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The Future Of Phone And Web Convergence

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Mike McCue is clearly a forward-thinking guy, one of those people whose ideas are ahead of the curve. Perhaps, at times, a bit too far ahead for them to take hold. This, however, hasn't slowed down the 39-year-old founder of Tellme Networks. His recent ideas on the convergence of the telephone and networked computing are beginning to take hold.

An early interest in computer software started McCue on the path that eventually led to his current endeavor. While still in high school, he developed several videogames, including the "Night Mission" helicopter game written in Extended Basic for the Texas Instruments TI-99/4A computer and released by Millers Graphics in 1985. After high school, McCue decided to forgo college and join IBM as a computer graphics specialist.

McCue left IBM in 1989 to found his first company, Paper Software, which produced a launch-pad style toolbar called SideBar for Microsoft Windows 3.1. In 1994, SideBar was sold to Quarterdeck, the company best known for its QEMM memory management software. Microsoft later added similar application-launching features to its Office and Windows products and SideBar faded into computer history. As McCue points out, however, the current Google Desktop Sidebar is a descendant of the ideas first introduced by Paper Software's application.

Paper Software's next product was WebFX, a plug-in for Netscape's Web browser that provided a three-dimensional interface for the World Wide Web using a superset of HTML known as VRML--"virtual reality modeling language." Netscape was so impressed that it acquired Paper Software in 1996 and integrated the WebFX technology into Netscape's Live3D product. But the 3-D Web never caught on the way many in the 1990s predicted, although it can be argued that these ideas have resurfaced in the current generation of multi-user virtual environments such as Second Life.

During his stint at Netscape, McCue oversaw the development of Netscape Netcaster, the company's "information broadcasting" tool, to automatically deliver news and information to people's desktops employing what was then called "push" technology. Despite enormous initial buzz, "push" products like Netcaster and PointCast lost traction after the 1990s. Yet many of the ideas they introduced, including RSS data feeds, the subscribe-and-sync model and background "pre-fetching" of data, are now common in products ranging from blog aggregators to on-demand video services.

Following the acquisition of Netscape by AOL, McCue left the company and founded Tellme Networks in 1999 to pursue his next vision. McCue and his team at Tellme were convinced that the telephone would be the nexus of the next technology revolution. The convergence of the telephone and networked computing meant that you could deliver information services in an entirely new way. The proprietary "walled garden" of existing telephony networks and voicemail systems could be replaced by more efficient open systems. The Web had shown the power of developing an ecosystem around an open architecture; why not bring that same vision to telephony?

Tellme's initial product was a voice-driven information service--what might be termed a "voice portal," much like the Web portals developed by Yahoo! and Netscape that were all the rage in the late 1990s. But while online advertising fueled the rise of companies like Yahoo! and Google, Tellme found it difficult to monetize a voice-based information service. McCue realized, however, that the infrastructure Tellme developed to drive the voice portal, built around the emerging Voice XML standard, could also be used to power telephone directory services and corporate voicemail systems.

Tellme still operates its public information service, available by calling 1-800-555-TELL, although most of Tellme's current business comes from providing telephony services to telecom companies and large enterprises. Tellme's Internet voice-recognition systems power the directory assistance services that consumers use when they call 1-800-555-1212 from AT&T or dial 411 from their Verizon landline or Cingular cellular phones. Tellme's technology is also behind the automated 800-number customer service lines at companies like Merrill Lynch and FedEx.

McCue hasn't abandoned his larger dream of a voice-driven Web, however. Like the SideBar launch pad, WebFX's 3-D world and Netcaster's information feeds, the notion of a voice portal may have been just a little ahead of its time. McCue believes Tellme's corporate information services and its public voice portal will soon converge to provide new ways of using the phone to interact with the universe of information.

Indeed, for McCue, the traditional 411-style directory service will soon be a thing of the past, replaced with what he terms "search on the phone." The notion is simple: Rather than using directory service to get a phone number, people will use the phone much like they use Google--to find whatever they want. Rather than calling an operator for the phone number of a specific company, consumers will simply state what they want and be given a list of options, or they will be connected directly to the business they are seeking. Instead of asking an operator, "What's the number for the Ralph's pizza at 134 Main Street," you will be able to just say, "Ralph's pizza," and be connected directly. Alternately, you could say "pizza," and you would get a list of the nearest pizza parlors.

Knowledge@Wharton recently met with McCue in Tellme's Mountain View, Calif., offices to talk about his vision of the future of telephony and voice-enabled services, as well as how some of his ideas from the 1990s have found a new life in the rise of Web 2.0. An edited version of that conversation follows.

Knowledge@Wharton: You recently announced a deal with Cingular. Can you use that as an example of how you are trying to fix some of the problems that you see with traditional phone service?

McCue: Directory assistance is used by about 40 million people in the U.S. right now. And it's used about 2 billion to 3 billion times a year. [Consumers] pay up to $1.80 per search in directory assistance, which is amazing when you think about it. If I were to tell you that I was going to start a company that would charge $1.80 per search query, you would think I was crazy.

But the convenience of that service is really powerful. People are on the go, they are in the car or whatever, and they can't look up [a telephone number] any other way, so they call 411. It's easy to dial the phone to just ask a human being what the number is.

The problem with this service is that it is very expensive to provide. And sometimes you get the wrong number, or sometimes you're on hold for a while. If you get disconnected, you have to call back again.There are a variety of challenges with that service.

We can make a better directory assistance experience today and also, more importantly, help the carrier understand where directory assistance is going tomorrow and help it recast directory assistance as search on the phone. Ten years from now, I don't think people will be paying $1.80 [for a directory assistance call]; they will be doing searches for free. How do the carriers rectify the fact that you can do a search for free on Google now?

We're painting a vision for them--that they really need to think of directory assistance as a search on the phone, not as the [traditional directory assistance service]. And meanwhile, all the tools and the platform that we are bringing to bear actually make the existing directory assistance far superior to anything that is out there.

In what way?

You can get listings sent to you [as a text message]. If you call [directory assistance], sometimes your call will drop and you didn't write down the phone number, so you have to call 411 again. What we do, if you call 411 again in a reasonable period of time, is automatically reconnect you to the business that you were previously talking to.

Plus, we automate about 35% of all the incoming phone calls to directory assistance in the wireless world and even more in the landline world. That saves [the service provider] tens of millions of dollars, which they can then use to help fund the future of directory assistance, which looks much more like search on the phone. It's a great deal, because it helps them with their existing needs today and positions them for the future. What Cingular did was unprecedented. They decided to standardize on an Internet-based company to handle all of their directory assistance.

Now that this Internet-based platform is in place, they're going to be able to do things that will really be amazing.

I'll show you. Give me a small city and state somewhere in the U.S.

Princeton, N.J.

[Speaking into a cell phone:] Princeton, N.J.

So I just hold the "talk" button and say, "Princeton, N.J." We take that speech utterance and ship the audio snippet to our platform. It recognizes it, and then we ship back the results to this client and display it.

Now I can search for a type of business. I'll say, "pizza," and it will show me all the pizza places in Princeton. And then we can look at the map, call the place we want, get driving directions and so on.

This works because your system knows the capabilities of my phone, so it knows what to send back--versus the voice response, which is generic across cellphone handsets?

Exactly.

In fact, when Tellme got started, phones were fairly dumb--all you did was to talk into them. But phones are now much more intelligent. Many of them have Web browsers; they all have text messaging. Isn't that a challenge to the path that you've been going down, of developing a voice-driven system?

If we didn't adapt to that, yes, it would be a challenge. But we've always believed that this world was going to happen. The people we hired--who have come from Microsoft, Netscape, Google, Yahoo!, eBay and so on--are very familiar with that world [of rich interaction through the phone]. In fact, it's almost foreign for them to be in the voice-only world. We've been itching for this world to finally materialize.

This phone is now more powerful than the IBM ThinkPad was in 1996, when the Internet was really hitting its stride. We are excited about how we can extend our platform to embrace these phones and make the overall experience better.

[To illustrate] how the enterprise call center stuff rationalizes with the voice portal stuff, here is the perfect example. I said, "pizza in Princeton, N.J." [If the pizza parlor were] a client of ours, I could also order a pizza. And [the system] knows what pizza I normally get. So I can just select the usual--a large pepperoni and a two-liter Coke--and I can then add a side, some Buffalo wings or something. And then I can place the order, and the order gets shipped to [the pizza parlor] and it just works.

So you can basically say what you want and actually complete the transaction. Because [we can provide the 800-number service], we're then able to provide this end-to-end search experience, which is unique in the industry. Nobody has anything like this.

Meanwhile, Tellme is monetizing this--we're making money. Every pizza that we sell, we get a percentage of that order.

This is the direction that mobile search and [Tellme's] services will go.

You've just referred to this as "mobile search." Companies like Google and Yahoo! are also approaching mobile search services. How would you differentiate Tellme's strategy from that of these other companies?

There are a few things. One is that Tellme is really geared around the phone and always has been. So the way that we think about this is going to be different than the way Google thinks about it. They think of it more as a Web company, and we think of it more from a phone perspective intuitively. We believe that speech recognition is critical, for example.

We've made it work really well with speech recognition, so that I can just say "pizza," and I don't have to type it. I think that this is critical to making any kind of phone "form factor" work well, because my mom isn't going to [enter text commands into a phone]. Kids will, but not when they are driving. Or at least they shouldn't be. So we think that voice is a really critical part of building up the service for the phone.

The other thing is that the ad models will be radically different than what they are on the Web. They'll be more transaction oriented--[based on] a percentage of the transactions people actually close with small- to medium-sized businesses on the phone. So the Web ad model that Google has done so well doesn't really hold true as readily on the phone.

However, Google recently signed an agreement with the Japanese telephone company KDDI to deliver mobile search to KDDI subscribers. Does that pose a threat to Tellme's model?

Oh, definitely.

How do you respond to that?

Well, the thing is that Google--because they're Google--they are doing everything, right? They are competing with everyone on everything. So, yes, to the extent that Google is doing stuff like this, it's competitive and there is some threat there. But I view that as healthy. I think that the space is so very different from what Google is used to operating in and where they make all of their money today. They don't make any money doing mobile search today, whereas at Tellme, we get paid tens of millions of dollars, right now, on mobile search.

And we've been doing local mobile search with directory assistance longer than any of the portals. So our results are better; our index is better. To do a local search is no trivial task, because every day 80,000 companies go into, or out of, business and disappear or appear in the database and have to be adjusted for.

It's a really hard problem, and so, as a result, over the years we've built an experience that works really well on the phone, that uses speech recognition and that has a phenomenal local index. We also believe that the ad model will be quite a bit more like a transaction model--like what I showed you with [the pizza example].

Not that Google can't do that. I'm sure they will try to do a bunch of those things. But, you know, they have 1,800 other things that they are doing, too. And they believe mobile is a big priority. But I do think there is room in here for a company like us, especially now with all of the experience we have had in doing it.

You could argue that directory assistance is search on the phone today. It is mobile search, and that's our opportunity to lose. We've got about 40% of all those searches today, and so the question is: "Can we keep that lead?" I think that, because of our experience around the phone and our user interface and monetization model, we've got a pretty good lead, but we're going to have to work at it. Google will definitely be a threat, and so will the other portals.

The other thing that is interesting about Tellme, which is different from Google, is that we are much friendlier with the carriers than Google is. So that will also come into play here, and that will be interesting.

In Asia and Europe, mobile phones are used, to a large extent, in a much more dynamic way than they are in the U.S. What is Tellme's position in some of these markets?

The global future is far more open than in the U.S., and I think that our future is bright there. This [richer] mobile client experience could take off more readily in Europe and Asia than in the U.S. In the U.S., the voice experience will be more quickly picked up on. So there are differences, and the opportunity is large across the board. It really is an international opportunity.

But since so much of your architecture is voice-driven, isn't it a challenge to implement it in different languages?

Yes, it does make it harder--but not impossible. It is just another barrier to entry. So if we can overcome that, then it's a barrier to entry for someone else. We do Spanish today. We do French. We can do Chinese, we can do Japanese, we can do the various dialects.

I think the more interesting problem is the business model around search overseas. Especially in China, there aren't a lot of businesses that are paying for advertising in search on the Web right now. That is a deeper issue.

There is the end user issue, which is making speech work well with different languages, and that is a hard problem. We're up for solving that one, I think. But then there's also the issue of monetization in China--that's hard. For Japan, it's much easier. But for China, it is definitely harder for [local] businesses to advertise at anywhere near the same scale as here in the U.S.

How are you going to sustain your lead in these markets?

Like we always have. We have to innovate; we need to think in a very focused way. We have to think about the end users constantly, about what the unique experiences are that will make them use our search over others.

What will your strategy be?

It's funny. Google could have been asked these same questions when they were just getting started, because they had Yahoo! out there. People were like, "How the hell are you going to compete with Yahoo!?" And how did they do it? It's similar to what we are doing, which is, first, a very focused approach--just around search [in the case of Google], and a "less is more" approach and better search results.

You could argue they provided marginally better search results. In fact, with Yahoo!, it was exactly the same search results, because Google was powering Yahoo! But they were presented in a better way, with a cleaner interface.

So why do people go to Google, instead of just continuing to use Yahoo? It's a great question. The interesting thing about that is there wasn't that much difference between Yahoo! and Google. They were both competing on the Web platform, both in the general same space, same business model, everything.

With the phone, it's a totally different user model and a totally different monetization model. It's a totally different set of constraints, and we're already in the lead there. So, we hope to continue to focus on the end user, building the best search experience that we can possibly build, and leverage the fact that we've got all this experience.

And it's not just experience; our search index is better than Google's right now. The grammars that we have--we do about 10 billion speech utterances a year. So what we are able to do is make the speech recognition system smarter and smarter. And that is something that Google can't get until they get that similar kind of traffic. How are they going to get that traffic? It's a chicken-and-egg problem.

So now that we've got that, it's up to us to build the best search experience we can and provide that across a variety of modalities, whether it's speech only, SMS, a combination of those two or via a mobile client that you download onto your phone.

We also need to work closely with the carriers and the handset makers to show them how this is their answer to Google, because they're very worried about Google.

Google said just the other day that handsets should be free, that carrier services should be free. Well, who is making money then? Is [Motorola Chairman and CEO] Ed Zander going to make any money there? Is [AT&T Chairman and CEO] Ed Whitacre going to make any money there? Who's making the money?

I recently asked an AT&T executive, "Who is your biggest concern from a competitive point of view?"--expecting to hear Comcast or Verizon. It was Google.

So I think that we can play an interesting role in this ecosystem.

Finally, the business model is quite a bit different. The ad products are very, very different than what you might see on the Web.

Given that the difference is so strong with the phone versus the PC in every way--including the business model, the ecosystem, the players and the user experience--I think that if you have a company focused on that the same way that Google was focused only on search, then there's an opportunity for that company to be successful. And that is what we are doing.

Among the carriers--Cingular, Sprint, Verizon--who do you think really gets the future of mobile phones?

That's a great question. I would say that, in terms of mobile search, they are all working from the same playing field right now. They all say the same things, they all sound the same. But I would also say that--just from a pure business model point of view--I think that Sprint is more enlightened than Cingular, and Cingular is more enlightened than Verizon Wireless.

Sprint and Cingular are much more open to third-party developers and to experimenting on their platform. Verizon is very closed, and I think that's going to backfire; it already has started to backfire. You can't download Google Maps, for example, on Verizon Wireless phones. They won't allow it. I think that's a mistake.

Verizon Wireless disables features on handsets that people buy--like Bluetooth sync with your PC to back up your contact address book. Why? Because they are worried you might easily be able to go to a different carrier by moving your contacts from one phone to another.

It is a very close-minded approach. It's monopolistic thinking. It's that "walled garden" approach. I think that Sprint and Cingular are far more open. They have their issues about walled gardens, too, but they're much more thoughtful about this than Verizon Wireless is.

But in terms of mobile search, I'd say that they're all at the same level right now.

The Web took off, in part, because the barrier to entry is so low. It's decentralized and independent, and you don't have to be beholden to anybody to publish your content. It's interesting to compare the Google approach of "let the Web happen and we'll find it" versus having a richer experience that requires a tighter integration.

That's right. And that's Verizon Wireless' argument: Let's control the experience and have a tighter integration. They argue that this is a better end user experience. To a certain extent, they're right. But there's [another] big reason why they are doing that--to control the economics.

Cingular is far more enlightened on that front. I think they recognize that the mobile Web, as it develops, is better. Not that they can't provide some tightly integrated services that ultimately can win on their own merits. They certainly can do that, and they think they should. But if you want to download Google Maps, go right ahead. That's how the Sprint and the Cingular guys think.

So it is an interesting question. There's very little that is open about the phone. There's our platform, in that you can build an application on our platform and access it on any phone in the world by just calling a phone number. So that's open; it uses open Internet standards, you can build applications, publish them and host them off your own Web site. So, literally, your Web site is answering your own telephone calls.

But don't application developers have to pay Tellme for this service?

Just like you host your Web site, you have to host your voice applications somewhere. And that's where we make money. Just like you pay to have your Web site hosted at some Internet service provider--that's like what you do with us. But the application is built by using open standards, and you can use tools and even host the application at your ISP if you want, and use Tellme to make the connection [and just] pay for that piece.

We are also limited by some of the same things that limit the phone. There are some things that are still closed about the phone and that are expensive about the phone.

An 800 number costs two to three cents a minute. That's just amazing. Imagine paying that for incoming Web hits. So it's much more expensive in a lot of ways. That's partly a regulatory [issue], and it's partly just the way the whole monopoly has grown up.

There really aren't any other good examples of open platforms [on the phone]. There's J2ME, which is what Google Maps is written in. But J2ME only works marginally on these mobile phones right now. You have to write once and test many. There's really no good answer. There's the BREW [Binary Runtime Environment for Wireless] environment, but the BREW environment only works on Verizon Wireless phones.

What about Adobe Systems' platforms for developing mobile software applications, such as Flash or FlashCast?

I would love to see Flash take off. I think it's done a better job in Asia and in Europe than it's done in the U.S. From everything that I've seen in the U.S, it doesn't seem like it's happening, which is a shame because it would be a great environment.

Let's look ahead five or 10 years. What does it look like when the Internet and telephony are finally integrated? What can I do then that I can't do now?

There's a far better way of using the phone in communicating with people and businesses that will emerge. You'll probably be wearing a headset that will provide an "always on" experience. As you're walking around, you might hear somebody say, "Hey, your 4:30 meeting just got pushed back to 5 o'clock." And you might then acknowledge that, or just say "OK, great. Then let's move my 6 o'clock to later, and I'll spend more time in the meeting that I'm in now."

This is a much more open and rich communications environment, where you can constantly be in touch. [You can] just push a button and say what you want--"Call the nearest Macy's." "Is my flight on time?" "Where is the nearest pizza place to where I am located right now?" The natural language [recognition], the Bluetooth connectivity with headsets and the voice-over-IP wireless data networks are getting to the point where that's absolutely doable.

It will be much more like e-mail and Web. The same will hold true for businesses and for directories. In the 10-year time frame, phone numbers will basically go away. Yes, you can dial a phone number, but you are mostly going to type or say the business that you are looking for and it will connect. You will get a more personalized experience.

When you call [your airline] today, the first thing you hear is, "Please listen to all of our menu options, because they have recently changed." Then you hear, "If you want to do this, this and this, press 1." "If you want to do this, this or this, press 2." Meanwhile everybody is getting exactly the same menu, whether you are a premium customer, whether you are on a trip right now or not, whether you're trying to buy a ticket, whether you're just checking the flight status, whether you're just checking on your bags--you get the same exact experience.

What will happen instead is that you will be able to push a button on your headset and you'll be able to say, "flight status," and you'll get the flight status. If you call [your airline] it will say, "Good morning. Your flight today is still on schedule to take off at 3:30." That is the first thing you will hear. We will know where you are on your travel itinerary. We'll know statistically what people are asking for [based on] where they are in their travel itinerary, and we'll give them the information right up front. Then we'll configure the menus right there for them.

It will be a much more personalized experience both in how you reach people and in how you talk and interact with businesses. And you'll be able to get other information--news, sports, weather, stocks, the kind of information that people need on the go--very readily just by saying it. You'll hear it or you can see it on the screen.

That is where I think things are going. We're starting to see the glimmers of this happening now. Ten years from now, I think it will be de facto, and people will start forgetting about dialing phone numbers. They'll start thinking about saying what they want and getting it and using directories based on names rather than phone numbers.

The business models around directory assistance will have completely moved to business-paid search as opposed to consumer-paid search. And voicemail won't even exist any more. It will be more of an integrated, persistent message store that is just mapped into your e-mail and will look more like instant messaging.

Why even call an 800 number anymore? Even today, 800 numbers don't make sense. They used to be for businesses to provide a free way for customers to reach them. Well, now it's free anyway for customers to reach them. Businesses are paying $10 million, $20 million, $30 million a year for 800 number services. Now you can't even get one because they are all used up, right? So now you get 888 or 866.

And, meanwhile, the entire infrastructure underlying all of that is going to change. It will all move to VoIP. But it will also be an open application framework. You're going to have visual and audio in a multi-modal way. You will be able to seamlessly switch between the two, listen to something while you are driving, say something, or type if you want to be quiet or you are just used to typing.

So, I think that's where it's all going and that's a huge shift. The telecommunications network is a trillion-dollar industry which is built on the current way the phone works.

When you were a Netscape employee, one of the products that you worked on was Netcaster.

Yes, that's right.

Do you have any thoughts about why it didn't succeed then? After all, many of the features introduced in "push"--such as subscribing to information updates and background data downloading--are commonplace now.

It was ahead of its time; that was the main issue. But a lot of the things--like RSS, which is used heavily now--came right out of Netcaster.

Netcaster had a lot of the Web 2.0 stuff, which was way ahead of its time. The whole thing was written in HTML. It was a Web service. In hindsight, we pushed the technology too far, too fast. And it was way too slow.

It actually worked great while we were building it. But when the security guys got their hands on it, it became abysmally slow. Because what happened was--I remember this vividly--the product worked great as an HTML site. We built the event model, the document object model and all that stuff people use now, into HTML. We pioneered all of that stuff back then. It was awesome. You could drag things around on the screen--it was a full-blown windowing environment in HTML.

Then we built the Netcaster service, which used RSS, as a way to have just the content that you need pushed to you, and you were able to access it online and offline. That was back before everybody was online all the time.

So, we got it all built and it was time to integrate it into Netscape. The technology guys at Netscape, the product guys, were like, "OK, well, you have to have all of these security things because you're letting people collect mouse clicks or bring up windows on the screen that don't have borders--so you can't tell if it's a Netscape window or not. So you need to ask the end users if they'll give you permission to do that." We were like, "What do you mean we have to ask the end user's permission to pop up something on the screen or to trap a mouse event? Come on."

And they were like, "No, you have to do it, according to our security policy." We were like, "Alright, OK. So we'll ask the user, 'Are you OK with us popping up windows? Are you OK with us trapping your mouse?'" Most people don't even know what the heck that means!

And the kicker was--we had made sure that we didn't write this in Java, because Java was really slow. Every time you invoked Java, it ate a bunch of memory and it took something like 30 seconds to load the Java runtime.

Well it turns out all of the security dialogs were written in Java. Somebody thought it would be a good idea to have the security manager be a Java application so that you didn't have to port to all the different [platforms]. It makes sense, I guess.

Every time Netcaster would come up, the Java runtime would fire up, and [a] bunch of memory would get utilized. And you would have these security dialogs coming up that the user doesn't even know about. And now everything is slow because Java is running at the same time our thing is running. We were like, "Oh, no..."

It was just ahead of its time. We had a lot of fun doing it, but it was just way ahead of its time.

And now it looks a lot like the kinds of things you see in [products like] the Google Sidebar, [which is] basically [like] Netcaster. And in fact, that sidebar was actually something that was a Paper Software invention.

But it really is funny to look back on all of that and, yeah, it was just an example of something being too ahead of its time.

But that was a great time, a great time back then.