The emergence of Web 2.0

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I N 1448, the "next big thing" was the invention of the Gutenberg Press, which enabled media to become mass media. The next "next big thing" after Gutenberg is here today in the form of tools that enable any user of the World Wide Web to easily write their own personal Web-diaries (known as "blogs", an abbreviation of "Weblogs"), which millions of other Web users can instantly read. These tools will enable the transition of "mass media" into "collaborative media."

So argues a recent essay in the Economist entitled "Among the Audience".

Indeed, in recent years, powerful new ways of using the Web have emerged. These innovations have enabled the World Wide Web to evolve from a simple, personal tool to a more social, interpersonal one, where the user is able to create and communicate "content" easily. Leveraging newer, low-cost technologies, these innovations, and the new ways of using the World Wide Web that they lead to, are collectively called "Web 2.0".

In this article, we will attempt to characterize Web 2.0 along the following lines: 1) where earlier Web features fell short; 2) the benefits that Web 2.0 brings to users, 3) the technological underpinnings, and 4) the business aspects. We will conclude 5) by examining the opportunities that Web 2.0 presents for Bangladesh.

We will use the term "Web 1.0" to denote the "original" World Wide Web, that is, the Web's capabilities prior to Web 2.0. Note that "Web 2.0" does not replace, but rather extends "Web 1.0".

Why Web 2.0?
Shortcomings of Web 1.0

Web 1.0 - the "original Web" - changed the world in many ways. However, while it has enabled us to browse newspapers, exchange (and perhaps drown in) emails, and conduct business through e-commerce, it has not lived up to many other initial expectations.

For example, despite earlier promises, Web 1.0 is not particularly strong at bringing together like-minded people who might want to band together for a cause or share a hobby.

Web 1.0 is also weak for collaborative work. While it is a good publishing medium for one-to-many publishing (that is, one expert, teacher, author, or reporter speaking to the masses), what if, say, twenty children of Class 5 want to collaborate together to write a story? In Web 1.0, there is not much functionality to enable this kind of work.

Individuals who want to publish often and regularly on the Internet also find Web 1.0 cumbersome. For example, "personal Web pages" that many people create do not lend themselves to quick and easy updates. If one wants to use one's personal web page to engage others in a discussion around a particular topic, that is also difficult.

Web 1.0 methods for searching for web pages on a certain topic are primitive. Because there are billions and billions of pages out there on the Web covering just about every topic under the sun, users think they can search for any topic they want and find the right information instantly. However, Web search "engines" yield correct results only if the topic is very simple. Searching for even a moderately complicated information often results in a wild goose chase requiring one to traverse many web pages before finding the right information.

Let me illustrate with an example. The other day I wanted to find out a reasonably straightforward piece of information: how many years does it take for all the cells in a human body to metabolise into new ones? That is, starting at a moment in time T, how long does it take for the body to completely replace all the cells that were present at the moment T?

I knew the answer had to be somewhere in the Web. But it took me a good fifteen minutes of typing in all kinds of combinations of words into Google and looking at a dozen web pages before I found an article with the relevant information. If search engines could mirror our thinking process more accurately, this search would have taken a few seconds. (By the way, the answer is seven years.)

These are some shortcomings of Web 1.0 that Web 2.0 attempts to address.

The benefits of Web 2.0

Some Web 2.0 benefits are in a) social networking, b) publishing, c) user participation/collaboration, and d) tags and the Semantic Web.

We will now illustrate these benefits with some examples.

Social networking

The goal of social networking web sites is to connect like-minded people with each other for a variety of purposes.

For example, LinkedIn is a Web 2.0 site that helps people build networks for furthering their careers. It is well known that people who actively build and maintain their professional networks find success more easily.

The idea of "degrees apart" is useful for networking. For example, someone I know personally is one degree apart from me. My friend's friends are two degrees away from me, and so on. To build a large network, we often must connect with those two or more degrees apart.

LinkedIn lets people build up their networks by enabling them to connect with those more than one degree apart - that is, friends of friends, etc. The Web 2.0 user, after joining LinkedIn, creates "connections" with their other friends who are also members of LinkedIn.

So when I joined LinkedIn, I established connections with five friends who were already part of LinkedIn. Each of my five friends, in turn, had over twenty contacts in LinkedIn, so I was immediately able to reach more than a hundred "friends of friends" two degrees from me.

Now let's say another friend of mine, Joe, joins LinkedIn. By connecting with me, Joe is able to connect with my five friends. At the same time, my five friends and I are able to connect with all of Joe's friends. And so on.

So LinkedIn provides a way to formalize "friends of friends" networks and enables people to connect with them. Today 5 million people use LinkedIn.
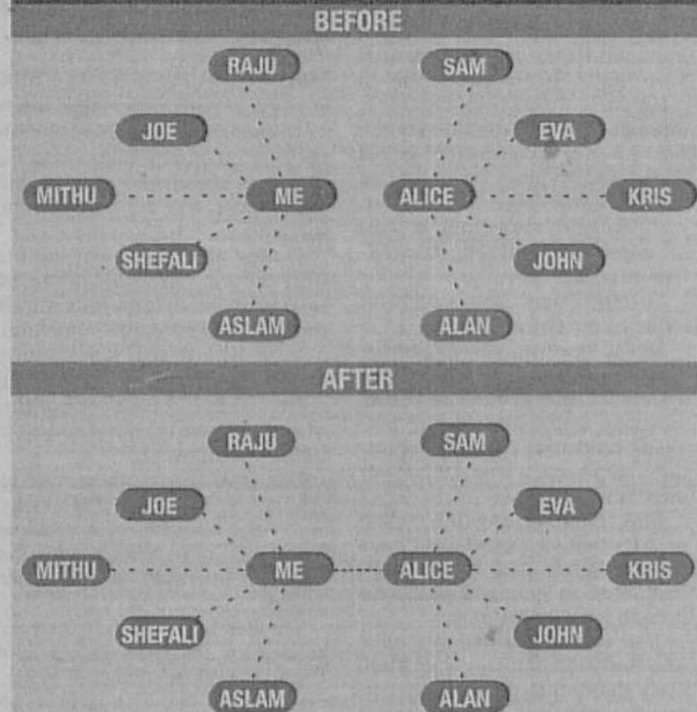
Another social networking site, FaceBook, is used by university students for finding like-minded students in their university. For example, when my friend's daughter was admitted to the University of California, Berkeley - a large university with over 30000 students - she faced a dilemma in finding a roommate in such a large and impersonal place. So she used FaceBook and successfully found a roommate with similar interests and values.

Building "virtual communities" is another example of social networking. Perhaps the best example was the Web-driven primary election campaign of U.S. Democrat Howard Dean in the 2004 Presidential Election. The Dean campaign mobilized hundreds of thousands of supporters through the creative use of their website, deanforamerica.com. Although Dean eventually lost to John Kerry for the Presidential Nomination, the campaign broke new ground by proving that it is possible to build and mobilize a huge grassroots organization through the Web.

Web 2.0 serves like-minded people in other ways. For example, the photo-sharing website, Flickr, allows photographers to share their photos easily. Further, photos can be "tagged" with words that describe the photos making it easy to search. Also intriguing is Flickr's Groups function which lets photographers who are particularly interested in one area of photography to conduct discussions and share the photos they have created. For example, Flickr's "HDR" group brings together photographers using digital photography for creating "High Dynamic Range" digital photographs - uncannily brilliant, almost super-real images that show us the world in a new way.

Publishing

Another key benefit of Web 2.0 is in publishing. The most striking example is in weblogs (or "blogs").

Simply put, a blog is a diary that one writes and maintains on the Web. Usually, anyone can read and write comments on the blog.

In recent years, blogs have become a leading source of news and information for those connected to the Internet.

Why are blogs popular? All web sites are easy to read, but blogs are also easy to write. This is the "big thing" of Web 2.0.

Some benefits of blogs are: a) providing more up-to-date and "raw" news (eg, the Dear Raed blog from Iraq during the 2003 US Invasion, which gave blow-by-blow accounts of the invasion as it unfolded, must be one of the most compelling pieces of "war literature" ever written.) b) readers who are only interested in certain types of news stories (eg, with a certain political flavor, or a certain geographical location) can often find blogs who cater to their interest, saving them time; and c) corporate blogs enable business leaders to communicate in a direct manner with their customers, vendors and business partners, etc.

Both blog readership and authorship numbers are remarkable. For example, the U.S. liberal news blog, dailykos.com, draws over 6 million readers every day. How many people write blogs? The number worldwide now exceeds 50 million.

Here is my personal experience with a blog. Last year, when my family and I left the US for Bangladesh after many years, our numerous longtime friends back in the US were curious about our new adventures. I started by writing them emails, but this grew tedious: I forgot to include people; could not keep track of what I had written; people sometimes lost them. So I started my own blog and now point my friends to it, effectively remedying the problems I was having using email. Anyone who knows about can go and read all of my "diary entries" including photographs.

Note that Web 2.0 publishing examples extend beyond blogs to other medias/genres. For example, the YouTube.com is a website where budding filmmakers can place their video movies for others to see. There are ways for viewers to discuss or rate the movies. One can also select most commonly viewed movies. And so on. YouTube thus enables many budding filmmakers and film-critics to view and discuss movies in a way not possible before.

Unfortunately, due to the poor state of Internet connection in Bangladesh, sites such as YouTube are effectively out-of-reach for Bangladeshis. With better utilization of submarine cable, this situation of course change.

User participation and collaborative work

Another power of Web 2.0 is in collaborative work. The most common way is to use "wikis", which are web sites which can be easily edited by everyday users. The owner of the wiki actually decides who had the permission to write, but in real life, most popular wikis can be edited by anyone.

Wikis are used in many different ways, for example, to manage a project, to brainstorm about ideas, to write a story collaboratively, or to create an on-line database for various purposes.

Perhaps the most well-known wiki is wikipedia.org, a free, on-line encyclopedia containing over a million articles that were written by on-line users. Anyone can go to wikipedia and edit virtually any of its articles (or create an article on a new topic.) Wikipedia, however, restricts editing of certain politically controversial articles (eg, the one on U.S. president George W. Bush.)

But, you ask, if anyone can write an article why should I believe it?

It turns out that for the most part wikipedia is self-correcting. That is, if someone goes in and writes incorrect information, other users quickly correct that. On the whole, wikipedia articles are good starting point for finding out about some topic.

Not only does wikipedia provide information to many, but it also serves as an experimental platform for healthy debate on the limits of free speech.

Another notable wiki is the website jotspot.com which enables businesses and other organizations to use wikis as a sort of on-line blackboard. Example uses include tracking defects (bugs) in engineering projects; managing project schedules, and writing technical documents collaboratively.

A wiki is the perfect tool for the aforementioned twenty children of Class 5 to collaboratively write, a story.

Tags and the Semantic Web

Finally, no discussion of Web 2.0 benefits would be complete without a mention of Semantic Web, an idea conceived by Sir Tim Berners-Lee, the inventor of the World Wide Web.

Today's World Wide Web is a web of computers each of which has some data in the form of web pages. The computers themselves do not know the meaning of the data that resides in other computers in the Web. In contrast, the Semantic Web is web of computers where each computer knows the meaning of the data residing at every other computer.

This can enable interesting things. For example, I can conduct more meaningful searches ("Computer, I would like to see all pictures of my daughter on a sunny day.")

Computers can make meaningful connections with data on other computers on the Web. Consider the scenario of a patient whose household computers are all connected to the Semantic Web.

When it is time for a doctor's appointment, the computer-based devices in the house can talk to each other and make decisions, turning off the TV, setting off the alarm clock, and printing out a map to the doctor's office. If the doctor prescribes a medication, the computer can then make a semantic link from the prescription name to other computers on the Web containing drug interaction information, thus warning the patient of possible interactions with other medicines he is taking. And so on.

We are still in the infancy of the Semantic Web. But one development of Web 2.0 holds promise in this area: the use of "tags". A tag is basically a label: it is data that describes data. So it contains a nugget or essence of information about the data it tags. Tags are usually attached to a document an image or other kinds of information on the Web.

One can combine tags to represent complex relationships and meanings. A formal way to do this is to build "ontologies" which are essentially data models representing relationships and dependencies of tags. While widespread use of ontologies to denote complex relationships and meanings (semantics) is not here yet, tags are being used heavily in other ways in many Web 2.0 applications. For example, use of tags in blogs and other content publishing sources (eg, Really Simple Syndication or RSS sources) enables very focused news-gathering. Use of tags in Flickr lets people easily share photos.

Technological underpinnings

Technological advancements have played a major role in the emergence of Web 2.0. In a nutshell these advancements have enabled the establishment of the Web as an efficient development and user platform.

What does that mean? While many Web 1.0 products were built using very basic technological tools in a kind of mad rush, the building blocks for Web 2.0 are much more refined and powerful.

An analogy from the world of building construction perhaps clarifies the distinction. Web 1.0 was like building houses from cement, sand, crushed bricks and aluminium. You had to mix cement, bricks and sand together to make concrete, then use concrete to make the house. With newer Web 2.0 technologies you effectively have concrete, prefabricated walls, corrugated iron sheets, etc to build houses. So you can make more interesting and elaborate houses than before.

Many Web 2.0 building blocks are available as open-source software products. These products are, for the most part, free to use. Further, the source code (ie, the engineering blueprint) is usually available for developers to modify as needed. Since there is a huge variety of open source software (for example, SourceForge, a repository of open source software, has over 115000 projects), the programmer can mix and match the right tools and build a program very quickly (and cheaply).

So, continuing our construction analogy, Web 2.0 programmers not only have ready-made concrete, but it is free ready-made concrete!

New engineering disciplines have also evolved that help Web 2.0 development. Primary among these is Agile Programming, a software development methodology focused on quick, incremental development that takes advantage of intense communication and collaboration among the team.

The Web as a platform also means that the parameters that define the "goodness" of software have also evolved. Speed has always been a parameter separating good from mediocre software. However, an equal (if not more) important parameter for Web 2.0 software is ease-of-use.

For example, if the common, everyday user of the Web cannot write a blog easily, then the Web 2.0 business offering this blog-writing feature will not succeed.

The business angle

Now let's look at new business opportunities presented by Web 2.0. Like any other business, required investments must be compared to returns generated.

Because of the technological underpinnings described earlier in Section 3, the investment required to start a Web 2.0 business is significantly less than it was to start a Web 1.0 one. There are many examples of Web 2.0 sites being assembled in a few months at a hundred thousand dollars or less. In contrast, during Web 1.0 heydays, a prototype cost about five million dollars to build and market; investors particularly Venture Capitalists often forked out large sums based on an entrepreneur's PowerPoint presentation.

What about the revenue? Most Web 2.0 businesses give away their basic product for free. For example, it does not cost the user anything to use Flickr, LinkedIn, etc. The business makes money through advertising, or through charging for more premium services. Another way to make money is to have a "corporate" version, with an associated support and maintenance agreement, which corporations can purchase.

Advertising on the Web has evolved dramatically since the early days of untargetted "banner" ads. Contextual advertisements are "smart". They are displayed when there is a match with the topic being displayed on the browser. For example, if I am researching the topic "fast cars" on the Web, my browser displays an advertisement for Porsche.

Targetted, contextual advertisements have proven to be effective. Why? Because they bring in more customers for the advertiser. Thus, businesses which want to advertise are willing to pay good money for contextual Web based advertisements.

Google is the best-known successful company based on ad-based revenue. Many Web 2.0 businesses are emulating Google's successes and generating revenue through advertising.

Advertising on a site is compelling only if there are many people visiting the site. Even if a Web 2.0 site is free, it does not mean users will flock to the site automatically. Since Web 2.0 companies often operate on tight budgets, they adopt viral marketing techniques to attract new users.

An example of viral marketing is LinkedIn. Someone who is already a member of LinkedIn sends an email to a friend to join it. In the email are all the instructions showing how. So the network grows with "word of mouth."

I should also point out that the "exit strategy" of many Web 2.0 firms is to get bought out by bigger firms such as Yahoo or Google.

Simple business formula: low-cost business startup and operation, provide real value to users who will then spread the word to others, revenues based mostly on meaningful advertisements, sell to a large company - and those who build the business end up making a tidy profit!

Opportunities for Bangladesh

Web 2.0 has arrived and is growing every day. Bangladesh can look at it as an opportunity and a challenge.

It is an opportunity because, starting with the right set of trained people, we can do many interesting types of work for local and overseas markets. While the low-cost structure of our IT labor market may give us a competitive advantage in the global Web 2.0 emergence, locally we can build Web 2.0 applications that can potentially bring many powerful changes to the country.

It is a challenge because if we do not train our technical people on these technologies, we will miss a very big boat. Other nations such as India, China and Russia will get ahead of us again.

So, what are some things we in Bangladesh can do immediately?

We can train our engineers on open source software in a very intense way. Steps in the right direction appear to be taken by the Bangladesh Open Source Network with projects to translate OpenOffice (an open source software similar to MicroSoft Office) into Bengali; they also contribute many of the Bangla articles to Wikipedia. This effort needs to be multiplied and deepened.

One strategic approach might be to set up a separate Center of Excellence focusing on Web 2.0 technologies. This Center, perhaps run jointly by a university and industry professionals, can focus on training young programmers to become competent in Web 2.0 technologies. (We can also build Centers of Excellence in other fields, such as software technologies for mobile phones, Geographical Information Systems, software development for microcredit, animation, etc etc. Building a skill-base of vertical and deep technical knowledge in selected areas is one way Bangladesh can become globally competitive in IT.)

EXAMPLE PICTURE SHOWING LINKED IN

BEFORE

AFTER

Before I linked with Alice, Raju did not have connection to Sam, Eva, Kris etc. After linking, Raju can now reach Sam, Eva, Kris etc.

these sites are put together, and we will open the doors of these Web 2.0 sites to those Bengalis who are not proficient in English.

Assuming that we train the people, what are some Web 2.0 applications for Bangladesh?

I hope that this question is ultimately answered beyond my wildest expectations by young, creative Bangladeshis, but for now I will point out that there are some issues and areas in Bangladesh that could benefit significantly from Web 2.0 virtual communities and collaboration.

Take, for example, corruption and transparency. Is it possible to build a Web 2.0 virtual community of Bangladeshis with the goal of fighting (or at least exposing) corruption, and promoting transparency?

Another example: saving the environment. A network of people dedicated to preserving our environment in Bangladesh and reversing its degradation could accomplish much together. Such a network could exchange knowledge, expose perpetrators, and brainstorm solutions to environmental problems.

The recent efforts by Professor Yunus to promote honest and competent candidates for the next general election may be a good goal around which to build a grassroots Web 2.0 Virtual Community.

Other areas in Bangladesh where Web 2.0 technologies can help are disaster-preparedness, direct farm-to-market selling, microfinance, etc.

Note that there is a natural fit between the Bangladeshi tendency to do things as groups or communities, and the emphasis on virtual communities in Web 2.0.

Today these ideas may seem far-fetched, but remember ten years ago the idea of widespread mobile phone usage all over Bangladesh also seemed far-fetched.

Already some distinctly Bangladeshi sites are using Web 2.0 techniques: Dhaka's own somewherein.net (with Norwegian collaboration) and the non-resident-Bangladeshi driven NGO website drishtipat.org are two examples.

Once we master Web 2.0 technologies on a larger scale, we will be better prepared to compete for foreign markets, either in the form of services (eg, outsourced software work) or of products. Who knows, perhaps the next LinkedIn, Flickr or Wikipedia will hatch in the brain of a young genius from Bangladesh. When that happens there will be no stopping us.

Conclusion

The 1990s dot-com bubble was created in large measure by inflated business valuations and unrealistic expectations placed on Web 1.0 businesses. When the bubble burst, many Web 1.0 businesses went belly up. It was difficult at that time to see a moment in the future when there would be renewed optimism in the World Wide Web.

Web 2.0 was born out of this wreck. There was much more to prove this time to a skeptical world.

It is no small measure of the inherent values that Web 2.0 delivers to users, that there is a second round of optimism. This time it is realistic, not hyperbolic, and the feet are planted firmly on the ground. For example, Time Magazine's list of most influential people in the world in 2005 contains no less than four Web 2.0 pioneers (the blogger Arianna Huffington, two founders of Flickr and the founder of wikipedia.)

Web 2.0 presents a tremendous opportunity for Bangladesh. But do we have the will to seize the day?

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