Macro-media and Micro-media

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(summer 2000)

Web users and producers, especially in the commercial sector, have focused much attention on “broadband” media, a term widely used to describe the ability to access “television quality” video over the Internet. But what will happen when this goal is met and the current TV look is recreated on the Web? What becomes the next frontier in the evolution of media? Below I explore one scenario: that media will move from “broadband” to *macro-media*.

Media technologies seem typically to move in one direction: toward “more.” More resolution, better color, better visual fidelity, more bandwidth, more immersion. Do digital media technologies simply mimic this pattern? After examining *macro-media*, I look at another important trajectory in media development: minimalist media or *micro-media*.

"Television quality"

When I read that the new RealSystem 8 (RS8) from Real Networks can finally deliver streams at full “video quality,” I immediately rushed to their Website and downloaded the new app. The sample clips posted on RealNetworks did look amazingly sharp and smooth, at least in comparison to what was available on the Internet until now. However, I could not systematically test the company’s claims that the new system offers video at “VHS quality” – because no site was offering video encoded at a high enough rate. The RealNetworks site had just a single sample clip encoded at 1 Mbps. 400 Kbps was all I could find elsewhere.

Given that just five years ago we were amazed to get postage-stamp Quick Time clips, the new RealNetworks technology is indeed a remarkable achievement. But the situation is laden with irony: the Internet was never designed to deliver this type of video stream and yet, for more than fifty years, we have had a system that is capable of delivering a "VHS quality" stream. Even more remarkable, this system is wireless. And, in contrast to today's streaming video, it never experienced "network time-out", "rebuffering" and other artifacts of the Internet environment. The video stream never stalled; the image never skipped frames. This system is broadcast television.

I don't want to undermine the accomplishments of RealNetworks and other companies working hard to deliver video over the Web. However, in our excitement over the ability to duplicate television-quality video on on a non-television medium, we may be forgetting something very important: what is new and exciting about the Web is that it is not television.

Although it can deliver a "perfect" video stream, television technology can only handle a dozen of channels at a time. In contrast, a Web user has access to an unlimited number of video streams. One recent estimate puts the current number of streams at 30 million. The count will have grown by the time you read this column. The user can search for these streams using search engines; she can play them at various sizes; she can play a multiple of streams at once. Using languages such as SMIL, the designers can arrange streaming video clips into a dynamic hypermedia program that includes still graphics, text, animation, and other media types in addition to video. Using formats such as QuickTime 4 from Apple, the designers can also embed hyperlinks into particular frames of a video stream, so when a user clicks on a frame or on a particular object within it, a movie launches a Web page. And they can also use software such as VideoLogger to automatically index video streams, identifying various speakers, spoken words, pans, zooms, and other changes in visual content. The user can then search video using this index just as we commonly search text files for

particular words. In short, while the Web video may finally look like broadcast video, what is truly important is that it has very different properties and capabilities from it. But even if we forget about these unique qualities and simply focus on the issue of video resolution, "VHS quality" is not the final frontier in the evolution of the Web media.

For a couple of years now, "broadband" was the hot term in the Internet world, fueling the imagination of companies developing network infrastructure, media-enabling software and the new "rich media" content itself. While some take this term simply to mean simply dynamic media featuring content in Shockwave, Flash, and other interactive media formats, most equate "broadband" media with "television-quality" video and audio. To receive such media over the Internet requires a high bandwidth connection (cable modem, DSL, or even "broader" hardware) and special software, such as Real Network's Real Video, Apple's QuickTime or Microsoft's Media Player.

But let us look at a near future when a typical user has enough bandwidth to receive "VHS-quality" video over the Web. What will happen next? Where will Web media go after this benchmark is reached? Let me suggest two directions (among other possibilities) which I will call *macro-media* and *micro-media*. Here I will discuss *macro-media*. I will address *micro-media* in the next section.

Macro-media

We will reach *macro-media* when we have such high bandwidth connections that the whole issue of bandwidth goes away. We will simply not think about it anymore. It would also involve very high resolution displays: not just the 1024 by 768 or 1280 by 1024 common for computer displays or the 1080 standard for DTV (Digital Television), but 4K, 8K and beyond. These displays will most

probably not be desktop-based but would fill the walls of our homes, offices, and other spaces.

The logic of technology development is such that we will get there in a not-too-distant future. If we already gone from the initial 512 by 384 resolution of the first Macs fifteen years ago to 2K resolution available today on computer monitors, why would technology ever stop? If we have gone from 300 Kbs to T1 in Internet access speed, it is only a matter of time before communication bandwidth is no longer an issue.

But what is the unique advantage of delivering television and high-quality video to a platform with unlimited bandwidth, unlimited resolution, and unlimited storage space? The delivery of television- and film-quality video – even old CinemaScope films - to such ultra-high resolution displays will still leave empty space for more data. This space can then be filled by other video streams or by other kinds of media.

One possible utilization of this space could be new kinds of shows and films in which not just one but a number of frames coexist on the screen to follow the narrative. (Mike Figgis' recent film Timecode, which uses four frames, is one example of this aesthetic at work today.) For instance, we can follow the activities of different characters simultaneously; different frames can also be used to display past events along with the main action; and so on. (Interestingly, Digital Television technology allows DTV monitors to receive a number of programs simultaneously. This may also encourage producers to adopt a multi-frame aesthetic.)

The second avenue of space allocation - surrounding the video image with other media - already exists both on television and on the Web. Television news and especially financial shows run market tickers, still pictures, graphics, and other

dynamic displays alongside the video image. (Probably the most "visually aggressive" example of such aesthetics today can be found on Bloomberg TV.)

Similarly, on the Web, many streaming media sites surround small video frames with other media types: blocks of text copy, lists of hyperlinks, still images and animation. (For typical examples, check videos on the abcnews.com Web site and its RealVideo Channel. Streaming channels in particular have adopted the practice of embedding a small video image within a larger multi-media composition.)

Rather than being reserved for particular kinds of programs such as news, in the era of *macro-media* such aesthetics may become the default condition for all programs, including fiction films. The future films and soap operas may look more like Bloomberg TV and less like Gone With The Wind.

To return to the present, it is ironic that new media companies have focused on the "television quality" issue at exactly the time when television itself is finally leaving behind the analog standard set half a century ago in order to become digital, thus embracing both a higher resolution and a new digital logic. Let us hope that television quality video is not the final stage in the development of Web video. Hyperlinks, automatic indexing, search, multiple resolutions and multiple frams – these new dimensions of digital video are waiting to be fully explored!

Micro-media

My Ericsson T28 cell phone comes with two built-in games: Solitaire and Tetris. Skeptical at first, I tried Tetris and found it to be quite playable. In Japan, which so far leads the US in the use of net-enabled phones, tens of thousands of users download simple computer games and cartoons onto their phones. But in this

age of mega-pixeled screens, why would people want to play games on a tiny phone screen?

The world of new media appears to move only in one direction: more of everything. Every year, CPUs run at higher speed. Computer display resolutions increase as does the bandwidth with which you connect to the web, the size of the hard drive in PCs, and the amount of RAM that it comes with. The Internet has moved from being a text-only medium to being a multi-media in the 1990s, with each new platform offering more detail, faster frame rates, and more life-like characters.

This constant movement toward "more realism," or higher fidelity, is not unique to new media; it can also be traced through the history of old media. For instance, cinema develops from the low-resolution black-and-white images in the 1890s toward sound and then color and then (if you accept VR and games as the next stage of cinema) to interactivity. Similarly, television progressed from just a dozen scan lines in the earlier decades of the twentieth century to the present-day digital standard of over 1,000 lines of resolution.

This trajectory towards more does not seem to leave room for any other development. Yet the history of digital media contains another kind of trajectory. While some media forms get richer, others stay purposefully "poorer." A more minimalist kind of media, characterized by low resolution, low fidelity, and slow speeds, is born. I call it *micro-media*. Despite the continuous evolution of computer and telecommunication technologies, *micro-media* is remarkably stable. It just keeps moving from platform to platform, from one technology to another. In fact, given the current prognosis that by 2003-2004 more users worldwide will access the Internet through cell phones than through computers, *micro-media* seems to be gaining more ground than ever. It will not only successfully compete with *macro-media* but may even overtake it in popularity.

The fact that companies are now rushing to deliver entertainment to cell phone screens – and that users are bound to enjoy these services – may appear less strange when we realize that the resolution of these tiny screens is not that different from the resolution of video console of the 1970s and the 1980s which, after all, enjoyed huge popularity. So once you think of your cell phone as an old game console that has just been miniaturized, the idea of delivering games, movies, and other forms of entertainment to its screen makes more sense. This is an example of *micro-media* at work: having been wiped out by technological evolution on one platform, ultra low-resolution computer games return at a later time, on another platform.

Here are some examples of *micro-media* migrations. Consider the history of 3D computer-generated virtual worlds. In the early 1980s, the slow speed of computers did not allow computer animators to render anything more complex than cartoon-looking 3D spaces consisting of flatly shaded surfaces. Today a consumer PC is fast enough to render Hollywood quality virtual worlds. But the hardware limitations of computers used to render virtual worlds in the 1980s have returned in another place: the Internet-based real-time virtual worlds. What used to be the slow speed of CPUs became the slow bandwidth. As a result, the 1990s VRML (Virtual Reality Modeling Langauge) worlds looked like the pre-rendered animations done ten years earlier.

The same logic can be observed in the history of Web protocols. The original HTML specification allowed text-based pages to include still images, but no other media. Gradually, the extensions of HTML and the development of special formats such as Real Video, ShockWave, Flash, and others turned static text-based Web pages into rich and dynamic multi-media experiences. At the same time, Wireless Application Protocol (WAP) was developed to strip down these rich multi-media pages into simple, low-resolution screens appropriate for delivery to Net-enabled phones. This is an example of *micro-media* logic: a bare

bones Web gradually became media rich, only to reappear once again in a different place in a “poorer” form than ever.

According to the so-called Moore’s Law, the logic density of silicon circuits (and thus the processing capacity of computer chips) doubles every eighteen months. Eventually, the law is supposed to stop working because the engineers will hit the limits of the physical organization of matter. What about *micro-media*? Is this a permanent phenomenon, or will it eventually disappear, with even the smallest displays offering high resolution and full color?

If the evolution of microchips toward being more and more dense is limited by the atomic organization of matter, the limiting factor in the evolution of media toward more and more visual fidelity may be limited by the size of our physical body. I love my Ericsson T28 cell phone, but I do find it to be too small! When I was in the store purchasing the phone, another customer walked in to buy a case for her T28 so that it would have more of a “presence” in her pocket or briefcase and so that it wouldn’t get lost. I followed her example and almost always carry my phone in a case.

Even if it may already be technologically possible to make a much smaller phone, its correspondingly more compact screen will be too small to be of any use. The technological race towards packing richer media experience into the tiniest of packages is limited by the size of our hands and the resolution of our eyes and ears. So until some futuristic scenarios – i.e. projection glasses that shine the video image directly into the viewer’s retina or direct communication between the computer and the human brain – become reality, we are stuck with *micro-media*.

If ultra-high resolution media, or *macro-media*, is one direction digital media will go after conquering the current frontier of “broadband” (i.e. “television quality”), *micro-media* is here to stay as well – at least for the foreseeable future. And as computing, digital media, and Internet platforms move away from bulky desktop

systems toward a multitude of small, hand-held devices – electronic organizers such as Palm Pilot and Pocket PC, Net-enabled cell phones, MP3 players, Gameboy players, and other appliances – *micro-media* is quickly becoming more and more widespread. So you better get used to playing Tetris or watching *Survivor* on your cell phone screen because this tiny screen is not going away.