where really cool things happened. Maybe it's the place that toilet paper was invented, where Al Capone used to gamble, or where the game Monopoly started. Big or small, we want to know about the past and present of interesting locations throughout the world. Make a pod that shows us what used to be there, and what's there now. See the examples below to get in the spirit.

resources

[Producer Training](#) [FAQ](#) [VCAM Terms](#)

Figure 12: Task assignments in current.tv
Assignments, source: <http://current.com/make/pod>
It Happened Here, source: http://current.com/topics/88798134_it_happened_here
both retrieved 20.09.2008

A similar concept of assignments can be found in the tasks provided within SFZero (see figure 13). Tasks form the basis for user contributions in SFZero by stimulating users to take action. Another role of tasks in SFZero can be seen in defining a general frame for contributions and thereby providing, in a limited way, a means to steer user contributions. The concept of tasks within SFZero forms therefore also a means of threshold reduction in the context of conceptual threshold reduction. Besides stimulating users to take action, SFZero also applies tasks in structuring the interaction of users with the application. The first task users of SFZero are automatically assigned for consists of the upload of a user image to the site⁶⁹. Though simple, the benefits of this approach are three-fold:

68. This role of assignments will be further discussed in chapter 2.3.3 *Management of contributions*.

69. see <http://sf0.org/tasks/player-photograph>, referenced 16.09.2008

- a. users complete their profiles on SFZero,
- b. by conducting the task users become aware of the picture upload mechanism a central tool for the completion of "praxis" and
- c. they conduct an activity that can be put in the context of the previously described concept of legitimate peripheral participation. By uploading a user image, users take the first step of gradually participating in the community of productive users.

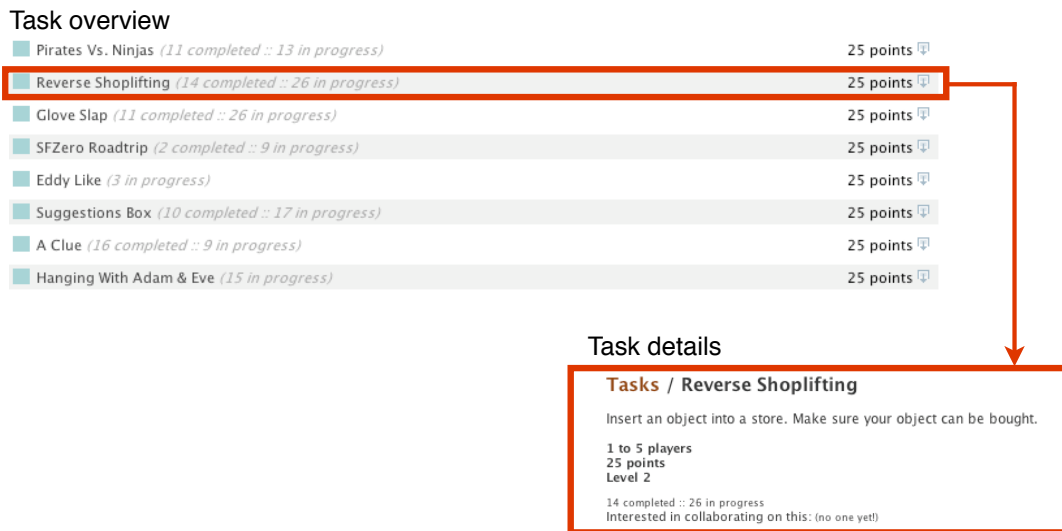


Figure 13: Task assignment in SFZero
 Task overview, source: <http://sf0.org/tasks/> retrieved 17.09.2008
 Task details, source: <http://sf0.org/tasks/Reverse-Shoplifting/> retrieved 17.09.2008

IV Templates

Game creation in The Wizard within SimsCarnival is based upon a set of templates that can be customized by user input. In total, The Wizard offers a selection of 30 different game templates⁷⁰ with varying levels of customization.

In principle, users create their game by following a multi-step dialogue in which they define variables of the game play. An example that illustrates this process in the context of a pinball game can be found in figure 14. It becomes apparent, that the input users can conduct within The Wizard is highly constrained and consists mostly of the alternation of pre-defined variables (see screens 3-11, figure 14). Within the workflow of The Wizard a higher degree of freedom is given only in screen 1 and 2 where users can provide a name for their pinball game as well as create the actual table design. As this process of designing the table layout significantly extends the step-by-step based approach of template manipulation it will be further re-

70. at the of writing, see <http://www.simscarnival.com/wizardtool>, referenced 18.09.2008

viewed in the following sub-chapter.

In general, the template-based approach shows an impact upon all three dimensions of threshold: In terms of technical threshold it reduces the amount of knowledge required in handling different toolsets like graphic editors or programming environments by embedding these information in the templates. In terms of conceptual threshold, the available selection of different games reduces the amount of possibilities but also makes users aware of existing categories of gameplay.

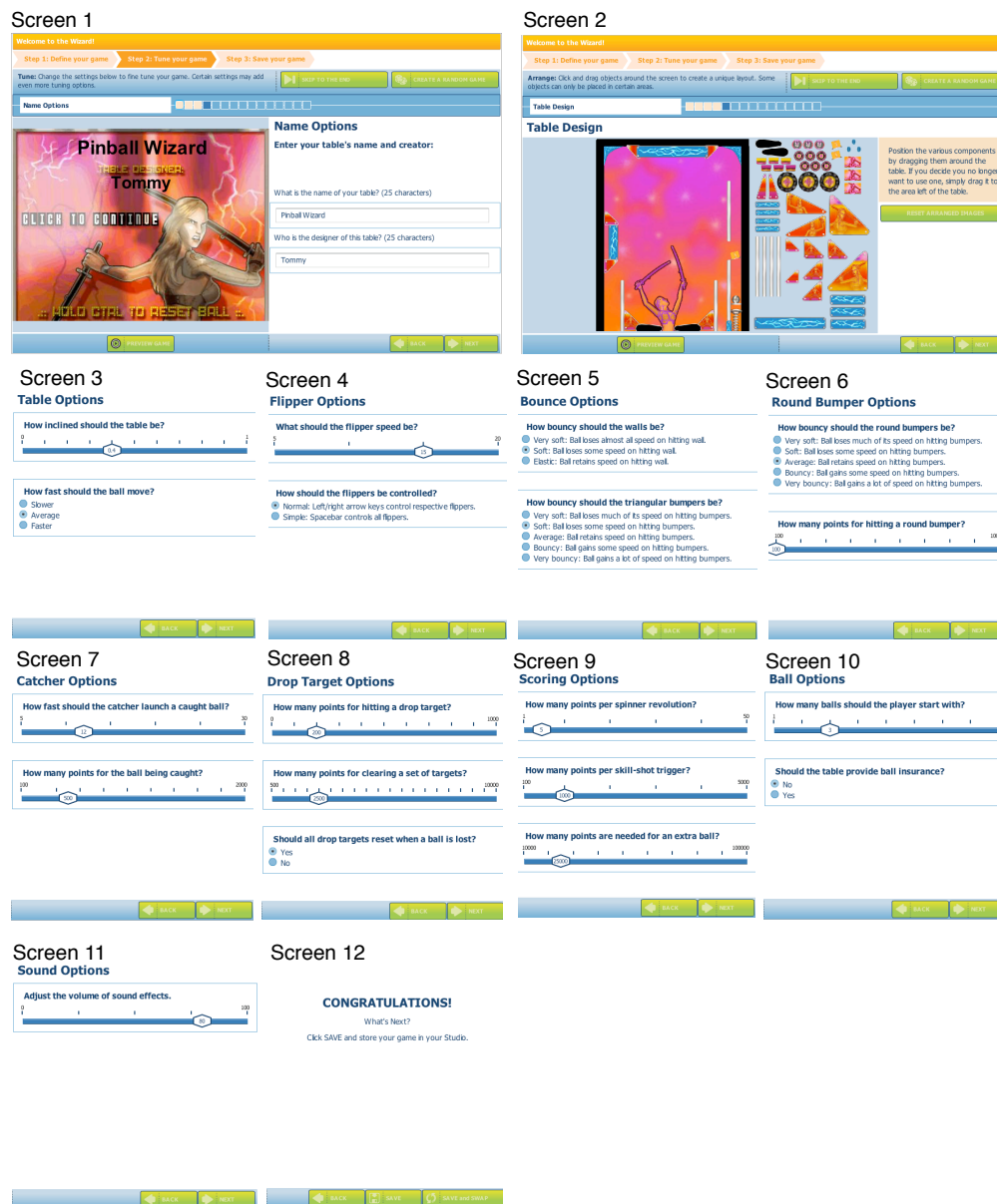


Figure 14: Dialog to create a pinball game through The Wizard interface in SimsCarnival source: author according to <http://www.simscarnival.com/wizardtool>, retrieved 18.09.2008

Content assessment threshold is affected in two ways through the use of templates. On the one hand, the pre-definition of substantial elements guarantees a minimum standard that can be achieved by users with relative ease. On the other hand, the low threshold of creation can provide a significant challenge for the identification of

expected quality within the user base. As the threshold for creating a relatively complex game is low, a wide range of users is capable to create such a game. But as the templates limit the solution space significantly, all contributions share strong similarities with only minor differences between them. Due to this equalization of production output, outstanding or special contributions are hard to achieve and are therefore limited to alternate uses of the templates which are in turn difficult to identify.

At the same time, this inside perspective of *content assessment threshold* could differ from the perspective of external users. As games created within SimsCarnival can be also sent to external users or downloaded to a local computer, the template approach provides advantages in terms of content assessment threshold as it offers a quality that can be appealing to other users that don't take part in the content production environment of SimsCarnival.

As an application that directly accompanies The Wizard, The Swapper allows users to change graphical assets of either user-created games or pre-existing standard games with custom images that can be uploaded. It allows users thereby to change the look of a particular game to a relatively high degree and provides a means to extend the actual design space. At the same time The Swapper provides also a means to provide contributions which fall out of the design space, for example by changing assets with images that do not conform to the user guidelines⁷¹.

A less sophisticated template system is embedded in SFZero, where user inputs consisting of text and images are automatically adopted upon time of publication to the layout and style guidelines of the website. While this process can be regarded as relatively trivial from a technical perspective, it nevertheless reduces technical threshold by embedding design information in the content production environment.

V Embedded constraints

As discussed before, the creation of the layout of the actual pinball machine in the SimsCarnival environment (depicted in screen 2, figure 14) differs from other elements of the template. In direct comparison to the template approach, it shows a higher degree of freedom as it allows the user to place the actual game elements (bumpers, slingshots, catchers and targets) in arbitrary configurations on the table which provides in turn a direct influence upon the interplay of the different elements. As this interplay relates to the actual challenge of playing the game (collect-

71. as for example by posting content that "depicts pornography, hate speech, intense/sexual violence, realistic blood and gore or strong profanity", see Case Studies, section SimsCarnival.

ing points, keeping the ball in the game) control over the layout significantly enhances the ceiling of the production process.

The approach of SimsCarnival in this example shows, how a complicated process with a therefore high threshold – the creation of a pinball game – can be reduced to the placement of objects on a plane. A further abstraction of the process can be observed in the nature of the different elements: each element performs a different operation when hit by the ball and influences the ball in different ways. By referring in the visual design of the game elements to the look of the real objects, the application tries to map the pre-existing knowledge of the user about pinball machines with the process of creation. While the actual features of these elements refer to their corresponding real world counterparts, their influence upon the game play is not directly replicated in the layout design mode. Therefore, the pinball creation is supported by a preview function which allows the user to play the game with the current configuration of elements. This concept of design- and testing-phase allows users to modify their creations and to understand the influence of the modifications upon the gameplay in an iterative process. From a conceptual point of view, the level of abstraction upon which the pinball editor is based relates to embedded constraints that are pre-coded in the software environment. Such embedded constraints in the pinball editor lower threshold in particular in relation to technical thresholds, where complicated processes, like the creation of a game, are reduced and abstracted.

This abstraction of complicated processes can be regarded as a common approach towards a lowered threshold in particular in the field of end-user programming. Environments like Microsoft Research's Boku⁷², Scratch⁷³ or Garrys Mod⁷⁴, a modification of the Half-Life 2 Source engine that allows users to develop interactive three-dimensional environments in a sandbox, follow a similar approach.

The Game Creator in SimsCarnival shows a different approach to embedded constraints by providing an alternate setup for game development. In comparison to the other applications within the SimsCarnival content production environment, The Game Creator is not integrated in the website but a program that needs to be downloaded and installed⁷⁵ separately. As a major difference to The Wizard, The

72. see <http://research.microsoft.com/projects/boku/>, retrieved 29/10/2008

73. see <http://scratch.mit.edu/>, retrieved 29/10/2008

74. see <http://www.garrysmo.com/>, retrieved 29/10/2008

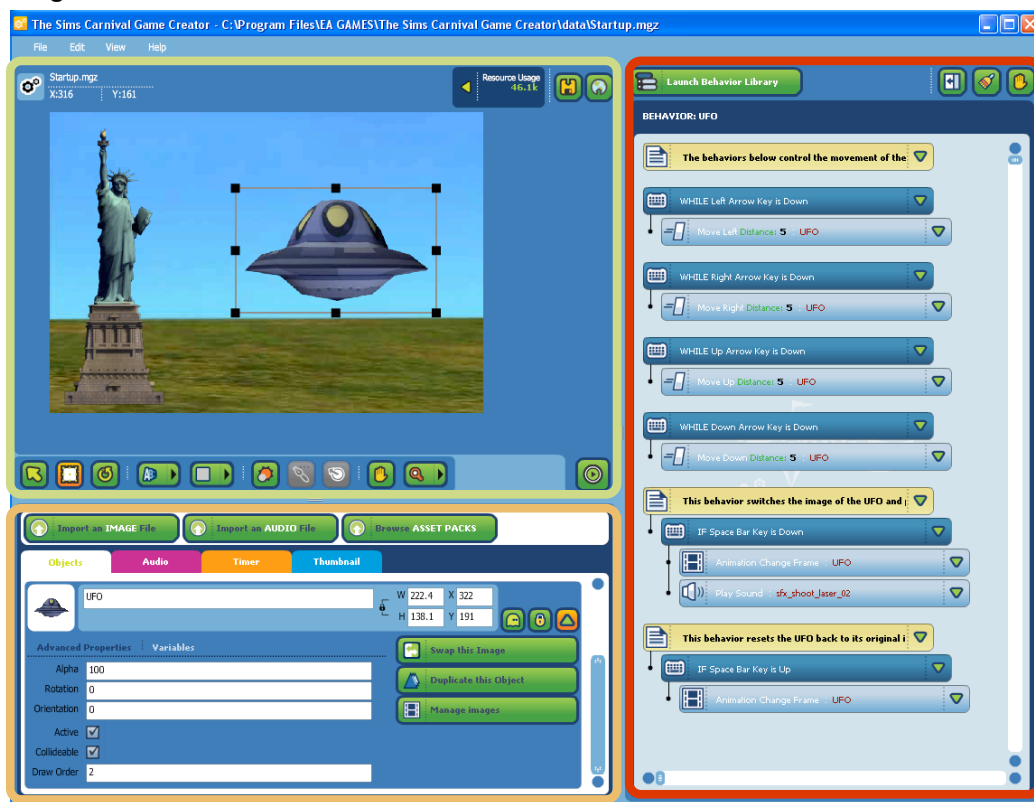
75. The Game Creator demands a Microsoft Windows 2000/XP/Vista environment

Game Creator does not provide a multi-step templated approach, but a more generic development environment for computer games.

At its very basis, The Game Creator provides three different sections,

- a stage that resembles the layout of the final game and allows users to arrange objects,
- an object information section where properties of objects are defined and new assets imported and
- a behaviour editor where user inputs (keys, mouse events) and logical constraints (conditions and commands) are mapped to objects on the stage.

Stage



**Object
Information**

**Behavior
Editor**

Figure 15: The Game Creator development environment, emphasis added
source: <http://www.simscarnival.com/view/create/gamecreator>, retrieved 17.09.2008

In order to develop a game, users place objects on the stage, define their properties, e.g. their bounding box or their drawing order and associate behaviours to them. In this context, the behavior editor plays a major role for game development in The Game Creator:

By defining whether an object is directly controlled by the user, independent from his inputs or related to his inputs, the author defines constraints that form the

gameplay of the final game.

This approach differs significantly from the approaches discussed before. Instead of referring constraints to a particular game, as in the case of the pinball editor, constraints are embedded in a more abstract way as they reduce the concept of game creation to the specification of rules for the interaction between a player controlled object and its environment.

Due to this level of abstraction, game production in The Game Creator shows a higher threshold than The Wizard or The Swapper but provides at the same time a bigger design- and solution space. However, The Game Creator can be considered a means of technical threshold reduction in comparison to programming languages. In this context it has to be pointed out, that the behaviour editor is in fact a highly specialized programming environment that applies conventional constructs like conditions and loops in a graphical programming environment.

Although the threshold of The Game Creator is higher than in The Wizard or The Swapper, the quality of the results does not necessarily match. Games created in The Wizard or The Swapper are variations of pre-existing and pre-developed games that are consistent and guarantee the existence of gameplay. Creations produced in The Game Creator on the other hand do not necessarily show significant game play. Interestingly it could be also far more complicated to produce the pre-existing games of The Wizard in the simplified environment of The Game Creator.

VI Staging & Interfacing

While the previous analysis of threshold reduction refers to individual content production environments, most applications integrate different content production environments in parallel. While these can be structurally separated from each other, as for example the feedback mechanism and dominant content format production in SFZero, current.tv and SimsCarnival, SimsCarnival also shows a strategy that tries to provide connections between the different content production environments.

Overall SimsCarnival offers four different environments:

- The Wizard⁷⁶
 - Allow to create simple games based upon a step-by-step based approach to authoring

76. see <http://www.simscarnival.com/wizardtool> referenced 17.09.2008

- The Swapper⁷⁷
Enable to replace stock graphical assets (backgrounds, object textures) of games created with the Wizard with custom material
- The Game Creator⁷⁸
Provides a complex game development environment including an asset management system and a proprietary graphical programming language
- a FLASH API incentive program⁷⁹
Monetary incentives are given to MACROMEDIA/ADOBE Flash developers that integrate the Carnival Highscore API in their games

Figure 16 illustrates the *threshold* and *ceiling* for these different content production environments.

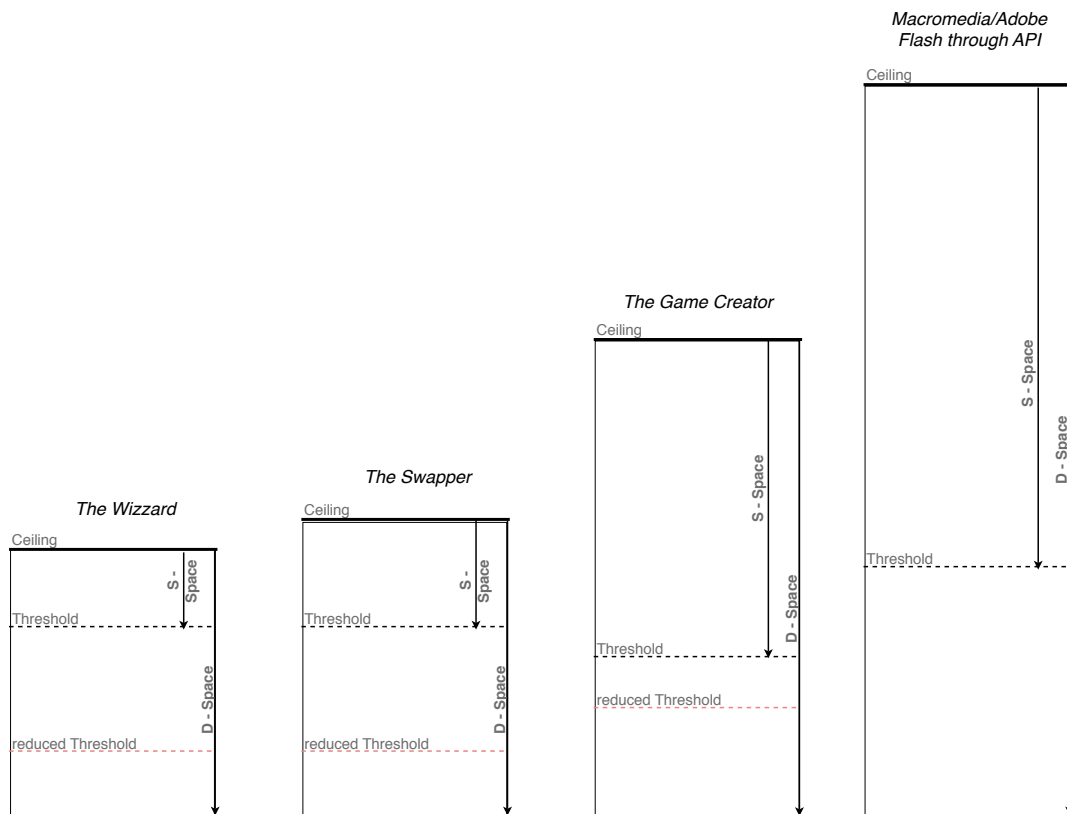


Figure 16: Combination of content environments with different thresholds, ceilings and design/solution spaces in SimsCarnival.
source: author

Again it has to be pointed out, that the absolute sizes of the different domains given in Figure 16 do not relate to absolute values but show a tendency: the threshold of

77. see <http://www.simscarnival.com/view/create/swapper> referenced 17.09.2008

78. see <http://www.simscarnival.com/view/create/gamecreator> referenced 17.09.2008

79. see http://www.simscarnival.com/flashprogramsignin?sourceid=flapi_ip_920_create referenced 17.09.2008

creation is higher in The Game Creator than in The Wizard but this difference is not quantified.

As it had been discussed before, The Wizard and The Swapper show a considerably lower threshold and ceiling and provide means that resemble rather the personalization of an existing subset of games than a tool to create new games. The Game Creator provides in comparison a higher ceiling and higher threshold for game creation. Although the ceiling in The Game Creator is relatively high, MACROMEDIA/ADOBE Flash poses an even higher ceiling through the integration of a full development environment.

By comparing the different thresholds it can be argued that the three embedded content production environments (The Wizard, The Swapper and The Game Creator) show patterns of increasing threshold. While this might not directly account for the combination of The Wizard and The Swapper as these environments show very similar thresholds, it can be hold up for The Game Creator.

Considering this progression in threshold the assumption can be made, that users also progress during their interaction with the environment: While novice users might refer to simple content production tasks, the bigger design- and solution space offered by The Game Creator could encourage them to continue in their development by adopting this environment. However, significant quantitative data that would represent transitions of users from one production environment to the other is not provided by the site. Nevertheless, the concept of user progression would fall in line with claims made by Bruns et al. in the context of user development in the Wikipedia⁸⁰. In the context of the SimsCarnival, we can therefore suppose that the design and interplay of different content production environments provide hints towards a strategic implementation of thresholds.

Further research needs to be conducted in this relationship. In particular to find out about the role of The Wizard and The Swapper in relation to The Game Creator. Two scenarios are plausible in this case: either users do not progress and regard both settings as separate entities with no further connections, or The Wizard and The Swapper provide a step in between, where the relative threshold between The Wizard and The Swapper is lower than the direct threshold of The Game Creator. In the later case, The Wizard and The Swapper would provide intermediate steps that users perform before engaging with the The Game Creator. Furthermore, if

80. see chapter 2.3.2.1 *Threshold and content production*

The Wizard and The Swapper wouldn't be a part of the system, fewer users might make use of The Game Creator as the required threshold would be too high for them. Besides this argumentation, further research into usage data and user transitions between these environments becomes necessary to verify this claim.

Interestingly, The Wizard and The Swapper are interrelated with each other, as games created in The Wizard can be modified in The Swapper. The Game Creator on the other hand does not provide a relation to the other two, thereby demanding a completely new set of skills without the ability to import games created in the other two environments.

While the supposed interplay of Wizard, Swapper and Game Creator points towards a strategic staging of user contributions, the integration of a MACROMEDIA/ADOBE Flash API leads in a different direction. As the development of computer games in the Flash development environment demands significant knowledge, we could argue that the threshold to achieve this knowledge is too high to provide a staged setup that would take users up to this point. Furthermore, such a setup would require even more resources to lower the threshold of production. As Flash exists outside of the SimsCarnival environment mainly supporting means could be used in this case.

However, due to its bigger design- and solution space as well as the existing Flash user and developer base outside of SimsCarnival the concept of an API in combination with monetary incentives provides an example for a hybrid crowdsourcing and user contributions strategy. It also provides hints towards the general existence of different user groups that are attracted by different forms of incentives.

2.3.2.4 Conclusion Content Production Environments

Content production environments play a significant role for applications that integrate user contributions. The analysis of different applications has shown, that they influence the way users contribute in two different ways: either due to their intrinsic features, by enabling users to produce content or, as soon as more than one content production environment is applied, in their interplay within an application.

A reduction of threshold not only enables the production of new content that provides relevance for other users but also supports the emergence of communities.

Both current.tv and SimsCarnival illustrate this approach:

The dominant content format in current.tv consists of videos ("pods"). These are required to show significant production value (see [Michel, 2006]) and the production of these videos requires therefore a high level of pre-existing knowledge and creativ-

ity. The ability for users to produce such content formats relies not only upon the means that current.tv provides – which are also outside of the production process – but upon the availability of high-quality video and audio recording devices and editing software for a wide group of users as well as the ubiquity of television and television formats. While the latter aspect does not guarantee wider implications for the ability of users to produce instead of consume, the ubiquity of television and its aesthetics prepare the ground for an understanding of the general structure and qualities of video based content. current.tv capitalizes on this pre-existing knowledge as well as on the general availability of hard- and software for production and postproduction by providing information that enable users to understand the particular demands of content production for television.

With the complexity of the process, its creative challenges as well as the quality demands expressed by current.tv the total amount of users that can cope with these expectations is limited. Although current.tv hasn't published any official information about user participation, according to an interview with a current.tv representative, about 500 users regularly upload content to the site (as of November 2006, see [Michel, 2006]). No further information is provided in this source about whether these contributions are aired or how often these regular users publish contributions.

While this general pattern is not surprising in the context of participation rates in user contribution environments⁸¹, it is surprising to see that current.tvs content production environment shows no particular path that would lead users to contribution. Instead, other contribution formats in the environment, like the provision of links, comments or ratings exist but provide no further connection to the process of creating video content.

To a different extent, this argument accounts for SimsCarnival as well: While the staged-setup of different content production environments in SimsCarnival suggests a path of user development, a clear separation remains between The Game Creator as the most complex content production environment within SimsCarnival and the incentive program for MACROMEDIA/ADOBE Flash developers even though the usage of MACROMEDIA/ADOBE Flash has a higher potential for relevant contributions and a surplus for passive users than the contributions created with The Game Creator due to the bigger design/solution space provided by MACRO-

81. see chapter 2.3.1 *Participation and Participation Inequality*

MEDIA/ADOBE Flash.

Similar to current.tv, the content creation environment in SimsCarnival interfaces with external resources, in this case, Flash developers, who already have the ability to develop appealing content. The content production environments within Sims Carnival follow in contrast to a lesser extent the idea of surplus generation for passive users but focus rather upon creating engagement through the process of content creation.

In contrast to these approaches, SFZero offers an environment that doesn't provide an explicit interface for tool-literate users. Instead, surplus for other users is generated by a content format that allows smaller contributions and therefore a higher granularity of tasks. In this perspective, both current.tv and SimsCarnival relate to content formats that already exist in the context of professional production and refer thereby to a context which requires complex contributions with a high granularity.

Furthermore all three examples apply monolithic contributions that are not subject to a continuous re-working as has been described by Bryant et al. for Wikipedia content (see [Bryant et al., 2005]). Even though this effect shows less relevance in the case of SFZero, as contributions are rather small, it gains significance for SimsCarnival and current.tv: both applications apply a form of content that requires a low degree of granularity and therefore prevent continuous re-working by other authors.

Overall SimsCarnival and current.tv apply different strategies to user contributions in parallel and these strategies show an impact upon the interface of the content production environments of the applications⁸².

Besides these observations, a different set of conclusions can be drawn from the analysis of threshold reduction techniques. While it has been shown, that in principle two different approaches to a lowered threshold can be followed – either by increasing the knowledge of the user or by embedding knowledge in the software – these means show different impacts upon the content that is created by users.

In this regard, an increase of knowledge on the user side is achieved by approaches that exist mainly outside of the actual production process. Their impact upon time and effort required for production is limited as they do not alter the process itself. However, such means of threshold reduction show an influence upon the design-

82. The specific impact of these strategies upon the management of user contributions will be further reviewed in chapter 2.3.3.1 *Integration of contributions*.

/solution space of applications: guidelines, feedback and learning cycles do not prevent users from contributions that are outside of the solution space. However they define accepted practices and show therefore also a normative impact upon user contributions.

Templates and embedded constraints/information on the other hand show a far higher impact upon the reduction of threshold. Nevertheless, their application does not happen without severe limitations. Templates are prone to wear off, an effect that can be observed outside of user contribution environments for example in the application of templates in applications like Microsoft PowerPoint (Microsoft Corporation, 1987-2008). Far from their original value as useful and appealing designs, their popularity has turned the stock templates into an almost vulgar caricature of an appealing design.

Besides this wear-off effect, the intense application of templates and embedded constraints/information can equalize user contributions in such a way that every contribution becomes completely exchangeable with each other. New contributions provide no further surplus for other users as it has been pointed out in the analysis of The Wizard in SimsCarnival.

The encoding of information and constraints within the content production environment can become also a means of control upon the output that users create. While this approach would in principal limit every contribution to conform with the solution space as design and solution space become in this case congruent, different examples show, that even carefully designed content production environments that incorporate embedded constraints leave room for alternate uses that transcend the intended solution space⁸³.

Embedded constraints also show, that the acceptance of such means differs between contexts. While Myers points out that in the context of professional software development (see [Myers et al., 2000]) constraint-based systems haven't gained wider popularity, their acceptance is higher in other domains such as in spreadsheets for

83. A popular example for this can be found in the recently published editor for the computer game Spore (Electronic Arts/2008). This editor is based upon a set of embedded constraints that allow users to create digital creatures with various features and provides a wide set of variations (variations of the amount of hands, arms and legs, a selection of skin, fur and feathers with different colors, modification of body-shapes etc.) while offering at the same time a low threshold for the development of creatures. Although in principal all parameters are controlled and defined by the editor environment which would in principal provide a limit to alternate uses outside of the solution space, some users found ways to extend this solution space by creating creatures that resemble in their shape primary male mammal sexual reproduction organs and published videos of these creatures and their dances online.

business applications.

Overall constraint-based systems and embedded information demand a careful attention upon finding the right balance between a reduction that still allows room for creativity and therefore contributions that provide surplus to other users and a streamlining of processes which renders all contributions into exchangeable instances.

2.3.3 Management of contributions

The following chapter will discuss how user contributions are integrated into the publication cycle of institutions and corporations. Different models of integration will be presented and discussed according to their underlying strategy. Subsequent to this, an analysis of incentives for participation will be given in regard to psychological as well as sociological-psychological models of motivation and consequences for the application of these models in user contribution environments will be drawn. The chapter concludes with an overview of challenges in user contribution environments, related to the problem of rights management, emerging conflicts between the involved stakeholders and a comparison between different concepts of content filtering.

2.3.3.1 Integration of contributions

As has been pointed out in previous chapters, user contributions can play two different roles in environments that integrate contributions,

- either the contributions of a minority of users are integrated in order to create a surplus for the majority of users or
- general participation is intended, which aims at integrating minor contributions from larger groups of users in order to create a higher engagement of the users with the application

In practice, both approaches are often mixed with each other in different emphasis. Besides such diverse intentions, a further dimension of user contribution integration evolves from the combination of user contributions and conventionally produced content.

Different strategies for such an integration can be observed and will be discussed in the following sections based upon previously referenced case studies. An emphasis will be put upon the role of institutions and corporations in the production process as well as their influence upon the content that is produced.

The concept of content platform as it is used in the following examples refers to the software environment that displays the actual content and can differ from the distri-

bution platform, which distributes content to the users. Such a separation between content and distribution platform is not familiar in web-based applications but is common in computer games where the actual game engine runs as a standalone program while distribution takes place over web-sites.

I Separation of user and corporate content production

In the separation model, users create content independently from corporations/institutions. While they use a platform that is provided by a corporation or institution, they create content with external tools and publish content via services that are independent from corporation's/institution's. An example for this strategy can be found in user created game mods for the first-person shooter Doom⁸⁴. While the original game and therefore the platform or target for content production was provided by a corporation, all content production processes took place independently from the publisher of the game.

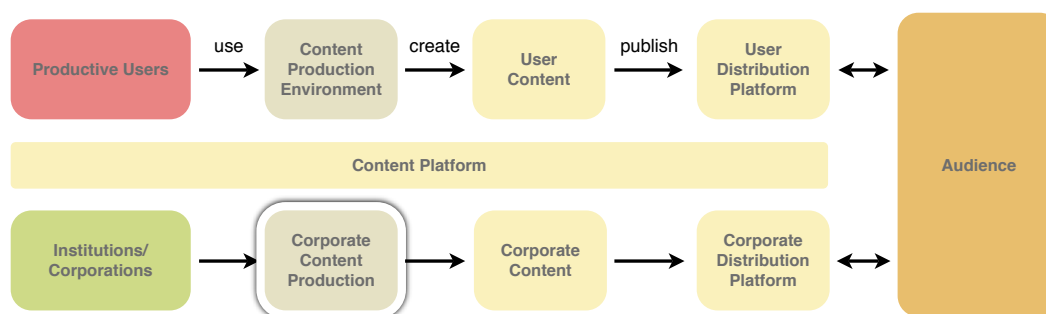


Figure 17: Separation of user and corporate contributions
source: author

In this model, institutions and corporations do not influence the content production process and benefit only indirectly from user contributions. Furthermore, a structural separation between user and corporate content production processes is in place that allows both parties to produce independently from each other.

II Integration of user and corporate content production

In the integration model, the integration of user contributions takes place in two ways: Either users create content with external tools and publish their content creations on a distribution platform that is owned or controlled by an institution/corporation, or users make use of content production environments that are part of the platform provided by an institution or corporation (marked as CPE in figure 18) and publish content on the corporate distribution platform. However, users are enabled to publish their contributions also on user distribution platforms.

This strategy can be observed for example in 'The Sims'⁸⁵, where users can create content using both tools that are integrated in the original game as well as external tools. Furthermore users can publish the content they have created on both user and corporate distribution platforms, which form in this case mostly internet

84. see chapter 2.2.1.1 *Computer game modding*

85. see chapter 2.2.1.1 *Computer game modding*

websites.

An extreme case of the integration strategy can be found in Auran's⁸⁶ integration of user contributions in the development process. In this case, productive users became a functional part of the development team and used a corporate content production environment. Due to this tight integration, user and corporate production processes also lost their structural independence and merged with each other thereby creating dependencies in the corporate production process based upon the expectation for user contributions.

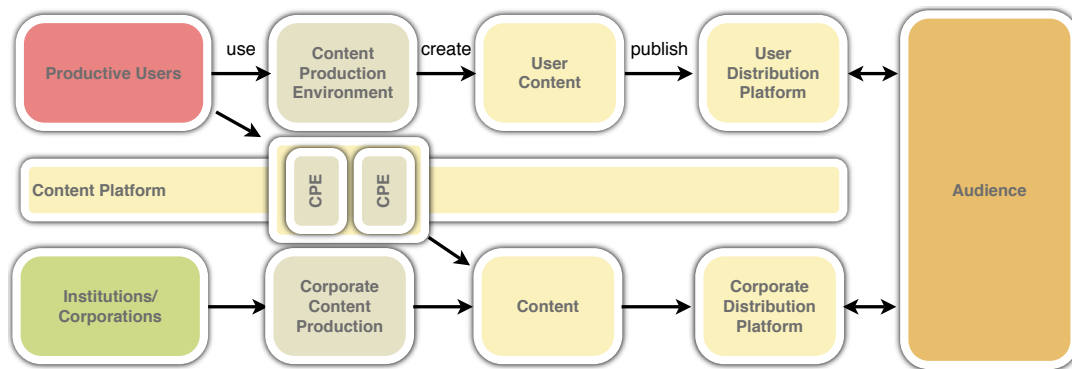


Figure 18: Integration of user and corporate contributions
source: author

Besides this extreme, which can be regarded as an exception rather than the norm, the integration scenario offers a higher degree of influence upon user contributions through corporations/institutions. Other than that the integration or provision of production environments allows corporations to influence the threshold of content production.

86. see chapter 2.2.1.1 *Computer game modding*

III Embedded user contributions

Applications that embed user contributions integrate content production environments in their platform but often enable users to use external tools as well. The publication of content is limited to a corporate distribution platform which is merged with the actual content platform. Examples for this approach are the previously discussed environments SimsCarnival, current.tv and SFZero. In all three environments, users can combine both internal and external tools for content production, but all contributions are distributed through a platform that forms the actual application. This approach differs from the previous examples, where the content platform remained largely independent from the distribution platform.

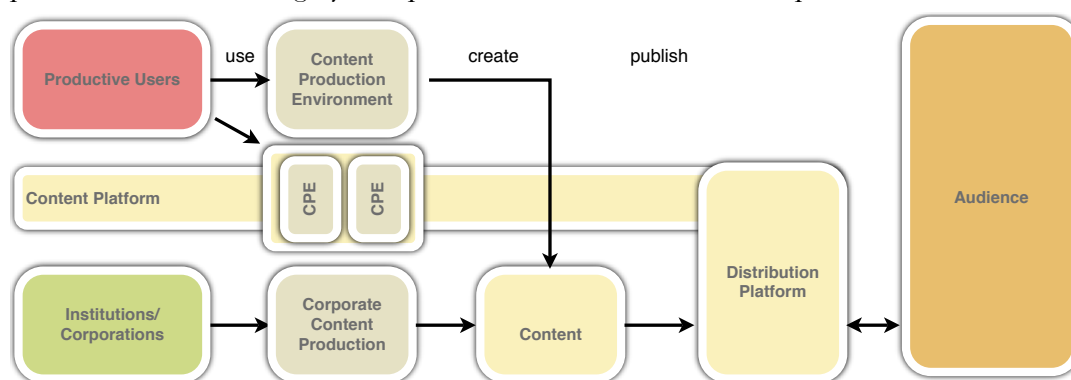


Figure 19: Embedded user contributions in a corporate environment
source: author

In the embedded user contributions model corporations and institutions have a far larger degree of control upon the content published for a particular content platform. However, this potential level of control and integration also demands a higher editorial responsibility which will be further discussed in chapter 2.3.3.3 *Management of contributions*.

2.3.3.2 Incentives for contribution

Open source software (OSS) production in general and user contributions in particular are examples for productivity that takes place outside of the classical work environment [Benkler, 2006]. From an economic point of view, their pure existence provides therefore theoretical problems: software released as OSS can be considered a privately produced public good and should therefore "suffer from problems of under-provision, delays in supply[,] and inferior quality" ([Bitzer et al., 2007], page 2) but in fact several open source software projects have become relevant competitors to proprietary software solutions⁸⁷. On the other hand, the *homo oeconomicus*

87. the canonical examples for this are the Linux operating system, the Apache web server and for example the Firefox browser see [Bitzer et al., 2007], 2

as a maximizer of utility usually tries to optimize his utility by collecting the most common medium of codified utility, money. However, with a lack of direct remuneration this concept of motivation does not become evident in OSS where "programmers write, read and revise all that code for free" ([Robert, 1999], page 104 cited by [Rossi and Bonaccorsi, 2005], page 2) and similar accounts can be made as well for user contributions for example in the Wikipedia (see [Schroer and Hertel, 2007]).

In order to resolve this problem, research in economics resorted to a psychological perspective, whereby motivation can be understood as either extrinsic or intrinsic. Extrinsic motivation describes the motivation of a person who conducts an activity as she expects a reward [Bitzer et al., 2007] whereas intrinsic motivation describes that "a person is said to be intrinsically motivated to perform an activity when she receives no apparent reward except the activity itself" ([Deci, 1971], page 105 cited by [Rossi and Bonaccorsi, 2005], page 3). In the later case, motivation originates from within the person and can refer to "pleasure or personal satisfaction" ([Benkler, 2006], page 94).

While the nature of motivation for a particular task can vary from person to person, negative effects have been observed in the relation between extrinsic monetary incentives and intrinsic motivation. In this case, monetary incentives do not provide a benefit by attracting more persons to conduct a certain activity but can lead in contrary to a crowding out of persons as fewer persons conduct an activity. Examples for this effect can be found according to ([Bolle, 2007]) in the drop of acceptance rate towards an atomic deposit in Switzerland, where acceptance dropped significantly after remuneration was offered (from 51% to 25%) ([Oberholzer-Gee et al., 1995] cited by [Bolle, 2007]) or in the decrease of punctuality after the introduction of a late fee for parents picking up their children at a nursery ([Gneezy and Rustichini, 2000] cited by Bolle).

While such negative effects of extrinsic motivation have been identified under particular circumstances in relation to monetary incentives, their appearance does not provide evidence for crowding out caused by non-monetary extrinsic motivation. Benkler refers in this context to a model of social standing ([Benkler, 2006], page 95) according to Nan Lin [Lin, 2002], that extends the concept of rewards beyond the limited monetary perspective. In this regard, people not only accumulate money, but also social capital and, depending upon their cultural background, these different forms of capital show different significance. As humans are usually also not monolithic in their preferred motivations [Benkler, 2006], they can be attracted by

one form of capital or the other depending upon the context of their actions. Benkler argues therefore, that non monetary incentives show a significant relevance in OSS and user contributions.

A different influence upon contributions in OSS development has been identified by Tirole and Lerner ([Tirole and Lerner, 2002] referenced by [Bitzer et al., 2007]) as a form of extrinsic motivation caused by the effect of "signaling" where developers use their contributions as a signal to others, in particular potential employers, in order to express their own abilities. However, Bitzer points out, that besides extrinsic motivation caused by signaling, intrinsic motivations play a significant role in OSS as well ([Hertel et al., 2003], [Lakhani and Wolf, 2003] referenced by [Bitzer et al., 2007]). In particular motives that can be subsumed under the term "gift culture" fall according to Bitzer (Ibid.) in this category. In the context of these motives, users want to give their contributions as a gift towards the community of users (Ibid.). Other than that, intrinsic motivation is also encouraged by altruism or ideological convictions that "see(s) OSS as a social movement promoting computer users' rights to use, study, copy, modify, and redistribute computer programs as part of fundamental democratic principles" ([Stallman, 1999] cited by [Bitzer et al., 2007], page 9).

Overall, contributors are attracted by both intrinsic and extrinsic motivations. In regard to a conflict between these kinds of motivation, evidence for crowding out has been found. However, the existence of hybrid schemes, where monetary, non monetary and intrinsic motivations exist in parallel within the same project shows that crowding out does not always appear. A positive co-existence between different forms of motivation can be found for example in the activities of corporations like IBM or Redhat which contribute to OSS by financing programmers to develop software under open licensing schemes (see [Benkler, 2006], chapter 2). Instead of limiting motivation for contribution to OSS to a particular set of motivations, it can be therefore argued that it is exactly this wide range of different motivations and the openness of the production process to provide different incentives which engages users to take part in the process. However, incentives are not arbitrary but need to fit to both the given context and the demands of the user base.

In order to find such a fit, Benkler points out, that monetary incentives provide distinct disadvantages in comparison with the exchange of social-capital. According to Benkler, monetary incentives operate usually in the context of either market transaction or firm-based production and are therefore limited in their application to scenarios where these two models can be applied. Both scenarios are common in

conventional production but require an appropriate definition of the outcome in order to find a price for the activity and demand also for "more precision of monitoring and enforcement on a per-transaction basis than do social exchange systems" ([Benkler, 2006], page 110).

Social exchange systems allow on the other hand according to Benkler a less crisp definition of price, as "actions enter into a cloud of goodwill or membership, out of which each agent can understand him- or herself as being entitled to a certain flow of dependencies or benefits in exchange for continued cooperative behavior" (Ibid. page 109). Exchange of social capital is according to Benkler a concept that is deeply rooted within human interaction but hasn't been taken into account so far in the context of productivity. Instead of relying upon a strict definition of price the exchange of social capital refers to mutual commitments which are not formalized and provide therefore a high level of flexibility (see [Benkler, 2006]).

I Non-monetary extrinsic incentives as instruments for contribution management

Both monetary and non-monetary incentives can be found in the previously analyzed examples for content production environments⁸⁸. SimsCarnival and current.tv make use of monetary incentives by offering remuneration for complex content contributions. Non-monetary incentives are on the other hand applied by all three applications through a user-point scheme.

User points provide a fixed formal means of transaction which offers a proxy for market transactions. As such, user points can signify a price for a certain contribution by associating a certain number of points for the publication. current.tv applies such an approach by accumulating the total amount of contributions conducted by a user as "activities". Once a user publishes a contribution, he automatically gains "activity" points.

SFZero refers to a market based model by associating a certain amount of points for the contribution of "praxis". Once a user publishes a "praxis" he is rewarded with the pre-defined number of points. Besides this direct remuneration where the amount of points that is assigned to a specific task reflects the difficulty of a task, the total reward that users gain also depends upon the points other users grant to a particular contribution. User-points in SFZero therefore also reflect the popularity or acceptance of a particular contribution after its publication and therefore allow not only to foster contributions by signifying preferred tasks with higher point ratings

88. see chapter 2.3.2.3 *Techniques of threshold reduction*

but also to filter contributions for quality based upon the dedication of points by other users.

In praxis, the application of non-monetary incentives raises several problems for the design of systems that apply them:

- By pre-defining the value of a particular action, the flexibility of social exchange systems is lost ("I invite you for dinner and might ask for a favor" vs. "I will give you 5 stars"). Even though the incentives provided are not monetary, the association of activities with an equivalent of non-monetary units limits transactions to market transactions.
- When actions in the system are coupled to non-monetary, quantifiable incentives, users can try "to game" the system. In the context of content production environments, "gaming" describes the process of accumulating non-monetary quantifiable signifiers without creating content that provides a surplus for other users. Systems that link the distribution of non-monetary incentives with the publication of content are prone to suffer from such activities. e.g. If an application grants one point to a user for any publication he conducts, users can publish arbitrary amounts of content and will accumulate points for these activities even though their contributions provide no surplus.
- The accumulation of points is meaningless without a reference. Such reference systems need to be build up and constantly maintained ([Benkler, 2006], page 110). Furthermore they have to be balanced and well designed.

Both monetary and non-monetary incentives gain particular relevance in relation to the participation rates of actual applications as it has been discussed before⁸⁹. In this context, a sustainable interest of contributing content by the productive users is mandatory in order to provide relevant content for the majority of users. Along these lines it can be argued, that motivation and incentives become a relevant means in the competition of applications⁹⁰ for highly-productive users. Based upon the distinction between productive and passive users, it can be argued that different motivations are in place for these groups and that in consequence different incentive schemes apply.

89. see chapter 2.3.1 *Participation and Participation Inequality*

90. for a discussion about the competition for productive users see [Michel, 2006]

II Initial contributions and motivation

While the previously described perspective upon incentives and motivation for contribution can provide an understanding of long-term engagement with a particular environment, it provides less insight into the motivation of users for initial contributions. In particular the accumulation of social capital requires that users value the acceptance within a particular community. Such acceptance is however an unlikely goal if users contribute for the first time while they are not aware of the existence of a productive community, as Bryant points out in her evaluation of the Wikipedia [Bryant et al., 2005].

In the context of OSS, Bitzer et al. identified three main components that encourage the start of OSS projects ([Bitzer et al., 2007]):

- The need for a particular software solution
OSS projects like Perl, Linux or Sendmail originated from the demand for a particular software solution that would offer more or different features than currently available software (Ibid.).
- fun and play, a *homo ludens* payoff
Software development or programming can become self-rewarding activities, where programmers enjoy the process of creation on its own. Programmers therefore gain a benefit from the development of software rather than from its actual use [Bitzer et al., 2007]
- gift culture, social standing
By publishing contributions as OSS, developers gain a social status in the community and accumulate social-capital. Furthermore, by referring to OSS as a social movement (see for example [Stallman, 1999]) contributors take part in this movement. In contrast to these claims, Bryants evaluation of Wikipedia contributions (see [Bryant et al., 2005]) showed that first time contributors were not aware of the existence of a community. As Bitzer's evaluation refers to OSS production, contributors in this context might be aware of the existence of a community of OSS developers before they start a new OSS project.
However further evidence needs to be found.

In relation to content production and content contribution, similarities as well as differences to OSS contributions become apparent.

In relation to the first aspect of this model by Bitzer et al. it becomes difficult to argue, that user-created content solves a particular problem as content is not neces-

sarily directed towards the solution of a problem. Instead of a personal need it becomes more appropriate to refer user contributions in this context to an aspect of personal use rather than personal need. This analogy can be given in direct reference to von Hippel's argument towards the intentions of users in user innovation whereby users innovate because they respond to their own demands and not to the demands of the market [von Hippel, 2005]. Similarly, users produce content for themselves, according to their own personal agenda.

This personal agenda as a set of user specific goals can relate to both intrinsic as well as extrinsic motivations. A reduction of the motivational perspective towards an either-or of extrinsic or intrinsic motivation falls short in consequence due to the existing variety of motivations and intentions in providing a full picture of the diverse nature of user motivations. Instead of a macroscopic analysis of motivation it is therefore more practical to refer to the personal agenda of users without attributing too much detail to the specific nature of the personal motivation. Personal use as well as the existence of a user's personal agenda are however not necessarily coherent within all user groups that are addressed in user contribution environments. The concept of "fun to play", as a self-rewarding activity can be found in user contributions as well⁹¹ and might have a higher impact upon the production of content with lower complexity as the time required for contribution is in general lower and the playfulness of an interface could become self-rewarding for the contribution of content.

Social standing on the other hand gains particular significance in user contributions both by acceptance from the community as well as through acceptance from the audience as soon as contributors become aware of the existence of a community/audience.

2.3.3.3 Management of contributions

In the application of user contributions, challenges emerge also from a pragmatic point of view. The following selection of different challenges has been compiled in order to develop constraints for the design of applications that incorporate user contributions. A domain that has been left aside in this compilation is the management of users and the sometimes productive but also fierce controversies that emerge between users in productive communities. A guide to different strategies of handling these productive conflicts can be found in [Fogel, 2005].

91. see chapter 2.2.3 *User contributions and engagement*

I Rights management

The problem of usage and distribution rights has been discussed to some depth in relation to the rights of users to distribute content and license content they produced themselves: concepts like the Creative Commons licensing scheme have gained significant popularity⁹² in this context. However, user contributions provide further challenges once contributions are placed in the context of corporate or institutional publications.

In this context, user contributions need to comply with the same demands that are made on conventionally produced content and thereby the liability of users in regard to their productions comes into play. current.tv provides an example for these kinds of demands⁹³:

Once a contribution is selected to be aired on conventional television, users need to sign forms that signify not only that the user agrees with the airing, but also that she has all necessary rights upon the content used in her contribution so that no rights of third parties are violated.

With the growing complexity of content formats, for example in video games, the identification of copyright violations becomes a relevant and at the same time complex issue, as such violations are not necessarily obvious. In the case of current.tv the selection process is highly formalized and implies the use of signed release forms, a procedure that is not feasible in the context of larger scale contribution environments.

An example for problems caused by the lack of personal liability in conjunction with the ability of users to publish content and to define the licensing scheme of content can be observed in the case of the Blender Model Repository (BMR). At the time of writing, Blender is a popular GPL⁹⁴ licensed 3D editor. Besides the open licensing of the program environment itself, the Blender community advocates the use of the Blender Artistic License⁹⁵ (BAL) for artwork that is created with the use of Blender. The BMR as a repository for 3D models in the Blender file format and under the license of the BAL became highly successful with more than 900 models

92. for an introduction and discussion of the Creative Commons licensing scheme see [Kim, 2007] or <http://creativecommons.org/>

93. see [Michel, 2006] for a description of the process

94. GNU GENERAL PUBLIC LICENSE, see <http://www.gnu.org/copyleft/gpl.html> for details, retrieved 17/10/2008

95. see http://download.blender.org/documentation/html/appendix_licenses_bal.html, retrieved 17/10/2008

and 2 million downloads. However, the owner of the site had to close down the BMR, due to legal requests which stated that several of the uploaded models were in fact copyrighted material, unwarranted declared as BAL licensed by the users who uploaded the content (see [Kator and Bart, 2008]).

II Conflicts

Due to different demands upon content quality that emerge between the involved stakeholders in user contribution environments, conflicts can arise. A popular case study for such conflicts can be found in the discussion around an HD-DVD processing key on the web-site digg.com.

digg.com is a website that asks users to recommend other websites and news that they regard as interesting for other users. On the 1st of May 2007, a number of users recommended a posting on the web-site doom9.net⁹⁶ by a user named *mus-lix64* in which a processing key was published that could be used to decrypt HD-DVD content. As digg.com feared due to this publication a cease and desist order by the AACS licensing authority, all links and postings that referred to this key were in consequence deleted. This deletion led in turn to an uproar in the user community of digg.com where large groups of users accused digg.com of censoring user contributions. In response to this, the founder of digg.com published a posting where he complied to the demands of the user base regardless of the eventual legal consequences for the corporation:

But now, after seeing hundreds of stories and reading thousands of comments, you've made it clear. You'd rather see Digg go down fighting than bow down to a bigger company. We hear you, and effective immediately we won't delete stories or comments containing the code and will deal with whatever the consequences might be.

[Rose, 2007]

In order to face the consequences of controversies in user contributions, corporations and institutions need to develop policies that enable a mediation process between the demands of the user base and their professional requirements. A specific challenge for the management of such conflicts arises also from the influence of ideological concepts that refer to grassroots democracy ideals which are popular in particular in the context of OSS⁹⁷.

96. see www.doom9.org/

97. see for example Stallmans concept of OSS as a social movement [Stallman, 1999]

III Filtering of contributions

With the proliferation and growing acceptance of user contributions, not only the willingness for contribution can grow but also the amount of contributions that applications face can increase. Along with this growth, the problem of content filtering gains significance:

Although only a relative minority of users contributes at all, given a significantly large user base the total amount of contributions can exceed the abilities of corporations or institutions to monitor contributions and their quality. Threshold reduction shows in this context a counter-effective impact, as a reduced threshold allows more productive users to contribute and leads therefore to a surge of contributions which might not match up with quality expectations of both users and corporations/institutions.

Filtering refers in this context to the selection of appropriate and accepted contributions and can be conducted by different means. In general, such means can be distinguished according to their position within the publication process.

Early filtering refers to selection processes that are applied before content is published. Under this perspective, the integration of high-threshold production environments can be considered as a filtering strategy as higher thresholds limit the amount of users that have the ability to produce content and in turn limits the amount of content produced. Early filtering strategies are also applied when contributions are monitored and pre-selected before they become published, an approach that is followed for example in publication work flows of content management systems, where editors can propose postings for publication but can not publish them directly.

Late filtering on the other hand refers to selection processes that take place after the publication of content. As contributed content in late filtering approaches is available to the whole user base, most applications apply concepts like collaborative filtering or active ranking and selection in order to provide filtering. All three of the previously described content production environments apply late filtering of user contributions in different ways:

- current.tv applies a binary rating system where users can vote content up or down.
- SimsCarnival makes use of two accumulative binary rating systems in parallel:
 - Users can attribute an “I like it” or “not for me” status to a contri-

bution. “I like it” statuses are accumulated and associated with the contribution but also with the author of the contribution.

- Contributions can be added to user favourites which results in the attribution of a “favs” attribution. “favs” are accumulated and associated with the contribution.
- SFZero integrates two rating systems
 - Multiple scale rating: Users can vote for a particular contribution and place a limited amount of points (between 1 and 3 points) for this contribution. Giving points to other users is subtractive, once the total of three points is used, no further points can be given. Points are accumulated and associated with the contribution and the user.
 - Binary rating system: Users can add contributions to their favorites. Favorites are accumulated and associated to the contribution but not to the contributor.

Besides these ratings, all three applications also apply a “flag” button in order to enable users to mark contributions that are regarded as not appropriate.

Both early and late approaches to content filtering have distinct advantages and disadvantages. While early filtering allows institutions and corporations to control all publications that are performed on the site, its level of control depends upon a rather stiff and inflexible organization scheme which also requires significant resources for monitoring. Furthermore, the acceptance of early filtering can be limited within the user base.

Late filtering on the other hand provides a higher flexibility and allows to integrate users in the process of filtering. This enables corporations and institutions to monitor the preferences of their user base through selection and rating mechanisms. However, late filtering is by no means a tool that enables institutions and corporations to completely control contributions and contribution quality. As practices within institutions and corporations are often directed towards early filtering mechanisms and the full control of published content, acceptance of late filtering mechanisms can be difficult to achieve from an organizational perspective.

An example for a hybrid approach that combines late and early filtering in different content formats is applied in SFZero, where “praxis” are filtered according to a late filtering approach whereas new “tasks” are monitored before publication, thereby treated with an early filtering approach.

2.3.4 User contributions in new media environments

The integration of user contributions demands for application of strategies that take into account the peculiarities of user contributions. A significant challenge for the development of such strategies emerges out of the analysis of both participation rates and content production environments. The categorization of users as highly active, active and passive users shows, that user contribution environments do not address a monolithic audience, but diverse user groups that have different demands upon the environment.

The same differentiation appears again in the analysis of content production environments where environments combine different applications for different user groups. Similarly, the incentives that institutions and corporations provide for these groups differ between each other.

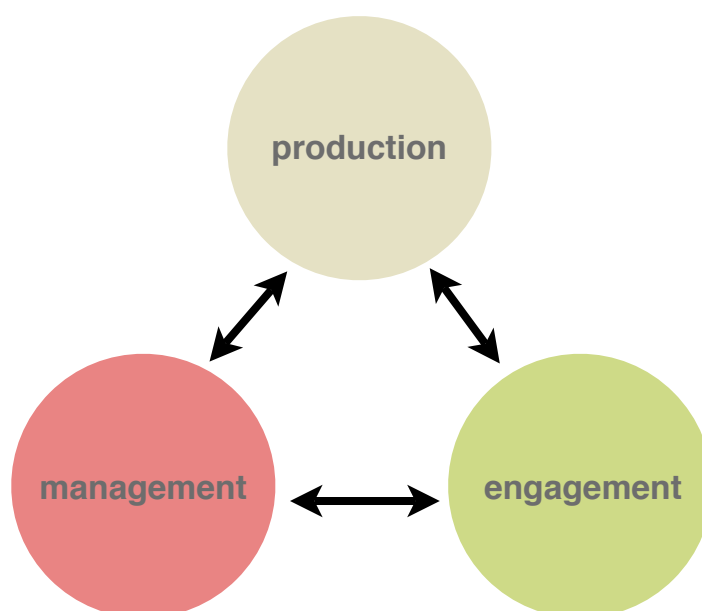


Figure 20: Entanglement of production, management and engagement in user-created content environments
source: author

While at the same time, different means of threshold reduction allow larger groups of users to contribute, it can be argued that the analysed applications follow a hybrid strategy of engaging users through the ability to create and publish content while at the same time providing an interface for highly productive users who follow their own interests and agendas both in relation to the integrated content production environments as well as in the incentives provided. Incentives and motivation play in this context a significant role, as different platforms begin to compete with each other for highly-productive users.

Overall three domains of user-created content can be identified which are highly entangled with each other: production, management and engagement (see figure

20). Means applied in the production of content influence the management of contributions by limiting the solution space while the management of contributions influences the engagement of users which shows in turn an impact upon the production of content.

3. Visitors and users in real and virtual museum environments

The following chapter is divided into two parts. The first part highlights the potential uses and actual applications of user contributions in museums and cultural heritage. In this context, two models will be discussed:

- I. in a more generic perspective the concept of the virtuous circle which tries to extend the interaction of museum visitors with the museum beyond the visit itself and
- II. different practical approaches and challenges of managing and curating user contributions for museums and cultural heritage.

In the second part of this chapter, the focus is narrowed down to the application of virtual worlds in museums and cultural heritage. Thereby potential advantages and actual uses of such virtual worlds will be discussed alongside different examples for museum activities in one of the currently most popular virtual worlds, Second Life. In relation to Second Life, examples for the integration of user contributions will be further discussed.

It would go beyond the scope of this thesis to provide a general insight into the scientific field of *museology*. Such discussion is provided elsewhere, see for example [Vergo, 1989];[Henning, 2006]: [Miles and Zavala, 1994] for an overview. However, some of the basic ideas of museums need to be referenced in order to provide a proper basis for the analysis of user contributions in museums and cultural heritage.

While privately owned collections of valuable objects and artifacts can be traced back to ancient Greece (for example in the *museion* at Alexandria [Vergo, 1989]), the modern museum emerged in the late 18th century as an institution that provides objects and collections to the public. As such, both the British Museum in London (founded in 1753) and the Louvre in Paris (opened as a museum in 1793) can be considered as the first modern museums which were guided by an explicit impetus of educating the public to become citizens of their respective national state [Henning, 2006]. In this context, museums played an important role in the construction of national identities, a phenomenon that is still valid today, where newly founded states try to establish national museums as one of their first public institutions in order to communicate the grand narrative of the state in a historical context.

In a traditional perspective of museology, museums followed four main principles (according to [Saumarez Smith, 1989]):

- Exhibits and collections should benefit the advancement of knowledge, therefore museums fulfill a role as educational institutions
- The arrangement of collections and exhibits is not arbitrary but should follow a "systematic and recognisable scheme of classification" (Ibid. page 8)
- Exhibits and collections are owned on behalf of the public and
- they are publically accessible, either for free or upon payment of a fee

This concept of museums as educational institutions and as places that provide collections of objects is still in effect but has been extended over the course of time. According to the Department for Culture, Media and Sport of the United Kingdom,

Museums enable people to explore collections for inspiration, learning and enjoyment. They are institutions that collect, safeguard and make accessible artefacts and specimens, which they hold in trust for society.

[Lammy, 2006]

In contrast to the classical perspective towards museums, this definition of the modern museum puts museums not only in the context of learning but also refers to them as places for inspiration and enjoyment. Therefore, museums become – to some extent – leisure time activities that compete with other forms of enjoyment for attention of the public or as Silverstone describes it, "one among many components in a complex array of cultural and leisure industries" ([Silverstone, 1994], page 161).

Based upon these characteristics and the definition of museums, three main functions of museums become apparent:

- I. The collection and preservation of objects,
- II. The arrangement and classification of these objects and finally
- III. The communication and mediation of educational and entertaining content to the public.

In the context of museums, objects are regarded as "interpretable, meaningful things made into evidence, documents, and facts" ([Henning, 2006], page 7). The act of embedding these objects in the museum turns them into both sources of knowledge as well as aesthetic and auratic objects. Nevertheless, the associated meanings that objects carry is not an intrinsic property of the object, but the result of external influences and attributions. As Saumarez Smith points out, objects change their meaning according to the context they are placed in and this process

of transformation of meaning does not end once an object arrives in the museum. Rather than that, museums constantly constitute new or alter existing meanings of objects [Saumarez Smith, 1989].

Museums do not only place objects in abstract categories and networks of relations to other persons or objects but also arrange objects in the physical environment of the exhibition space. In the past two hundred years of the existence of the museum, different guiding principles for these arrangements dominated. From classical categorization schemes such as chronological sequence and the definition of "styles" or spatial segmentations referring to schools and "cultures" up to aesthetic principles guided by the desire to provide environments for contemplation or the decomposition of the unique object in favour of hands-on experiences in science centers, many different approaches have been applied in the design of object constellations. Similarly, the intentions of these designs changed as Henning points out from the creation of national identities to Marxist concepts like self-realization as well as "the creation of the perfect consumer" ([Henning, 2006], page 3) in design exhibitions or "technological citizenship"(Ibid.) promoted through science centers.

A further perspective upon museums shall be given in regard to the changing conception of the "public" and its role in museums. While public presentation has been a constituting factor for the development of museums, its relevance for museum practices has changed over the years. As Henning points out, up to the turn of the 20th century museums were open to the public but intended and designed for an audience that possessed a so called *museum set* (Ibid. page 106) – the ability provided by education and accumulated cultural capital to make sense of museum exhibitions. Therefore, museums aimed their exhibitions at a relatively small group of either elitist connoisseur who put an emphasis upon the aesthetic experience of museums or upon experts in the subject matter as for example in the case of ethnographic museums ([Penny, 2001] referenced by [Henning, 2006], page 104-105). After the turn of the 20th century, this coherence of audience changed as more and more visitors with different social backgrounds began to make use of museums. As these visitors did not possess the necessary *museum set*, new exhibition strategies and attitudes towards the public had to be developed. ([Henning, 2006], page 105).

In the context of the new museology, the relationship of museums and their visitors gets in the focus of attention again and measures are taken, both through policies as well as museum practices to bridge the gap between audience and museum and to adjust the previously fuzzy image of museum audiences. The increasing relevance

of museum audiences can be also traced in the changing role of museums that shifts from legislators to interpreters of cultural objects [Ross, 2004]. It would go beyond the scope of this thesis to discuss this process in detail or to provide an overview about the theoretical foundation of this shift, which also refers to the changing role of intellectuals in general and the deconstruction of "universal superior rationalist thinking" (Ibid.). However it shall be pointed out that this process of change results in conflicting interests between museum professionals and policy makers in particular. While policy makers push accessibility and an enhanced focus upon audiences in order to support economic arguments, museum professionals tend to value the object and collection oriented classical perspective of museums (Ibid.). Thereby, the process of opening the museum towards the audience is put in the context of an altered perception of museum visitors from citizens to customers and lately consumers and often referred to as a process of popularization. In the context of this thesis it becomes therefore relevant to point out, that the process of opening cultural objects to interpretations and ultimately visitor contributions is set in a broader perspective of cultural hegemony and a clash of dominating paradigms.

Through their handling and communication of objects and knowledge, museums play an important role in cultural heritage. Cultural heritage thereby describes the contemporary use of the past ([Howard and Ashworth, 1999]). McLoughlin et al. point out, that the concept of cultural heritage has been extended by the UNESCO from a previously narrow focus upon works of art to a wider notion of living culture by incorporating for example cultural landscapes, natural sacred sites, underwater cultural heritage, handcrafts, oral traditions or languages⁹⁸ [McLoughlin et al., 2006]. A general categorization of these different forms of heritage is provided by classifying them as tangible (Moveable heritage and museums, sites buildings etc.⁹⁹) or intangible heritage (Oral traditions and expressions; Performing arts; Social practices, rituals and festive events; Knowledge and practices concerning nature and the universe; Traditional craftsmanship¹⁰⁰).

Interestingly, this concept of cultural heritage is rooted within social practices and refers not to intrinsic features of objects like the previously mentioned aura of ob-

98. for a complete overview about the domains included in the UNESCO definition refer to [McLoughlin et al., 2006], page 45

99. see also http://portal.unesco.org/culture/en/section/Moveable_Heritage_and_Museums, retrieved 17/10/2008

100. see also <http://www.unesco.org/culture/ich/index.php?pg=00002>, retrieved 17/10/2008

jects which describes an imminent and intrinsic feature of objects (see [Benjamin, 1968] for a discussion of aura). In contrast to the classical museum perspective, the meaning of objects in the context of cultural heritage is therefore not given, but constructed and may, as the objects themselves, change in the course of time. Similar to other texts¹⁰¹, objects not only refer to a single reading or interpretation alone, but are subject to different readings and interpretations (see [Lammy, 2006]) a role that gains increasing relevance in both cultural heritage as well as museum communication.

3.1 Media in museums and cultural heritage

Besides the role of the museum as a medium in itself (see [Henning, 2006], pages 70-99, [Silverstone, 1994]), media technologies have been used in various forms in the context of museums and cultural heritage. From the diorama and the use of lighting technologies in exhibition design at the beginning of the 20th century (Ibid.) up to simulations and hands-on experiences in science museums or multimedia terminals and web-sites nowadays, museums actively incorporate technology in the communication and design of collections and exhibitions. Besides its role in the communication to the public, technology is also used in the preservation of objects, for example by digitizing and storing tangible and intangible cultural heritage.

Storage and retrieval of object related data have been one of the first uses of computers in the context of museums (see the foundation of the Museum Computer Network in 1967¹⁰² [Misunas and Urban, 2007]). As such, the application of media and computer technology in museums and cultural heritage can refer to a broad body of literature, both from a theoretical as well as a practical perspective. A fact that is also underlined by the existence of scientific conferences on a national and international level which discuss the application of computers and media technology in museums¹⁰³ or the interest of international funding bodies like the European Union in the promotion of museum communication through computer and media technology as well as the engagement of transnational professional organizations like ICOM (International Council of Museums). Due to this wide research interest

101.the term *text* is used in this context to describe hermeneutic entities, therefore entities which can be interpreted

102.It is worth mentioning, that at about the same time, computers and computer generated art or artworks that referenced computer technology became a part of the museum themselves through groundbreaking exhibitions such as *Cybernetic Serendipity – The Computer and the Arts* (1968).

see <http://www.medienkunstnetz.de/exhibitions/serendipity/> , retrieved 17/10/2008

103.see for example Museums and the Web, ICHIM, VAST: International Symposium on Virtual Reality, Archaeology and Intelligent Cultural Heritage

and the available literature, an introduction into the broader subject matter in particular in regard to the preservation and storage of cultural heritage can be found elsewhere¹⁰⁴.

Instead, the following sections will discuss elements that enable and enhance the application of user contributions in the museum environment. Parallels as well as differences to and challenges for the application of user contributions will be discussed.

Three different steps will be reviewed in particular:

- I. The connection between real world sites and online environments as a basis for user engagement and the creation of a sustainable relationship between visitors and users. In this perspective, the integration of information and media technology in the *virtuous circle* as an approach to connect visitor actions in the museum with pre- and post-visit activities outside of the museum will be reviewed.
- II. Already existing uses and applications of visitor and user contributions in the museum both in a traditional context as well as its current use.
- III. The application of virtual worlds in museums and cultural heritage as environments that provide tools for content creation and encourage active user contributions.

3.2 From visitor to user: the virtuous circle

The concept of the virtuous circle has been developed at the National History Museum (NHM) in London (see [Barry, 2006]). At its very core, the concept aims in connecting the physical visit of the museum with a post-visit activity on a website. By interacting with the website, museum visitors become users of the online environment and get encouraged to re-visit the museum site again. Through this process, a virtuous circle of engagement in real and virtual environments is encouraged (see figure 21).

As a point of departure for this engagement and the creation of the virtuous circle, Barry sees a tight technical integration of digital media in the museum environment and the website through

- a. the personalization of data through the visitor during the visit – the

104.see for example the discussion of Interoperability in the MICHAEL (Multilingual Inventory of Cultural Heritage in Europe) project [Anna et al., 2008], the documentation of the European Digital Library Project [Fuegi, 2008] and as an introduction into the field [Cousins, 2007].

- mapping of visitor interactions to a user profile ,
- b. the exchange of data between the terminals and the museum web-services,
- c. personalized access upon this data on the website by the user – the transition of the exhibition to the home environment and
- d. the provision of relevant online material that encourages re-visits and further engagement.

So far, the concept of the virtuous circle has been applied in several terminals but also two full exhibitions in the NHM, Dino Jaws¹⁰⁵ (see also [Benfield and Griffiths, 2007]) and Ice Station Antarctica¹⁰⁶.

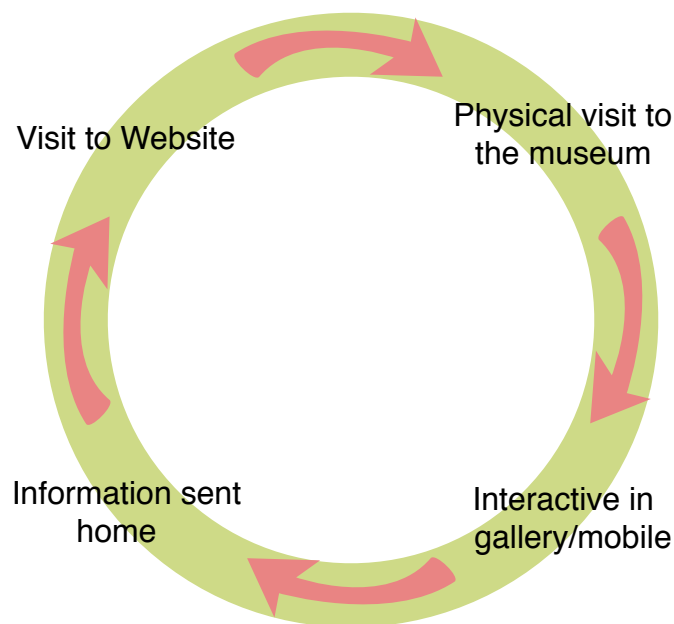


Figure 21: The virtuous circle according to Barry
source: figure by author according to [Barry, 2006]

The concept used by the NHM to connect the on-site visit with online activities is similar across all applications. However, Ice Station Antarctica as the latest example for this approach applies the most advanced means and will be further reviewed.

The Ice Station Antarctica exhibition opened in April 2007 and was shown for one year until April 2008 at the NHM. Before entering the exhibition, visitors obtained a ticket¹⁰⁷ with an imprinted barcode which was registered within the system. In the

105.see www.nhm.ac.uk/dino-jaws for the online part of the exhibition. retrieved 18/10/2008

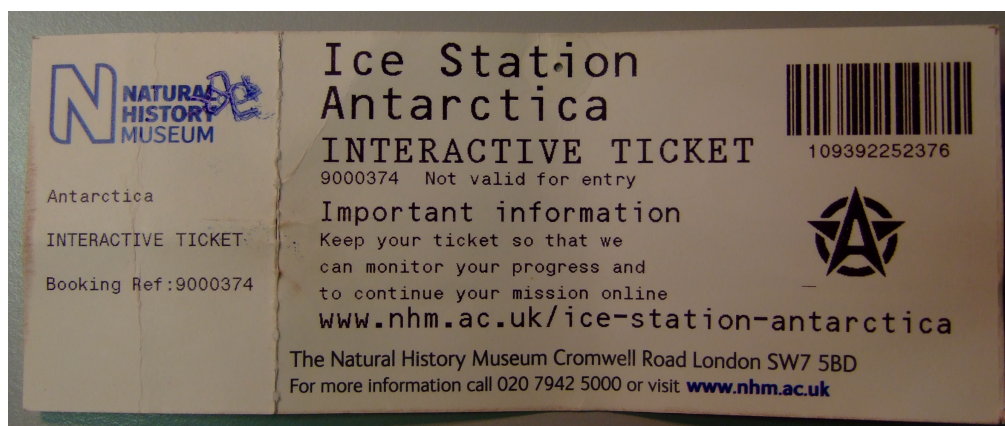
106.see www.nhm.ac.uk/ice-station-antarctica for the online component of the exhibition. retrieved 18/10/2008

107. Because of funding provided by the National Lottery, access to major museums in the UK is

exhibition, visitors followed a pre-defined path that lead them to four different terminals and interactive installations (Dress Sami, The Diving Game, Drive a Snowmobile, Basecamp Emergency) which the visitors interacted with after reading in the barcoded ticket to a barcode reader at the exhibit. At the end of the exhibition, users finally signed-out their tickets on a terminal.

Back home or on any Internet terminal, visitors were able to register to the online service by entering the registration number printed on the ticket. Registration to the environment is limited to visitors that visited the exhibition before and obtained a ticket with a registration code. Once registered and logged-in, users can play flash games and thereby gradually improve in an embedded ranking system.

In the beginning of their interaction career, users that complete the exhibition hold the rank of Ice Graduate but can become Ice Officer after solving a series of games. Graduation certificates can be printed from within the website.



Picture 2: Ticket for the Ice Station Antarctica exhibition at the NHM, London. Barcode and Registration number are in the upper right corner.
source: image taken by author

The implementation and concept of Ice station Antarctica provides an example for the integration of the virtuous circle and illustrates at the same time the challenges that emerge for such an implementation. The following overview reviews in detail the design of the interaction in the different phases of the virtuous circle:

I Mapping visitor interactions to user profiles

The Ice Station Antarctica exhibition applies tickets with printed barcodes in order to map user interaction in the exhibition with user profiles for the online environment. This approach requires the setup of an appropriate infrastructure in the exhi-

provided free of charge (see <http://www.lotteryfunding.org.uk/>). Even though the NHM takes part in this funding scheme, an entrance fee has been charged for Ice Station Antarctica due to its status as a special exhibition.

bition space as barcode readers need to be placed next to every terminal and interactive installation. The use of barcodes is in this context beneficial, as barcodes can be printed on the entrance ticket, thereby enabling a relatively cheap but also consistent association of user interactions with user profiles.

Nevertheless the use of barcodes provides several problems. First of all, tickets need to be handled by the visitor in a proper way. The barcode has to be in the line of sight, unconcealed and relatively close to the reader. Second, as the reader applies optical scanning and is placed within reach of the visitors, the reader needs to be cleaned as it gets stained.

As an alternative to the use of barcodes, RFID could be used as well, as it provides similarly to barcodes a contact free identification but is not affected by concealment as the technology does not demand for a line of sight. However, the price of individual RFID-tags is still significantly higher than the printout of a barcode.

II Exchange of data between the exhibition space and the web

In a personal conversation with Jonathan Griffiths one of the developers of Ice Station Antarctica the author was told that the original concept of Ice Station Antarctica intended an even tighter integration between the exhibition space in the museum and the website. In the original concept, the performance of the visitor at each installation should lead to consequences in the online environment. e.g. scores at the on-site game The Diving Game would affect the online profiles of each visitor. However, due to the complexity of the project and the challenges for data exchange, this approach was omitted in the final implementation.

III Transition to the home environment

Visitors connect their user profiles created through the interaction with the environment by registering on the website with the number code printed on the tickets. Besides this code, no further security measures to prevent fraud, such as user specific passwords have been taken. As user profiles created in the exhibition are not personalized, the potential danger of abuse is rather limited.

A further benefit of the code based profile association results from the late registration of users: by associating the code with a user profile outside of the exhibition, the demand for user terminals in the exhibition space as well as the workload for the visitors is decreased. This newly developed process replaced earlier approaches where visitors were asked to type in their e-mail address in a terminal at the exhibition (see [Barry, 2006]).

As a drawback, late registration does not allow for the integration of e-mail re-

minders for visitors after their visit, hence leading to lower registration numbers as visitors can forget about their registration.

IV Content production and encouragement for revisits

As has been pointed out before, users can find different games on the website whose completion influences their *rank*. These games are provided in a sequence, therefore the availability of games depends upon the completion of other games but also upon the release of new games on the website. While this release cycle can lead to a more sustainable engagement by encouraging users to return to the site upon the release of a new game, a problem emerges once the initial games are not completed. In this case, users might choose not to interact with the site again due to disappointment.



Picture 3: Certificate of Graduation from the Ice Station Antarctica. Incentive provided on the website.
source: www.nhm.ac.uk/ice-station-antarctica retrieved 17.07.2008

The integration of ranks in the environment provides an approach towards sustained engagement of users. See picture 3 for an example of the certificates that users can download from the website. Due to the reference towards ranking schemes in professional life and computer game levels – a concept that is well in-

troduced in modern society – the benefit of sustained engagement is clearly communicated. Nevertheless, the acceptance of this progression scheme also depends upon the acceptance or non-acceptance of the initial set of available games.

Previous implementations of the virtuous circle show a lower than expected connection rate of users (see [Barry, 2006]) with only about 16% of the users who made use of the associated website. However, Barry points out, that this rate is still higher than in the established e-mail newsletter system of the NHM (Ibid.).

Despite the amount of content that is provided in the online environment, relatively few incentives are given that would encourage users to re-visit the museum site. Therefore it is doubtful, to what extent, a virtuous circle of re-visits is in practice encouraged.

Furthermore, the combination of rewards associated to the completion of computer games creates a challenge for the production of new content. As soon as the concept becomes successful and users engage increasingly with the online environment, the demand for new games grows. However, with the demand for new games additional production costs come into play and increase the required investment. Consequences and alternatives to this aspect will be further reviewed in chapter 4. *A framework for building, maintaining and influencing user contributions.*

V Organization of content production

The implementation of the virtuous circle provides also challenges in regard to the organization of production. As Barry points out in [Barry, 2006], content production in the museum environment usually combines different stakeholders from various disciplines. While on the one hand domain experts in the content area (in the case of Ice Station Antarctica, experts for antarctic flora/fauna and antarctic expeditions) are in charge of developing the content, these persons also need to cooperate with experts in the domain of new media content creation in order to perform the task. The ability to collaborate is limited to some extent by the literacy of the content experts in the technical domain and their knowledge of established use practices as well as potential uses. Technology experts on the other hand are often not aware of the content and its specific demands.

In consequence, the content production process involves a high degree of friction in the communication between content and technology experts as changes by the content experts often need to be *translated* into an appropriate content format.

An alternative to this approach is the development of intermediate-authoring tools, which allow content experts to conduct changes on their own without the need to

either rely upon others to commit the changes or to cross the threshold of complex authoring tools. A discussion of such interfaces in the development of a PDA guide for a literature museum can be found in [Wieneke et al., 2005]. Nevertheless, the integration of user contributions in the museum environment puts further challenges that will be reviewed in the following section.

3.3 Visitor and user contributions in the museum environment

In the following section, different examples for productive user contributions in museums and cultural heritage will be discussed. Due to the scope of this thesis, approaches that focus upon the creation of content and active engagement through content creation will be emphasized. Other notions of user contributions towards museums, in particular in relation to concepts like participatory design are left aside¹⁰⁸.

The integration of user contributions in museums can be categorized along the two perspectives of museum activities discussed before: either from the point of view of audience communication or in order to extend the collections of the museum through the creation of new content. This separation of purposes shows an analogy to the previously elaborated intents of user contributions where contributions are enabled either in order to stimulate an encouraging process or to create a certain result¹⁰⁹.

In analogy to the virtuous circle, the terms visitor and user are applied to distinguish the place of interaction: if a person interacts with digital media in the museum environment, she is regarded a visitor; if she interacts online, outside of the real world museum, she is regarded a user.

Similar to the wider field of user contributions, user & visitor contributions in the museum can show an ambiguity in their purpose which makes it difficult to classify them as strict collection or audience communication related.

I Museilaboratoriet

Year	Environment	Media	Purpose
2005 ¹¹⁰	Internet	Wiki: audio, video , text, image upload	collection

The project *Museilaboratoriet* emerged from a cooperation of three museums in the

108. An introduction into participatory design in the context of museums can be found in [Taxen, 2005].

109. see chapter 2.2.4 *Aims of user-created content and implications for use*

110. see <http://www.museilaboratoriet.fi/> and <http://www.tii.se/projects/museumslab> for a description of the project in english, retrieved 28/10/2008

swedish speaking part of Finland and consists of a website that applies a wiki-oriented technology for user contributions. The online exhibition encourages students and local residents but also other users of the website to upload different sorts of media (audio, video, text, still images) that are related to the history of the local communities. Based upon these uploads, selections of uploads are compiled as exhibitions and presented to the website users.

II Portable Antiquities Scheme

Year	Environment	Media	Purpose
2007 ¹¹¹	Internet	-	collection

The Portable Antiquities Scheme had been developed in response to the 1996 UK Treasure Act, whereby Treasures (objects made of gold or silver or groups of coins) have to be reported to a public authority. Besides these mandatory reports, the Portable Antiquities Scheme encourages finders to voluntarily report the finding of any metal and pottery object that is supposed to be older than 300 years. In order to evaluate objects and to record their properties as well as the locality of the findings a network of Finding Liaison Officers (FLO) has been established in England and Wales who act as an interface to the local public. Content that is published on the website is generated through a multi stage approach:

The finder approaches an FLO and discusses his findings with him. In case the findings are relevant enough, the FLO then records details of the discovery and provides an image of the object to the database.

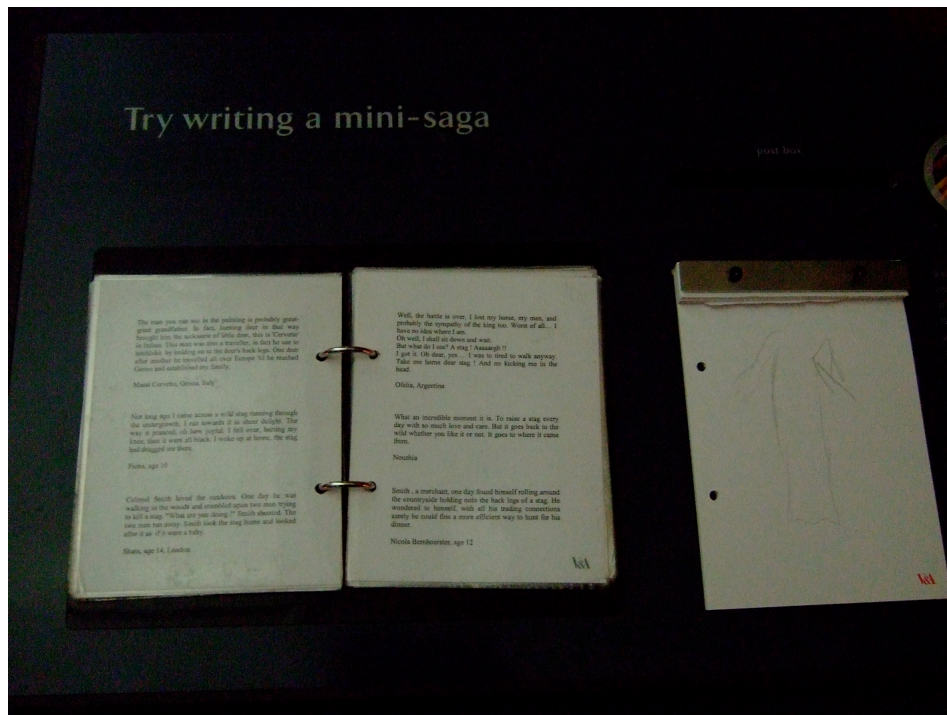
III Mini Saga

Year	Environment	Media	Purpose
1999 ¹¹²	exhibition	pen & paper	audience, collection

As part of the British Galleries 1500-1900 gallery, visitors are encouraged to write a mini-saga, consisting of about 50 words on a piece of paper. The visitor-contributed saga are collected and transcribed as well as printed and become part of the exhibition space themselves. See picture 4, page 112 for the setup of *Mini Saga* in the V&A.

111.see <http://www.finds.org.uk/>, retrieved 29/10/2008

112.see also prototyping research report 17 of the Victoria&Albert Museum http://www.vam.ac.uk/files/file_upload/5866_file.pdf, retrieved 24/10/2008



Picture 4: The Mini Saga project in the British Galleries 1500-1900 of the V&A, London. Image taken by the author

IV V&A tile designer

Year	Environment	Media	Purpose
2005 ¹¹³	Internet	Adobe Flash	audience, collection

During the International Arts and Craft Exhibition at the V&A (March - July 2005) users of the associated website were encouraged to create their own tile designs inspired by the work of William De Morgan¹¹⁴. For this purpose, a MACRO-MEDIA/ADOBE Flash based application was developed that provides a simple interface to the creation of tile designs by offering a set of design elements that can be arranged (position, scale, rotation, colour) on the tile. Overall more than 8000 tiles were created up to the time of writing.

V Tate Tales

Year	Environment	Media	Purpose
2008 ¹¹⁵	Internet	text entry	audience, collection

Tate Tales forms a part of the public engagement program Tate Kids at the Tate Galleries and is aimed primarily at children. In the Tate Tales application, users are encouraged to create stories inspired by pre-selected pictures of paintings and

113.see http://www.vam.ac.uk/vastatic/microsites/1312_artsandcrafts/design_a_tile/tool/, retrieved 28/10/2008

114.see http://www.vam.ac.uk/vastatic/microsites/1312_artsandcrafts/design_a_tile/, retrieved 28/10/2008

115.see <http://blog.tate.org.uk/tate-tales/>, retrieved 29/10/2008

objects. Pictures and objects are furthermore commented and suggestions for potential stories are given.

VI Franklin Remixed

Year	Environment	Media	Purpose
2005 ¹¹⁶	Classroom, Internet	various media	audience

As part of a collaboration between four Philadelphia based museums, the Franklin Remixed project encouraged middle school pupils to create their own remixes of museum objects in order to comment or discuss the life of Benjamin Franklin.

[Twiss-Garrity and Fisher, 2007] describe the use of several media and applications in order to achieve this goal:

- a. the use of a blogging engine (Wordpress) for text entry and media combination,
- b. the publication of podcasts (through slapcast.com) and
- c. the exchange and sharing of images (through Flickr.com).

VII Living Museum

Year	Environment	Media	Purpose
2007 ¹¹⁷	Classroom, Internet	Image creation&upload, text creation	audience, collection

The Living Museum project has been developed by the Museum of Jewish Heritage, New York, USA and targets pupils of Jewish schools that create together with their teacher a collection of objects that relate to their personal Jewish heritage. Pupils select a private object that reflects their Jewish heritage and create a photograph of this object as well as a label text that describes the object and its relevance. Several objects are combined into a gallery whose cohesion and narration is developed by groups of pupils.

The teacher finally submits the exhibition to the Museum of Jewish Heritage which publishes it on the Living Museum website once the content meets the required quality concerns. According to [Farber and Radensky, 2008] these criteria are:

- The majority of the artifacts must relate to the topic of the exhibition, in this case, Jewish heritage.
- Artifact labels should be free of grammar and spelling errors.
- Artifact labels must contain no egregious factual errors.

116.see <http://www.franklinremixed.com/>, retrieved 28/10/2008

117.see <http://www.living-museum.org/>, retrieved 29/10/2008

- The viewer should be able to decipher the object in a photograph.
- Student privacy must be protected. Therefore, no photographs of students may be posted and no last names of students may be used.
- Organizational consistency between exhibitions needs to be achieved. Therefore, the majority of artifacts in an exhibition must be complete and the artifacts must be divided into galleries, each containing more than one artifact.

(content requirements for the Living Museum according to [Farber and Radensky, 2008])

VIII steve.museum

Year	Environment	Media	Purpose
2006-08 ¹¹⁸	Internet	text entry	collection

The steve.museum project aims in researching the creation of folksonomies through social tagging. To this end, users associate tags to different images of digitized artworks on a website. These tags are aggregated and compared with a previously generated vocabulary of descriptive terms that had been developed based upon existing classification schemes.

According to [Trant et al., 2007] the creation of such folksonomies can help to increase access to online collections by using a description that is more common than museum specific schemes. The project itself evaluates interfaces for tag inputs, the structure of the associated tags and the relation to other

IX Review

The above overview of examples for user contributions in the context of museums and cultural heritage is not exhaustive but illustrates nevertheless the spectrum of usages which user contributions serve in the museum environment today. Applications like the Mini Saga in the V&A also emphasize that user contributions follow a tradition in the museum environment that is not necessarily limited to digital media. Several motives and concepts that had been developed in the previous chapters can be identified also in these examples.

First, the application of user contributions in museums can focus on both outcome and process oriented approaches¹¹⁹. Users extend existing collections of objects, as in the Portable Antiquities Scheme or the Museilaboratoriet project, and thereby

118.see <http://www.steve.museum/>, retrieved 04/11/2008

119.see chapter 2.2 *Classification and Ends of user contributions*

perform content creation that emphasizes upon the outcome of the process. In contrast, applications like *Franklin Remixed* or the Living Museum aim in creating engaging production processes and therefore refer to the quality of user contributions as engaging activities, here in particular in an educational context.

Second, the content production environments that are applied in the examples tend to integrate a low technical threshold for production. In Tate Tales, Museilaboratoire, Mini Saga, Franklin Remixed, Living Museum and *steve.museum* text entry and to some extent image uploads dominate.

The *V&A* tile designer in contrast does not integrate text entry or image upload but provides a custom made interface for the creation of tile designs with a low technical threshold. The usage of text entry based content production environments shows in this regard both positive and negative aspects. While the creation of such user contribution environments is due to the proliferation of blog-engines like Wordpress relatively simple, content creation processes can become challenging for the users when text based content dominates. As [Farber and Radensky, 2008] point out, the complexity of content production emerges thereby not due to the technical threshold for content creation but rather due to conceptual and in particular content assessment thresholds¹²⁰ related to the quality demands of the museum. The case study of the Living Museum by Farber and Radensky (Ibid.) illustrates such quality concerns for user contributions and discusses policies that have been developed in order to choose contributions for publication¹²¹.

Third, closely related to policies and requirements for content publication, the examples also highlight different concepts for the integration of contributions and the publication workflows applied. Whereas contributions in the *V&A* tile designer are published immediately after creation through the user, the Living Museum and the Portable Antiquities Scheme provide complex review processes that do not lead to a direct publication of the content. Both the Living Museum and the Portable Antiquities Scheme are also examples that refer in their integration of user contributions closely to quality concerns that are more common to the museum environment than to other user contribution environments. Due to this dissection of creation and publication and the integration of specially trained intermediates a potential impact upon the motivation for contribution can be assumed: as users provide contributions but receive no encouraging feedback, contribution rates

120.see chapter 2.3.2.1 *Threshold and content production*

121.see also the list of criteria for publication in the *Living Museum* description

might be lower than they potentially could be. However, further evaluation needs to be conducted in order to support this claim.

Fourth, the integration of user contributions requires not only the interest of users to participate but also struggles with the acceptance of museum stakeholders. As Trant et al. point out, their approach to tagging and folksonomies in the *steve.museum* project is received in the museum community not without serious concerns as "the anarchy of emergent folksonomies" [Trant et al., 2007] is feared to jeopardize expensively developed standards for collection description.

Content published under the name of a particular institution can also threaten the reputation of this institution once process oriented user contributions become confused with institutional publications as Jenkins points out in the context of Universities [Jenkins, 2008]. In order to cope with this problem, some museums apply policies of content control with mixed results as discussed above in the context of the *Living Museum*. Resistance towards user contributions also emerges from the traditional perspective towards museums and the tension created by recent reforms as it has been discussed in chapter 3.1 *Media in museums and cultural heritage*. To some extent, user contributions can increase these tensions as they can question the traditional self-understandings of the role of the museum. In order to apply user contributions in the context of museums and cultural heritage it becomes therefore necessary to mediate between the different viewpoints.

In this context it is worth noticing that user contributions and user created content related to museum objects already take place outside of the museum environment and thereby outside of the control and influence of museums and cultural heritage institutions. As Chan points out [Chan, 2008], museum content is discussed, appropriated and published on the Internet in environments like Flickr without museums taking notice or being informed about this process. Similar developments can be found for example in the unofficial audioguides to the Museum of Modern Art in New York which were produced by enthusiasts¹²². All in all, it can be concluded, that users will appropriate and use museum objects for their own agendas, whether museum are willing to let them or not. However, museums could significantly benefit from an integration of such contributions once appropriate means of interfacing with productive users are defined and means for productive engagement of museum audiences are developed¹²³.

122. see the *Art Mobs* project under http://mod.blogs.com/art_mobs/, retrieved 04/11/2008

123. These challenges will be further reviewed in *chapter 4. A framework for building, maintaining and*

3.4 Virtual worlds in Museums and Cultural Heritage

Virtual worlds provide a challenging and highly potential environment for museums and cultural heritage that encourages and fosters user contributions. The following chapter discusses the concept of *virtual worlds* as well as different applications of *virtual worlds* in museums and cultural heritage with a focus upon Second Life.

3.4.1 An introduction into virtual worlds

According to Bartle, the definition of virtual worlds can be related to the concept of a *world* as "an environment that its inhabitants regard as being self-contained" [Bartle, 2003] which takes place in the *virtual* domain. *Virtual* is in this context juxtaposed to the terms *real* – which describes "what is" and *imaginary* – which refers to "what is not". Therefore *virtual* describes according to Bartle "that which isn't, having the form or effect of that which is" (Ibid.).

This interpretation of the term *virtual* is also supported by Deleuze concept of *virtual*, however put in a different wording: "what we call virtual is not something that lacks reality but something that is engaged in a process of actualization following the plane that gives it its particular reality" ([Deleuze, 2001], page 31 cited in [Fuller, 2003], page 109)

More specifically, *virtual worlds* can be regarded as computer mediated environments, where users interact with each other. In order to distinguish such environments from other software environments, Bartle refers to a group of criteria that virtual worlds share (Ibid):

- The world in a virtual world is bound to automated rules "that enable players to effect changes to [the world]" (Ibid.)
- Users of a virtual world are represented as a single character in the virtual world. "All interaction with the world and other players is channeled through [these] characters" (Ibid.).
- Interaction with the world takes place in real time
- The world is shared between all other users of the world
- The world is persistent.

Given Bartle's background as one of the developers of *MUD* (Trubshaw/Bartle, 1978) (*multi-user dungeon*, a text based virtual world) [Koster, 2002] it comes as no surprise, that the graphical representation used in virtual worlds is not part of this

influencing user contributions.

list of criteria. In a historical perspective however, virtual worlds have been associated with the development of concepts like cyberspace or virtual reality. Concepts that refer to a high degree upon aspects like immersion through technological means, may it be by head-mounted displays or other forms of interfacing but in general related to three-dimensional graphical representations.

Although the subject matter can not be treated in sufficient depth within this thesis it should be noted, that the relationship between virtual worlds and concepts like cyberspace is highly entangled with references to and influences of popular culture, both in a historical dimension as well as in a contemporary perspective. This can be traced on the one hand to the emergence of the concept cyberspace as a direct reference to the short story *Burning Chrome* (Gibson, 1982) by William Gibson and on the other hand to the influence of further publications from the wider domain of science-fiction literature, like for example *Snow Crash* (Stephenson, 1992) by Neal Stephenson. The later and in particular its concept of the Metaverse being an inspiration and role model¹²⁴ for the development of *Second Life*, a virtual world that will be further reviewed in detail in this chapter.

Coming back to Bartle's definition of criteria for virtual worlds, it can be argued, that his distinction allows to exclude several related concepts from virtual worlds. As Bartle points out, online chat rooms for example fulfill a subset of the criteria (user as individual character representation, real-time interaction, shared world, to some extent – persistence) but miss the criterion of enabling users to change the world by showing a lack of "physics" and are therefore not virtual worlds ([Bartle, 2003]).

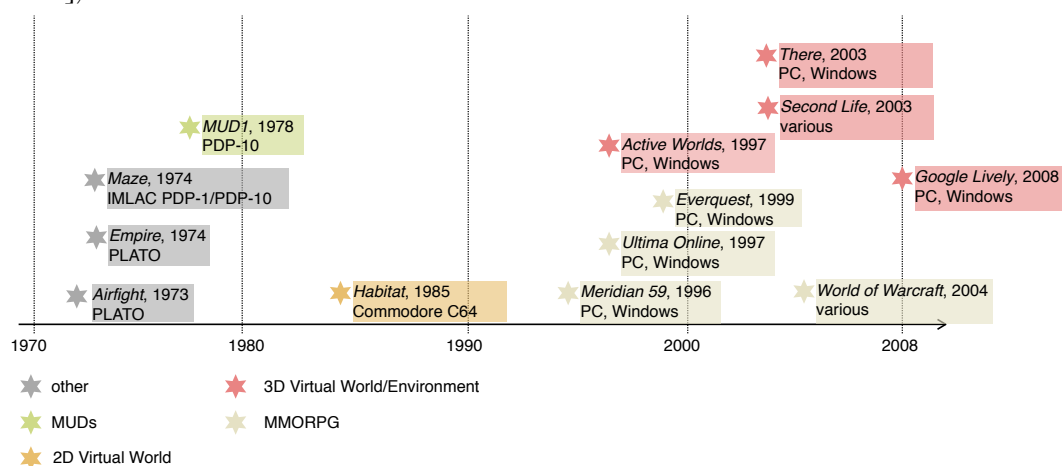


Figure 22: Timeline of virtual worlds based upon the work of Koster and extend with further information. Diagram by author, see text for other sources.

124. see [Ondrejka, 2004] for a discussion of this influence.

Virtual worlds are not a recent development but can refer to a rather – in computing terms – long historical development. Figure 22 highlights some of the main developments and milestones in recent years¹²⁵.

This timeline is not complete, but shows a variety of concepts and developments. Starting in the mid 70s of the last century, applications developed for mainframe environments like PLATO (Programmed Logic for Automated Teaching Operations)¹²⁶ anticipated software environments that were later transferred to micro computers. With PLATO's ability to display 512x512 monochrome pixels and through its nature as a mainframe based environment, multi-user applications and games that formed predecessors of virtual worlds were developed. Empire for example, allowed up to 32 players to play in parallel against each other in a persistent world. The game shows traces of the virtual worlds concept according to Bartle's criteria as it offers real-time interaction, physics and a shared, persistent world. On the other hand, users are not referred to as individual characters.

Maze and Airfight are examples for environments that allowed simultaneous multi-player activity and applied thereby 3D line graphics in the case of Maze: which can be therefore regarded as an early predecessor of later first-person shooter.

Another historical reference is found in the development of MUD1, the first MUD (multi-user dungeon) a virtual world that is displayed solely through text and where users interact with each other also only through text entry. MUDs gained some popularity in the early 80s of the last century and can be still played today. They also raised interest for scientific evaluation in particular from the social sciences as publications by [Sherry, 1997; Curtis, 1992] underline. While no further evidence for the direct impact of early virtual world related concepts from the 70s were found by the author, MUDs showed a significant influence upon the development of virtual worlds [Koster, 2002; Bartle, 2003].

An extension to the text-only approach of MUD is found in 2D environments which emerged in the middle of the 1980s. Habitat (Lucasarts, 1985) (see picture 5)

125. The information depicted in figure 22 is to a large extent based upon the more exhaustive Online World Timeline by Koster [Koster, 2002]. Information for environments created past 2002 are taken from the home pages of the environments:

There: <http://www.there.com>, retrieved 06/11/2008

Second Life: <http://www.secondlife.com>, retrieved 06/11/2008

Google Lively: <http://lively.com>, retrieved 6/11/2008

World of Warcraft: <http://www.worldofwarcraft.com>, retrieved 6/11/2008

126. for an introduction into PLATO see [Wooley, 1994]

and its successors Club Caribe (QuantumLink, 1988) and WorldsAway/Habitat II (Fujitsu, 1994) are notable examples for this approach. In the case of Habitat, an environment that used the at the time popular Commodore C64 platform as a client, anecdotal evidence for user behaviour in particular in relationship to the active incorporation of users is described. Parallels to these observations by Morningstar and Farmer [Morningstar and Farmer, 1991] will be drawn later in this thesis in regard to user contributions and user engagement.



Picture 5: Screenshot of Habitat (Lucasarts, 1985)
source: [Morningstar and Farmer, 1991]

Even at the time of writing, the concept of 2D virtual worlds is still popular in specific segments. Whyville (Numedeon, 1999) for example provides a 2D virtual world aimed at children in the age group between 8-15 and focuses upon learning experiences¹²⁷.

In the mid 90s of the last century, the focus of virtual worlds in relation to 3D environments started to change with game-related concepts gaining more and more momentum. In order to distinguish such virtual worlds from other approaches that are not necessarily related to gaming, the term massive multi-user online role-playing games (MMORPG) has become common. Applications that relate to this category are for example Meridian 59 (3DO, 1996), Ultima Online (Origin, 1997), Everquest (Sony Online Entertainment, 1999) or World of Warcraft (Blizzard Entertainment, 2004).

In contrast to these environments, virtual worlds like Second Life or Active Worlds

¹²⁷.see for example the information about Whyville Educational Outreach activities at http://b.whyville.net/top/pdf/whyville_educational_outreach.pdf, retrieved 06/11/2008

are not regarded as games per se. However, this distinction is controversially discussed depending upon the definition of *game* as Boellstorff underlines by stating that "there is no way to claim virtual worlds are games without trapping oneself in a definition of "game" so vague as to include most of our actual lives" ([Boellstorff, 2008], page 22). As a practical criterion to distinguish game related virtual worlds from non game virtual worlds, Boellstorff emphasis in relation to Curtis evaluation of MUDs [Curtis, 1992] the lack of general goals as such a criterion. In conclusion virtual worlds might not be games in themselves, although they share a similar graphical appeal with MMORPG and computer games, but they can be environments where games take place. Hence virtual worlds like Second Life or Active Worlds can become platforms for game concepts.

Virtual environments like There (Makena Technologies, 2003) or Lively (Google Inc., 2008) share several similarities with virtual worlds like Second Life. Nevertheless, they lack the criterion of virtual worlds according to Bartle's definition. Both environments do not allow users to alter the environment itself and provide therefore rather extended versions of chat rooms with three-dimensional representations instead of virtual worlds.

3.4.2 Museums and cultural heritage in Second Life

In the following section, the use of the virtual world Second Life through museums and cultural heritage institutions will be evaluated. As it has been discussed above, Second Life is only one of several virtual worlds and environments that currently compete with each other¹²⁸. Nevertheless, Second Life gained significant attention not only in the media but also in the museum community which led to a wide selection of different approaches that provide an insight into the strategies of user contribution integration and the communication of museum and cultural heritage related content in virtual worlds.

As such, the following section starts off with an overview of the features that distinguish Second Life from other environments. Following this overview, recent development of Second Life will be analyzed and critically reviewed with a focus upon

128. Different providers offer an overview about current virtual worlds with various figures. A list of – at the time of writing – 18 virtual worlds has been published by Techcrunch (<http://www.techcrunch.com/>) at:

http://www.techcrunch.com/wp-content/casual_immersive_worlds.html, retrieved 07/11/2008

The virtualworldsig (<http://virtualworldsig.com/>) provides a list that includes all in all 47 different virtual worlds:

<http://spreadsheets.google.com/pub?key=ppnM8o4SM2ttEabKCnRxcag>, retrieved 07/11/2008

user rate development and an estimation of the potential of virtual worlds in general. Furthermore different models for museum and cultural heritage activities in Second Life will be discussed accompanied by examples of these approaches in the context of user contributions.

3.4.2.1 Features of Second Life

As discussed above, Second Life is a virtual world which applies a 3D environment. Although Second Life uses the Internet as a means of communication between the user clients and the central server infrastructure of Linden Labs – the providers of Second Life – via TCP and UDP it operates not in a web browser but requires a separate client program that is available for Microsoft Windows, Apple OS X and various LINUX derivatives.

The features which are offered by Second Life are to a large degree not unique to the environment as similar constellations of features can be found in its competitors as well. However, major differences to other environments and unique features of Second Life will be underlined in the discussion of the following six categories¹²⁹:

- I. Real-time text/voice chat and instant messaging
- II. Integrated content production environment
- III. Interactivity and content
- IV. Virtual Land, ownership and rights management
- V. Micro-payment and economy
- VI. Access

I Real-time text/voice chat and instant messaging

Along with all other virtual worlds, Second Life applies a means of communication between its users. Traditionally, inter-user communication takes place in Second Life through text chat and instant messages.

Text chat is thereby comparable to the spoken word in its nature. Once a user starts to chat with other users, the reception of his messages is bound to the spatial distance of the partners. Communication is therefore not channeled and private but can be read by other users depending upon their distance to the speaker/typer. Instant messages on the other hand are not public, but directed towards a specific recipient (see picture 6).

Due to the representation of all users as individual characters (commonly) in an an-

129. The following categorization is an extended and updated version of the categorization provided in [Wieneke and Nützel, 2008] and [Wieneke et al., 2007]

thropomorphic shape, also called avatar in reference to the incarnation of the hindu god Vishnu [Britt, 2008], the distribution and appearance of users within a certain part of the virtual world becomes apparent immediately. From a practical point of view, this leads to situations where it becomes obvious for the user whether a place is popular or not, as either larger groups of users or no other users at all linger at a certain place. Also the interaction of users with a particular place in the virtual world becomes more apparent for outside observers due to this representation.



Picture 6: Chatting in Second Life. Image taken at the International Spaceflight Museum. source: author

Besides text based communication, Second Life implemented the concept of voice chat through voice-over-ip (voip) as well¹³⁰ whereby users do not need to type in order to communicate with each other.

II Integrated content production environment

A peculiarity of Second Life is the integrated authoring environment that allows users to create content for the virtual world. As it had been pointed out before, this feature of Second Life distinguishes the environment from virtual environments like There or Lively where the ability to impact change upon the actual environment is significantly limited as objects in these environments can be only traded and not created. Second Life shares the concept of content creation within the environment with other virtual worlds like for example Active Worlds. In particular Active Worlds allows users to create content but limits this process to the combination of

130. according to <http://blog.secondlife.com/2007/08/02/the-second-life-voice-viewer-is-live/>, retrieved 08/11/2008, the feature has been integrated in August 2007

pre-defined content elements unless the user owns a part of the virtual world which gives him the ability to upload 3D content in the RWX or COB format¹³¹.

The general concept of allowing users to create content for a virtual world can be traced back to the evaluation of Habitat by Morningstar and Farmer, which point out that "the line of development most interesting to us is to expand on the idea of making the development and expansion of the world itself part of the users' sphere of control." [Morningstar and Farmer, 1991]. By allowing users to create new objects and to design the environment a general potential to enable user contributions is achieved. A concept that places Second Life as a whole in the context of user contributions.

The management of the integrated content production environment follows the concept of embedded user contributions¹³²: content production and publication take place to a large extent within the environment. External tools are only used for specific tasks, as for example the design of textures or audio content which can be uploaded into the environment. Publication of content also takes place only within the environment, external repositories for media objects are not available.

As Linden Labs show relatively few influence and policing upon content that is created within Second Life the environment applies a context independent production¹³³. Due to the size of the solution space provided by the integrated content production environment, Second Life can be furthermore regarded as a platform that offers stakeholders the ability to make use of the environment according to their own agendas.

The creation of content in Second Life is based upon the principle of atomic construction [Ondrejka, 2004]. Instead of providing pre-defined objects which represent complete models, all objects are based upon a set of primitives which are transformed and combined into the final shape¹³⁴. This concept of construction differs significantly from other common 3D authoring environments like 3D Studio Max, Maya or Blender and requires therefore a specific workflow (see picture 7). The creation of objects applies embedded constraints but shows due to its generic approach a relatively high technical threshold.

131. see <http://www.activeworlds.com/help/aw41/>, retrieved 08/11/2008

132. see chapter 2.3.3.1 *Integration of contributions*

133. see chapter 2.1.3 *Crowd Sourcing, user contributions & context independent production*

134. in contrast to Benklers concept of content granularity, *atomic construction* refers to this combination of primitives and not to the complexity of production.



Picture 7: Content creation with primitives in Second Life.
source: author

Besides the embedded content production environment for the creation of new assets, Second Life also applies a parametric content production environment that allows users to customize the look of their avatar. In this case, the technical threshold for production is lower (see picture 8).



Picture 8: Parametric modification of the avatar.
source: author

III Interactivity and content

Besides an integrated content production environment for the creation of new objects, Second Life integrates a scripting language entitled LSL¹³⁵ (linden scripting

135.see http://wiki.secondlife.com/wiki/LSL_Portal for an introduction into the language.

language) that allows users to provide objects with reaction upon user inputs. Furthermore LSL integrates the ability to animate objects based upon the embedded physics engine of Second Life and to connect Second Life objects with web services. Content that is developed in Second Life is bound to the environment itself and can not be exported and only to a limited extent imported¹³⁶ into the environment. Therefore all required content needs to be developed specifically for Second Life. More significantly, content that has been created for Second Life can not be exported, therefore the preservation of assets and in consequence investments is highly limited, as the sustainability of these assets is bound to the existence of Second Life and Linden Labs as a company.

IV Virtual Land, ownership and rights management

Although the content production environment is integrated in the client, users that want to create new objects need to have the necessary rights to perform building activities. These rights are associated to and dependent upon the whereabouts of the user in the virtual world. Although sandboxes exist in various places in Second Life, where users can create objects, the persistent placement of these objects is in general bound to the ownership of a location in Second Life. Vending or renting of virtual property is also a major source of income for Linden Labs¹³⁷, as in contrast to most mmorpg Second Life requires no monthly- or usage-fee for its use (see picture 9 for a map view of a Second Life area).

Owners of virtual property also have the ability to terraform the environment and to set usage rights as well as access restrictions which allow the creation of private environments that deny entry to un-privileged users. Furthermore the interaction of users with the environment can be limited as for example flying, a common mode of transportation in Second Life, can be enabled and disabled. At the time of writing, a total of 1834 km² is owned by users of Second Life¹³⁸.

retrieved 08

136. Second Life allows to import textures, animations and sounds. The import of objects into Second Life became feasible through *sculpted prims*: color maps that encode the shape of an object. However, *sculpted prims* show less flexibility in handling than conventional prims and are limited in complexity due to the maximum resolution available for image uploads. Furthermore, hollowed shapes and cavities can not be represented through *sculpted prims*.

137. see the economic statistics at http://secondlife.com/whatis/economy_stats.php, retrieved 08/11/2008

138. see Resident Owned Land, August 2008 in http://static.secondlife.com/economy/stats_200808.xls, retrieved 08/11/2008



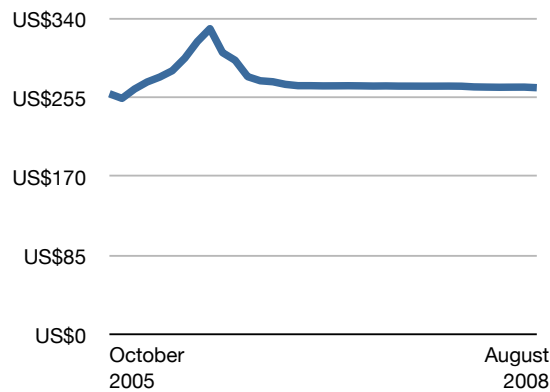
Picture 9: Map view of a part of Second Life.
Image taken from <http://slurl.com/>, retrieved 08/11/2008

Content creation in Second Life is combined with a fine grained rights management system that associates since its introduction in November 2003 [Ondrejka, 2004] any rights upon content created in Second Life with the user who created it. This concept, is not typical for virtual worlds, as other environments grant the rights upon the creations exclusively to the service provider (Ibid.). Users are free to set and transfer these rights to other individuals or groups. The intrinsic rights management system allows the exchange and disposal of objects and forms the basis of the economic system in Second Life.

V Micro-payment and Economy

Similar to other virtual worlds and MMORPG, Second Life integrates its own currency entitled Linden Dollar (L\$). The concept of currencies is popular in virtual worlds as it allows users to trade objects between each other. The relevance of this concept for the implementation of virtual worlds is underlined by the existence of a currency in early examples of virtual worlds like Habitat [Morningstar and Farmer, 1991]. In contrast to Second Life, Habitat's currency (the Token) existed only in the virtual world whereas the Linden Dollar is exchangeable both to and from the US Dollar¹³⁹ (see also picture 10).

139. Exchange rates are free floating with a current rate of 263 L\$ for 1\$ according to <http://secondlife.com/whatis/economy-market.php>, retrieved 08/11/2008



Picture 10: Exchange Rate of the Linden Dollar against the US Dollar
source: data – http://static.secondlife.com/economy/stats_200808.xls, graph – author

Effectively, this free-floating and exchangeable currency is implemented as a pre-paid account and allows one-click micro-payments. In comparison to the Internet, where different micro-payment services compete with each other, Second Life provides therefore significant advantages for the trade of assets.

The availability of a currency alongside a market for the exchange of goods as well as the existence of a demand for goods and services provides also the basis for the emergence of an economy. A discussion about the impact of such economies in virtual worlds can be found in the context of the MMORPG EverQuest [Castronova, 2002].

In the context of Second Life, the existence of an economy sets the basis for the motivation of users to create content according to [Ondrejka, 2004] as the existence of a free market provides stimuli for users to create and innovate (Ibid.). Interestingly, this concept of remuneration and monetary incentives for production and innovation contrasts to some extent with Benkler's perspective upon extrinsic monetary incentives¹⁴⁰. In particular two contrasting aspects become apparent:

- I. Monetary incentives and market based production demand for a clear cut definition of the product and service in relation to a fixed definition of the price. Prices for assets in virtual worlds are however not related to copy costs or the price of raw materials, therefore the definition of a prize provides a complex task.
- II. The integration of a fine grained rights and economic model limits peer-based production and incremental improvement as exclusive

¹⁴⁰.see chapter 2.3.3.2 *Incentives for contribution*

ownership of objects makes such modifications more difficult.

VI Access

Due to the relatively large degree of freedom for creation and action given to the users of Second Life within the environment, not all places and actions performed in Second Life are suitable for all audiences. Due to this, Linden Labs provides two separate instances of the environment: Second Life which is available for users over the age of 18 and Teen Second Life for users between 13 and 17 years of age.

Both environments are strictly separated from each other with adults that want to operate in Teen Second Life requiring special permission¹⁴¹. In practice, this separation leads to a higher administrative effort, as two separate instances need to be kept up once diverse age groups are addressed.

3.4.2.2 Development and sustainability of Second Life

In order to discuss the future development of Second Life it becomes useful to regard the environment in the context of its predecessors. As it has been pointed out before, Second Life continues the traditional concept of virtual worlds and refers thereby to the foundational myth of virtual worlds as an utopian promise of computer mediated alternate realities. Second Life alludes to this reference also in his name, by suggesting that it would offer a "second" life outside of the boundaries and limitations of the first, *real* life. This reference to a utopian idea advocated Second Life's appeal to mass media and resulted in massive media coverage in particular during 2006-07, see for example the reviews of Second Life in The New York Times [Siklos, 2006] or in The Guardian [Jeffries, 2006] where it was heralded as "the hottest thing on the web" (Ibid.). However this coverage abated over time which raises the question whether Second Life and virtual worlds show sustainability in their development or can be regarded as a temporary fashion that disappears as fast as it appeared.

While it is difficult to predict future developments and trends, the coverage about Second Life can be seen in parallel to the interest upon virtual reality and cyberspace in the mid 1990s: similar to the hype that surrounds Second Life today, both concepts were encouraged by a high degree of enthusiasm – see for example [Rheingold, 1990; Heilbrun, 1988] – and attracted mass media attention but disap-

141. The special permission for adults to operate in Teen Second Life demands for a background check that includes a "Social Security Trace Report with Residence Listing ([for] U.S. Residents)", "a Criminal Records Check (Felony and Misdemeanor)" and "a Nationwide Sex Offender Check (U.S. Residents)" according to <https://www.ascertainsi.com/secondlife/bgConsent.asp>, retrieved 08/11/2008

peared soon after and where in practice replaced by the *world wide web* with its focus upon 2D interaction paradigms.

Therefore it is necessary to point out that the idea of 3D computer mediated interaction in virtual worlds is neither a contemporary phenomena nor the only possible path of development. However, its main ideas and concepts are recurring which suggests that the demand for the implementation of such concepts exists. Nevertheless it is from today's perspective uncertain whether virtual worlds, besides their incarnation in computer games, will continue to attract a mass audience and similarly, whether Second Life will show a particular relevance in the future.

In relation to Second Life, current statistics provided by Linden Labs show a growth of usage underlined by the increase of user hours spend in Second Life (see figure 23). In comparison to other environments Second Life remains a rather small scale environment: while Second Life peaked at about 70.000 concurrent users¹⁴², World of Warcraft reached 1 million concurrent players in China alone during April 2008¹⁴³.

Second Life also provides due to the peculiarities of its content creation and storage system severe challenges for the sustainability of engagement by institutions and corporations. As it has been discussed before, investments that are undertaken in the creation of new assets could be lost if Second Life ceases to exist as a platform. This content strategy applied by Second Life shows strong similarities to early on-line platforms like CompuServe (CompuServe Information Service) and its market strategy in the 1980-90s where content was held in a walled garden environment. Despite these limitations, Second Life provides nevertheless a useful and informative environment for the evaluation of user contributions: first of all, the tight integration of content production tools and workflows within the environment itself allows user contributions to take place. Second, Second Life can be regarded as a case study for an emerging environment. While the principal concepts of virtual worlds have been around for several years, actual uses and practices that would appeal to a mass audience haven't been identified yet. The emergence of such practices depends however upon innovation as discussed before and Second Life provides an environment where these practices are actively explored through user contributions.

142.see <http://secondlife.com/whatis/economy-graphs.php>, retrieved 09/11/2008

143.see http://www.corp.the9.com/news/2008/news_080411.htm, retrieved 09/11/2008

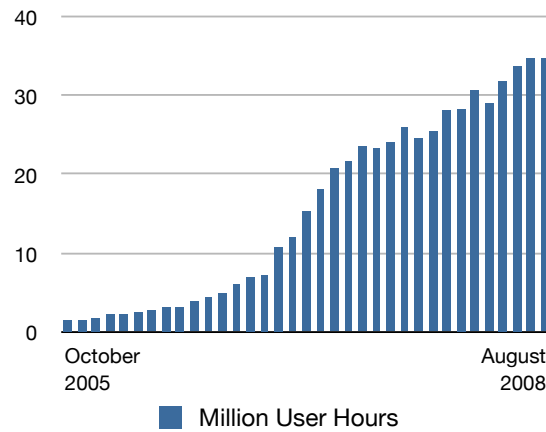


Figure 23: User hours spend in Second Life
 source – http://static.secondlife.com/economy/stats_200808.xls, graph – author

3.4.2.3 Museums and user contributions in Second Life

Museums and cultural heritage make use of 3D reconstructions both related to research into and documentation of findings and objects but also in the communication of museum objects¹⁴⁴. Furthermore museums and exhibition design share similarities with virtual worlds in the concept of designing spaces that lead to an immersion of the visitor. Due to this close relationship and museum activities that encourage user activity, virtual worlds have been applied in the context of museums and cultural heritage for several years.

In the tradition of museum activities in environments like Whyville¹⁴⁵ or Active-Worlds¹⁴⁶, Second Life makes no exception in the active involvement of museums and cultural heritage. It would go beyond the scope of this thesis to present and discuss all museum related activities within Second Life in detail, instead a selection of projects will be presented, that show the range of approaches for museum activities in Second Life. Furthermore, the issue of learning in virtual worlds and museums in virtual worlds will not be further reviewed in the following section. Perspectives towards this aspect can be found for example in [Wieneke and Rodriguez-Echavaria, forthcoming publication].

144. see in this context for example the wide domain of computer visualization in archeology, reflected by conferences like CAA (computer applications and quantitative methods in archeology) – <http://www.caaconference.org>, or VAST (international symposium on virtual reality, archeology and intelligent cultural heritage) <http://www.vast2008.org/> or the cultural heritage stream at Eurographics 2007 [Arnold and Ferko, 2007]

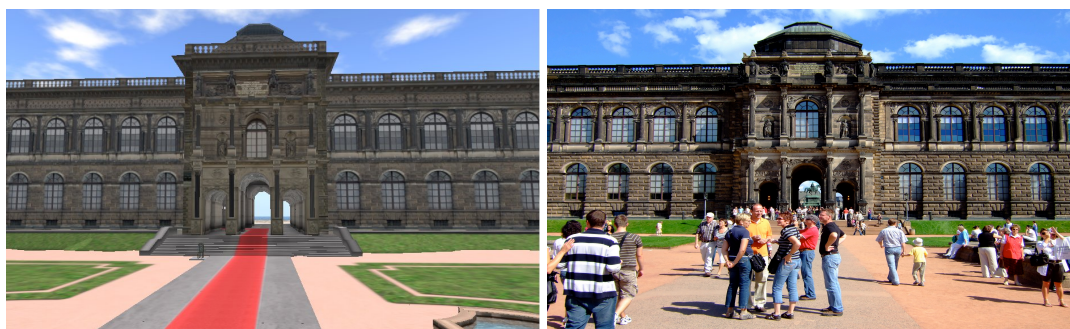
145. see for example the *Getty Museum* in *Whyville*, http://www.getty.edu/education/for_kids/, retrieved 11/11/2008

146. see for example [Girinkaya and Gulen, 2007]

I The Dresden Gallery

Starting of with a classical approach towards museum communication, the Dresden Gallery¹⁴⁷, shows a detailed reconstruction of the Gemäldegalerie Alte Meister in the Sempergalerie at the Zwinger in Dresden, Germany. An outside view of the environment is depicted in picture 11.

Inside the Dresden Gallery, the reconstruction of the environment is continued as the paintings of the original gallery are shown at a position that corresponds to their placement in the real world gallery. Furthermore, the environment integrates the existing audio guide system, by mapping audio-tracks that were created for the real world exhibition to the virtual counterparts.



Picture 11: Dresden Gallery (left) and Gemäldegalerie Alte Meister in the Sempergalerie at the Zwinger in Dresden, Germany (right)
source: author

In terms of user activity, the Dresden Gallery provides no further means for contribution besides a guestbook at the entrance. The environment itself is, similar to the permanent exhibitions in the real world environment, static. No changes are conducted on a regular basis within the general setup.

The production of assets that shape the environment has been conducted in a conventional setup: an agency specialized in the design of Second Life environments designed the gallery according to the specifications of the museum [Schuster, 2008]. According to the responsible representative of the Gemäldegalerie Alte Meister the Dresden Gallery in Second Life is regarded as both a marketing activity as well as an experiment with new technologies for museum communication and reached so far its expectations. With 170 visitors a day¹⁴⁸ the environment is one of the most successful museum environments in Second Life and caused since its opening sig-

147. locations in Second Life will be referenced in the following as SLURLs. This format allows links to locations in Second Life through a web url and offers a pragmatic way for referencing.

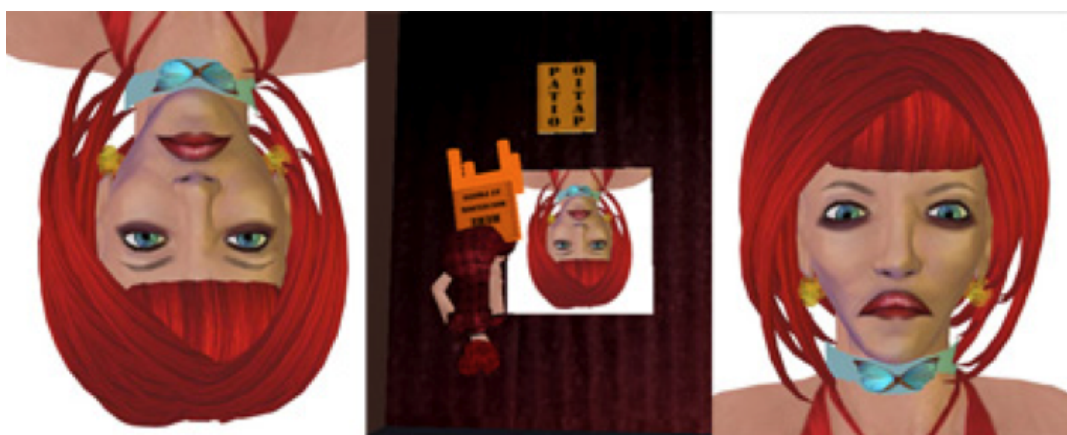
Dresden Gallery: <http://slurl.com/secondlife/Dresden%20Gallery/210/134/43>, retrieved 15/10/2008

148. figures from 17/10/2007 according to [Schuster, 2008]

nificant media attention (Ibid.). However, the Dresden Gallery is also not regarded as a replacement for the original environment but intended to encourage visits to the real world environment (Ibid.).

II SPLO: The Exploratorium

A different approach to museum communication in Second Life shall be illustrated in relation to the activities of the San Francisco Exploratorium in Second Life. One of the foundational principles of the Exploratorium as a science museum in the real world and in this regard as one of the spearheads of hands-on science experience has been the idea "to make it possible for people to believe they can understand the world around them" (Oppenheimer¹⁴⁹ cited in [Hein, 1990] by [Henning, 2006], page 84). For this purpose, the Exploratorium followed approaches that "render perceptible the imperceptible" ([Henning, 2006], page 85) in its real world exhibits. A similar strategy is applied in the virtual part of the Exploratorium in Second Life which tries to "do things with a visitor that would be impossible to do in real life" [Rothfarb and Doherty, 2007].



Picture 12: The viewer is rotated in a chair in this exhibit of the SPLO environment of the Exploratorium in order to experience the changing nature of perception.
source: [Rothfarb and Doherty, 2007]

Picture 12 shows a practical example of this approach within SPLO¹⁵⁰, the Second Life environment of the Exploratorium: the image of a character is depicted on the wall of the museum environment. Once a user sits down on a chair facing the exhibit, the user is rotated with the chair around an axis which changes his perception of the image. Due to several health and safety regulations, such a rotation of the visitor would have been impossible in the real world environment (Ibid.)¹⁵¹.

149. Frank Friedmann Oppenheimer, the founder of the Exploratorium, also brother to J. Robert Oppenheimer also known as the "father of the atomic bomb"

150. see <http://slurl.com/secondlife/Exploratorium/110/86/26>, retrieved 15/10/2008

151. It should be pointed out, that this line of argument by [Rothfarb and Doherty, 2007] could be criticized by emphasizing that in the real world environment, the picture instead of the viewer could

In comparison with the Dresden Gallery, *SPLO* provides a higher degree of involvement into the environment due to its hands-on approach. Besides that, Rothfarb and Doherty also underline the importance of user contributions by referring to anecdotal evidence of users creating exhibits as a spare time activity: A user approached the museum in *Second Life* with a model he developed for the explanation of Brownian motion¹⁵² that he extended after feedback from the museum staff by allowing visitors to sit on top of one of the particles. All in all, contributions are not supported through an organizational scheme within the museum but take place in through informal exchange.

Another difference to the Dresden Gallery is found in the connection of the virtual world with the real world environment: whereas the Dresden Gallery shows no further connection to the real world museum environment, *SPLO* also provides a connection between the *worlds* by means of events that take place in both real and the virtual environment (see the example Total Solar eclipse Webcast in [Rothfarb and Doherty, 2007]).

III International Spaceflight Museum

In comparison with the *SPLO*, the International Spaceflight Museum (ISM)¹⁵³ in *Second Life* provides a tighter integration of user contributions as the museum itself is not related to any real world museum, but the result of a cooperation between different enthusiasts in the field of space flight and space exploration.

Picture 13 depicts a view upon Spaceport Alpha, one of the sites of the *ISM*. Even though the exhibits in the *ISM* were created outside of conventional museum structures by enthusiasts, they show a variety of concepts that are usually associated to museums as for example object descriptions, automated tours using tour buses or text based and location-dependent audio-guide systems.

The participants of the *ISM* consist of a mixture of enthusiasts with diverse backgrounds: some started their involvement into the exhibition of spaceflight related material either upon contact with the *ISM* while others have been part of real world interest groups related to space and space exploration which found a *Second*

be rotated. However, other use cases are possible that would be indeed impossible in the real world environment.

152. Brownian motion – the random movement of particles ([Rothfarb and Doherty, 2007])

153. see <http://slspaceflightmuseum.org/drupal/>, retrieved 12/11/2008 for the website of the museum and <http://slurl.com/secondlife/Spaceport%20Alpha/48/78/24/> or <http://slurl.com/secondlife/Spaceport%20Bravo/12/80/23>, both retrieved 12/11/2008, for the museum islands

Life basis under the umbrella of the ISM¹⁵⁴.



Picture 13: View upon the rocket ring at Spaceport Alpha in the International Spaceflight Museum
source: author

IV The Tech virtual

While the ISM gives an example for the cooperation of users and user groups in the creation of a remarkable exhibition environment, The Tech virtual¹⁵⁵, the virtual version of The Tech – Museum of Innovation¹⁵⁶, exemplifies the cooperation and interfacing of a real world museum with productive users and interest groups.

In December 2007 The Tech started The Tech Virtual Museum Workshop program that aims at encouraging users to create and develop exhibits within Second Life that would be judged in the context of a competition and – for the winning exhibits – rebuilt in the real world environment. Any exhibits created by users are published under a creative commons license and The Tech virtual refers to the process of incorporating users in the production of new exhibits in different contexts as open source production¹⁵⁷. In order to achieve this goal, The Tech virtual developed a concept and policy to enable user contributions. Five principles were emphasized in this context:

- the connection between Second Life and a website,

154. according to a personal conversation with Dr. Troy McConaghy (Troy McLuhan) who volunteered in the initial foundation of the ISM.

155. see <http://slurl.com/secondlife/The%20Tech/191/158/37/>, retrieved 12/11/2008 and <http://thetechvirtual.org/> for the website of the project. See also picture 14

156. see <http://www.thetech.org/>, retrieved 15/10/2008

157. see <http://thetechvirtual.org/blog>, retrieved 13/11/2008

- the provision of a training program for object creation in Second Life,
- an exhibit design tutorial
- a staged environment where exhibit presentation and development are separated from each other
- the provision of incentives for contribution through a competition that offers monetary incentives

Through the connection of Second Life with a website, *The Tech virtual* enabled in principle a communication between users within Second Life and on the web. However, the connection between the two environments is relatively simple with back and forth linking between the environments and no further exchange of data. Nevertheless, this combination of web technologies and Second Life allows users to resort upon already existing and established solutions for the presentation and discussion of projects through text based project descriptions, media files and comments on the website.

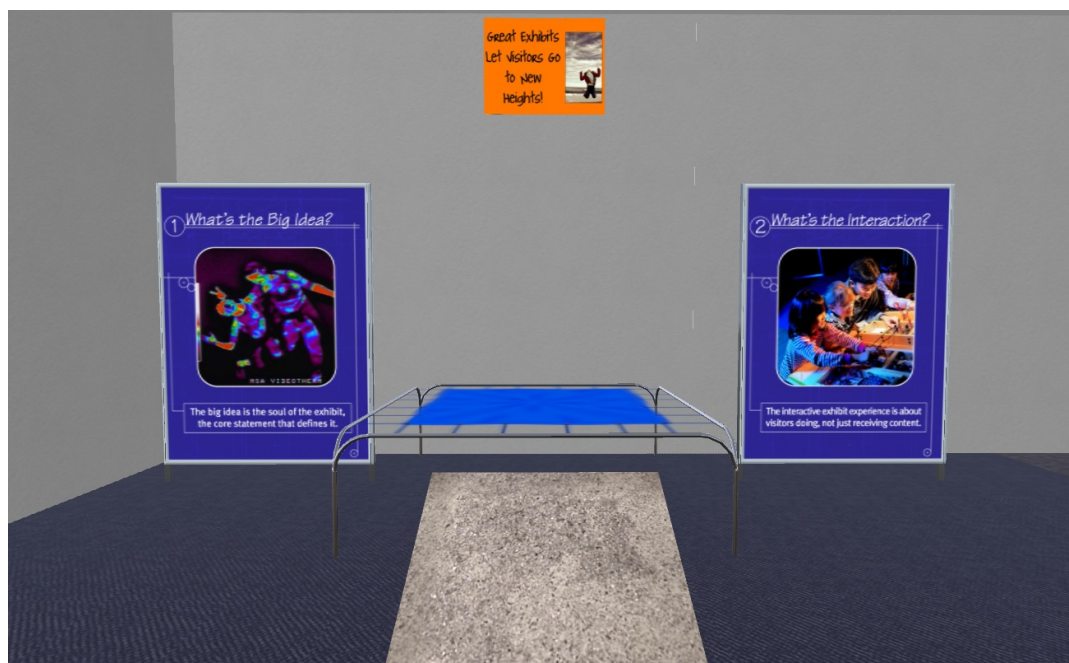


Picture 14: Outside view of The Tech virtual
source: author

Regular online workshops in *The Tech virtual* allow users to gather the required knowledge to create new objects in Second Life. In the context of user contributions this can be described as a means to lower the technical threshold for production. The exhibit design tutorial provides information about the design of exhibits. It addresses thereby content assessment thresholds of production by defining what makes up good exhibits. Picture 15 shows the connection between principles that were developed in relation to real world exhibits and their application in Second

Life. It is worth pointing out, that the transfer of principles from the real world to the virtual world is feasible in an environment like Second Life; an aspect that does not necessarily translate to the development of online exhibits on websites.

A further feature of the setup is provided in the separation between design/development environment and exhibition environment. This approach allows to leave a larger degree of freedom in the design of user exhibits without the need to present the exhibits as prototypes.



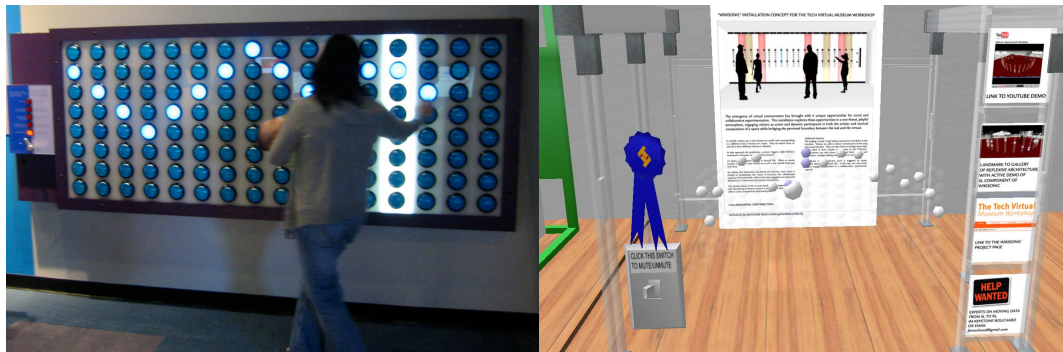
Picture 15: The exhibit design tutorial in The Tech virtual provides an overview about more abstract concepts that make up a good exhibit.
source: author

Such a functional separation of design and presentation space counteracts thereby problems that appear for example in the Wikipedia, where articles that didn't achieve a status that would justify their presentation are presented in the same context as publication quality articles because no differentiation is made on a structural level.

The organization of user contributions as a competition allows various motivations to be addressed. Besides monetary incentives given through the actual prize that is awarded to the winning exhibitions, the element of competition in general but also the acknowledgement associated with the reconstruction of the design in the real world museum can be regarded as providing a set of diverse motivations.

Overall, the strategy of The Tech virtual reflected in the previously discussed aspects provides relevant impulses for the incorporation of user contributions in the context of museums in Second Life. Nevertheless several aspects of this strategy demand for a critical review:

First of all, the reconstruction of objects in the real, which were designed in a virtual world without the constraints of physics, leads to a high complexity of the transfer process. In the end, The Tech virtual therefore decided that the exhibits designed by users were not directly transferred but rather inspired the final real world constructions ([Simon, 2008], section 8). See picture 16 for a comparison between real world implementation and virtual world design.



Picture 16: Wall of Music Buttons (left), the real world implementation of Wikisonic (right)
source: The Tech

A further point of critique resulted from the observations conducted by curators of The Tech virtual: although the website should provide an interface between Second Life and the more accessible web environment, relatively few users made a transition between the environments through this interface and user groups remained to a larger degree separated from each other (see [Simon, 2008], section 6). Another issue raised in the evaluation of the project is the intense demand of users for information about the expectations of The Tech virtual in relation to their contributions. Although a general description of the features of an exhibition was given, users were unaware about the required scale and depth of their contribution and were therefore challenged with a high threshold in terms of conceptual and content assessment thresholds¹⁵⁸.

The concept of integrating user contributions in the context of a competition also raised issues in regard to the sustainability of engagement beyond the deadline of the competition and the encouragement of cooperation between users. As prizes were given to the winners alone, users decided to develop projects on their own without cooperating with others, therefore a high potential for collaboration became lost (see [Simon, 2008], section 3).

In terms of user involvement and productive engagement, the time spent upon the

158. see keynote presentations at *Summit on Democracy in Exhibition Design*, video available at <http://thetechvirtual.org/june-4-summit/keynotes-summit-on-digital-democracy-in-exhibit-design>, retrieved 10/06/2008

creation of exhibits could be regarded as a relevant criterion. In regard to a particular winning exhibit – Mashup Masterpiece by Marie Crandell – the user/creator spent about 100 hours of work during four weeks development of the exhibit¹⁵⁹ thereby showing a high degree of engagement and involvement with the museum and the content of the exhibit.

3.4.2.4 Conclusion

As it has been shown, museums already apply Second Life in diverse ways. In their interaction with Second Life, museums can benefit from groups and individuals that are already productive and have the necessary skills to provide contributions to museums. Hence, Second Life shows a strong potential for museums to understand the demands of productive groups and individuals and provides a test bed for the development of interfaces between these productive users and the museum as an institution.

However, museum activities in Second Life also underline challenges in integrating real world visitors into the environment. Thereby Second Life shows a high ambiguity in acceptance: some users tend to accept the interaction paradigms of Second Life and its attitude towards construction with high sympathy and provide in consequence a high engagement whereas others show less acceptance for these concepts and therefore less engagement with the environment.

So far, relatively few experiments have been conducted in the integration of Second Life with real world exhibitions and museum visits. In consequence the application of the virtuous circle as discussed in chapter 3.2 *From visitor to user: the virtuous circle* could provide a viable concept for a tighter integration of museum visitors with the environment.

3.5 Challenges for user contributions in museums and cultural heritage

The examples discussed before underline the value and potential of user contributions in museums and cultural heritage. However, they also illustrate that a naive application of user contributions along the line of "giving users something to do" falls short in regard to the nature of user contributions and the specific demands that museums and museum policies show in relation to user contributions.

Although the application of user contributions in museums shares several similarities with the general application of user contributions in other environments (see chapter 2. *User contributions in new media environments*) several specific demands need to

159.see <http://thetechvirtual.org/blog/archive/2008/07/21/evolution-of-a-museum-exhibit>, retrieved 05/08/2008, log-in required

be addressed.

In terms of participation inequality, relatively few data has been collected so far that would provide a consistent picture of participation ratios in the museum environment. Based upon the pattern found in other applications¹⁶⁰ a similar distribution of highly productive, productive and inactive users can be nevertheless supposed, which makes productive users also in the museum environment a scarce resource. In contrast to other environments however, museums are in touch with a vast pool of potential contributors through their audiences in the real world. In this context, the application of the virtuous circle could lead to strategies that enable museums to tap on this resource. Along these lines, the integration of existing interest groups provides a significant potential for museum activities. Thereby the concept of different levels of contribution and the relationship and progression of users between different contribution formats and toolsets needs to be further reviewed.

A significant challenge for the integration of user contributions in the context of museums is also given through attitudes and self-perception of museum staff in relation to the audience of the museum. As it has been discussed in the beginning of this chapter, this process of transformation and the opening of museums towards their audiences does not take place without friction and can lead in the case of user contributions to a severe lack of acceptance through museum staff. Nevertheless, the integration of user contributions provides in this context also an example for the productive cooperation between domain experts and laymen and could lead therefore to new insights into the design and encouragement of such cooperations which could be in turn applied to other domains.

With the connection of real and virtual environments through the virtuous circle, the challenge of sustaining engagement arises. This demand for interaction with an environment that provides the potential for a long term interest into the subject matter is on the one hand supported by user contributions as an instrument for potential progression between different levels of contribution that provide a depth of engagement which in turn sustains interest¹⁶¹. On the other hand, means to sustain this interest also support the application of user contributions as productive users are encouraged to continue their involvement with a particular environment.

The following chapter will discuss the issues raised in this reflection in more depth and will provide a guiding framework that addresses the particular challenges

160.see chapter 2.3.1 Participation and Participation Inequality

161.see Jenkins comment about user-created content and engagement in 2.2.3.3 *Convergence*

which emerge from the integration of user contributions in museums and cultural heritage. It needs to be pointed out that although different tools and concepts can foster user contributions and that the integration of such approaches can be abstracted to form generic concepts, the interest, engagement and involvement of users depends upon the nature of the subject matter. If a certain topic that is communicated in the museum fails to raise interest, the means to support user contributions won't change this basic condition.

4. A framework for building, maintaining and influencing user contributions

Based upon the characteristics of user-created content discussed in the previous chapters, the following chapter addresses the emerging challenges that relate to the integration of user contributions with the demands of institutions and corporations in museums and cultural heritage. The chapter is divided in three parts.

Chapter *4.1 Towards a design for contribution* discusses the challenges that originate in the design and application of user contribution environments. Starting off with a juxtaposition of different design principles, the special requirements of a design for contribution will be discussed. Based upon the limitations of other theoretical approaches, formats that allow contributions in particular in relation to game design will be further reviewed. The chapter concludes with an overview about different principles that can lead to the development of a coherent design for contribution.

In chapter *4.2 User and contribution management* the particular demands of museums and cultural heritage in the context of user-created content will be reflected and the application of computer game principles in both contribution management and engagement of users will be discussed. The chapter discusses how quality demands can be transferred and encoded into game rules and how game based incentives can support user engagement.

Chapter *4.3 Exploration* discusses the implementation of previously developed design principles. As such, the examples focus upon the design of formats for user contributions as well as the connection between real and virtual environments.

4.1 Towards a design for contribution

The following chapter does not provide a new design theory for interaction but rather highlights the difficulties of applying conventional approaches like usability engineering and its underlying paradigms to the demands raised by an openness for contribution. Instead of developing a fully-fledged theory, the principles that will be discussed are regarded as a first step towards an extension of already existing approaches.

Before this thesis continues with the discussion of these features the potential impact of a large scale application of user contribution environments in relation to its consequences for professional routines and practices has to be pointed out. While it is highly doubtful that user contributions will replace professional production of content, it is likely – although this needs to be backed up by further evidence – that this process will alter the nature of professional activities in the domain of digital media.

As it has been discussed before, two main developments point in this direction: on the one hand, content production for users outside of professional routines and practices becomes simplified, as the thresholds for productions is lowered with the integration of expert knowledge into devices and software applications. At the same time, the engaging nature of user contributions changes user expectations towards content and interaction with content. Rather than focused upon content as the end product of a production process which takes place outside of the user domain, the process of creation itself becomes a target for user activity.

Therefore professional routines and practices will not become extinct in relation to media production but change their scope. Instead of developing content, the design of environments that allow, manage and encourage contributions will gain more significance. In relation to game design and development, Cook states that "In the new world of user content, game developers are meta-publishers and the creative users are the new game designers." [Cook, 2005a]. Although such wide ranging suggestions need to be critically and carefully reviewed, the concept of designing for contribution does not mean that the relevance of professional practices diminishes but rather that they need to be transferred to other domains. As it has been shown in the context of content production environments and in particular in relation to techniques for threshold reduction¹⁶², the development of templates and embedded constraints provides new challenges and requires significant amounts of work for professional practices. The following chapter will highlight these domains and discuss the challenges that emerge within them further.

4.1.1 Usability, task-efficiency and information design in the context of user contributions

In the analysis of existing environments for user created content, three main domains were identified which are foundational for the implementation of user-created content environments and need to be addressed in the design of new environments:

- I. Enabling contributions by providing environments that
 - leave room for contributions,
 - provide tools and workflows for contribution which face
 - technical,
 - conceptual and

162.see chapter 2.3.2.3 *Techniques of threshold reduction*

- content assessment thresholds
 - allow the publication of content
- II. Managing user contributions by
- defining and developing a quality of content
 - providing mechanisms for filtering contributions
- III. Encouraging contributions by
- providing incentives and
 - allowing an openness for user related motivations

Design decisions made within these three domains also need to refer to the intended goal of the content production process, relating either to result oriented approaches, where the creation of new content dominates, or to process oriented approaches, where the engaging nature of the content production process prevails.

From a theoretical point of view, the combination of these three domains and the nature of interaction within user-created content environments leads to contradictions with conventional design principles and theories. It would go beyond the scope of this thesis to provide an extensive and complete review upon the wide body of existing theories of human computer interaction in order to discuss the potential deficit of different theories in catering for the integration of user contributions. Nevertheless some aspects of user-created content shall be compared directly with paradigms of established theoretical positions in order to illustrate the shortcomings of these approaches in the context of user contributions.

I Task performance in usability engineering and user-created content

The concept of usability engineering describes a structured process to develop and construct applications that enable usability. Usability is in this context defined by five usability attributes (see [Nielsen, 1993], page 26):

- learnability,
- efficiency,
- memorability,
- errors and
- satisfaction.

While the concept of *usability engineering* in the development of user interfaces has been widely acknowledged and adopted, its application in the context of user-created content falls short in catering for all three domains of user-created content. Al-

though the ability to produce content is a condition for the successful application of user contributions, the fulfillment of the five usability attributes is not a sufficient criterion for user-created content environments. In contrast to the work and task related approach of usability engineering, users have no obligation to perform a certain task¹⁶³ in user-created content environments. Therefore the scope of *usability engineering* is too limited in order to deal with aspects of management and engagement.

II Task efficiency and auto-telic interaction

The concept of task efficiency forms a foundational principle of *usability engineering* (see [Nielsen, 1993], page 22). In this context, the concept and notion of *efficiency* as a metric for the evaluation of interfaces and environments dates back to the successful application of Fitts' law (see [Dix et al., 1993], page 24) in the development and evaluation of pointing devices. Although these approaches which aim at an optimization of performance gained significant merits in the development of computer interfaces in particular in the development of the graphical user interface, optimization falls short when it comes to describing a form of human computer interaction which is self-rewarding. In user-created content environments, such self-rewarding or in reference to Csikszentmihalyi autotelic activities, which become an end in itself [Csikszentmihalyi, 1990] gain importance in relation to the motivation of users to create content as it has been discussed in chapter 2.3.3.2 *Incentives for contribution*. Similarly, the contrast between task efficiency and autotelic activities emerges in the context of user-centered design where according to Norman, rather the interaction with the computer than the interaction with the task is put in the foreground and where "the computer should be invisible to the user, acting as the means by which the person enters into the engagement [...]" (see [Norman, 1986], page 49). This dominance of the task however is questioned in user-created content environments, where the process of production gains more relevance than the actual outcome. Fuller refers to this also in relation to computer games where "the task is precisely to perform the interaction with the computer, for as long as it remains pleasurable or compulsive" (see [Fuller, 2003], page 109).

Interestingly, Norman refers in [Norman, 1986] to a similar setup that is reviewed herein. Although he describes the Pinball Construction Kit (BudgeCo, 1983)¹⁶⁴ as an example "that illustrates the toolkit notion of interface" (see [Norman, 1986],

163.see chapter 2.1 *Characteristics of user-created content*

164.see also the reference to the *Pinball Construction Kit* in 2.2.1.1 *Computer game modding* and the discussion of the pinball editor in 2.3.2.3 *Techniques of threshold reduction*

page 51) his personal experience with the environment was frustrating as he wishes that "the tools were more intelligent – do as I am intending, not as I am doing" (Ibid., page 51). In the context of work efficiency, this conclusion is valid, in the context of games and to some extent in user-created content environments aimed at process based engagement. However it is the interaction and not the fulfillment of the task which matters.

III Information Design and openness for contribution

Another domain which can be contrasted with the demands of user-created content is the concept of *information design*. Again, the notion of efficiency comes into play in the definition of this concept by Horn:

Information design is defined as the art and science of preparing information so that it can be used by human beings with efficiency and effectiveness.

[Horn, 1999], page 15

According to Horn, Information design aims at

- a. the development of documents which "are comprehensible, rapidly and accurately retrievable, and easy to translate into effective action" (Ibid. page 15),
- b. the "design of interactions with equipment that are easy, natural, and as pleasant as possible" (Ibid.) and
- c. enabling people to navigate in three-dimensional environments both in the real and in virtual worlds (Ibid. page 16).

Implicitly, Information Design follows thereby an ideal of information presentation that can be regarded as total. This aspect becomes in particular apparent in the concept of structured writing which is subsumed by Horn under the general concept of Information Design. Structured writing is applied in the production of written communication and "requires a method for ensuring that all relevant subject matter has been obtained and is presented in the form the user needs" (Ibid. page 23). Due to the intention of providing a complete coverage and communication of all relevant material this aspect of Information Design becomes total, providing complete coverage of information relevant and available.

In the context of user-created content, such an approach becomes counter productive as it leaves no room for further contributions, simply because all relevant information is communicated and any further information that might be added but hasn't been communicated is by definition not relevant. While Information Design

aims at a closure of information, the integration of user-created content depends upon a perpetual openness for contribution which is limited through the total perspective of Information Design upon information. Nevertheless, Information Design also discusses concepts for action and user activity which will be further reviewed in the following section.

Openness for contribution should not be regarded as an arbitrary omission of information, which would lead to inconsistency, but as a strategic process that defines useful opportunities for contribution. As contributions in user-created content environments can take place in regard to two different goals – either with an emphasis upon the output or with an emphasis upon engagement through process – different strategies become necessary in order to address these intended goals. In both scenarios, openness for contribution becomes a *conditio sine qua non* for the integration of user contributions. But with an emphasis upon the process, openness for contribution needs to be accompanied by engagement that is rooted within the content itself. As not all content formats embed such concepts of engagement, the following section reviews formats that integrate engagement with an openness for contribution.

4.1.2 Formats for contribution

Although the term format is used in a technical sense as a structural description of content, its notion shall be used in the following in a broader sense: format describes in this sense not only technical storage and retrieval but also the practices that relate to its use and its production.

For example: a quiz format defines a setup of at least two participants where one asks questions which are answered by the other. The quiz format includes aspects as the concept of question and answer, the nature of the questions as closed questions that can be answered in a correct or incorrect way, a growing difficulty of questions over time, a system of incentives etc.

As this example illustrates, the concept of formats covers a broad array of design decisions which need to be addressed in the production of content. It also illustrates, that content formats can refer to social expectations and practices once the format is introduced and accepted as in the case of the quiz format.

In relation to user-created content, formats can provide a framework for the production of content that allows to steer user contributions by defining the bound-

aries of contribution. Referring back to the categorization scheme given before¹⁶⁵, formats can be also regarded as a means to lower content assessment thresholds by providing a guiding structure to the contributions of users. Concepts like "pods" in current.tv which define a short video-clip intended for distribution over the Internet or "tasks" in SF0 which describe a task that users need to conduct and document to achieve associated points are examples for the definition and use of formats in user-created content environments.

The concept of "tasks" as it is applied in SF0¹⁶⁶ also illustrates the engaging nature of such formats and their principle dual-use that becomes relevant in user-created content environment. The performance of a "task" is in itself an engaging activity that leads to action once a user decides to perform the "task". The "tasks" are designed in such a way that their performance through the user is feasible and interesting. At the same time, the successful completion of a "task" demands for the publication of "praxis", a description in text, still or moving images and sound that illustrates the successful completion of the task. The concept of "task" and praxis provides an example for the combination of an engaging activity (the performance of the "task") with the publication of content (the documentation of the performance and the publication of this documentation) and therefore for a content format that combines openness for contribution with embedded engagement.

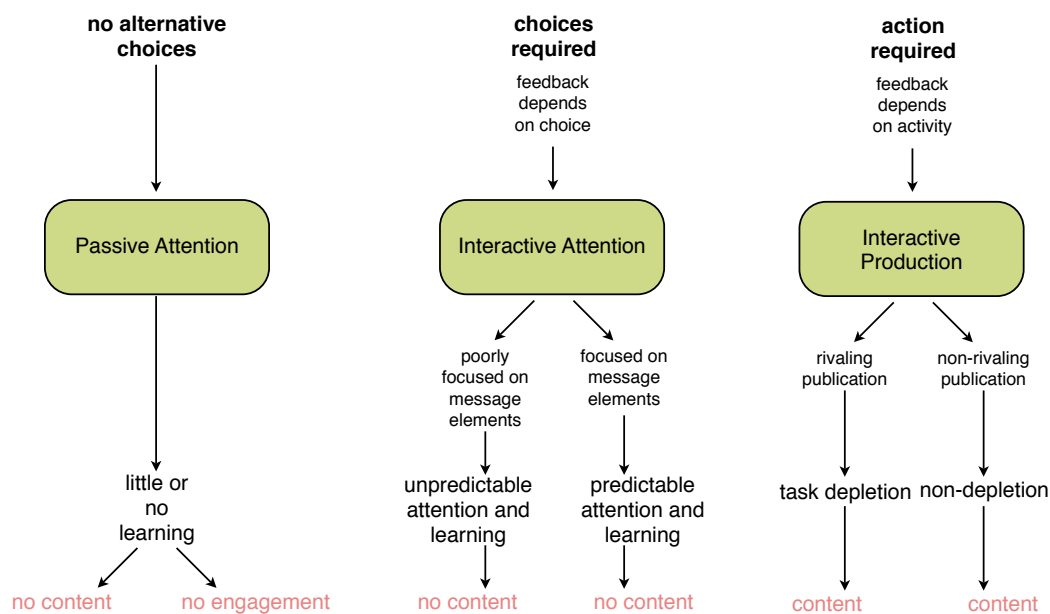


Figure 24: Passive and Interactive Attention versus Interactive Production. Diagram according to [Screven, 1999] extended by the author

165. see chapter 2.3.2 *Content Production Environments*

166. see also chapter 2.3.2.3 *Techniques of threshold reduction* section I b. for a detailed description of SF0

It should come for no surprise, that the engaging component of the "task" concept in SF0 shows strong similarities with game-related concepts, in particular with the genre of adventure games that are build upon tasks or quests which the main character has to master as games themselves are based upon engagement. In contrast to games however, the result of the interaction is not left to the player alone but turned into content that is published and provides a surplus for other users.

From a theoretical point of view, this concept of interactive production can be compared with other means of engagement. Screven proposes a model for engagement in the museum environment that is directed towards learning [Screven, 1999].

While learning is not within the focus of this thesis, the principal conclusions of Screven's model can be transfered to the demand for engagement in user-created content environments. Figure 24 displays an overview of Screven's model for passive and interactive attention with an extension towards interactive production as a mode of engagement in user-created content environments.

According to Screven, passive attention describes the interaction with an environment that allows users to press buttons or switches which in turn excite a change in the environment (for example by "pressing a button that lights up a text panel" (see Ibid. page 167) or by starting an automated experiment). Although users of such environments are encouraged to take action, their interaction with the environment is described by Screven as "one-way" (Ibid. page 167) interaction because feedback doesn't differ based upon the response of the user. Whether or not the user interacts with the environment because he is aware of the processes depicted doesn't matter as the result will be the same in any case.

In contrast to this model, Screven proposes the concept of interactive attention where users are confronted with a process of decision making. In this concept, the responses of the user lead to different reactions of the system. Attention or engagement are in this case higher in comparison to the passive attention model.

Interactive production on the other hand provides an extension to Screvens model by adding the component of content creation, thereby referring to the concept of interactive attention but extending it at the same time through the publication of content. A further distinction of the interactive production model is made between different setups in regard to the rivalry of the publications conducted by users. The concept of rivaling contributions describes thereby whether a contribution conducted by one user prevents a contribution by another user. For example: in the context of a quiz, only one answer is regarded as the correct answer. Once a user publishes

the correct answer and the answer is verified, all future answers by other users can be neglected as the correct answer is already given. Hence a rivalry between contributions exists that makes further contributions irrelevant. Rivalry of contributions leads in turn to task depletion as the performance of a task which has been solved leads to no further benefit, thus rendering the task irrelevant.

Morningstar and Farmer describe in their analysis of Habitat the application of rivaling publications in the context of a treasure hunt game. The treasure hunt entitled "D'nalsi Island Adventure" (see [Morningstar and Farmer, 1991]) was developed during several weeks and required the coordination of different actors as well as the design of an in-world environment. Eight hours after the treasure hunt started, the puzzle was solved although the authors expected the treasure hunt to take several days. As the solution to the treasure hunt involved rivaling contributions, the treasure hunt itself became pointless for other users to conduct as all puzzles and tasks were depleted.

A further dimension to the design of formats for user-created content environments is provided in the concept of modularity or supplement-ability which refers to both Benkler's concept of Commons-based peer production¹⁶⁷ and Bruns' description of produsage¹⁶⁸ as an unfinished process. Content formats that fit in this category apply rivaling contributions but allow at the same time the extension of existing contributions thereby preventing task depletion.

An example for this approach can be found in the article format in the Wikipedia. Although an article is a rivaling format – only one instance of an article in a specific language is allowed, therefore the publication of an article rivals with the publication of a completely different article related to the same subject matter – the article format allows other users to publish supplements to the original article thereby limiting the impact of rivalry upon task depletion.

	supplement-able	non supplement-able
rivaling contributions	Wikipedia <i>article</i>	Habitat <i>treasure hunt</i>
non-rivaling contributions	Discussion forum <i>thread</i>	SFO <i>task</i>

Table 6: Matrix comparison of contributions in terms of supplement-ability and rivaling contributions
source: author

Table 6 provides an overview of different formats for user-created content in rela-

167. compare also chapter 2.2.3.1 *Commons-based peer production*

168. compare chapter 2.2.3.2 *Produsage*

tion to their supplement-ability and their integration of rivaling or non-rivaling contributions. In this context, the Habitat treasure hunt format is regarded as a format of rivaling contributions which are non supplement-able. Hence the contribution provided by one user rivals with any other contribution and prevents at the same time supplements by other users. SF0 tasks are categorized according to this scheme as non-rivaling but also non supplement-able as multiple contributions are possible but a single contribution can not be extended. In contrast to these formats, threads in a discussion forum are non-rivaling as a single post does not prevent other posts. As posts that reply to other posts are enabled, the format of discussion forum threads is also supplement-able.

4.1.3 Participation inequality and design for contribution

While the design of formats for user-created content can be regarded as a central challenge of a design for contribution, the analysis of user-created content environments in the previous chapters shows that further domains need to be addressed as well. In particular the concept of participation inequality and user activities provides significant design challenges that shall be further reviewed in terms of two domains:

- I. High/low level interfaces: Due to the diverse interests as well as different abilities of users in the user base, users conduct different activities within a content production environment. In order to tap into the full potential of the user base, the design of different activities that users can conduct and of the interfaces which allow users to conduct these activities become necessary. The development of these interfaces also needs to take into account participation inequality and the limited availability of highly productive users.
- II. User progression: Highly productive users are a scarce resource. In order to fulfill the demand for highly productive users but also to lower the dependency of user-created content environments towards a productive minority, means of encouraging users to become highly productive users need to be developed

In contrast to the design of formats for user-created content, the principles discussed in the following subchapters are not generic but depend in their application upon the strategic use of user contributions within a user-created content environment. In case a particular environment focuses only upon the engaging nature of content, higher levels of contribution and more complex activities could become

less relevant for this environment. On the other hand, environments that focus primarily upon the creation of new content might not esteem the relevance of low-level contributions. While the relevance of different levels of contribution might therefore differ depending upon the specific use case it should be argued in the following that the combined application of different levels of contribution provides significant benefits for both scenarios.

4.1.3.1 High/low-level interfaces

User-created content environments face heterogeneity in their user base with different demands and abilities. In response to this inhomogeneity, activities within the content production environment can address different levels of involvement focused upon the different abilities of individual users thereby tapping into the diversity of the user base. Two different strategies can be observed in relation to this process in user-created content environments:

- a. through the application of a content format that shows a high degree of flexibility and that allows to integrate diverse audiences within the same format and interface or
- b. by providing different content formats and interfaces that are aimed at different user groups.

An example for environments that apply strategy a. is found in the Wikipedia, where the content format of *articles* provides in combination with the integrated communication tools a wide variety of activities that users can conduct¹⁶⁹ through the same interface.

In contrast to this, an example for strategy b. is found in the SimsCarnival environment¹⁷⁰ which provides different content formats, activities and interfaces for different user groups.

Figure 25 shows an overview of the integration of different activities within a user-created content environment. By offering a variety of activities with different levels of complexity, different individuals and groups in the user base can be addressed. In reference to Koster's model of content production in game environments¹⁷¹ the amount of users that have the abilities to perform an activity decreases in relation to the complexity of the activity. In contrast to Koster's model which is directly related

169. see chapter 2.3.1 *Participation and Participation Inequality*

170. see chapter 2.3.2.3 *Techniques of threshold reduction*

171. see Figure 8: *Content pyramid. Content production in game environments according to [Koster, 2006]*, page 57

to content production processes, the concept of activities is not necessarily limited to processes that result in new content but includes as well supportive processes like moderation and filtering.

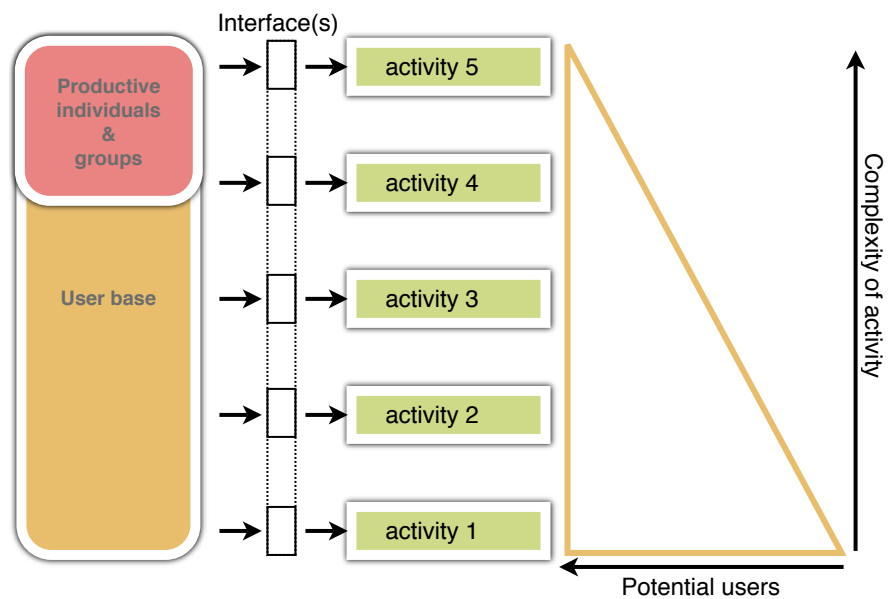


Figure 25: Activities and Interfaces for different levels of complexity
source: author

The particular design challenges that emerge in user-created content environments in relation to high and low level interfaces encompass

- the identification and development of activities that users can conduct
- the design of interfaces that allow users to perform these activities
- the identification and evaluation of the demands and interests of the homogenous user base to conduct these activities

Activities and interfaces within the same user-created content environment can highly differ from each other, thereby leading to specific solutions for different groups.

4.1.3.2 User progression

While the design of high and low level interfaces enables different users and user groups to contribute to an environment, the concept of user progression relates to the development of users within a specific environment. As only a relative minority of users contributes at all and only a fraction of these users provide a majority of content, user-created content environments show a tendency to become dependent upon the contributions of this minority. In order to increase the number of contributors for activities of higher complexity, the transition of users between levels of activities gains significance and will be reviewed in the following.

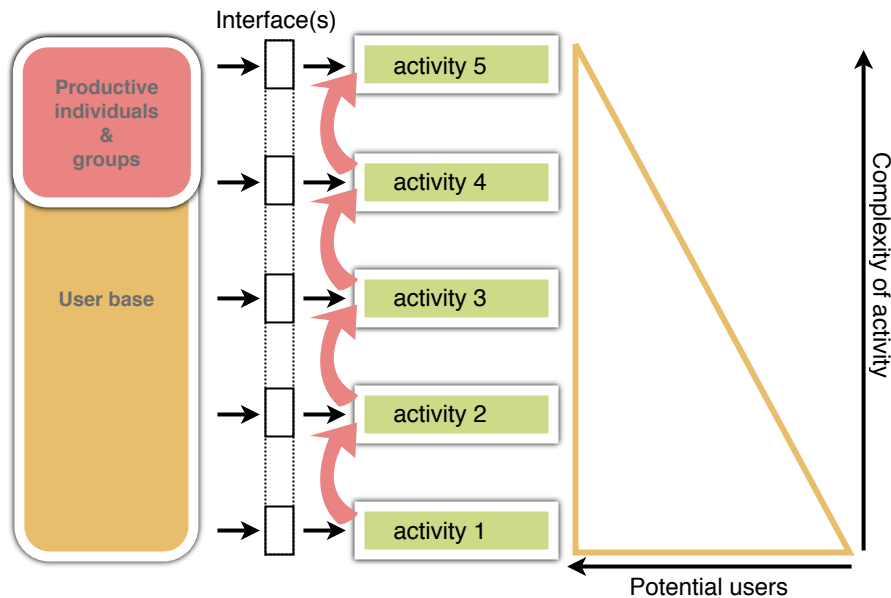


Figure 26: User progression between different levels of activity
source: author

Further evaluations of interaction and cooperation between users within user-created content environments becomes necessary to gain a deeper understanding of user contributions and to provide in consequence interfaces with a better fit and appropriate content formats. Therefore the relationship between quantitative and qualitative aspects of contribution need to be further reviewed as it had been discussed in chapter 2.3.1 *Participation and Participation Inequality*.

Figure 26 illustrates in a schematic overview this process of progression between different levels of activity. Although the figure displays a linear progression, linearity is not mandatory as users might also jump between different levels. While the nature of activities and their associated difficulty depend upon the design of the environment it is worth to consider the above figure with caution in relation to the pyramidal hierarchy of activities because pyramidal representations intrinsically attach a higher value to states in the top of the pyramid. Even though an activity is more complex and even though it might address a smaller group of users, its relevance for a specific environment is not necessarily higher than a less complex activity. Simple optimization strategies fall short therefore in user-created content environments.

This challenge to the interpretation of pyramidal hierarchies can be also traced in the reception of the Taxonomy of Educational Objects by Bloom et al.¹⁷² which classified in its original version according to [Krathwohl, 2002] learning objectives

¹⁷²also known as *Blooms Taxonomy*

according to six different domains in hierarchical order: Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation (Ibid.). Each domain provides thereby the basis for the next domain therefore advocating a linear progression of the learner from bottom (Knowledge) to top (Evaluation). However, not all learning outcomes require a full transition from bottom to top.

In the context of user-created content environments, strategies for user progression therefore need to identify the demand of the environment for certain activities while maintaining a balance with the goals of its users. In this regard, user progression also influences the sustainability of contribution activity by offering different perspectives upon the medium term development of users within the environment. User progression shows thereby relevance in maintaining involvement with an environment.

Examples for strategies of user progression between different levels of activity can be found again in a comparison between the Wikipedia and SimsCarnival. While the Wikipedia provides a progression scheme that users follow in their interaction with the environment¹⁷³ SimsCarnival applies different levels of activity with no obvious connection between them. Even though a principal progression between different content production environments in SimsCarnival seems feasible, each content production environment applies its own interface thereby requiring users to learn new methodologies and abilities in order to overcome initial thresholds for contribution.

Even though the praxis of user progression is described to some extent in Bryant's account of user development in the Wikipedia (see [Bryant et al., 2005]) the author of this thesis is at the time of writing not aware of any evaluations of environments that apply a designed approach to the progression of users between different activities. This lack of research raises the question whether user progression schemes can be pre-defined or emerge as practices within a specific environment. In order to discuss this matter thoroughly, further research becomes necessary.

4.1.3.3 Flow and auto-telic activities

In relation to the progression of users from lower levels of engagement to higher levels over time, a review of adjacent theoretical concepts from related domains provides impulses for the development of user progression scenarios. In particular

173.see also the discussion of Bryants concept of *Becoming Wikipedian* in [Bryant et al., 2005] in chapter 2.3.1 *Participation and Participation Inequality*

the concept of *flow* according to Csikszentmihalyi¹⁷⁴ shows an interesting point of departure:

Based upon several interviews conducted in the mid 1970s Csikszentmihalyi developed the concept of flow or optimal experience in order to describe experiences that fully absorb the attention of human actors during the performance of an activity (see [Csikszentmihalyi, 1990]). A specific feature of the activities analyzed by Csikszentmihalyi is that they are auto-telic, therefore provide an end in themselves instead of referring to extrinsic motivations or as Csikszentmihalyi describes auto-telic as "[...] a self-contained activity, one that is done not with the expectation of some future benefit, but simply because the doing itself is the reward" (Ibid. page 67).

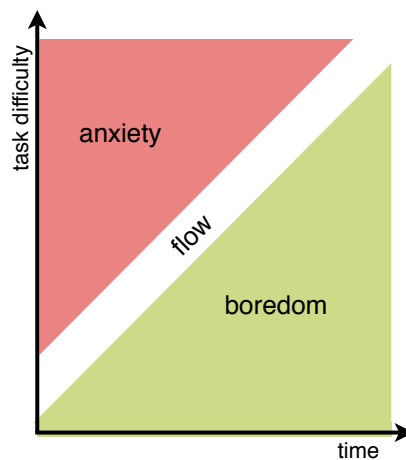


Figure 27: Flow as a balance between anxiety and boredom
source: author according to [Csikszentmihalyi, 1990]

Besides describing the concept of flow, Csikszentmihalyi also identified a set of criteria that encourage and support optimum experiences (according to Ibid. page 49):

1. Flow occurs when human actors are confronted with a task that they can complete
2. Human actors must be able to concentrate upon the task
3. The task itself has clearly defined goals
4. The task offers immediate feedback
5. The performance of the task is undertaken "with a deep but effortless involvement that removes from awareness the worries and frustrations of everyday life" (Ibid.)
6. The task allows human actors "to exercise a sense of control over

174. see also the discussion of *flow* in 4.1.1 Usability, task-efficiency and information design in the context of user contributions

their actions" (Ibid.)

7. "The concern for the self disappears" (Ibid.)
8. "The sense of the duration of time is altered" (Ibid.)

An important aspect in the concept of flow is furthermore found in the balance between anxiety and boredom in relation to the task. Anxiety thereby refers to a slight overstraining of the abilities of the human actor while keeping the task just feasible and permanently above the boredom threshold, where a task would be too easy. While maintaining the difficulty of the task between these two borders, human actors progress in their performance and perform increasingly complicated tasks (see also figure 27).

In the context of user-created content environments, the concept of flow provides an interesting approach to the design of user progression scenarios. A direct application of these principles is nevertheless limited. While user progression discusses the changing activities of users over a longer time with different productive sessions, flow describes a single experience within a relatively short time frame. Furthermore the constraints of environments that support *flow* need to be matched with content production processes. A process that significantly alters conventional production processes and demands for new approaches towards content production.

An example for the integration of flow related processes can be observed in the changing nature of content production environments for computer games. Cook suggests in this context a transition from external editors for the creation of new content/*mods*¹⁷⁵ over the integration of content distribution platforms within a game environment towards the upcoming integration of play and production within the same environment [Cook, 2005a]. In the later case, production of content becomes a self-contained activity following Csikszentmihalyi's concept of auto-telic tasks. Production is in such environments performed in parallel to the actual flow experience.

Currently, such developments are in their infancy and at the very beginning of application. Nevertheless it can be supposed even from today's perspective, that most conventional content formats offer only a limited compatibility towards the integration of play and production which raises new challenges for the design of content formats. In the context of user progression and identification of user activities however, approaches that combine play and production show a promising potential.

175. for a discussion of the term *mods* see chapter 2.2.1.1 *Computer game modding*

The previously¹⁷⁶ referenced game environment *Spore* (Electronic Arts/2008) can be regarded as a forerunner of such a combination of productivity and play: in *Spore*, the players create and evolve species from the a single cell state through the development of societies up to the conquest of space. According to its lead-developer Will Wright, the game is heavily based upon the concept of engagement through creation (see [Kosak, 2005]) a lesson learned in user studies of *The Sims*, where the engaging nature of content creation highly influenced user behavior.

A combination of play and productivity is also found in applications like *gwap*¹⁷⁷ (Carnegie Mellon School of Computer Science, 2008) or the *Google Image Labeler*¹⁷⁸ (Google Inc., 2007). In both applications, users play games against other human players with the objective to identify certain features of images (*gwap*, *Google Image Labeler*) or texts (*gwap*). While interaction in these environments is largely auto-telic and game related, the resulting product of the interaction process is used in both environments to generate meta data which is associated to the reviewed images or texts.

Applications like *Spore*, *gwap* or the *Google Image Labeler* incorporate production processes that provide new impulses for the design of user-created content environments. With their implicit publication processes, these environments also overlap with concepts like user-generated content¹⁷⁹ where an explicit publication of content is omitted.

4.2 User and contribution management

Whereas the previous chapter referred to a more generic perspective upon content creation in user-created content environments, this chapter discusses the management of user contributions in the context of museums and cultural heritage. Based upon the previous review of user contributions in the museum environment¹⁸⁰ further practical challenges for the application of user-created content environments will be discussed in sub-chapter 4.2.1 *Practical challenges for ucc in museums and cultural heritage*. As it will be pointed out, museums and cultural heritage environments have a strong interest in the integration of user-created content but lack to some extent the resources that are required for a successful application in particular in relation

176.see the comment upon constraint based content production and filtering in *Spore* on page 81

177.see <http://www.gwap.com/gwap/>, retrieved 12/11/2008

178.see <http://images.google.com/imagelabeler/>, retrieved 14/11/2008

179.compare chapter 2.1.1 *User-created & user-generated content*

180.see chapter 3.3 *Visitor and user contributions in the museum environment*

to contribution filtering and quality control. In order to cope with this challenge, sub-chapter 4.2.2 *User activities and filtering* discusses the design of filtering activities for users under the premise of game oriented interaction.

4.2.1 Practical challenges for ucc in museums and cultural heritage

As it had been discussed in chapter chapter 3. *Visitors and users in real and virtual museum environments*, museums apply new media technologies both in order to address new audiences and to preserve objects. Thereby they make use of technologies which demand for new interaction concepts or, as it is the case in user-created content, new content formats and organization schemes. Even though museums show a positive attitude to the integration of such new technologies – with different emphasis depending upon the institution in question – the resources that are available to them often do not suffice to enable a full exploration of these new technological environments.

In the course of the development of this thesis, the author experienced in several occasions that the museums he got in touch with showed a high interest in research and experiments but lacked at the same time significantly in available personnel resources that would allow them to prepare new projects and conduct small scale experiments. Even though this anecdotal experience needs to be backed up by further evidence, the general pattern seems reasonable in the context of contemporary museum and cultural heritage funding within the European Union. Similar to other areas of the public sector, the available workforce in museums and cultural heritage institutions has been "optimized" in recent years to cover only everyday demand while offering relatively few resources for activities that go beyond this demand. New media integration is in this context supported within museums through additional funding by local, national or european research funding bodies but after the duration of the project, which is usually limited to a few months or years, relatively few additional resources are available that would allow to continue an exploration. Even though user-created content could provide a means to continue this necessary exploration and adaptation of new media environments¹⁸¹ museums and cultural heritage institutions need to spend personal resources in the editorial processes that are required to keep up certain levels of quality. While the performance of such editorial activities might be feasible in the context of larger museums, their performance becomes infeasible for small and mid-sized museums that don't possess the

181.see chapter 2.2.1 *Substitute or supplement for conventional content production?* and chapter 2.2.2 *User-Created Content and Innovation*

required additional workforce to monitor user contributions.

Therefore museums and cultural heritage sites would highly benefit from management tools for user-created content environments that lower the burden of constant monitoring. However, even with such means that will be sketched in the following chapter, it can not be guaranteed that all contributions follow the strict guidelines museums usually put upon their own content. Hence a structural separation of institutional content and user contributions becomes necessary. In order to place user contributions in the context of the institution a modified *embedded user contributions*¹⁸² strategy should be suggested that provides both production tools and a distribution platform but clearly marks user contributions as non-institutional content (see figure 28).

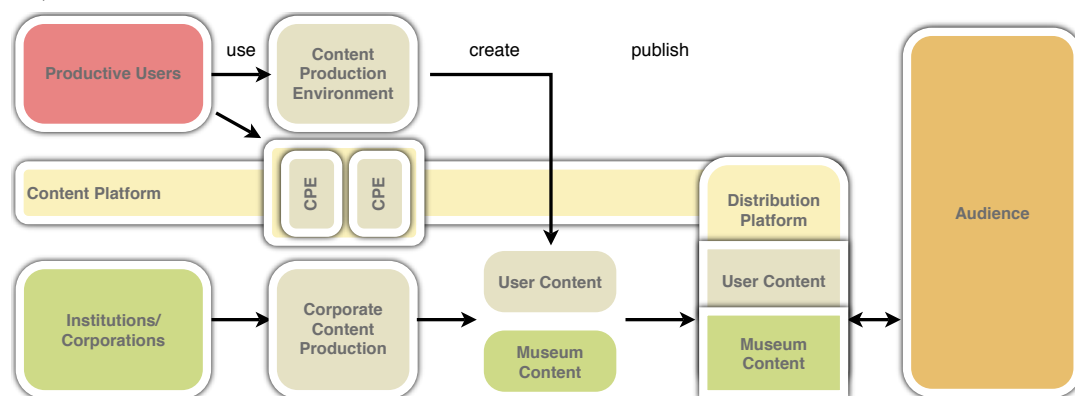


Figure 28: Modified embedded user contributions strategy for the museum environment
source: author

While the structural separation of museum and user content allows the application and communication of different quality levels, monitoring and filtering of user contributions gains relevance in this kind of setup as well and will be discussed in the following.

4.2.2 User activities and filtering

The extended concept of activities instead of contributions as discussed in chapter 4.1.3 *Participation inequality and design for contribution* provides not only a theoretical armamentarium to separate different activities in the content production process but allows also to extend the integration of users to domains outside of the content production process. Therefore, activities such as content filtering or ranking can equally become useful activities in the context of user-created content environments.

User-based content ranking and filtering mechanisms are concepts that have been

¹⁸²see chapter 2.3.3.1 *Integration of contributions*

covered in the past through research in computer science and can therefore refer to a rather broad base of scientific publications. Guha distinguishes in [Guha, 2001] primarily between open and closed rating systems. Closed rating systems are in this context environments where a closed group of editors reviews content and provides ratings whereas in open rating systems the rating process is opened up to all users of the environment. A further distinction of open rating systems is given by Guha through the concepts of aggregation, where multiple implicit and explicit ratings are aggregated and meta-rating systems where rating mechanisms are applied upon ratings (Ibid.)

An example for the later case is given in the Slashdot¹⁸³ comment rating system. Slashdot publishes user contributed but edited news articles in the wider context of computer and Internet related subjects. Users can create comments to the articles which are rated by other users. As a meta-rating system, these ratings are in turn rated by other users (see also [Benkler, 2006] for a detailed description of the process).

Concepts like the Slashdot meta-ranking mechanism are already applied on a wider scale in user contribution environments and allow for a basic monitoring and filtering of contributions. It is worth to point out, that such mechanisms nevertheless do not mirror criteria that were defined by a corporation or institution but reflect instead the attitudes of individual users. In the light of participation inequality, such rating mechanisms can therefore lead to a bias of perspective as only a subgroup of the total user base contributes ratings. Furthermore, through the abilities given to this subgroup, its users can gain a significant influence upon institutional practices as illustrated in the case of the digg/hd-dvd case¹⁸⁴. While the integration of user-contributions will inevitably lead to a shift in the power structure of content production, the challenge in this context is not to influence users to behave as the museum would behave but rather to communicate the quality standards of the museum in order to allow users to make informed decisions about their filtering activities.

If we regard the activity of content filtering as a content production process – overall, the process of rating is a production of metadata – then the challenge turns into a content assessment threshold that defines on a meta-perspective "what makes up a good contribution". Besides the emergence of standards for content quality or the formal description of the demands upon content, a third perspective can be

183.see <http://slashdot.org/>, retrieved 08/11/2008

184.see chapter 2.3.3 *Management of contributions*

deduced from game related principles and specifically role playing.

In this specific type of games, both in the digital domain as well as in non-computer mediated environments, players take up roles that are defined through a generic description and fill these roles with their own interpretations while performing an overall game.



Picture 17: Become a secret agents, an example for user roles in Club Penguin
source: www.clubpenguin.com, retrieved 23.11.2008

Applied to the context of user-created content environments, the question emerges whether roles can be designed in such a way, that concepts of content quality as well as content expectations become embedded within the roles and allow users therefore to better understand demands for content quality and to enforce them.

A practical application of this concept can be found in Club Penguin¹⁸⁵ (New Horizon Interactive/Club Penguin Entertainment, 2005), an online environment aimed at children between the age of 6 and 14. Users in Club Penguin are depicted as penguins and can collect or buy items and chat with each other. As a unique selling point, Club Penguin provides a highly moderated environment and therefore a relatively safe place for children. In order to provide this tight monitoring, Club Penguin encourages users to take part in the monitoring process by becoming a "Secret Agent". With the status of a "Secret Agents" users receive items that can be attached to their avatar and additional missions but are also asked to become "[...] the eyes and ears throughout the Club Penguin world" (Club Penguin, Become a Secret Agent) (see also picture 17).

185.see <http://www.clubpenguin.com/>, retrieved 12/08/2008

While it would go beyond the scope of this thesis to discuss the ethical implications of the "Secret Agent" concept, the example illustrates, how users can take part in the monitoring of processes through the use of pre-defined roles.

A similar concept of roles can be also found in SF0, where users can become members of a group (see figure 29 for an overview of SF0 groups). Groups in SF0 define a constellation of conforming and conflicting interests between groups of players and allow alternative solutions ("praxis") based upon the paradigms of the group.

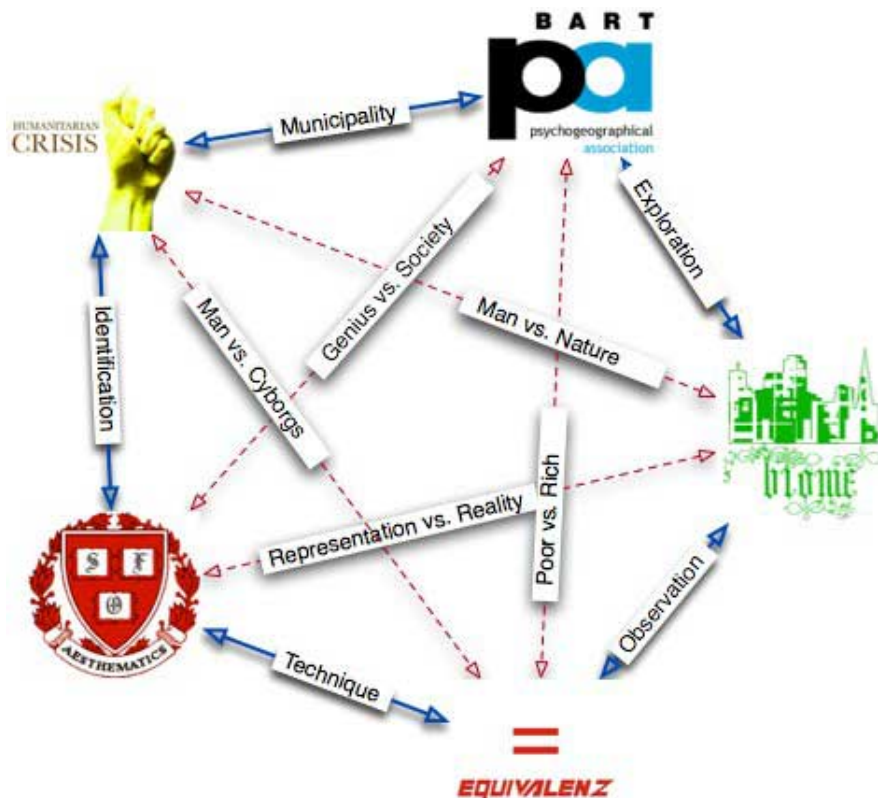


Figure 29: Group relations in SF0
source: <http://sf0.org/groups/>, retrieved 5/08/2008

Through these alternative solutions, the application of the group concept as an alternate to the concept of roles allows in principle the creation of a dynamic interaction and competition between the different groups.

In contrast to the role-oriented models in Club Penguin and SF0 which both lead to consequences in the actual use of the application, current.tv applies a concept of levels of activity which reflects user activity and offers a symbolic representation rather than functional roles.

Even though levels in current.tv are only symbolic and carry no intrinsic abilities as in the case of the functional roles model in Club Penguin, the concept of levels in current.tv also communicates reputation as levels depend upon the overall time of engagement and activity. Based upon this individual reputation, levels can perform

a function in the review process as well. e.g. in the practical process of giving feedback where the feedback of long time contributors with a higher reputation gains more relevance.

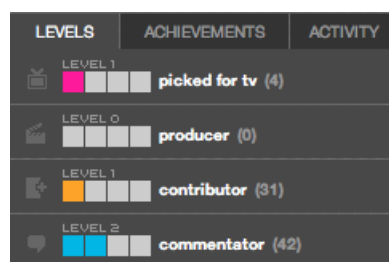


Figure 30: Levels as symbolic representation of user activities in current.tv
source: <http://current.com/users/>, retrieved 12/10/2008

As it had been discussed in the previous examples for the impact of the production process upon the engagement of users¹⁸⁶ a similar pattern of entanglement¹⁸⁷ between the different domains of user-created content environments becomes apparent in these examples:

Even though levels and roles provide a function in the management of user contributions they also have an impact upon the engagement of users. With a concept of levels that referred to activities and time of engagement, the outlook upon higher levels in current.tv can create a motivation for users to continue their engagement over time, therefore leading to a sustainability of motivation. The Secret Agent role in *Club Penguin* follows this pattern as well, as users can become Secret Agents only after a certain time of engagement.

A point of departure for future research in the design of such roles and levels could be provided in an inversion of the personas model as it is applied in the context of usability engineering (see [Alan, 1999]). Personas represent in this context fictional persons that are characterized in order to represent potential users of a software product. An inversion of this principle by turning the idealized descriptions into roles for users could be applied in order to guide users towards certain expected outcomes and behaviours.

4.3 Exploration

The following section presents and discusses examples for the application of the previously identified design principles for user-created content environments.

Chapter 4.3.1 *Userette* discusses the userette project that allows users to publish loca-

186. auto-telic activities can provide engagement, see chapter 4.1.3.3 Flow and auto-telic activities

187. see also the relationship between production, management and engagement as discussed in Figure 20: *Entanglement of production, management and engagement in user-created content environments*
source: author, page 97

tion based text descriptions and images on the web via their mobile phones. The main intention of the project was to make use of the ubiquity of mobile phones in the public in order to analyze potential connections between real and virtual environments. In terms of content formats, userette explored the potential of a supplement-able format with non-rivaling contributions. In a review of the project users of the system were also interviewed about their motivation for publication.

The Questalicious project discussed in chapter 4.3.2 *Questalicious* offers a more generic approach to user contributions by providing a web framework that integrates different formats for user contributions and a variety of connections between real and virtual environments. The chapter discusses also different approaches towards engagement as well as the practical implementation of these approaches.

4.3.1 Userette

The userette project was developed at the Bauhaus-University of Weimar, Germany in the context of the Locative Media Framework seminar during the summer of 2006. The main objective of the project was to provide a more coherent overview about the annual end of year exhibition (Mediengang) at the Bauhaus University. As the event itself took place over the course of three days with parallel presentations on various locations, it became difficult for visitors to decide upon which location to visit at a certain time. userette offered a solution to this problem by aggregating and publishing snapshots that were sent in by visitors of the exhibition through the multimedia messaging service (MMS) of their mobile phones. Those snapshots were in turn published on the userette website and were accessible through a generic web browser and a special WAP interface.

4.3.1.1 Interaction concept and content format

Two separate interaction concepts were developed for *userette*.

- I. for content retrieval and
- II. for the creation and publication of new content.

I Content retrieval and browsing

Content retrieval was enabled on two different platforms (see figure 31). A generic web interface supported browsing of published contents based upon the time of publication and upon the location which the contribution referred to (see picture 18 for a screenshot of the html interface).

A WAP output intended for use with mobile phones (see picture 19 for a screenshot of the WAP interface) had been included to allow for mobile access to the site as the intended use case focused to a large degree upon mobile access. In comparison with

the html site, interaction with the the WAP site was limited due to interaction constraints on the mobile phone (screen size, navigation) and included therefore only browsing by location.

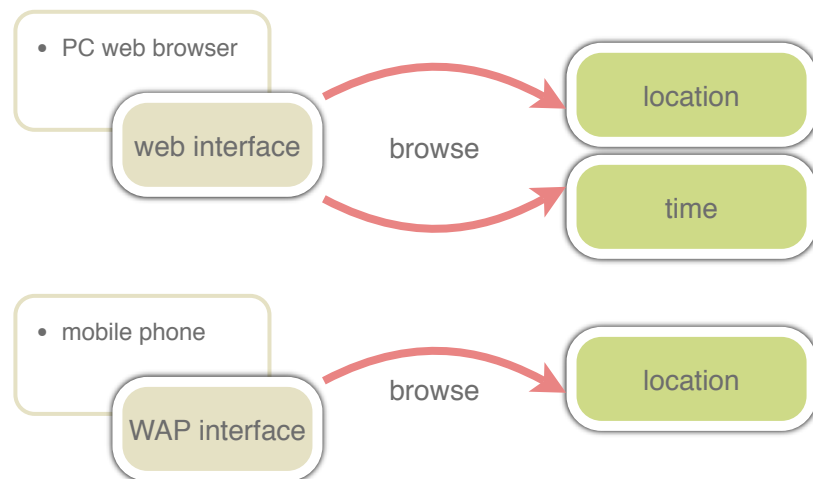
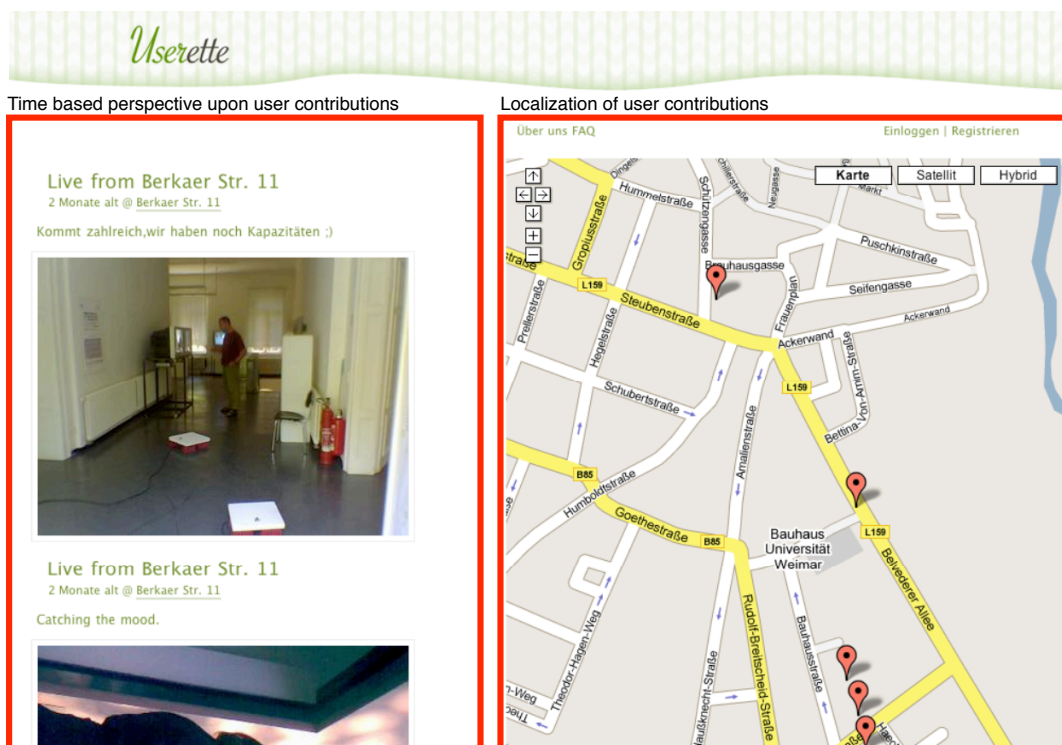


Figure 31: Content access in userette
source: author



Picture 18: html interface of userette. User contributions can be browsed according to the time of publication on the left side and based upon the location of the contribution on the right side.
source: author

II Content creation and publication

The second interaction concept focussed upon the content creation and publication part of userette. On purpose, the contribution format was simplified and reduced to the publication of text and images with an emphasis upon images, as images offered the ability to mediate a broader perspective upon a certain location.

Again, two technical platforms for content publication where included:

- A stationary scenario where users could upload images and enter text through a generic browser and
- a mobile scenario that made use of MMS to publish content.

Due to the given ability of most modern mobile phones to create images and to send them as MMS messages, the combination of MMS and photos was also regarded as a low technical threshold for content production.

Localization was conducted through an integration of toponyms in the MMS. As the MMS standard offers the possibility to send messages to both mobile phone numbers as well as e-mail addresses, a system of location specific e-mail addresses was implemented that automatically localized contributions based upon the e-mail address to which these contributions were sent. Even though the system therefore showed a potential source of localization error as wrong localizations could take place by using the wrong e-mail address, the concept was preferred in comparison to the integration of GPS enabled phones due to the far higher proliferation of MMS capable phones in comparison with GPS enabled phones.



Picture 19: Screenshot of the WAP interface of userette.
source: author

This aspect gained particular relevance as in comparison to projects focussed upon the technological feasibility of image localization like for example in the Framedrops project [Gross and Kleppe, 2005] the integration of user contributions was put in the foreground. In this context, a significant impact of participation inequality was expected and therefore a large base of potential users became a requirement that could at the time of the experiment not to be fulfilled with the use of GPS phones.

Figure 32 provides an overview about the content production process in userette. The process consists of three steps that need to be conducted by the user:

- I. the user creates an image of a local scene
- II. she identifies the local toponym
- III. based upon the image the user creates a MMS that is sent to an e-mail address defined by the toponym and a generic host address.

Once the MMS is sent, the publication process is automatically initialized and the content published on the website.

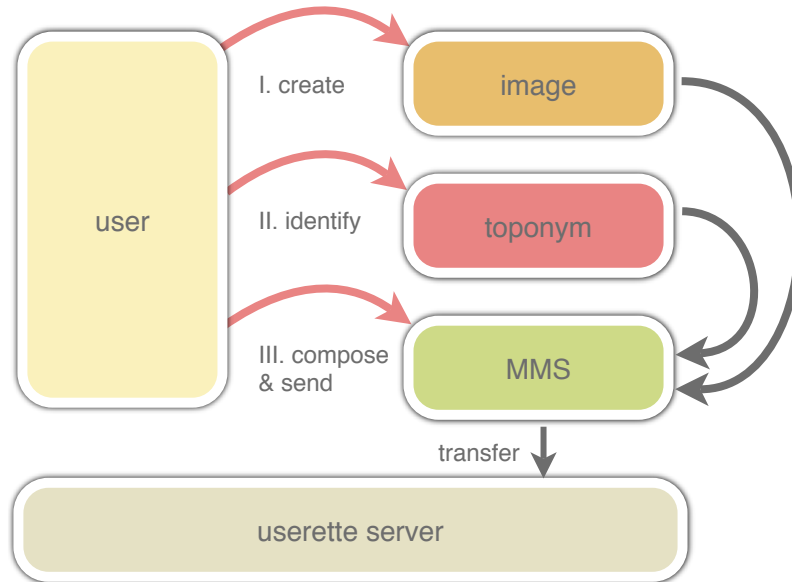


Figure 32: Content production process in userette, MMS source: author

The content format applied can be categorized as a supplement-able and non-rivaling contribution format as contributions with newer time stamps supplement older contributions for a specific location while at the same time contributions for a certain location do not prevent other contributions for the same location.

4.3.1.2 System architecture and components

In the implementation of the userette project, three main components were realized:

- I. the technical implementation of the *userette* server
- II. a localization scheme based upon toponyms
- III. marketing material intended to raise awareness and interest in the system.

I The userette server

The userette server provided the required technical functionality of the project and combined functions for the creation, distribution and storage of content. As such, the userette server consisted of different technical modules interacting with each other (see figure 33):

- I. An IMAP Mail Server that received the pre-formated MMS messages in the internet e-mail format.
- II. The userette server software, a Python application developed using the Django web-framework¹⁸⁸ which provided
 - a. An e-mail parser that parsed incoming messages and stored data in a mySQL database (text content of the messages and user-ids) or in the filesystem (images and BLOB (binary large objects) in general)
 - b. A template based html and WAP renderer that retrieved the data from the mySQL database and the file system. Output of the renderer was delivered through a lighttpd¹⁸⁹ based web-server.
 - c. An SMS gateway used to send confirmation messages

At the beginning of the project, an implementation in a different Python-based web-framework (Turbogears¹⁹⁰) was intended. During the development process several limitations of this framework in particular in relation to the documentation of functions and bug-tracking became obvious which lead in consequence to the decision to apply the better documented Django web-framework. Overall, the use of Python and the Django web-framework environment allowed for a fast development and prototyping cycle.

A specific challenge for the development of the server component emerged from the formatting of the MMS based e-mail input. Standard MMS (see [Open Mobile Alliance, 2008]) allows for a high degree of flexibility in relation to the output as any kind of content can be automatically adapted depending upon the intended output device. This conversion of content is performed by the mobile phone service provider of the sender through the MMS Proxy-Relay (see Ibid., page 11).

Practical field tests of MMS2email delivery by the four major mobile phone service providers (T-D1, Vodafone, E-Plus and O2) in Germany lead to the result that each single one of them followed its own content conversion strategy. Content elements (in the case of userette: text and image) were embedded in generic content of the service provider and sent as html-based e-mails, depending upon the service

188. see <http://www.djangoproject.com/>, retrieved 10.11.2008

189. see <http://www.lighttpd.net/>, retrieved 12.11.2008

190. see <http://turbogears.org/>, retrieved 12.11.2008

provider with attached or encoded text and image data.

This practice made it necessary to develop a special filtering method for each service provider. Fortunately it was possible to trigger the different filters through analysis of the host address of the e-mail message, as these contained the clear-text names of the respective service provider. Nevertheless, this filtering strategy relies due to its dependence on text-scraping upon a relative stability of the MMS format. While this stability was given in the course of the experiment, the formats used by the service providers might differ over time, requiring a constant adaption of the filters.

After the successful parsing of incoming messages, the data is stored in a mySQL database and in the filesystem. Based upon the unique sender ID – the mobile phone number – an association with the user account is made in case of a publication conducted by an already existing user or a new user account is created and the content is associated to this account. Finally a confirmation message is sent to the sender of the MMS utilizing the phone number of the user.

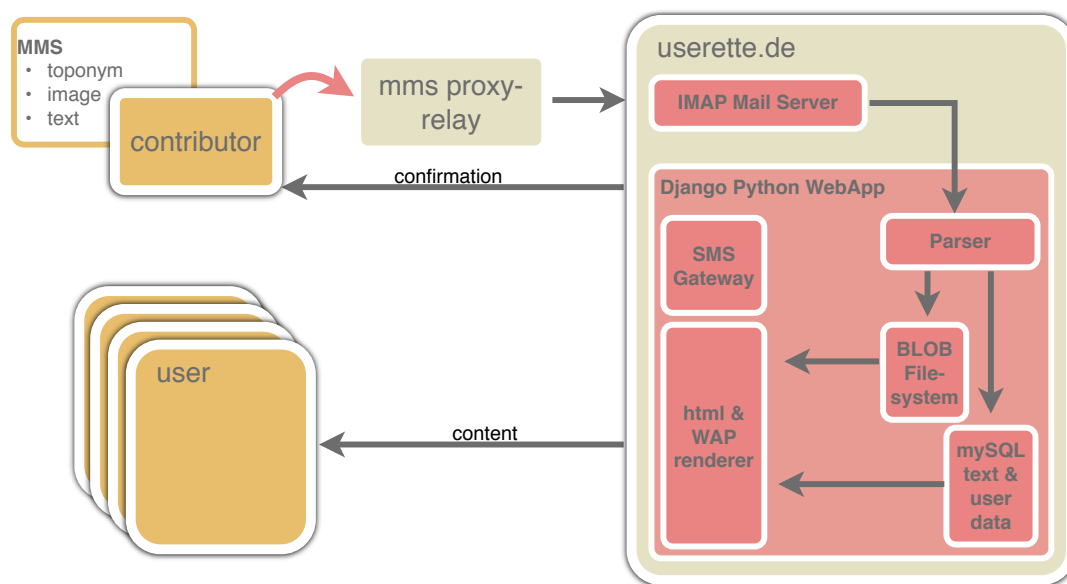


Figure 33: System architecture userette
source: author

In terms of content distribution, the html and WAP renderer directly access the stored data and publish it dynamically on the site. Unless the content contributor associated an alias for his mobile phone number on the web-site no personalized information is associated to the published contribution.

II Toponyms and localization scheme

The localization scheme applied in userette was based upon posters with an instruction for contribution and a location specific e-mail address. The e-mail address used referred to toponyms that were already established in the target group and conven-

tionally used in everyday life. Picture 20 shows an example of a poster used in the Marienstrasse 18, conventionally abbreviated as m18.



Picture 20: userette poster and localization component
source: author

III Popularizing the service

In order to make users aware of the service within the timeframe of the *Mediengang*, different marketing materials were developed. These materials consisted of flyers that presented in brief the features of the system and re-wrapped chewing gum giveaways with the name of the service (see picture 21).

4.3.1.3 Review of the experiment

In relation to participation numbers, the userette project encouraged surprisingly few participants to contribute. Within the three days of activity, only 5 users contributed using the MMS content production environment and no user published more than once. In a review of the postings provided, a number of hypothesis for this low number of contributors were developed:

- the relative novelty of the service
- a lack of acceptance in using mms services
- high thresholds in relation to
 - conceptual and

- content assessment thresholds
- problems in the communication of the purpose of the service
- a lack of motivation for contribution
- potential technical problems in the filtering process

As the telephone numbers of the contributors were retrieved from the messages and stored in the userette database, telephone interviews with the contributors were arranged within two weeks after the event took place. All five contributors agreed to take part in the interview and allowed a recording of the telephone conversation for later analysis. As within the small sample group a quantitative evaluation would show only limited significance and due to the early stage of development of the project, a structured qualitative interview was applied.



Picture 21: userette flyer (left) and chewing gum wrap (right)
source: author

The interview consisted of three questions and an optional fourth question that was added after the first two interviews:

- I. Context of the question: usage
Text: Did you experience problems in the use of MMS?
 - A. (enquiry 1) do you use MMS often?
 - B. (enquiry 2) do you use SMS often?
- II. Context of the question: comparability

Text: Which services would you regard as similar to *userette*?

III. Context of the question: improvement)

Text: What did you miss in *userette*, what should be improved in future versions?

IV. Context of the question: Why did you use the service?

Interviews were conducted in German and all interviewees were native German speakers.

The evaluation of the interviews showed results in three different domains:

First of all, users were not accustomed to the kind of service provided by *userette*.

One of the users compared the service with Flickr or a weblog service but didn't refer to the user contribution aspect of *userette*. As users couldn't find any comparable service it is also doubtful, whether users identified a particular use of the service for themselves. In consequence, this argument also leads into a significant conceptual threshold: as the use of the environment is not obvious for productive users, the nature of the required content is also not obvious.

In terms of improvements, one user suggested increased feedback towards the contributions as only a single SMS was sent in return. Another user also expressed the demand for further feedback and in particular additional information about the activities of other users. In relation to their motivation for contribution, three users described themselves as early adopters who try out new technologies without necessarily expecting any practical use value from this activity.

Even though the evaluation of the *userette* project shows limited significance due to the small group of active contributors, the responses of the contributors provide additional insight in relation to the previously discussed concepts of user-created content environments.

In this context, the request for additional feedback underlines the demand for users that perform the role of observers or more general the role of an audience. Without an audience, a significant motivation for contribution is lost as users contribute only for themselves without the positive feedback of an audience or the reassurance that their contributions led to interest.

The *userette* project referred to a large degree upon an altruistic motive of "help" to create information for all visitors of the event (see the marketing material depicted in picture 21, page 172). Overall, the motivation provided through this motive was not sustainable enough in the context of the project. Hence a stronger motivation

and personal use value are suggested for future projects.

In *userette*, content was organized in relation to the place and time of publication and not in relation to the author who actually created the new content. In hindsight, this organization principle and the presentation of content can be contrasted with recently emerged web services like Twitter¹⁹¹:

Twitter provides a relatively similar setup in comparison with *userette* but instead of focussing upon the use of MMS, Twitter applies SMS both as a means of content production as well as publication. Users can write SMS to the service or publish their messages online and other users can in turn subscribe to these messages which are then delivered either through a web site or an SMS.

In direct comparison, Twitter refers to a far stronger degree to the concept of authorship and audience than *userette* did and allows due to this approach to tap into other motivational domains than *userette*.

Another inherent limitation of *userette* emerged from the decision to use MMS. The initial decision to use MMS was based upon the relative similarity of the process with the creation of SMS, a practice that was regarded as very popular within the target audience. After conducting the experiment, this pre-assumption had to be adapted: Even though the production process to create a MMS is relatively similar with the one required for the production of SMS, it can be argued that a relatively large group of users never tried to actually send an MMS before. Also the process of MMS creation differs between device manufacturers so that no generic description of the process could be provided. In this context, the entry of the e-mail address provided difficulties: Due to the use of toponyms in the e-mail address, the beginning of the e-mail address had to be entered manually for every new location (already used locations could be stored with some devices) thus rendering the process of addressing the contribution into a relatively long and cumbersome process.

An alternative model to this process can be seen in the use of hashtags in Twitter. Hashtags are single words in a textual message in Twitter which are marked by a hash and allow to contextualize and sort incoming messages¹⁹². Similar to their more generic use in Twitter, this concept could have been applied to localization as well. Interestingly, hashtags are a practice that emerged from the actual use of the

191.see <http://www.twitter.org>, retrieved 10.12.2008

192.see <http://twitter.pbworks.com/Hashtags>, retrieved 03.02.2008 for an introduction into their development and use in Twitter.

environment and can be therefore regarded as a part of active shaping and re-shaping as it has been described in chapter 2.2 *Classification and Ends of user contributions*.

As MMS creation was regarded as a process external to userette, significant technical thresholds in the production of MMS might have therefore emerged that were not lowered within the userette environment. Due to these difficulties, the initial idea of a very low threshold for production was not achieved.

4.3.2 Questalicious

In contrast to userette, Questalicious followed a broader approach towards user-created content and offered an adaptable and extendable environment for the exploration of user contributions. In the experiments and prototypes that were developed in the context of Questalicious, three primary aspects were explored:

- I. The connection between Questalicious as a web site and other environments both in the real and in virtual worlds
- II. The design of engaging activities
- III. The implementation and exploration of formats for contribution

The following sections will discuss the results of these experiments as well as the design of different prototypes. An outlook upon potential future extensions and developments will be given as well.

4.3.2.1 System architecture

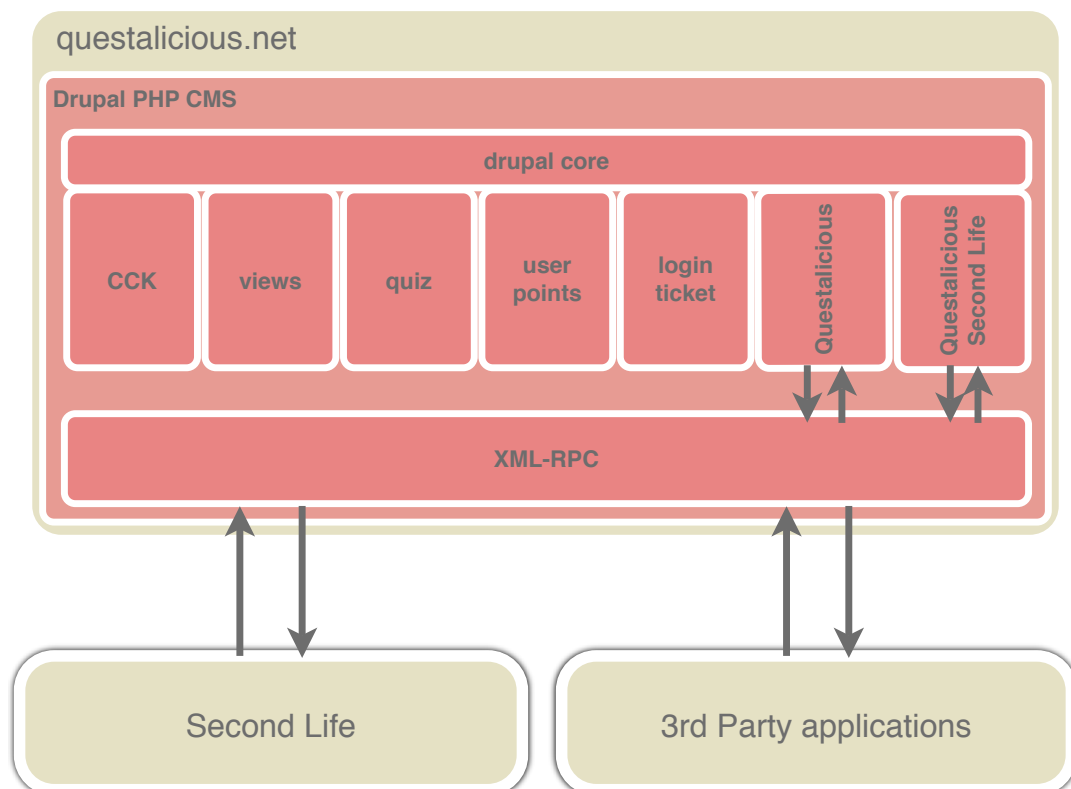


Figure 34: Questalicious architecture
source: author

Questalicious consists of several modules which were developed for and implemented in the open source Drupal¹⁹³ Content Management System. Drupal offers a wide variety of existing modules that allow additional functionality to be integrated and therefore enables the creation of working prototypes in a relatively short timeframe. Based upon existing third party modules two additional modules were developed that extend the primary functionality of Drupal in terms of its connection to 3rd party applications and in particular Second Life. Figure 34 shows an overview of the Questalicious architecture.

4.3.2.2 Connecting real and virtual environments

In the following section, different connections between real and virtual environments will be discussed. Such connections between real and virtual environments follow the idea of the virtuous circle¹⁹⁴ as a condition for the continuous engagement of museum visitors with a virtual environment in the post and pre-visit phases of the museum visit and are therefore a point of departure for the implementation of user contribution strategies.

I Quest cards

The concept of quest cards was developed with the intention of connecting museum environments that either do not apply digital media in the exhibition space or apply digital media which have no connection to external data storages with a virtual environment.

Quest cards consist of printed cards that present a single quest to the visitor. The design of the quest is in the example of the Space flight quest card (see picture 22) arbitrarily cryptical and intended to be solved by means of the exhibition or an intense examination of the subject matter.

Besides the quest itself, the card contains a unique ID, a reference to the associated web site and a set of rewards. Rewards can either refer to a virtual environment, as for example a new dress for use in Second Life, or refer to real world environments by providing for example a free re-entry to the museum.

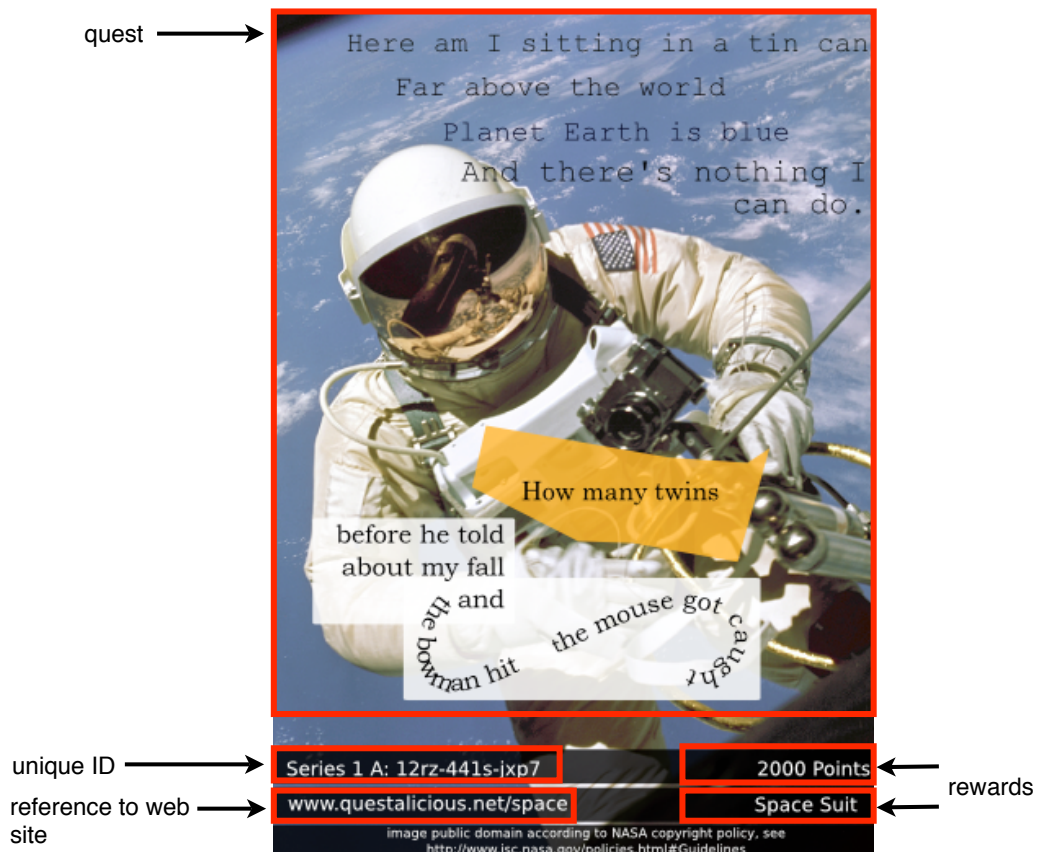
Through the application of a unique ID, the rewards that are associated to the quest card can be redeemed only once. Due to this approach, the cards and the as-

193.see <http://drupal.org/>, retrieved 10/05/2008

194.see chapter 3.2 *From visitor to user: the virtuous circle*

sociated rewards become unique, an aspect that further enhances the value and meaning of the cards.

The concept of quest cards is derived from the alternate reality game Perplex City¹⁹⁵ which successfully applied Perplex City puzzle cards in the engagement of a large audience. In the museum environment, such cards offer the potential to build up a connection with a website without the integration of digital media technology in the exhibition space itself. Furthermore, the sale of quest cards could become an additional source of income for museums.



Picture 22: 'Space flight' example quest card
source: author

The design of quest cards provides two major design challenges: on the one hand, several formats of questions have become obsolete in the context of web search engines like Google. On the other hand, the difficulty of the quests needs to be balanced in order to enable visitors to sustain interest and to solve the quest.

An informal evaluation of the quest card presented above with a group of five potential users underlined this problem: without guidance through the solution process, users lost interest in the quest relatively fast. In contrast, users that received guidance and occasional hints reported that they enjoyed the process and felt en-

195. see <http://www.perplexcity.com/>, retrieved 10/02/2008

gaged by the quest cards.

II 4D cinema

The following concept for a connection between a real world environment and Questalicious had been developed in cooperation with the Technical Museum Stockholm, Sweden.

The Technical Museum Stockholm operates a "4D" cinema which screens educative movies in a force-feedback environment. In order to continue the engagement in an online context, a connection between the real world environment and *Questalicious* became necessary. As every movie session in the 4D cinema contains an interactive part where visitors answer questions through a remote control that is placed next to the visitors seat, it was decided to transfer the results of this quiz to a web environment where visitors could find out about their own score as well as the questions of the quiz.

The particular challenge in this environment emerged from the connection between the quiz results which were stored on a computer in the cinema environment and the actual user. Due to financial constraints, the connection between the environments should be designed as effective as possible and preferably with a late personalization, therefore without the association of results and personal user data in the 4D cinema environment.

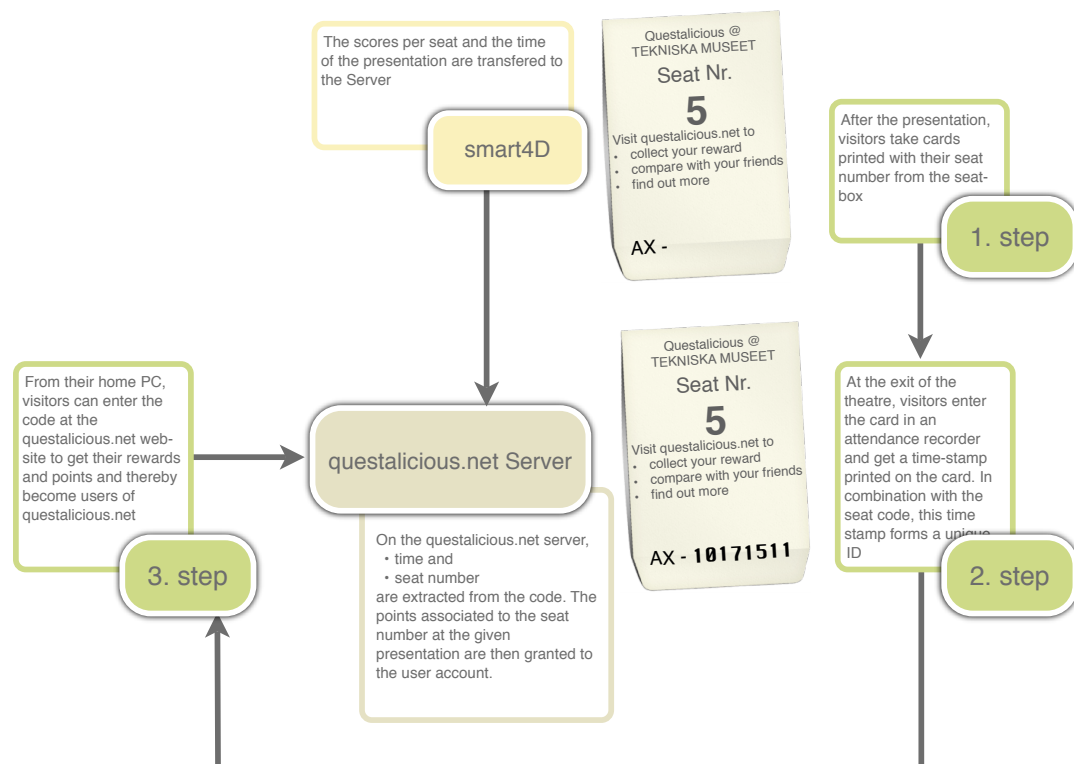


Figure 35: Connection between the 4D cinema and Questalicious
source: author

Figure 35 illustrates the concept that had been developed in order to solve this problem.

After the end of a movie session, the results of the quiz are transferred on a per seat basis from the smart4D server to the Questalicious server using XML-RPC calls.

Attached to each seat, the visitor finds a card with an imprinted seat number.

Upon leaving the cinema, the visitor enters the card in a "classical" mechanical attendance recorder that prints the current time upon the ticket.

Back in the home environment users can log in to the Questalicious environment and enter the code printed on the card. The code itself is at this stage composed of a generic combination of letters that encode the seat number and a time stamp from the attendance recorder. Based upon these two codes, the Questalicious server identifies the session that was attended in reference to the time printed and the seat in reference to the seat code. Once an association is made, the results of the quiz are transferred to the user account.

Even though fraud becomes an option in this scenario as visitors could take seat cards that do not belong to their seat, the risk associated with this behavior is relatively low and the consequences of abuse minor.

4.3.2.3 Contribution formats in Second Life

Questalicious is built upon the concept of quests as engaging tasks that users can conduct. Quests thereby consist of a particular challenge that a user completes once he publishes a solution. Such quests can take place in different environments both in the real world as well as in virtual environments. Besides being a platform for the distribution of quests and the personalized collection of quests as well as the aggregation of solutions Questalicious provides therefore also gateways that connect different environments with each other.

Within the Questalicious project, quests were reviewed as a contribution format with non-supplement-ability in both rivaling and non-rivaling contributions (see table 7).

While the concept of rivaling/non-supplement-able quests has been described in relation to the concept of quest cards in the previous section, the following section refers to a different quest format that applies a non-rivaling/non-supplement-able design.

	supplement-able	non supplement-able
rivaling contributions	-	Example: <i>Space flight</i> questcard Correct solutions are identical for all users
non-rivaling contributions	-	Example: <i>Las Meninas</i> re-enactment Users perform a re-enactment together, the documentation of this re-enactment forms a coherent entity that is not supplement-able. Different re-enactments can exist in parallel.

Table 7: The quest format in relation to rivaling and supplement-able solutions
source: author

As it has been pointed out before¹⁹⁶, Second Life provides due to its integrated authoring tools and the large potential solution space several opportunities for user contributions in the context of museums and cultural heritage. Nevertheless, content creation in Second Life is a difficult process that limits due to the relatively high threshold for content production the amount of potential contributors. In search for a content format that allows a variety of activities for users with different skills, the concept of re-enactment in combination with the quests format in *Questalicious* provided an interesting point of departure.

Re-enactment describes in the following the performance of a specific scene or a particular context. In contrast to the creation of objects, re-enactment in Second Life requires no further skills from the user than the ability to navigate in the environment and to communicate with others. Per se, re-enactment provides an activity that users can perform but not an act of content creation. In order to turn the activity into a content production process, a further documentation activity had been integrated where the user performance is recorded by other users with the goal of publishing these recordings as videos or images on a web-site.

In order to explore the potential of this format in Second Life, different elements of a re-enactment were developed:

- I. generic roles that users can choose from,
- II. a setting in which the re-enactment takes place,
- III. a common goal for the participants of the re-enactment,
- IV. individual goals for each participant that conflict with the goals of

196.see chapter 3.4 *Virtual worlds in Museums and Cultural Heritage*

the other participants

I Generic user roles

To provide activities for different levels of engagement, generic roles were developed that allow the integration of a variety of users with different abilities and interests:

- I. Highly active users in the re-enactment group that perform characters of a painting
- II. Editors that record, document and publish the performance
- III. Viewers that review and comment the performance

II The setting

For an initial experiment, the painting *Las Meninas* by Diego Velázquez¹⁹⁷ was chosen as a setting for the re-enactment and its constellation of characters as well as the spatial setting reconstructed in Second Life (see picture 23).

The decision to choose *Las Meninas* as a setting for the re-enactment experiment is based upon several factors. First of all, the painting itself depicts a relatively small group of 9 persons (11 including the persons depicted in the mirror) which allows in contrast to pictures that show larger groups or single persons or couples to find an appropriate number of re-enactors for the performance. Second, the historical background of the different characters is well documented and analyzed (see for example [Kahr, 1975]), thereby providing a point of departure for the development of character descriptions. Furthermore, the use of perspective in *Las Meninas* and the particular position of the viewer raised several questions towards the perception of the painting and lead to intense discussions which offer a wide network of potential references to a variety of fields.

197. *Las Meninas* (1656, Diego Velázquez, Museu de Prado, Madrid, Spain)









Picture 23: Screenshot of the preparation of the re-enactment of Las Meninas
source: author

Due to these features, *Las Meninas* has been treated in different media before, for example in the virtual construction *Las Meninas* (Bizri, Johnson, Vasilakis: 1997) or in short movies like *89 seconds at Alcázar* (Sussmann: 2004). Again, these additional references can be seen as an enhancement to the network of references and therefore a potential source for the development of characters and activities.

In the reconstruction of the room within Second Life, characteristic features such as the paintings on the wall or colour and texture of the room itself were omitted in order to allow for an abstraction of the setting.

III Common and individual goals

The setting of a common goal allows to define a frame for the activities of all members of the re-enactment group. By defining individual and conflicting goals, a further element of dynamics is added to the constellation of the characters in the painting. In the experiment, the common goal of all actors was to convince the rest of the group that their specific point of view upon reality is correct. The specific perspective was pre-defined on a *Questalicious* page and differed between the characters where some regarded themselves as members of the spanish court in the 17th. century whereas others saw themselves as users of Second Life in the 21st century. Table 8 displays the different characters of the re-enactment, their backgrounds as well as their personal individual goals as they were presented to the users.

	Character Name	Background	Goal
	Margarita Teresa de España	Margarita is in this painting 5 years old. At the age of 16 she will marry her maternal uncle and paternal cousin, Leopold I and become a Holy Roman Empress, German Queen, Queen of Hungary, Slavonia, Croatia and Bohemia and an Archduchess of Austria. She will die at the age of 21 after giving birth to six children.	-
	doña Isabel de Velasco	You are a lady-in-waiting or meninas and you are at this court in order to please the infanta	It is the year 1656 and you have the honor to be a meninas at the spanish court. And thats where you are. Or not?
	doña María Agustina Sarmiento de Sotomayor	You are a lady-in-waiting or meninas and you are at this court in order to please the infanta	It is the year 1656 and you have the honor to be a meninas at the spanish court. And thats where you are. Or not?
	Maribarbola	You suffer from a genetic defect that limits your growth. Some sources suggest that this defect is related to Achondroplasia which can be sometimes also related to inbreeding. Your time is obsessed with hierarchies of all living things and in the category of humans your genetic flaw puts you in the lowest category.	At this court it is your job to entertain the infanta. Even though basically all her family suffers from genetic defects due to inbreeding she hasn't been harmed at all. Make the other characters doubt about the infantas descent. But be careful, this court is a lions den.
	doña Marcela de Ulloa	You are the chaperone of the princess. Due to unknown reasons you are dressed in mourning.	You play a renaissance character at a conference about virtual worlds. Exactly like the other ones do. Or do they really? Find it out and convince them, in case, of the truth.
	guardadamas	Every single person in this painting had been identified besides this character. Some sources suppose that he is a guardadamas, something comparable to a modern bodyguard.	You fell from grace. While every other person is remembered, you are forgotten and nobody knows why. Try to make up for whatever you did and guard the court against any heretics and sceptics.



	Don José Nieto Velázquez	The queen's chamberlain and the head of the royal tapestry works.	Are you coming or going? The thing you know is that this dynasty will disappear and all its members with it. A reign that lasted for centuries and a debt that was paid for by humans suffering from inbreeding. What could be more artificial or unreal?
	Diego Velázquez	The painter of this amazing image.	Who is to tell if we are the observers of this image or if we are observed by the characters in the painting. You are the artist, so support every interpretation that comes up.

Table 8: Characters backgrounds and goals in the 'Las Meninas' re-enactment
source: author

The choice of constellations and relationships is not entirely based upon a verified historical background but a reference to different interpretations of the characters inspired and influenced by the existing network of interpretations in other media.

In the initial planning of the experiment it was intended to provide the role of Margarita Teresa de España as a character. Due to several discussions within the Second Life community about the depiction of Avatars as children¹⁹⁸, the character of Margarita Teresa de España was replaced with a transparent block displaying a wallpaper of the character from the original painting (billboard).

IV System architecture

The system architecture implemented of the *Las Meninas* project made use of the already existing Questalicious infrastructure and aimed at providing a connection between Second Life and a web-environment. As only relatively few but productive users make use of Second Life in comparison to the overall user population of the Internet¹⁹⁹ it became therefore relevant to develop connections that allow users which do not participate in SL to retrieve content and thereby become an audience for creations in Second Life. Also accepted practices such as forums, comments and

198. see for example http://wiki.secondlife.com/wiki/User:Marianne_McCann/Child_Avatars, retrieved 12.12.2008

199. see chapter 3.4.2.1 Features of Second Life

rating mechanisms are available in web-environments and can be used to organize as well as encourage productivity in Second Life. A final rationale for the creation of a coherent connection between Second Life and a web-environment is found in the creation of consistent profiles which allow users to access and organize their contributions and activities in both domains.

Figure 36 shows the interaction diagram of the re-enactment experiment.

Interaction with the *Las Meninas* re-enactment started in Second Life with the visit of Brighton University Island, a virtual island owned by the University of Brighton and kindly provided for the preparation and performance of the experiment.

Once users arrived on the island, they connected with the website and thereby subscribed into the re-enactment by clicking upon a connection object (in this case, the model of a vending machine in front of the reconstructed *Las Meninas* room. This click upon the connection object created an HTTP POST request to the Questalicious server which transferred the time, location in Second Life and name of the Avatar that performed the click.

With this information, a new user account was automatically created on the Questalicious server and an http-response object composed that contained a link to the generic role selection page on the *Questalicious* server.

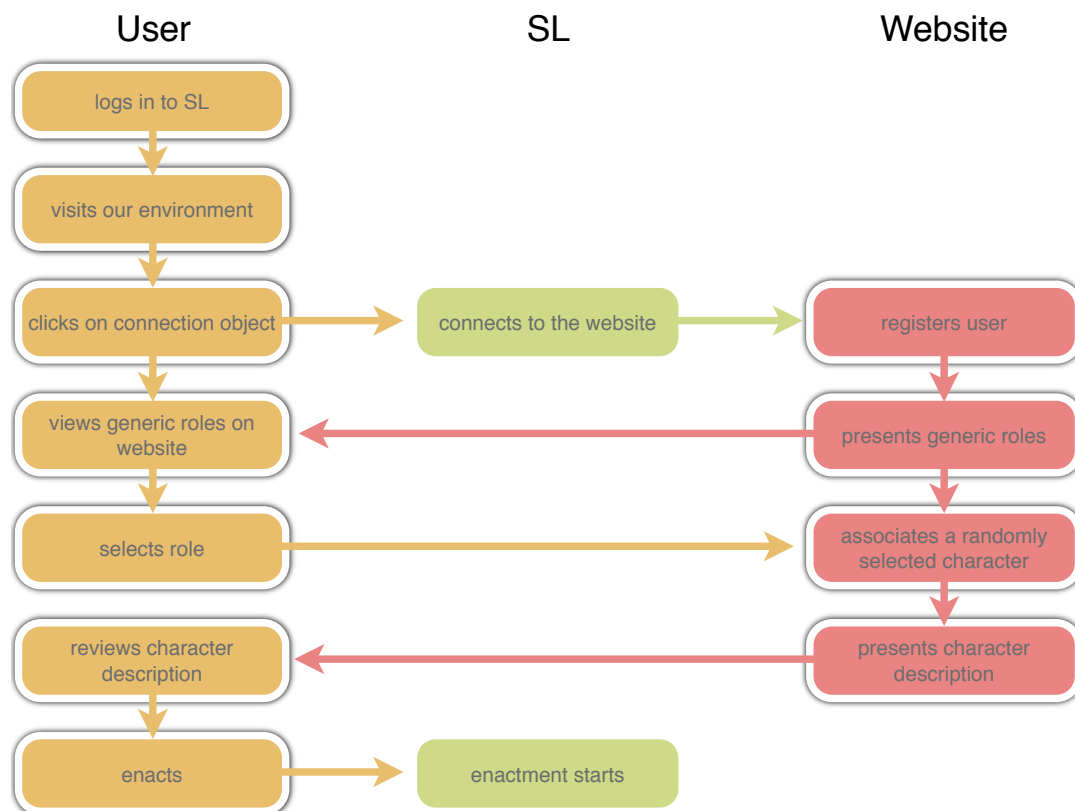


Figure 36: Interaction diagram in the re-enactment experiment

In case the user selected on this page the generic role of a character, a character from the list of available characters was randomly associated to the user on the *Questalicious* server and a further http-request was sent to Second Life that opens a page with the description of the character to the Avatar. Any subsequent click upon the connection object by the same Avatar led again to this page.

After the users reviewed the character descriptions and objectives, the re-enactment commenced.

V The experiment

The experiment was conducted at the *Creative Tinkering* workshop during the re-Live08 conference in Milton Keynes in November 2008.



Picture 24: Enactment of Las Meninas at the Creative Tinkering workshop, reLive08
source: Jos Boys

9 users of which 5 decided to take part in the re-enactment group were observed during the 10 minute re-enactment which was followed by a group discussion focusing upon the experience of the users with this form of engagement. Participants were to a large extent avid users of Second Life with only two users beginners in the environment.

While users referred to the re-enactment as an interesting activity, they demanded at the same time a more concrete definition of tasks and a higher dynamics between the characters. Interestingly, the users also pointed out, that the engagement with the painting in a virtual environment encouraged them to find out more about the painting and to see it in real life if possible.

Users performing the characters also suggested additional material, such as contemporary clothing or gestures that would underline the peculiarities of their character and would allow them to play with these objects while acting.

In contrast to the original intention of the experiment, a recording of the enactment by other users did not take place due to technical problems. Hence, the experiment failed in understanding the surplus value of content creation for other users and investigated only the engaging aspect of reenactments.

Overall, the concept of re-enactment was engaging for the participating users but it

is doubtful, whether the content that could have been created from this session for external users could have provided a significant surplus value, leading to a higher degree of interest.

Nevertheless, the results of the experiment suggest that re-enactments can become a relevant target for user contributions. Contributions are in this context however not necessarily the actual results of the re-enactment, but rather than that the preparation of the re-enactment: The creation of background stories, motives, relationships between characters as well as the design of objects for interaction.

In this case, the threshold for production would be significantly higher and therefore in terms of production potential limited by the available amount of productive users.

5. Conclusion and suggestions for future research

This thesis demonstrated and analyzed the practical use and application of user contributions both in a generic perspective with a focus upon Internet environments as well as computer games and more specific in the context of museums and cultural heritage.

Following the analysis provided in this thesis it has to be pointed out, that user contributions operate within a different context than conventional content production. Whereas conventional content production refers to professional practices that build upon contractual agreements and can therefore rely upon the completion of productions, user contributions do not offer a similar stability and reliability. In contrast, users have no obligation to create content but require instead a permanent motivation to produce content. Based upon this relationship, a tight entanglement between production of content, management of contributions and engagement with the environment or motivation for production becomes necessary. Hence, user contributions can become a substitute for conventional content production processes but a functional one-to-one replacement is permanently endangered by the fluctuation of users to other environments. This situation is further intensified by the relatively low number of highly-productive users in user-created content environments: as the number of users who provide the majority of content is low, the relevance of each highly-productive user for the environment can become significant. Institutions or cooperations that want to rely completely upon user contributions as a substitute for content production are therefore threatened with falling into reliance on highly-productive users which can influence the autonomy of decision making processes within the institution or corporation. This case had been highlighted in the context of the *digg/hd-dvd* case in chapter 2.3.3.3 *Management of contributions*.

Environments that apply a platform oriented approach and have therefore a relatively minor influence upon individual user contributions are similar to approaches that combine user contributions with content produced in conventional production processes to a lesser extent endangered by these dependencies.

Besides its relation to conventional production processes, user contributions also offer a new perspective towards content exploration. In this regard, the content as the outcome of the production process has less significance than the process of production, editing and reviewing. By enabling users to participate in these domains, institutions and corporations can sustain the relationship with their audiences as users

can show a higher engagement with environments that allow them to become productive.

These two principal strategies for the integration of user contributions with corporate/institutional stakeholders are reflected in the design of content production environments as they had been reviewed in chapter 2.3.2 *Content Production Environments*. However, the reviewed environments do not show a clear distinction by implementing either content or process oriented content production environments but instead unify both approaches within the same application through different interfaces with the intention to address a maximum of different user groups.

The motivation of users to contribute on the other hand is an aspect that is closely related to the design of content production environments. Depending upon the complexity of the content production process and its intention as either outcome or process oriented approach, a wide variety of different user motivations can be observed. Even though further evidence is necessary to prove this point, process oriented approaches show a tendency to focus more upon the playfulness of the production process and rely therefore on concepts of "fun to play". On the other hand, existing evidence suggests as well that production processes in process oriented approaches also contain a social dimension that highlights the relationship between different users in the act of production. In this perspective an overlap with the emerging field of social software can be observed that should be further refined.

In outcome oriented production, aspects like "fun to play" show a minor impact whereas social acceptance gained by contributions has a higher relevance. Even though the use of monetary gratification schemes is subject to a controversial theoretical discussion, practical applications show successful implementations of such incentives in particular in relation to more complex content formats.

Current discourse in the analysis of user contribution environments is marked by a relatively limited perspective towards actual user activities within user-created content environments. Nielsen's trinity of highly-productive, productive and passive users is in this regard the most prominent example for such an approach. While his simplified model allows for a macro-perspective towards user contributions and enables it therefore to discover patterns of authorship which are similar to conventional content production environments where a minority produces for a larger audience, the model hides at the same time the practices which are performed by users in user contribution environments and which are not necessarily reflected in the total number of edits. Instead of classifying users in such a scheme the author sug-

gests that it is more fruitful to trace back the actual roles which users play within a specific environment. While this analysis demands for a distinct sociological/anthropological perspective an identification of roles can become an influential factor for the design of applications, e.g. when such roles are reflected in the interface. Further research becomes also necessary in identifying the stability of roles and the adoption of roles by users. At the time of writing, the author is not aware of any research that significantly supports evidence for the emergence of roles as stable states which do not change within the general user population. Individual roles on the other hand can be suspected to change over time, leading to a progression or development of users which results in different forms of contribution individual users conduct over the course of time. In the context of content production environments, the question can be raised to what extent such a process can be supported and encouraged. In particular, whether it is possible to develop career paths that would enhance the sustainability of the relationship between users and institutions/corporations and at the same time if roles and career paths provide in this context a tool for the increasing competition for productive users.

In the context of museums and cultural heritage, user contributions can provide a tremendous potential in the creation of new content but also as a tool for the mediation of cultural content. At the time of writing, this potential hasn't been fully leveraged but museums actively experiment with the potential of user contributions and can refer in relation to the engaging potential of user contributions to a tradition of productive user contributions in non-digital environments. With the application of concepts like the virtuous circle, new connections between real and virtual environments can be established that benefit the use of engaging production processes in the mediation of content. These connections constitute significant extensions to existing practices that focus mainly upon on-site use and therefore require additional exploration.

In relation to outcome oriented user contributions, three different domains show – depending upon the orientation of the specific museum – particular relevance:

- First in the collection of subjective reports and descriptions in the tradition of "oral histories" where museum visitors or for example eye witnesses report and document their very personal and highly subjective experiences. (e.g. in the Museilaboratoriet project²⁰⁰)

200. for the following examples see chapter 3.3 *Visitor and user contributions in the museum environment*

- Second, the findings of amateurs that have significance for the collection activities of museums and are treated with similar standards (see The Portable Antiquities Scheme)
- Third in the development of new content that aims in exploring new perspectives towards the interpretation and mediation of content by highly productive users.

For the later case, relatively few applications can be observed at the moment, not only because the creation of such content is subject to higher thresholds but also as such content production touches the sensitive domain of interpretation and legitimation of alternative readings. An aspect that tends to conflict with the self-understanding of museums as interpreters of cultural heritage and their political role in the development of collective identities.

Overall, the here presented thesis does not lead to a coherent and singular solution for all aspects of user contributions but instead distinguishes user contributions from other modes of content production, maps the conditions under which user contributions operate and discusses the practical challenges that are raised in the implementation of user contributions from an engineering perspective. The author hopes therefore, that this thesis will serve as a basis for the future analysis and design of user contribution environments. Necessarily this thesis therefore raises a demand for future research in different domains:

In general, a follow up and further exploration of the issues discussed in chapter 4. *A framework for building, maintaining and influencing user contributions* is suggested. In particular the development of new contribution formats and the design of environments that incorporate different contribution opportunities while combining these opportunities into contribution careers shows in the point of view of the author a prospecting point of departure for the further exploration of user contribution environments.

Also the development of a structured approach towards the identification of production thresholds is suggested as a future field of research. Such an approach for the identification of technical, conceptual and content assessment thresholds could be generalized and applied to a variety of fields in the context of user contributions.

With a focus upon the museum environment, further experiments become necessary that evaluate a more detailed qualitative feedback of both museum curators and visitors/users in order to give a fully qualified estimation of the practical impact

of user contributions upon the museum environment.

From a practical perspective, the most pressing demand is found in relation to the domain of user contribution management and here in evaluation tools which allow for a fast monitoring of user contribution environments. As user contribution environments are highly dynamic and can become affected by rapid changes of contribution patterns these changes need to be visualized and displayed in order to allow management to take appropriate measures. As relevant changes are not necessarily reflected in unfiltered quantitative data, for example in publication rates alone, a certain level of abstraction becomes necessary in order to qualify the quantitative data.

e.g. while publication rates alone might remain constant as new users flood the service, an in depth analysis might show that half the authors of the fifty most popular applications are delayed for several days in comparison to their general publication pattern. While the identification of such events does not necessarily lead to a direct solution it allows management nevertheless to be alerted and to react.

In addition to the real time monitoring of events, qualified quantitative data could be also used as a source for contribution forecasting, in this case not with the intention to provide precise predictions but instead in order to identify potential future shortcomings of the environment.

In this context it should not be ignored that user contributions are not arbitrary expressions of users but at the same time creations. As such and regardless of the particular motivation of the user, these creations can carry associated personal meanings and might play an important role for the personal identity of the user. Therefore any manipulation and evaluation of contributions needs to stick to defined standards not only in terms of user privacy but also in relation to ethical guidelines.

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II. Glossary

BAL	Blender Artistic License
BMR	Blender Model Repository
CBPP	commons-based peer production
COB	content format in Activeworlds
cop	community of practice
EA	Electronic Arts
FLO	Findings Liaison Officer, position in the <i>Portable Antiquities Scheme</i> , page 113
HTML	Hyper Text Mark-up Language
ISM	International Spaceflight Museum
lpp	legitimate peripheral participation
MMORPG	massive multi-user online role-playing games
MMS	multimedia messaging service
npd	new product development
OSS	open source software
PDA	personal digital assistant
RWX	content format in Activeworlds
tcds	threshold, ceiling, design & solution space
TCP	transmission control protocol
UCC	user-created content
UDP	user datagram protocol
UGC	user-generated content
voip	voice over ip
WAP	Wireless Application Protocol
zpd	zone of proximal development

III. Abstract German/ Zusammenfassung

Eine Analyse produktiver Nutzer Beiträge in digitalen Medienanwendungen für Museen und kulturelles Erbe.

Einleitung

Bis noch vor wenigen Jahren war das Verhältnis zwischen Museen und digitalen Medien durch die Nutzung von Museen als Fallstudien für die Anwendung neuer digitaler Medien geprägt. Im Gegensatz zu dieser frühen experimentellen und stark Technologie-orientierten Nutzung können digitale Medien heute als ein integraler Bestandteil der Vermittlungsstrategien (*mediation strategies*) im Museum betrachtet werden. Einhergehend mit dieser neuen Rolle kann nicht nur eine zunehmende Professionalisierung der Produktion digitaler Anwendung für den Museumsbereich beobachtet werden sondern auch ein stark wachsender Bedarf nach neuen Inhalten (*content*).

Vergleichbar mit ihrer Rolle in der Medienindustrie stellen neue Inhalte auch im Museumsbereich einen der Hauptkostenfaktoren dar und werden besonders für kleinere und mittlere Museen mit begrenzten finanziellen Mitteln und dünner Personaldecke zu einer zunehmenden Herausforderung. Von Nutzern erstellte Inhalte (*user contributions*) bieten sich als alternative Ressource für die Produktion von Inhalten an. Gleichzeitig reflektiert die Produktion von Inhalten durch Nutzer eine andersartige Form der Auseinandersetzung mit Inhalten wie sie vor allem im Internet beobachtet werden kann. Im Gegensatz zum Modell des Zuschauers als passivem Empfänger von Informationen kann die Produktion von Inhalten somit auch als Strategie zur Erschließung von Themen verstanden werden und zeigt damit neuartige Perspektiven für die Vermittlung von Inhalten im Museum auf. Da der Einsatz derartiger Konzepte im Museumsbereich zur Zeit noch eine relativ geringe Verbreitung genießt ist es notwendig, eine breitere Perspektive auf die produktive Einbindung von Nutzern zu eröffnen um die besonderen Herausforderungen, Potentiale aber auch Einschränkungen ihrer Anwendung herauszuarbeiten.

Von Nutzern erstellte Inhalte finden sich in einer wachsenden Zahl von Anwendungen im Internet und dienen dort sowohl als Ergänzung wie auch als Ersatz für konventionelle Formen der Produktion von Inhalten. Die Wikipedia als prominentes Beispiel dieser Entwicklung zeigt dabei das besondere Potential solcher von Nutzern erstellten Inhalte für die Produktion von Inhalten in digitalen Medien auf.

Gleichzeitig stellt eine solche Form der Produktivität ausserhalb des Kontextes der Lohnarbeit an sich kein neuartiges Phänomen dar sondern kann auch im Bereich der analogen Medien nachvollzogen werden. Im Kontrast zu dieser Nutzung wie zum Beispiel im Bereich der unter dem Stichwort Bürgermedien bekannten Ansätze liegt der Schwerpunkt dieser Arbeit nicht auf einer alternativen, unabhängigen Form der Produktion, wie sie auch von *Bloggern* als Gegenpool zu etablierten Nachrichtenmagazinen ausgeübt wird, sondern in der Verbindung zwischen produktiven Individuen und Institutionen beziehungsweise Firmen.

Abbildung 1 illustriert diese potenzielle Beziehung zwischen Institutionen und Firmen auf der einen Seite und Nutzern beziehungsweise produktiven Nutzern sowie Gruppen von Nutzern auf der anderen Seite. Während die konventionelle Produktion von Inhalten durch eine strikte Trennung zwischen unternehmensinterner Produktion von Inhalten und der Produktion von Inhalten durch private Nutzer gekennzeichnet ist, heben Umgebungen, die auf von Nutzern erstellte Inhalte bauen, eine derartige Trennung durch die Schaffung von Schnittstellen auf und integrieren externe Nutzer nicht nur als Quellen für die Produktion von Inhalten sondern nutzen den Prozess der Produktion auch als Mittel zur Erweiterung der Beziehung mit ihren Nutzern.

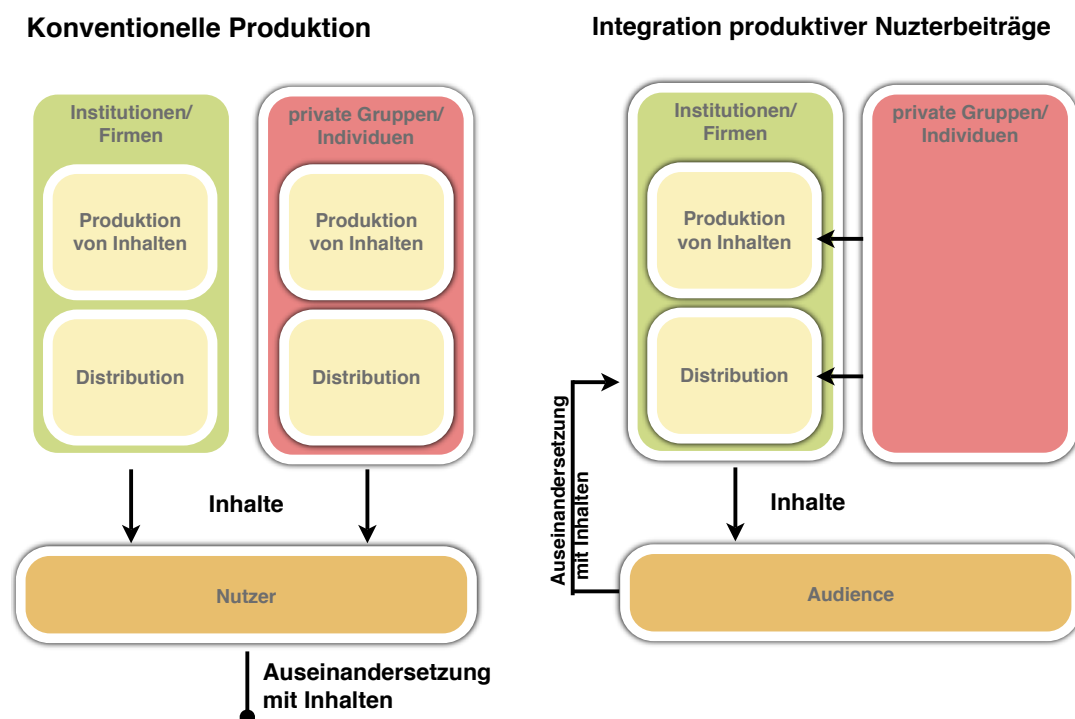


Figure 37: Vergleich zwischen konventioneller Produktion und der Einbindung produktiver Nutzerbeiträge

In der vorliegenden Arbeit wird dieses Model weiter diskutiert und dabei analysiert, mit welchem Ziel, unter welchen Bedingungen und mit welchen Mitteln Nutzer in

den Prozess der Erstellung von Inhalten eingebunden werden können. Dem vorweggenommen sei, dass von Nutzern gestaltete Inhalte trotz ihres prinzipiellen Potentials nicht als *silver bullet* und damit als universelle Lösung für die Produktion von Inhalten verstanden werden sollten. Gleichzeitig sei vor Erwartungen gewarnt, die auf die Entwicklung von einfachen Rezepten oder allgemeinen Mustern und *Templates* für die Implementierung von Anwendungen abzielen, die automatisch zu einer *optimalen* Produktion von Inhalten durch Nutzer führen. Anders als im Kontext konventioneller Produktion kommt es zu keiner vertraglichen Verpflichtung der Nutzer zur Produktion von Inhalten, so dass Umgebungen, die produktive Nutzerbeiträge einbinden diese Einbindung allein nur ermöglichen, fördern und erhalten aber nicht durch Automatismen erzwingen können.

Aufbau der Arbeit

Kapitel 2: Nutzerbeiträge in digitalen Medien

In der Vorbereitung dieser Arbeit zeigte sich, dass trotz der wachsenden Relevanz produktiver Nutzerbeiträge für die Produktion digitaler Medien und ihre Popularisierung durch Konzepte wie *web2.0* eine Forschungslücke in der Ingenieurwissenschaftlichen Betrachtung der Gestaltung, Entwicklung und Organisation von Umgebungen die produktiver Nutzerbeiträge einbinden existiert. Im Vergleich mit dem Konzept der *participation* in den Sozialwissenschaften wurde bislang keine vergleichbare Perspektive für die Ingenieurwissenschaften weder in Hinsicht auf ihre allgemeine Anwendung noch im spezifischen Bezug auf Museen und kulturelles Erbe entwickelt.

Aus diesem Grund wird in Kapitel zwei auf Grundlage der Eigenschaften digitaler Medien zunächst eine allgemeine Definition und Klassifikation für Nutzerbeiträge in digitalen Medien entwickelt. Aufbauend hierauf werden theoretische Perspektiven auf den Einsatz und die Anwendung von Nutzerbeiträgen kritisch bewertet. Ein Schwerpunkt wird dabei auf die Rolle produktiver Nutzerbeiträge im Bezug auf ihr Potential für Produktion und Innovation aber auch in Hinblick auf ihre Bedeutung für die kontinuierliche Beschäftigung mit einem Angebot (*engagement*) gelegt.

In der Folge werden diese theoretischen Modelle auf drei praktischen Anwendungsfälle bezogen um allgemeine Konzepte und besondere Herausforderungen der Einbindung von produktiven Nutzerbeiträgen zu identifizieren. Um eine Vergleichbarkeit zwischen den verschiedenen Fällen zu ermöglichen und verschiedenen Massnahmen der Einbindung zu klassifizieren wird ein deskriptives Modell des Pro-

duktionsprozesses für Umgebungen, die produktive Nutzerbeiträge einbinden entwickelt und auf die Anwendungsfälle bezogen.

Kapitel zwei schliesst mit einer Analyse der Herausforderungen im Bereich des Managements produktiver Nutzerbeiträge. Dabei werden Strategien der Einbindung produktiver Nutzerbeiträge, Möglichkeiten der Gewährung von Anreizen (*incentives*), besondere Herausforderungen zu Fragen des geistigen Eigentums und Konflikte zwischen produktiven Nutzern und Institutionen/Firmen sowie Konzepte der Selektion von Nutzerbeiträge (*content filtering*) behandelt.

Kapitel 3: Besucher und Nutzer in realen und virtuellen Museumsumgebungen

Aufbauend auf den zuvor entwickelten Prinzipien der Einbindung produktiver Nutzerbeiträge erweitert Kapitel drei diese Perspektive durch die Identifikation der besonderen Anforderungen von Museen und kulturellem Erbe. Neben einer allgemeinen Einführung in die Anwendung digitaler Medien im Museum wird in diesem Kapitel die Relevanz einer strategischen Verbindung zwischen realen und virtuellen Umgebungen für die Auseinandersetzung (*engagement*) von Besuchern mit dem Museum und seinen Inhalten betrachtet. Basierend auf dieser Rolle von Museen als Informationsanbieter in realen und virtuellen Umgebungen werden verschiedene Beispiele für die Anwendung produktiver Nutzerbeiträge im Museum betrachtet und in den Kontext des im vorherigen Kapitel entwickelten Klassifikationsschemas gesetzt.

Um die Auswirkungen einer Anwendung produktiver Nutzerbeiträge besser betrachten zu können wird daran anschliessend ein Schwerpunkt auf die Nutzung von virtuellen Welten durch Museen gelegt. Virtuelle Welten qualifizieren sich für eine solche Betrachtung nicht nur durch ihr im entstehen begriffenes Potential für die Vermittlung von Inhalten sondern auch durch ihren forcierten Einsatz produktiver Nutzerbeiträge. Das Kapitel schliesst mit einer Bewertung der daraus gewonnenen Erkenntnisse (*lessons learned*) und einer Übersicht über die besonderen Herausforderungen an produktive Nutzerbeiträge für Museen in virtuellen Welten.

Kapitel 4: Entwicklung eines Frameworks zum Aufbau, Erhalt und Management produktiver Nutzerbeiträge

Basierend auf den in Kapitel zwei und drei gelegten Grundlagen und Analysen wird in Kapitel vier der Grundstein für die Entwicklung eines *Frameworks* für die Einbindung produktiver Nutzerbeiträge gelegt. Das Kapitel beginnt mit einem Vergleich verschiedener theoretischer Positionen aus dem Bereich des *interface design* und *interaction design* um die Unzulänglichkeiten dieser Ansätze für die spezifischen

Anforderungen der Einbindung produktiver Nutzerbeiträge herauszuarbeiten. Basierend auf diesen Schwächen wird das Konzept eines *design for gaps and productivity* in der Entwicklung von Formaten für Nutzerbeiträge dargelegt und diskutiert.

Im Anschluss hieran werden in Kapitel vier Strategien entwickelt, die auf die ungleichmäßige Verteilung produktiver und nicht-produktiver Nutzer (*participation inequality*) in Umgebungen die produktiver Nutzerbeiträge einsetzen abzielen. Da aufgrund dieser Verteilung hoch-produktive Nutzer zu einer knappen Ressource werden wird ein Model verschiedener Formen der Beteiligung entworfen, das nicht nur Nutzer mit unterschiedlichen Fähigkeiten einen Anknüpfungspunkt bietet, sondern auch die Weiterentwicklung von Nutzern im Sinne einer *participation career* durch die Verbindung verschiedener Formen der Beteiligung unterstützt. Als Ausgangspunkt für die Entwicklung einfacher Formen der Beteiligung wird das Konzept des *flow* und der *auto-tellic activities* betrachtet.

Im Weiteren werde praktische Konsequenzen des Management von Beiträgen sowie neue Konzepte für die Selektion von Beiträgen vorgestellt und diskutiert. Abschliessend werden Experimente und eigene Entwicklungen vorgestellt, welche Möglichkeiten zur Bewertung der dargelegten Konzepte bieten.

Zusammenfassung und Ausblick

Die vorgelegt Arbeit zeigt praktische Anwendungen produktiver Nutzerbeiträge auf und analysiert deren Einbindung sowohl in Hinblick auf ihre allgemeine Anwendung im Internet und in Computerspielen als auch im Spezialfall der Anwendung in Museen.

In Folge der hier dargelegten Analyse ergibt sich, dass produktive Nutzerbeiträge in einem anderen Kontext operieren als die konventionelle Produktion von Inhalten. Während konventionelle Produktion auf professionalisierten Abläufen basiert, welche vertraglich ratifiziert werden und daher von den beteiligten Parteien im Allgemeinen erfüllt werden, ist eine ähnliche Stabilität im Bereich der produktiven Nutzerbeiträge nicht gegeben da im Gegensatz zu den Bedingungen konventioneller Produktion der Einsatz produktiver Nutzerbeiträge einer permanenten Motivation der Nutzer zur Produktion von Inhalten bedarf. Basierend auf diesem Bedarf ergibt sich für die Produktion von Inhalten eine starke Verknüpfung zwischen Produktion, Management von Inhalten und Motivation der Nutzer. Daher können produktive Nutzerbeiträge zwar prinzipiell als Ersatz für konventionelle Formen der Produktion eingesetzt werden, eine vollständig äquivalente Substitution wird allerdings auch durch die Fluktuation produktiver Nutzer in konkurri-

ernde Angebote erschwert. Eingeschränkt wird eine solche Substitution weiterhin durch die relativ geringe Anzahl hochgradig-produktiver Nutzer (*highly productive users*) in Umgebungen die produktive Nutzerbeiträge einsetzen wodurch jedem einzelnen dieser Nutzer besondere Bedeutung zukommt. Diese Bedeutung kann sogar soweit führen, dass von einer einseitigen Abhängigkeit von Institutionen/Firmen gegenüber produktiven Nutzern gesprochen werden kann, welche die Autonomie von Institutionen/Firmen in Frage stellen kann.

Neben ihrem Einfluss auf die Organisation der Produktion zeigen produktive Nutzerbeiträge auch alternative Perspektiven für die Auseinandersetzung mit Inhalten auf. In diesem Fall stellen nicht die erzeugten Inhalte das Hauptaugenmerk des Produktionsprozesses dar, sondern der Prozess der Produktion selbst (Prozessorientierung der Produktion). Durch Teilhabe der Nutzer an diesen Prozessen können Institutionen/Firmen nicht nur die Beziehung mit ihren Nutzern verlängern, sondern den Nutzern selbst wird die Möglichkeit zu einer intensiveren Auseinandersetzung mit den Angebot gegeben.

Beide Formen des Einsatzes produktiver Nutzerbeiträge finden sich in den untersuchten Anwendungsfällen wobei keine klare Trennung zwischen diesen beiden Zielen erkennbar ist sondern vielmehr eine Verknüpfung zwischen Ergebnis- und Prozess-orientierten Ansätzen die in der Einbindung verschiedener Schnittstellen (*interfaces*) im selben Angebot ihren Ausdruck findet.

Die Motivation zur Produktion von Inhalten steht in einem engen Verhältnis mit der Gestaltung der Produktionsumgebungen (*content production environments*). In Abhängigkeit von der Komplexität des Produktionsprozesses und seiner Ausrichtung auf Prozess oder Ergebnis kann eine Vielzahl verschiedener Motivationen identifiziert werden. Obgleich weitere Erhebungen notwendig sind um diese Aussage zu verifizieren zeigen Prozess-orientierte Ansätze einen verstärkten Einsatz spielerischer (*playfulness*) Produktionsformen auf die sich in den Kontext von Konzepten wie *fun to play* einordnen lassen. Andererseits lassen sich Hinweise finden, die darauf hindeuten, dass Prozess-orientierte Ansätze auch eine soziale Dimension integrieren bei der der Beziehung zwischen verschiedenen Nutzern eine gewichtige Rolle zufällt. Hierin lässt sich eine Überschneidung zwischen produktive Nutzerbeiträge und dem sich entwickelnden Feld der *social software* feststellen der den Bedarf nach weiterer Forschung unterstreicht.

In Ergebnis-orientierten Anwendungen produktiver Nutzerbeiträge verringert sich der Einfluss von Konzepten wie *fun to play* zugunsten der sozialen Akzeptanz durch

produktive Nutzerbeiträge. Auch wenn monetäre Gratifikationssysteme in diesem Kontext auf theoretischer Ebene stark diskutiert werden unterstreicht ihre zunehmender praktischer Einsatz doch ihre Relevanz.

Zur Zeit ist die Analyse von Umgebungen, die produktive Nutzerbeiträge einsetzen, geprägt durch eine limitierende Perspektive in Bezug auf die tatsächlichen Handlungen von Nutzern. Niensens Konzept einer Dreiteilung der Nutzerbasis in passive, aktive und hoch-produktive Nutzer erlaubt zwar eine Makro-Perspektive auf den Einsatz produktiver Nutzerbeiträge, verdeckt dabei aber gleichzeitig den Blick auf die verschiedenen Tätigkeiten, die von Nutzern in derartigen Umgebungen ausgeführt werden. Im Gegensatz zu einem derartigen Klassifikationsschema erscheint es dem Autor dieser Arbeit daher zielführender, eine Analyse dieser spezifischen Rollen durchzuführen. Eine derartige Analyse bedarf eines soziologisch/anthropologischen Ansatzes, der sich als bedeutsam für die Entwicklung neuer Anwendung herausstellen kann, insbesondere, wenn sich derartige Rollen in der Entwicklung von spezifischen Software Schnittstellen (*interfaces*) niederschlagen.

Der Forschungsbedarf in Bezug auf derartige Rollen in unterschiedlichen Umgebungen ist derzeit hoch, da zum Beispiel keine belastbaren Informationen darüber vorliegen, ob derartige Rollen an sich stabil bleiben und inwiefern Nutzer ihre persönliche Rolle innerhalb einer Umgebung im Laufe ihrer Interaktion über längere Zeiträume ändern. Weiterhin stellt sich hierbei die Frage inwieweit nicht nur die Definition von Rollen sondern auch die Entwicklung über verschiedene Rollen in die Gestaltung von Software Schnittstellen einbezogen werden kann.

In Bezug auf Museen und kulturelles Erbe zeigen produktive Nutzerbeiträge ein prinzipiell hohes Potential, sowohl für die Erstellung neuer Inhalte als auch als Werkzeug für die Vermittlung von Inhalten. Bei Niederschrift dieser Arbeit konnte noch kein Museum eindeutige Erfolge beim Einsatz produktiver Nutzerbeiträge in einem grösseren Massstab vorweisen, allerdings zeigt sich ein grosses Interesse gross und verschiedene Museen erforschen Weltweit den Einsatz produktiver Nutzerbeiträge. Hierbei und insbesondere in Bezug auf Prozess-orientierte Ansätze können sich Museen zum Teil auf schon existierende Erfahrungen aus dem Bereich der analogen Medien stützen. Mit dem Einsatz von Konzepten wie dem *virtuous circle* werden neue Verbindungen zwischen realen und virtuellen Umgebungen geschaffen, die gleichzeitig auch neue Einsatzmöglichkeiten für Prozess-orientierte Ansätze der Einbindung produktiver Nutzerbeiträge schaffen.

In Bezug auf den Ergebnis-orientierten Einsatz produktiver Nutzerbeiträge zeigen

sich für Museen, abhängig von der Ausrichtung des Museums, drei verschiedene Einsatz Szenarien:

- Erstens in der Sammlung von subjektiven Berichten und Beschreibungen in der Tradition der *oral histories*.
- Zweitens in Funden von Amateuren, die eine besondere Relevanz für die Sammlungsaktivitäten von Museen besitzen.
- Drittens in der Entwicklung von neuen Inhalten, die gleichsam neue Perspektiven für die Interpretation und Vermittlung von Inhalten aufwerfen.

In Bezug auf letzteren Aspekt lassen sich aktuell relativ wenige Anwendungen beobachten, dies nicht nur, da die Entwicklung derartiger Inhalte mit einer relativ hohen Eintrittsschwelle in der Produktion belegt ist, sondern auch da derartige Ansätze den hoch-sensiblen Bereich der Deutungshoheit und Legitimation alternativer Lesarten berühren. Ein Aspekt, der zum Teil mit dem Selbstverständnis von Museen als Interpreten kulturellen Erbes und ihrer Rolle in der Definition kollektiver Identität in Konflikt treten kann.

Insgesamt stellt die vorliegende Arbeit keine eindeutige Lösung für alle Aspekte der Einbindung produktiver Nutzerbeiträge dar sondern unterscheidet produktive Nutzerbeiträge von anderen Formen der Produktion von Inhalten, zeigt die Bedingungen auf unter denen produktive Nutzerbeiträge operieren und beschreibt die praktischen Herausforderungen der Einbindung produktive Nutzerbeiträge aus Ingenieurwissenschaftlicher Sicht. Der Autor hofft, dass diese Arbeit damit einen Grundstein für die notwendige weitere Analyse und die Gestaltung neuer Umgebungen für produktive Nutzerbeiträge legt.

Notwendigerweise entsteht aus den betrachteten Perspektiven auf produktive Nutzerbeiträge ein Bedarf an weiterer Forschungstätigkeit:

Zum einen in der weiteren Entwicklung neuer Formate für produktive Nutzerbeiträge und der Gestaltung von Umgebungen, die produktive Nutzerbeiträge einbinden und die Produktion von Inhalten mit verschiedenen Nutzerrollen und einer Analyse der zeitlichen Änderung von Rollen durch Nutzer verbinden.

Weiterhin in der Analyse und Gestaltung von Produktionsumgebungen und hierbei im besonderen in Methoden der Senkung von Eintrittsschwellen (*thresholds*) der Produktion. Eine konkrete Methodik der Identifikation von Eintrittsschwellen (*thresholds*) der Produktion ist hierbei sehr zu wünschen, da ein solcher Ansatz auch auf allgemeiner Eben ausgeführt und in einer Vielzahl von Projekten Verwendung

finden kann.

Im Bezug auf den Einsatz im Museum sind weitere Experimente notwendig, die ein detaillierteres Bild der Resonanz von Museums Kuratoren aber auch Besuchern realer bzw. Nutzern virtueller Museumsumgebungen liefern um die Bedeutung sowie die Akzeptanz produktiver Nutzerbeiträge im Museum eingehender bewerten zu können.

Eines der dringenden Probleme aus praktischer Sicht ist die Entwicklung von Evaluationswerkzeugen, die ein sinnvolles *Monitoring* von Umgebungen, welche produktive Nutzerbeiträge einbinden, erlauben. Aufgrund der Dynamik solcher Umgebungen zeigt sich aktuell ein starkes Defizit in der Identifikation von veränderten Nutzerhandlungen und Veränderungen in der Häufigkeit und Frequenz neuer Beiträge. Hierbei bietet sich eine graphische Visualisierung auf Basis einer Abstraktion an. Zusätzlich zu einem *real-time monitoring* der Publikation könnten qualitativ bewertete quantitative Daten auch zur Vorhersage der weiteren Entwicklung einer Umgebung genutzt werden. Dies allerdings nicht mit der Intention, präzise Voraussagen, zum Beispiel zur Wahrscheinlichkeit einer Publikation durch einen bestimmten Nutzer, zu treffen sondern um zu Beispiel den Einsatz neuer Hardware besser planen zu können bzw. bei einem spontanen Absinken der Publikation Gegenmassnahmen zu ergreifen.

Insbesondere im Kontext des *Monitoring* produktiver Nutzerbeiträge sei dabei in Erinnerung gerufen, dass Nutzerbeiträge nicht beliebige Daten sondern mit Bedeutung für den einzelnen Nutzer belegte Ausdrucksformen sind, die einen Beitrag zur Identitätsschaffung des Einzelnen darstellen können. Daher sollte sich jede Manipulation und Evaluation produktiver Nutzerbeiträge an definierte und klar ersichtliche Standards nicht nur auf Ebene der Privatsphäre und des Datenschutzes, sondern auch auf ethischer Ebene halten.

IV. Curriculum Vitae

Name: Lars Wieneke
Geboren: 18.01.1977 Salzkotten
Staatsangehörigkeit: deutsch

Ausbildung

11.2004 – 07.2009 Doktorand Bauhaus-Universität Weimar,
Deutschland

01.2007 – 11.2008 Research Fellow University of Brighton,
Grossbritannien

10.1997 – 06.2003 Studium der Medientechnologie,
Technische Universität Ilmenau,
Deutschland
Abschluss: Diplom-Ingenieur

1987 – 1996 Gymnasium Antonianum Geseke,
Deutschland

1983 – 1987 Grundschule Sankt Marien Verne,
Deutschland

Berufliche Tätigkeiten

seit 11.2008 freiberufliche Tätigkeit in der Entwicklung
von Medienanwendungen für Museen und
kulturelles Erbe
Lascelle, Frankreich

01.2007 – 11.2008 *University of Brighton, Grossbritannien*
Research Fellow

- 10.2003 – 01.2007
Bauhaus-Universität Weimar
Professur Interface Design
künstlerischer Mitarbeiter
- 10.2003 – 12.2004
FHDW – Fachhochschulen für die Wirtschaft
Paderborn/Gütersloh
Lehrbeauftragter Content Management im
Studiengang Medieninformatik
- 07.2003 – 10.2003
Technische Universität Ilmenau
Fakultät für Mathematik und Naturwissenschaften
Institut für Medien- und
Kommunikationswissenschaft
FG Kommunikationswissenschaft
Ilmenau
wissenschaftliche Hilfskraft
- 10.2002 – 05.2003
DaimlerChrysler AG
Forschungsbereich HMI Konzepte und Systeme
RBP/BM
Stuttgart
Diplomarbeit
- 04.2002 – 07.2002
Wyższa Szkoła Lingwistyczna
Czestochowa, Polen
Lehrbeauftragter Deutsch als Fremdsprache
- 04.2001 – 12.2001
Technische Universität Ilmenau
Fakultät für Mathematik und Naturwissenschaften
Institut für Medien- und
Kommunikationswissenschaft
FG Kommunikationswissenschaft
Ilmenau
wissenschaftliche Hilfskraft
- 09.2000 – 02.2001
Fraunhofer Gesellschaft
IPSI- Institut für integrierte Publikations- und

Informationssysteme

Arbeitsgruppe Ambiente – Arbeitswelten der Zukunft

Darmstadt

Praktikum

02.2000 – 04.2000

Siemens Business Services GmbH und Co OHG

Electronic Business Solutions CECS 1

München

Werkstudent

08.1999 – 09.1999

Siemens Business Services GmbH und Co OHG

Advanced Services & Media

München

Werkstudent

02.1999 – 04.1999

Siemens Business Services GmbH und Co. OHG

Advanced Services & Media

Paderborn

Werkstudent

04.1998 – 08.2002

Tri-O-Com GmbH

Northeim

Praktikum

07.1996 – 10.1996

Infopoint Informationssysteme GmbH

Paderborn

Praktikum

V. Declaration

Ehrenwörtliche Erklärung

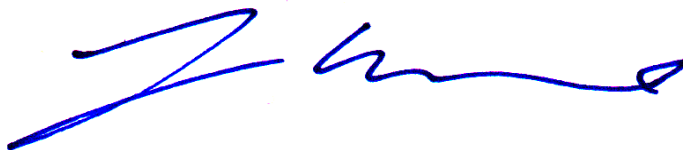
Ich erkläre hiermit ehrenwörtlich, dass ich die vorliegende Arbeit ohne unzulässige Hilfe Dritter und ohne Benutzung anderer als der angegebenen Hilfsmittel angefertigt habe. Die aus anderen Quellen direkt oder indirekt übernommenen Daten und Konzepte sind unter Angabe der Quelle gekennzeichnet.

Es waren keine weiteren Personen an der inhaltlich-materiellen Erstellung der vorliegenden Arbeit beteiligt. Insbesondere habe ich hierfür nicht die entgeltliche Hilfe von Vermittlung- bzw. Beratungsdiensten (Promotionsberater oder anderer Personen) in Anspruch genommen. Niemand hat von mir unmittelbar oder mittelbar geldwerte Leistungen für Arbeiten erhalten, die im Zusammenhang mit dem Inhalt der vorgelegten Dissertation stehen.

Die Arbeit wurde bisher weder im In- noch im Ausland in gleicher oder ähnlicher Form einer anderen Prüfungsbehörde vorgelegt.

Ich versichere, dass ich nach bestem Wissen die reine Wahrheit gesagt und nichts verschwiegen habe.

Lascelle, den 10. Juli 2009

A handwritten signature in blue ink, consisting of a stylized first name and a last name, written in a cursive style.

Unterschrift