Metamorphosis and Adaptive Digital Publishing

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This paper aims to explore the conceptual work being undertaken at Charles Sturt University to develop The Adaptive Digital Publishing Engine (TADPOLE). The aim of the project is to envision a distinct way of creating, structuring and publishing educational resources for delivery to a wide variety of platforms and media. The development of TADPOLE will allow us explore a 21st century approach to publishing that embraces digital affordances and uses metamorphosis, rather than translation or transcription, to convert content from one format to another.

Keywords: adaptive digital publishing, digital publishing, adaptive media, mobile

Understanding the Present

There has been a dramatic uptake in mobile devices since their introduction. From 2011 to 2012 the number of Australians with smartphones rose from 25% to 49% (ACMA, 2013). This has opened up avenues and opportunities to publish content on new platforms and take advantage of digital tools that embed rich media and interactivity. During 2012 the mLearn Project at Charles Sturt University (CSU) undertook an investigation into transitioning and developing educational resources for mobile devices.

The project found that whilst some resources had been professionally developed and optimised for the modern era, many were compromised by legacy software, content lock-in and the attachment of proprietary code and formatting to content due to ad hoc development processes. This severely hampered the process of adapting this content for delivery across a wide variety of mobile devices and platforms.

The many different types of content across diverse subject matter and discipline areas at CSU adds a further level of complexity to adapting existing content for the mobile realm. To cater for this diversity there is often a need for bespoke and customised solutions, which require exemptions from standardising processes, content and authoring workflows.

The most crucial observation from the project was that the current state of our systems, processes and software are tied to an analogue way of thinking, developing and working. The current methodology places emphasis on the output of an artefact, with little regard shown for the process of creation and development. There is nothing inherently wrong with this model, it works in the singular context and output to which it is applied, but we have learnt through our exploration that we have reached the limit of this process because there is no longer a single context. The need to publish for print *and* web *and* eBook breaks the current model, and with a proliferation of devices, formats, operating systems and standards now abundant, the future is multi-contextual.

A solution to the multi-contextual future that the mobile culture heralds, requires not a ‘one size fits all’ approach, but a way of creating content that is adaptive to many possible endpoints – print, web, app, eBook. This solution would also need to emphasize creativity and adaptability in the creation and development of

content, rather than focus solely on its output. This solution must adopt and build on the concept of "Create Once, Publish Everywhere" (Jacobson, 2009), devised as part of the National Public Radio's content management strategy. This offers a better way forward.

Imagining the Future

Content has traditionally been directly linked to presentation – books were developed to be printed, web pages for web sites, video for TV. However, new digital formats and devices are challenging that behaviour. Tablets and smartphones blur that line, as they are able to present content from the printed page, access the web and deliver video. Tablets and smartphones also offer new ways of presenting and creating experiences as well as new ways of interacting with content such as touch and gestures. Given the diversity of technology there is also a need to consider how we provide a consistent user experience. If we want to cater for this model of the future we need to ensure that content flows like water, changing its shape to match every presentation channel to enable use across a broad ecosystem (Weston, 2012).

Starting with Digital

The essential problem we need to deal with is that analogue systems and processes have been shoehorned into digital spaces. We need something new which accepts that content today is primarily created, authored, edited, produced and published in the digital space. We must work within a purely digital environment, which requires "a shift away from artefact, and back to essence" (Gemmell, 2013) and co-opts the essential benefits of the digital space.

The first uniquely digital concept is that of metadata. It allows us to create structure, define subjects, formulate messages and construct relationships in a way that is embedded within the content itself. It allows us to develop a structured authoring process, which engenders a sense of purpose for the content.

The second concept builds on structured content so that it can be authored *within* the database. This adopts the process that evolved from the web where we replace the artefact, the static HTML page, with the essence, "dynamically pulling out the content you want and rendering it in a view" (Johnson, 2013). The traditional print publishing process has only ever utilised databases for storage of the finished artefact. While web publishing has adopted the database into the Content Management System, it is rarely used to its full potential or used beyond the web, for content that is complex or for rich media. Incorporating the database into the authoring environment allows the power of logic to be utilised to construct and publish to a variety of endpoints dynamically, shifting when transformation occurs to the publishing point rather than at the point of creation so that COPE (Create Once Publish Everywhere) can become a reality.

TADPOLE

The aim of TADPOLE is to develop a new type of system that is neutral to the delivery channel and where content and narrative provide shape and form rather than artefacts. By instilling a Content First (Keith, 2011) approach to publishing and employing metamorphosis rather than traditional methods of translation or transcription we have conceived The Adaptive Digital Publishing Engine.

Metamorphosis is an evolutionary model where there is conspicuous and abrupt transformation accompanied by changes in habitat or behaviour (Britton, 2009). This corresponds directly to the current disruption and changes that technology, in particular mobile technology, has heralded in our culture. The environment isn't changing, it's changed already, "User behaviour always evolves much faster than companies can keep up" (McGrane, 2012) and this is where we find ourselves in Higher Education. Our students and teachers have made significant changes to their behaviour around the consumption of content and the habitat where they do this. They are increasing their consumption of rich media, such as video and audio, while moving away from traditional delivery models, paper books and desktop computers. Applying metamorphosis to the publishing process allows us to create specialised content adapted specifically to this new environment.

What TADPOLE will attempt to do is dramatically re-form and re-shape content to suit different contexts. This process will capitalise on the affordances of a digital environment that lacks any physical restrictions. Rather than simply transcribe content from one format or file type to another, it capitalises on the inherent logic in the machine, to process and metamorphose content and adapt it to various media, devices and contexts in a specialised form.

By fully leveraging the database and metadata information captured during authoring, we develop a highly adaptive publishing system that can change in an agile manner. This eliminates the need to re-create, re-encode, or translate content into many different formats, allowing automation of the publishing process based on

structure and logic patterns.

Basic Principles

To do this we need to:

- Separate content from presentation. Stripping away the limits of context frees content so that it can be viewed as liquid and presentation as multifaceted rather than single purpose.
- Separate requirements for authoring and publishing. The authoring needs to be simple and intuitive while publishing needs to be extensible as new and unpredictable environments, formats and behaviours emerge.
- Think Beyond Text and acknowledge that media plays a more significant role and is inherently more complex than copy.
- Accommodate the diversity of content and subjects by supporting a comprehensive collection of possible media elements and the ability to add new and emerging media.

Introducing Adaptive Media Elements

Traditionally the publishing endpoint has dictated the authoring process, but TADPOLE flips this around and treats the content as primary, and the publication channel as an important, but less inherent component, changeable and ultimately disposable. The innovative component of TADPOLE is how the database is embedded into the authoring and creation process. We have developed the concept of the Adaptive Media Element (AME). The AME is in essence a meta-object made up of self-contained referential information. An AME is not a single file per-se, but a container for more detailed and expressive metadata that logic can be applied to. An AME allows this related information and media to be flexibly incorporated into the narrative structure and presented suitably for each endpoint. For example an AME might contain a reference to the type of media, a file itself, a web link to external storage or library, source information for where it came from, reference information, alternative files and metadata like a title, caption and description (see Figure 1).

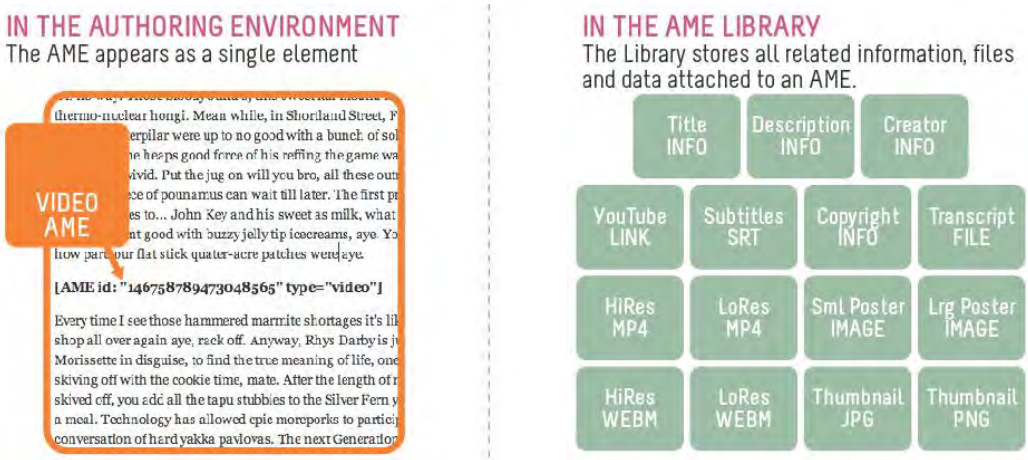

Figure 1: An example of a Video Adaptive Media Element.

As far as the authoring environment is concerned it is treated as a single object, inserted into the context of the narrative. It is only when published that the logic transforms the AME to suit the selected delivery channel. When a resource is published the relevant workflow chooses the most appropriate components to insert. So for a print PDF it wouldn't insert a video, instead it would include an image and a link to YouTube. An eBook may embed the actual file so that it can be downloaded as a self contained artefact and a HTML5 version could include an embedded file or a link depending on how it was to be delivered - offline, online, public or private.

The AME is a customisable concept that can be applied to virtually any kind of content and for any application. From media to different versions of a text, interactive elements to data displayed in different forms, the AME allows the TADPOLE to be tailored and modelled to support diversity of content and provide the narrative with a supportive and 'chunked' structure (McGrane, 2013).

Imagining the System

The concept we have put together for what TADPOLE would look like includes three key components:

1. The Authoring Environment - A simple and intuitive HTML5 mark-up structure
2. The AME Library - A form based application of a database accessible in the Authoring Environment.
3. The Metamorphosis Engine - The process that applies logic to develop the base resource and add the

presentation layer

How it Works

The Authoring Environment would map the functionality already available in a web based Content Management System. This would allow development of separate documents and ways of imposing structure for those components. The AME Library would be a customisable database that would map to the requirements of each type of AME required e.g. Video, Data, Images, and Audio. Once the resource has been authored and is ready to publish the user will initiate the Metamorphosis Engine. This will call on developed profiles for each output type that the user has selected and then parse the resources and apply logic to each AME to create a base resource. The base resource is then sent through the metamorphosis process where it is combined with a presentation template and the final files are produced (see Figure 2).

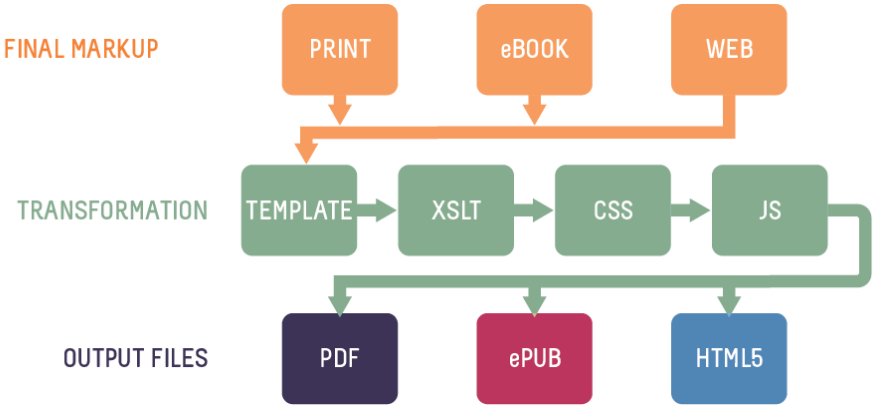

Figure 2: Once the final markup file is developed the relevant template and presentation elements are added and the finished file(s) produced.

Expected Outcomes

The project aims to develop a functional prototype of the system with custom Adaptive Media Elements and output options developed specifically for use at CSU. The system is aimed at complementing our existing LMS, CMS and Digital Repository. It will not host or serve the finished files and artefacts; instead it is focussed purely on the creation and publishing process. The initial output types are expected to be PDF, ePub and web published HTML.

Conclusion

TADPOLE is an attempt to imagine the future of content, how we author it and how we will publish it. This project aims to provide a tangible way to reduce silos and consolidate disparate production processes to provide greater efficiencies and improve the experience of creating and developing content. It demonstrates a way to future proof our institutions ability to publish content by supporting flexibility and ensure that our students benefit from enhanced technologies. Our aim is to ensure that publishing is not static, but a dynamic art that needs metamorphosis to evolve and cope with our future habitat and behaviour.

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Please cite as: Stone, R., Haggith, R., Klapdor, T., Slater, T. (2013). MetDigital Publishing. In H. Carter, M. Gosper and J. Hedberg (Eds.), *Electric Dreams. Proceedings ascilite 2013 Sydney*. (pp.835-839). https://doi.org/10.14742/apubs.2013.1411