

# *The Future of the Web*

## *Slide 1: The Future of the Web (Introduction Slide)*

We all know what the web is. We use it everyday. Our computers are tied into it. Our mobile phones are tied into it. Like the microwave of a past generation, we cannot imagine our life without it. However, unlike the microwave, the Internet is always evolving and changing. What are the business implications of that change? Will users employ the WWW in the same way? It will evolve and change for sure....but how will it do that, and how will that change the way we use the Web? Those are the questions that we are going to look at today.

## *Slide 2: Use of Modules:*

In reviewing the content of this professional development module, it may be helpful for you to use the following tools to take notes, summarize key points and identify ideas to implement in your classroom:

[Cornell Notes Sheet Example](#) - Sample Cornell Notes Sheet that demonstrates how to take notes, summarize key points, and identify specific ideas for implementation.

[Cornell Notes Sheet Blank Form](#) - Blank Cornell Notes Sheet for use in taking notes, summarizing key points, and identifying specific ideas for implementation.

[Mind Map Example](#) - Example of how to use a mind map to take notes, summarize key points, and identify specific ideas for implementation.

[Mind Map Blank Form](#) - Blank Mind Map for use in taking notes, summarizing key points, and identifying specific ideas for implementation.

[Professional Development Action Plan](#) - Form to use in taking ideas for implementation from the professional development module (from Cornell Notes Sheet and/or Mind Map (and planning to implement them in your classroom.

## *Slide 3: Objectives*

Let's talk a little bit about our learning objectives for this module.

First, this lesson will emphasize that the web is not a static entity. It is always evolving and always changing, and we need to keep that mind as we use it.

Remember, it is important to master the present, but one always needs to keep an eye on the future.

Second, we will identify four possible directions that the web is heading. During this discussion, we will look at the possibilities that any one direction will become dominant, if any one direction will fail to flourish or if any/all directions will congeal together.

Third, we will look at the applications that these new technologies will lend to the business world. Are any of these directions “really-cool-but-not-applicable-to-the-real-world”? Are all of them applicable? Would you use some of them in your personal life, but not your professional life? I am going to ask you to think about these questions during the presentation.

Finally, we are going to identify some new technology. We can talk about RDF and OWLs all day, but until you see it in action, the possibilities may not become apparent to you.

#### ***Slide 4: The Web Has Version Numbers....***

Now, let's move on to the heart of the presentation. As mentioned before, the Internet is not a static entity. It is evolving, growing and changing. Because of this phenomenon, many people have resorted to giving version numbers to the Web. So far, we have Web 1.0, Web 2.0 and, now, Web 3.0.

#### ***Slide 5: Web 1.0***

Web 1.0 designates the state of the Internet back at the very beginning when the Internet was first penetrating homes all over the world. Back then, the primary use of the Internet was taking print media (books, news- as in newspapers, magazines, song lyrics, etc.), converting that media to HTML and posting it online.

#### ***Slide 6: Web 1.0 (cont.)***

However, unlike version numbers for MS Word or Excel, Web 1.0 is not obsolete. It is not finished. This movement is still going on and will probably never stop. This is because as new material heads to print (new Harry Potter prequels, new editions of Time magazine, etc.), it will need to be made available online.

However, there is very, very little (if any) innovation remaining in the simple task of posting data online. Therefore, this process will remain, but it will remain as part of the background. The majority of the Internet-centric community has shifted its focus toward data integration

## ***Slide 7: Web 2.0***

With Web 1.0, the goal was to post a lot of “content” /data on the Internet. Once the technological advances hit the point of diminishing return, the race was on to figure out ways to share all of the data. The main question that drove this movement was, “How can I take this data and share it with other people?”

Soon sites began popping up all over the Web trying to answer this question. They all had different approaches, but they all strove for the same result – sharing and collaboration.

Therefore, Web 2.0 (as an umbrella term) describes any site, service or technology that promotes sharing and collaboration. This includes blogs, wikis, tags and RSS feeds, del.icio.us and [Flickr](#), [MySpace](#) and [YouTube](#).

***Teacher NOTE: There is a podcast on video presentation found on YouTube (<http://www.youtube.com/watch?v=nsa5ZTRJQ5w&feature=related>) that is 5 ¼ minutes long. It does an excellent job of explaining Web 2.0, and can be incorporated into the presentation either before or after this slide.***

## ***Slide 8: Web 2.0 (cont.)***

Now the question is, “Have we reached the point of diminishing returns as far as collaboration and sharing is concerned?” No not at all. Web 2.0 is still an ongoing process. It will continue – perhaps a little more in the background as Web 3.0 starts to take off.

## ***Slide 9: Web 3.0***

That brings us to Web 3.0. What will it look like? What will it encompass? There are four possible directions.

## ***Slide 10: Four Directions***

Which direction is the Web heading? There are four main thoughts being:

1. Semantic Web
2. 3D Web
3. Media-Centric Web
4. Pervasive Web

Let’s look at all these individually. Before we do, let me ask the question “are any of these advances meant to dominant the others and replace the current Web (i.e. battle it out like HD DVD and BlueRay) OR are they meant to work together to extend or enhance the current Web?” Think about that as we discuss each of these in turn.

### ***Slide 11: Semantic Web***

This first direction that we are going to discuss – the Semantic Web – is the one that is the most associated with Web 3.0. That is probably because it is the most defined, having been introduced to the mainstream in a [\*Scientific American\*](#) article in May 2001.

### ***Slide 12: Semantic Web***

Before we start talking about the Semantic Web, let's define the term and give a little bit of background. "Semantics" is a word that is the meaning behind what is said. It deals with communications, and communication between computers is at the heart of the Internet.

Today, computers do not understand; they mimic. Think of a parrot mimicking the words of its owner. It can repeat those words, but it does not understand them. The same is true with computers. They can "talk" to one another, but they do not understand the meaning of the shared information.

### ***Slide 13: Semantic Web (cont.)***

The Semantic Web will change this.

### ***Slide 14: Semantic Web (cont.)***

As computers begin to understand what is being said OR what has been posted on the web page, then they will understand the meaning (or the semantics) behind a web page. Then, like a rolling boulder gaining speed down a hill, they can actively help us retrieve information from the Internet.

Today, they cannot do this. They can passively retrieve and collate data (that has been designed for human, not machine, consumption) via Internet-based search engines. They can lay out all the possible data points for a user; however, the human element then needs to troll through all the line items in order to put any kind of sense to the data.

The Semantic Web will try to bring structure and meaning to the content of Web pages. It aims to create an environment where software agents follow instructions from users, roam from page to page, and, instead of laying out data points, are able to fully complete those instructions and give meaningful, concise answers /recommendation / data points.

### ***Slide 15: Semantic Web (cont.)***

So how will computers start to “understand” data that is found on the web, without becoming the sentient machines of the Terminator movies?

There are two ways. The first method, which is currently being advocated by Tim Berners-Lee (the man credited with inventing the World Wide Web), calls for a reannotation of all web pages found on the Internet.

The second method is different. Instead of calling for a complete overhaul of web page formats, proponents of this method want to build agents that can better understand the web pages, as they exist today.

### ***Slide 16: Semantic Web (cont.)***

What a reannotation of the web would mean is that content providers would have to add machine-readable metadata to the human readable pages that we have today. Why is this important? This is important because, in order for the Semantic Web to succeed, the information found on the web pages needs to be easily read by today’s software agents. That is not possible today for the majority of information found on the Internet because it was produced mainly for the human brain to analyze and process. This includes everything from videos on YouTube to the text of Emily Dickinson poetry. Metadata needs to be added to this content to make it machine readable. Only when machines can read the data can the Semantic Web succeed.

Currently we do have official standards describing this metadata in place. This includes eXtensible Markup Language (XML), Recourse Description Framework (RDF) and the Web Ontology Language (OWL).

XML lets everyone create their own tags\*. Scripts can make use of these tags in sophisticated ways, but the script writer has to know for what the content provider uses each tag. In short, XML allows users to add arbitrary structure to their documents but it does not help with “meaning”.

*\*NOTE: tags are hidden labels such as or that annotate Web pages or sections of text on a page*

RDF handles the “meaning”. RDF encodes meaning into sets of triples. Think of each triple being like the subject, verb and object of a basic sentence. These triples can be written using XML tags. In RDF, a document makes assertions that particular things (people, Web pages or whatever) have properties (such as "is a sister of," "is the author of") with certain values (another person, another Web page). It turns out that this structure is a natural way to describe the vast majority of the data processed by machines.

Now that meaning is coded in, a problem can arise when two databases use different identifiers for the same concept (this comes about when two words have too very different meanings – such as “hot” and “well” and “polish”). A script that wants to compare or combine information across the two databases has to know that these two terms are being used to mean the same thing. That is where OWL comes in to play. OWL is used to explicitly represent the meaning of terms and the relationships between those terms. This representation of terms and their interrelationships is called ontology.

They are already trickling into real-world sites, services and other tools, including:

- [Yahoo's new food site](#)
- A new kind of semantic web portal – [Twine](#) - from Radar Networks is building a kind of semantic web portal. To date, this portal is being marketed as a new kind of “online community” – one that will help users find and catalog information around their own personal interests.
- A development platform, [Jena](#) that is in the works at HP.
- New Semantic Web structures found in [Oracle's spatial dB tool](#).

### ***Slide 17: Semantic Web (cont.)***

Now let's move on to the second method being proposed. Here, proponents are pushing for smarter web agents. They do not advocate making web pages easier to read (which they view as a complete and time-consuming overhaul of the Web); instead, they advocate making the software agents smarter.

Currently, there are several companies offering tools that seem to have smart, proactive software agents. However, most are not much different than Amazon's recommendation engine.

### ***Slide 18: Semantic Web (cont.)***

So now what is the bottom line? What is the point of this new Semantic Web? The coming of Web 3.0? Search engines will become more accurate. Because they don't have to just depend on encoded, arbitrarily assigned or incomplete tags, software agents will be able to follow through on all user instructions and present complete information. There will no more 12-page-long result pages that the user will then have to manually troll through in order to piece together an answer. The semantics of the web pages would help us with our tasks and instructions.

You could say that the bottom line is that web searches will yield more results and that the WWW would become more relevant than it is today.

*Teachers' NOTE: for more information on the Semantic Web, check out the following introductory lessons on YouTube:*

- [Online introduction to the Semantic Web.](#)
- [An online overview of the Semantic Web by Tim Berners-Lee, who is the founder of the WWW and the man who first coined and defined the term “Semantic Web”](#)

### ***Slide 19: 3D Web***

Now that we gone through an overview of the “Semantic Web”, let’s move one and talk about one of the other “directions” that the Web seems to be heading – the “3-D Web”.

### ***Slide 20: 3D Web***

The 3D Web has been referred to as “The Web that you can Walk Through”.

Google Earth, which is currently in use, is considered one of the first steps in the direction of a 3D Web. Users today can use Google Earth to get a birds-eye view of their grandparents’ house in Anaheim, CA, but they cannot drop down from that birds-eye view and actually walk the streets of Anaheim. However, Version 4.3 of Google Earth (currently in beta) does show 3D versions of certain cities and does allow the users to drop down to street level and take a 360 degree view of the street.

The next step (as visualized by proponents of the 3D Web) would be to allow users to walk the streets of Anaheim, CA or Seattle, WA, or Boston, MA, for sightseeing (visiting Bunker Hill), campus tours (UCLA) or house hunting.

In the future, it might be able to interact with others, through their avatars, who are also “on the ground” doing the same thing.

### ***Slide 21: 3D Web (cont.)***

So what is the point? Sure Google Earth is cool....I get to see my cousins’ upstate New York vacation house, but what are the real world applications of the 3D Web.

There are two viewpoints. Many proponents see this not only as an extension of Google Earth but also as an extension of the virtual worlds (like [Second Life](#) and [There.com](#)) that are found throughout the Web. They see the entire web transforming from the 2D web of words, pictures and video to one big alternative universe like [Second Life](#) and [There.com](#).

Others just see it as another aspect to the web. They see it as a way to recreate our existing tangible world for those people who may never get to see the Taj Mahal or the Galapagos Islands.

### ***Slide 22: 3D Web – Real Life Example***

Several universities, including Southern Methodist University, UT Dallas, the Dallas County Community College District (DCCCD), Princeton, Harvard and Rice have all created virtual campuses in [Second Life](#).

These virtual campuses are not meant to replace typical courses (i.e. students do not register for a “Second Life” course, the same way they might register for an online course).

Instructors are not required to incorporate Second Life into their curriculum. If the instructor chooses to incorporate Second Life, students may be asked to attend a lecture or a PowerPoint presentation in a virtual meeting room on their college’s island\*.

*Note: an island is a virtual parcel of land in Second Life. The universities pay for their islands (Second Life’s fee structure). Students can visit for free, but they must set up an avatar.*

Instructors have found that Second Life assignments can provide learning experiences not available in the real world. For example, students can track items through a supply chain OR build something that would be impossible (due to time or money) in the real world, and then interact with it in Second Life.

There are, however, drawbacks. Some students are resistant to the merging of their “real lives” with that of their online lives.

### ***Slide 23: Media Centric Web***

If the web is not going to turn into one big alternative universe where avatars roam virtual streets, what should be done to harness the information found in 2D photos, illustrations, videos, MP3 files, podcasts or other sound files?

Proponents of the Media Centric Web have a solution.

### ***Slide 24: Media Centric Web***

Currently, when you want to search for an image or a video on the Web, you must type in keywords to your search engine. With the Media-Centric web, you “find media using other media” not keywords that have been tagged to that particular image.

Today, when you search the web for music/images, etc., you are really searching for the keywords that have been tagged (like filenames and captions) to those files. You are relying on content providers to annotate their images accurately and that can be

a hit-or-miss proposition. Your search engine may not pull up over 30% of available files or it may clutter the results pages with useless or irrelevant files.

So, with the Media Centric Web, if you would like to find an image, you will scan in an image. The agents will return hits using face recognition technology.

To find a song, you will supply another song. Currently, it is almost impossible to find a song that “sounds like Elvis” or similar songs (in score, vocals, etc) to the one that you have. The same is true for photos. Right now it is almost impossible to find a picture of a person who looks like “Elvis” versus a picture of Elvis, himself.

### ***Slide 25: Media Centric Web (cont.)***

Companies are already taking the first step in this direction. “Image Crunchers” like [Riya](#) and [Polar Rose](#) and a “music matchmaker” service called [Pandora](#).

### ***Slide 26: Media Centric Web (cont.)***

Let’s look at the “Image Crunchers” first. Riya, Inc (based in Silicon Valley) has two products that fit the bill for “media centric web”. The first is a web-based photo-sharing tool (also called Riya) that can be used for personal photographs. Riya will automatically tag the user’s pictures using face recognition software. In the past, if you have a picture of your mother, you previously have to go in and manually tag the word “Mom” to all your photos. With Riya, you can show the tool what your mother looks like and it adds the tags for you. Users have reported it as being “surprisingly accurate.” However, this tool cannot be used for Web-wide image searching.

Riya also has a shopping visual search engine, Like.com, where pictures of certain consumer goods are used to search and retrieve similar items. The site lets users search for items by keyword. Once they find a picture of something they like, they can find more that look like it. They can also adjust sliders to tell the system that color is more important to them than shape (or vice versa), and they can zoom in on a feature of the product and search for more products that share that feature. So if you like that big purple bow on your girlfriend’s purse, but cannot afford the purse, you can use these engines to focus on the bow and have them search the Web for similar (and perhaps) cheaper versions.

### ***Slide 27: Media Centric Web (cont.)***

Another “Image Cruncher” that can currently be found on the web is a browser plug-in called Polar Rose. This plug-in also performs face recognition for personal photographs but it works all across the web. It can be used on photographs posted to any web site.

Like Riya, it is only a means for tagging images automatically for now.

### ***Slide 28: Media Centric Web (cont.)***

For now, what can be done to help music lovers find similar songs to their favorites or to help them find all songs in a particular genre (like Halloween songs for a party)? On the web is a service called Pandora, which has been created by a group of “musicians and music-loving technologists”, called the Music Genome Project.

These musicians have analyzed songs from 10,000 artists. They note the “music make-up of each track” using their judgment and experience. Pandora then takes this “music makeup” index and the user’s list of favorite artists, and constructs a new collection of songs that will suit the user’s tastes. These songs can then be played via the user’s computer. It is like a personal jukebox played over the web.

The downside to this is that the program still relies heavily on the musicians’ input, judgments and opinions.

### ***Slide 29: Pervasive Web***

Now, we come to the final direction - the Pervasive Web. This is the only direction in which the Web is branching that leaves the desktop computer and/or laptop behind.

### ***Slide 30: Pervasive Web***

The Pervasive Web is also calling the “Internet of Things” or the “Ubiquitous Web” because many people believe that the Web will become like the telephone. It will merge seamlessly and remain behind the scenes during most (if not all) aspects of our daily life.

The Pervasive Web indicates the connecting of the physical world with the Internet’s virtual world – a web that is everywhere.

Some examples would be:

- Refrigerators being able to exchange information with supermarket shelves.
- Washing machines that can “talk” to clothes to make sure that they are washed correctly.
- Phones that can turn down the volume on TV’s or stereos when a call comes in.

### ***Slide 31: Pervasive Web***

The idea behind the “Pervasive Web” is that (eventually) all items of daily life will be equipped with radio tags (some as small as a grain of sand). Items such as yogurt

cups, shoes, canned goods, end tables and airplanes can be identified, tracked and managed by computers via the Internet.

In order for this to be possible, the Internet needs to be able to encode 50-100,000 billion objects and follow the movement of those objects. Just as a note: every human being is surrounded by 1,000 to 5,000 objects.

### ***Slide 32: Pervasive Web (cont.)***

However, in order for this to become a reality, some technologies need to be enhanced and used.

- Radio Tags – As mentioned before, some radio tags are already being fitted onto manufactured goods for inventory and tracking purposes. With the advances in nanotechnology, many of these tags are approaching the size of a grain of sand. This means that eventually all products will be able to be tagged adequately.

RFID stands for Radio Frequency Identification, and was invented in the middle of the 20th century. It is the lynchpin around “thing-to-thing” communications around which location-specific identification is built. It is the most mature of the enabling technologies. It has established standardization protocols and commercial applications currently in use.

RFID uses radio waves to identify tagged items. It is sometimes called the next-generation of bar codes. Early applications include automatic highway toll collections, SCM systems for large retailers, pharmaceutical counterfeiting prevention, ski passes, tagging children in schools or hospitals, VIP access to bars.

In addition, Nokia has embedded RFID readers in their phones for businesses with workforces in the field, cutting down on the amount of equipment that workers have to “lug” out into the field.

- Mobile Internet Services have to be expanded and currently they are. More than 2 billion mobile phones were in circulation in mid 2005. Companies are now working on higher speed, next generation mobile networks for those phones. 3G (IMT-2000)
- Wireless sensors are necessary because they bridge the gap between the physical and virtual worlds. They enable objects to respond to changes in their environment. They are already widely in use in many situations: security gates, home automation, and office building maintenance.
- Internet Addresses. The current 32 bit code yields about 4 billion addresses. However UCODE (being developed by Japan’s Ubiquitous ID Center), which

uses 128 bits, would give enough addresses for a trillion tags to be assigned to individual objects every day for a trillion year. That is enough to fulfill the 100,000 billion objects out there.

### ***Slide 33: Pervasive Web (cont.)***

Some current examples and early adopters of the pervasive web are wireless inventory systems (such as those by UPS), and public restroom sensors (like those found in the Adobe's headquarters in San Jose, CA).

There are two men's bathrooms and two women's bathrooms equipped with tiny wireless sensors in all paper towel, soap and deodorizer dispensers. These sensors send alerts through the building's network when supplies are running low. An order to replenish (any of the above) will go to the maintenance staff by email, pager alert or cell phone text message.

In addition, Cognos Systems (the company that designed the sensors and software system) hope to have sensors that can measure water flow in all toilets and sinks. However, one huge problem that still looms for the "pervasive web" is the issue of privacy. How comfortable would you feel if someone monitored your "hand washing practices" every time you used the bathroom? How comfortable would you feel having companies know how often you trade out your living room furniture?

Privacy groups have already started asking some very hard questions that will need to get answered before the pervasive web becomes the ubiquitous web.

### ***Slide 34: Applications for the Business World***

Much the way FaceBook and MySpace became online sensations and cemented the direction of the Web (from an online library to a virtual community), each one of these directions needs a killer application – one that will cause people to abandon their old methods and adopt the new technology.

Consumers do not care about the technology that we have discussed. If they did, Apple's OS would be the industry leader (instead of Microsoft). Consumers care about utility and fun.

The bottom line is that for a technology to succeed, business leaders need to find a mainstream use for it. They need to create a market for these new technologies, one that consumers "get" and want to use. History is littered with examples of business leaders finding new inventive ways to use new technology.

- Weak adhesive = post-it notes
- Frozen soda powder and water = popsicle
- Waterproof adhesive tape = duct tape
- X-Y Position Indicator for a Display System = computer mouse

To date, many aspects of the four directions are showing signs of commercial viability:

- Twine- a personal database that represents information in a structured way and supports queries. That is a huge advantage, but will people care?
- BlueOrganizer – leverage semantics to proactively pull information off of the web via a browser plug-in. Will it succeed or will people see it as advertising?
- Google Earth – sure it is cool to scroll down to street-level San Francisco, but, given where the technology is now, what would be a practical use for this? Technologists say it could lead to people buying homes fully through the Web. Is this feasible? Remember, it is possible to buy a car off the Internet, but that activity has not yet gone “mainstream” because people want to touch, feel and sit in their potential new car. Would buying a house online hold the same limitations to people?
- Universities on SecondLife – will people join?
- Wireless sensors found in your refrigerator (to help with maintenance, etc.) in public bathrooms (to help with cleanliness and maintenance), but will privacy concerns trump all benefits?

In order for these technologies to succeed, they must be positioned so that consumers understand and desire the benefits to the point that they override their concerns and hesitations.

### ***Slide 35: Bottom Line***

What is the bottom line for you, the future business leaders of America?

It is simple. This entire presentation was given to you today to show you what direction(s) the Web is heading, and to emphasize the fact that it is not a static entity. It will always grow and change. Most things do because there will always be people who want to improve our current technology – from the UI on ATM machines to stow-away seats in an SUV. The trick comes with finding a way to make people want to use it. Once a new technology sparks peoples’ imagination, it becomes viral and gains a momentous amount of traction in the marketplace.

Only then will Web 3.0 become more than just a vision.

### ***Slide 36: So Which One will it be?***

Which direction do you think the web will head? Maybe one, maybe none, maybe all?

The answer is probably a little of all. That seems to be what we have now...the beginning steps towards every single one.

### ***Slide 37: Web 4.0?***

Which leads to the last slide....where do you think Web 4.0 will head? Many believe towards even tighter integration between friends, families and colleagues. How do you think they will get there?

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