

# Pick and Mix: Pervasive Content Creation Processes

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**Abstract.** This position paper gives an overview of pervasive content, with an emphasis on the processes of creation rather than consumption. It includes a brief discussion of the development of pervasive content, noting that much of the discussion has focused on infrastructure while ignoring social processes. The paper concludes by presenting a model of the common process of pervasive content.

**Keywords:** content creation, pervasive computing, collaborative creation, ubicomp, embodiment

## 1 Introduction

We are reaching a stage in post-industrial societies where computer technology is sufficiently powerful and cheap enough to afford uses which could only be dreamed of in the past. The integration of pervasive technologies with changes in the way we communicate and interact with information is at the forefront of the social, as well as technological, changes that are occurring globally. Indeed, for many years social scientists and commentators have been talking about post or late-modern societies [1] or network societies [2] and the ways that social relationships may be altered by technologies. It is clear, however, that in recent years a dramatic change has occurred in the prevalence of new forms of ICTs and the ways they are being used to create and distribute content, which the authors of previous analyses and theories could not have foreseen. This paper briefly examines the processes currently involved in content creation and design, contrasting these with more ‘traditional’ perceptions. It suggests some areas of interaction that might be followed to enable us to more fully understand and develop pervasive technology to support the creation of content in the future.

## 2 The Development of Pervasive Content Creation

It is difficult to give an initial date of the beginning of the development of Pervasive Content Creation, though the difficulty may be one of definition, rather than historical fact. The various elements that make up pervasive content (minaturisation, the advent of pervasive or ‘ubiquitous’ computing as an ideal etc.)

have been discussed for many years, but it is only recently that these have come together to form notions of ‘pervasive content’ as a field of study. We should note, however, that this field is still as yet an unclear one. In fact, content that is often described as ‘pervasive’ is in reality little different to the mass media forms of the past. Nevertheless, we can clearly characterize pervasive content into two areas: consumption and creation. The first of these consists of content that is delivered or consumed through the technologies of pervasive computing, such as mobile phones, mp3 players or those devices still (primarily) in laboratories, including robots or other mobile or kinesthetic devices. As these technologies become more common, it will be possible to produce content in a greater variety of environments than at present, and in multiple ways.

Pervasive content *creation* can thus be defined as the reverse side of these technologies: the creation of content through pervasive computing. Devices such as digital cameras and mobile phones are already used, and additional information added to content via manual or automated geo-location tagging [3] or other forms of information appending. This information can then be picked up and used to produce new content through mashups or via its use as inspiration. Pervasive content creation is a process of picking and mixing.

Much of this has only become possible in everyday life through the emergence and uptake of improved infrastructure. Cloud computing, improvements in server-side technology and storage and client-side interfaces are supporting the rise of pervasive content creation, and this is where the majority of research has been focused. Yet, despite the widening uptake of technologies and parallel research and development, there does not currently appear to be an equal amount of research examining the actual processes of creation on a social level. We need, then, to explore in a more detailed manner this aspect of pervasive content.

### **3 Discussion: Modeling the Picking and Mixing of Pervasive Content**

As discussed above, the technical changes of the past few years have radically changed how content is created. There have been social changes occurring in tandem with this<sup>1</sup>. For example, created content is now easily available online, allowing individual pieces to potentially reach large audiences. The high viewing numbers of popular video clips on YouTube<sup>2</sup> or photographs on flickr<sup>3</sup> attest to this fact. On the one hand we have ‘massively’ collaborative content creation activities, such as can be found in some online video websites [4] On the other hand, however, we find content creation that occurs on a more ‘micro’ social scale – self-drawn paintings on a

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<sup>1</sup> In this paper I am conflating to some extent ‘creation’ and ‘design’, as the latter of these has a much more solidly developed ‘process’. Future research will explore the relationship of ‘expert’ design and non-expert pervasive content creation.

<sup>2</sup> <http://www.youtube.com/>

<sup>3</sup> <http://flickr.com/>

touchscreen mobile phone for example. How are these two extreme to be connected? A model of the process that covers both forms may help.

Models can be useful for us, not only in the traditional sense of setting areas of tasks to be completed, such as those often used in design [5], but also as outlines of areas of social interaction. I suggest a model of pervasive content creation in Figure 1.

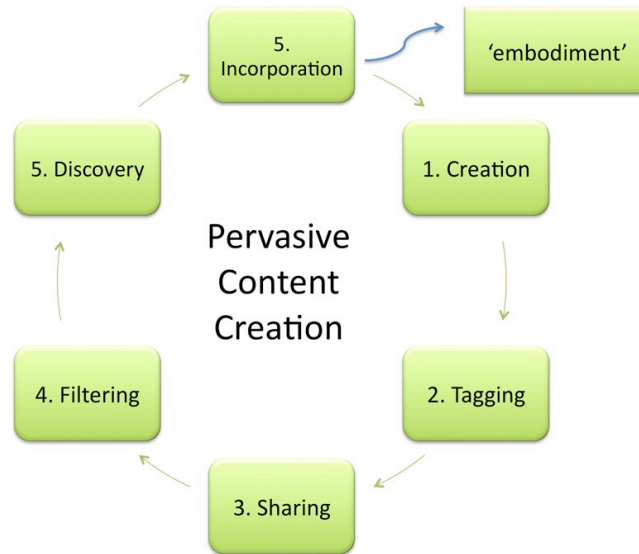


Figure 1. Pervasive Content Creation

The model attempts to show in a clear way the areas of interaction that occur in the creation of pervasive content. It begins with the initial *creation* of an image, sound/song, video, text or other content. This may be individually created or jointly made (an example may be a workshop or joint-project). This is where the content takes its initial form, where the ‘inspiration’ of the creator builds on previous knowledge and experiences of other content.

The next step is *tagging* where content is modified in order to enable greater ease in filtering, arranging and (re)discovery in the future. This may happen automatically, such as with EXIF data or GPS tagging on photographs, or it may be done manually, as is often the case in flickr or the hash tags in twitter<sup>4</sup>.

Thirdly, the content is *shared* somehow, entailing putting it ‘out there’ for others to find and use. This may mean simply uploading an image onto a website or uploading to another server where it can be accessed. There are at present several obstacles to content sharing, many of them not technical, but social and legal ones. Issues over the interoperability between DRM systems and concerns over intellectual property are just some of the challenges that are being tackled [6].

The next stage of *filtering* is usually an automated one. Algorithms are used in search engines, and content may be arranged according to GPS data or tags. Content

<sup>4</sup> <http://twitter.com/>

may also be categorized manually, though this is becoming increasingly uncommon. This filtering is to make the discovery of content easier.

The content, which has been created, tagged, shared and filtered is then *discovered* by users who use search engines, websites and tags. This content may also be discovered by automated downloading to mobile devices, or physically showing displays to other group members in small-group settings.

This comprises the steps of pervasive content creation. Once discovered however, content may become *embodied* – i.e. content may become part of users physical appearance, identity, skills and knowledge. This final part of the model is where we may find more obviously the idea of ‘creativity’ or inspiration. However, as the model shows, the creation of content is far more complex than traditional notions of individual, isolated artists; it is a model to represent the socio-technical changes of pervasive computing and creation.

Obviously this model is simplified to a great extent; steps may be omitted for example, yet we can see that the order is logically quite fixed. It is not possible to discover content until it is created and shared; current filtering works well with tagged content, and discovery must occur before content can be incorporated into new content. The model therefore clearly allows us to focus on the settings where these steps or ‘fields of interaction’ occur. Using similar techniques of observation and analysis I have previously explored group interaction around shared information kiosks and displays, and using hand-held technologies [7, 8]. These studies have clearly shown the benefits that qualitative and detailed analysis can provide for our understanding of use. The next stage is to ‘bring the users back in’, which, in the case of pervasive content, means large numbers of co-located and non co-located creators. By doing this—observing, recording and analyzing—we will be able to discover what forms of interaction happen and the relationships between each field. This is the task for the future, which should enable us to design better technologies and better methods of creating and consuming pervasive content.

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