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THE FUTURE OF SOFTWARE

RAY OZZIE CEO, GROOVE NETWORKS

hosted by Mark Anderson, President, Strategic News Service

Mark Anderson: Good morning, everyone. I hope you had a great sleep and are ready to go.

... We have a couple of changes in the program. One is in Session #3 in the breakouts this afternoon. We have a new person, Tia [Walker] from Authora, and she will be showing you Authora's new product, which, essentially, if you remember all the headaches you've had with PGP encryption trying to send e-mails to each other in the old days, back in Phil's days – she's fixed those problems. She has created what looks like a communications platform which is fully encrypted and with no hassle. She'll be talking about that on Authora's behalf in the third room of the breakouts.

Other breakouts, as you know, are on Mars, Sustainability, and Japan and China. I would encourage you to go to any or all of the above. I wish I could go to all of them myself.

I will mention that in the Japan and China breakout we have Joi Ito, who was going to be with us for the "About Japan" discussion, but who has to go to some darn place in Switzerland. So he will not be there, but he will be talking about Japan in this breakout this afternoon.

... Today we're very, very lucky to have Ray Ozzie with us. Welcome, Ray. Ray is probably well-known to all of you. He's a really interesting guy, he likes to program computers, and he was described by Mr. Gates at one point as "the most brilliant programmer in the universe," or some such thing. He doesn't need that kind of accolade, because he's proven through his own work that this is in fact the case. He has done things with software that nobody else has done. These are not easy things to do; they tend to be the hardest things to do. If you're a software person, you understand the challenge that he's taken on in almost all of the products that he's made. There are easy things, but Ray, for the right reasons, has picked the things which are not easy.

I'd like to talk to Ray today a little bit about software over the next five years, and particularly about his kind of software, because he and I probably both agree that that is the most interesting part of the market.

I'll tell you just a little story. Ray doesn't know this story, but I was in this town about a year ago at a meeting I cannot tell you about, and with some people who I won't describe.

Ray Ozzie, Groove Networks: Sounds like a good story. *[Laughter]*

Anderson: In this meeting a problem came up, and it had to do with Groove Networks, and it was being used in a very, very high-end, demanding way. And someone said, "Well, is this problem going to get fixed, or – ?" I happened to be in the meeting, and I said, "If you guys

understand who you're talking about, you have no worries. Ray is going to fix this for you. You ought to just give him a call, and he'll fix it." I believe that all actually happened afterwards.

I'm just very impressed to have you here. I'm really pleased, and I think that we all benefit by your presence.

Ozzie: Thanks. I've been working in this area of computer support, cooperative work, collaborative software, for many, many years now, largely because of some things that I was exposed to back at the University of Illinois in the mid-'70s. I don't know how many of you have heard of a system known as Plato, a computer education system – really, it was a computer-based teaching system. But it was a little microcosm of probably about 1,000 terminals, half at the University of Illinois, half spread throughout the world.

It was a very innovative system at the time. While people in our Computer Science program were punching cards, these guys had built graphics terminals in an online interactive environment where many of us experienced what today we know of as e-mail, discussions, instant messaging, online gaming – many years before we all experienced them on the Internet. A lot of us who experienced that system were pretty fortunate in that we got a little peek at what at least one end state might be. Those of us who were touched in various ways took some of those ideas and kept working on them and developing them, in my own case more in the commercial domain – commercial collaborative software.

But I was very touched at the time. The thing that really was a turning point for me in those days was, I was working on a programming project with a guy who was my boss, online, and I hadn't seen him in months. I had never met him at the beginning, and we were interacting over instant messaging. The instant messaging on Plato was a character-by-character instant messaging, where you could see as people typed, character-by-character, and this guy just drove me nuts because he typed *so* slowly. So I was trying to go slowly, and I got really frustrated.

A few months later I found out why he typed so slowly. It's because he was a quadriplegic, and he was typing with a stick. It was a crystallizing moment for me, because I had been working with this person mind-to-mind, and it really set the stage, at least for me, and particularly for the cofounders of Iris Associates, who worked on Lotus Notes with me. It gave us this innate belief that working with other people online could be a really, really good use of technology, that technology could be molded and shaped in some way to be "power steering for human interaction." I've been trying to do that ever since, in one way or another.

Anderson: Let me just jump in right there. I think that the greatest gift that you've brought to the market, if not to programming, is that you have insisted on making this stuff real in terms of the way people use it. Unlike a lot of folks in programming, I think you tend to look at things in terms of the customer first, and really understand how people work together or want to work together, and then you try to build that.

Ozzie: Right.

Anderson: Which is a novel idea, really. Wild, really.

Ozzie: Well, we gave that a lot less thought in Notes than we did in Groove. In Groove – I saw Don Norman out there; as he will attest, very early on in the process it was a very specific design goal that we wanted to build this kind of collaborative solution from more or less both ends inward. Collaborative software is inherently social in nature, and collaborative software also

needs to take into account organizational dynamics and a number of other things, so that it doesn't just help people work with one another, but it helps them work together in the context of the things that they're doing with their organization. It was a very explicit goal to make something that people would want to do their work in, because the more work that was done within the tool, the more artifacts there were that would be available for organizational use for being plugged in to organizational processes.

Anderson: The question that leaps to my mind is, if we look out five years – and it could be any number, but we picked five for a reason, because it's the hardest number you could think of – I want to ask you, as you see this picture in your mind of five years from now, the ultimate computing design, you're combining it in your mind with the ultimate design of a workgroup somehow...

Ozzie: Right.

Anderson: So, based on what you know about software and what you know about collaborative workgroups – I don't think you'd call it P2P, I think you'd call it something else. But what is that structure; what is the architecture you see five years from now?

Ozzie: I guess I would have to step back and say –

Anderson: I hope you're not going to say "client-server."

Ozzie: No, no. The technology in Groove is inherently decentralized. It's principally something that works at the edge of a network, more or less like the Internet itself works in e-mail and things like that, very directly, person-to-person. They might use intermediate routers, but the application logic is at the edge.

Where I think things are going. You have to really step back and say, When we as an industry developed the PC, the operating system and the hardware and things like that were built by people of my era, in the '60s-'70s era. And the ultimate, the thing that we thought we were all building for was this workstation era. If you can picture an Apollo domain system or an early Sun Microsystems workstation, that was kind of the ultimate. If we could get the PC to that level, we would have solved the problem. We've worked as an industry to get to that point, but guess what? It's the wrong model. It's not the right model moving forward.

Anderson: Right, right.

Ozzie: The reason I say that is because in that era, the things that were important to us in manipulating were resources like disks and files and things like that, and that was the big function of the OS. Today, the first class objects that should be being manipulated by the OS are people and relationships and shared workspaces and things like that. You hardly do *anything* on a computer anymore that doesn't involve some type of a relationship. So *trust* and security has to be much more well factored in. We build systems that had directories that are rooted at the enterprise, as though the enterprise was some magical hierarchical thing that was at the top, when in fact what we've got is a mesh out there, and what we need now are security models that are more cellular in nature as opposed to being specifically rooted in the hierarchy.

Firewalls are another good example of that. There is no such thing as an insider versus an outsider anymore; it has to be fundamentally rethought around that –

Anderson: It has to go around that corporate wall –

Ozzie: That's right. And fundamentally, even if you go up the stack into productivity applications, in the early era of the PC we built applications that were oriented around emulating a paper spreadsheet, emulating a typewriter, emulating things that we would use as single individuals. Moving forward, virtually everything we do involves other people, communications; and I think that this portends a shift into collaborative productivity as opposed to individual productivity. How can you do presentations, for example, that don't just serve you as the presenter, that bring the audience into the notion of what is a presentation? How do you do writing on the Web involving other people; how do you do financial rollups with spreadsheets and things like that?

Anderson: You'd have to actually build a firewall around the document.

Ozzie: Around, I think, what I would refer to as a workspace, a shared workspace.

Anderson: But a workspace may be outside of the corporate firewalls.

Ozzie: That's right. It may span. A natural workgroup that *you* might work with might involve me, might involve someone in another country, might involve someone in another company, and we all want to treat the Internet – big surprise – like a big transparent peer network with end-to-end connectivity, and over the last few years we've broken the Internet. We've set up these NATs and we've set up firewalls, and we've ruined the asymmetric nature. But as people, we still want to treat the Internet like that.

So I think over the next three years, probably three to five years, you're going to see us an industry try to rebuild the Internet one layer up, whereas instead of IP messages going across, it's XML packets, one level up. Instead of it being "We'll try to fix some of the things that we didn't do right in the past," perhaps end-to-end secure from the outset; perhaps more of a bringing that symmetric nature one layer up.

Anderson: This, to my mind, takes us to two places at once. It takes me to a question of hardware and software and how those two play off each other in terms of power, because it's been a very boring story, I think, until now. But I think it's changing. And the other question is one of centralization, which you've attacked here.

It just so happens that one of the nice things about being at FiRe is we have experts here who are good at almost any darn thing you want to talk about, and we happen to have Will Swope here. Will, would you please come up and join us?

Will is VP at Intel, and happens to know all about enterprise. You just heard this, Will. Does this make sense to you?

Will Swope, Intel: A lot of it makes sense because, of course, we're big believers. The tradeoff that you get is that there are times you *have* to keep it central. We do about 98% of all of our buying and invoicing over the Net. So for us, we still have a corporate space; we have something that we have to maintain. The trick's going to be how you get these interactive workgroups that don't get blocked by the firewall and can keep autonomous security.

Anderson: It's almost like supply chain has to be managed in a separate way.

Swope: Yes, and we don't know how to keep that separate, so if we're managing a fab, and we work with a lot of customers – Intel's probably *an* example, but it's really not the only one, probably not even the best one. But there are things at the corporation you have to keep secure, where that firewall matters. The other thing that's going to happen to us is that the handheld device is going to be a real trick in terms of dealing with, in both models – because it doesn't have inherently ringed security – is you've got to kind of authenticate who you are. You can use a smart card or something like that, but once you get into these kinds of models and then you try to have them all work together in some heterogeneous, logical way, the loser is usually the end user, who's trying to go back and forth between two or three levels of security, and sometimes you end up getting lost about which one is more germane to the job you're on. Does that make any sense?

Ozzie: Yeah, it does.

Swope: Whew.

Ozzie: It absolutely does. Part of the thing that I've observed – and I think other people have, and you probably have, if you just reflect back on how you use computers – is the use of technology and devices is bifurcating dramatically. There's both the – I guess I'll refer to the "kiosk" mode of use, where we like to be able to walk up to a PC, any PC, and use the browser to get at our e-mail or whatever through a browser. It's an end-user-to-one device model, and it's highly tethered.

At the opposite extreme, it's an end-devices-to-one-person model, where essentially what we want is, we have a phone, maybe a PDA, maybe a PC at work, maybe a PC at home, and we want to federate those things in such a way that they're treated as a logical unit for us. So everything that we *want* synchronized is automatically synchronized between them so that we can treat devices interchangeably. In that world, we're moving the opposite of tethered; we're moving toward extreme mobility. And I think the security models that we have at the systems software level really have to move forward to address both those models, and potentially in different ways. The way you protect that kiosk mode of use and that highly centralized form is much different than the mixed centralized/decentralized form that you have when you're taking devices –

Anderson: So you're describing a security need that I don't think anybody's even *attacked* yet. Because in this federation of devices that are yours, you want them to all have the same trust level, the same authentication abilities, and to be equally interchangeable in terms of having content that you might draw down from a corporate database.

Ozzie: Well, I don't think anybody in particular likes synchronizing. Synchronizing is an explicit operation, and it shouldn't be an explicit operation. It should be securely done, transparently amongst the devices that we use, whether we use them outside the firewall, inside the firewall, at a Starbucks, where everything is being sniffed, or not.

Swope: This is a great conversation, because when you really think about how software is constructed, it's not built that way today. Most software assumes it's either connected or not connected. It's occasionally connected, or occasionally disconnected, depending on your view. That's going to really restructure a lot of the way that corporations have written code and tried to execute it.

So what you've got is – I'm trying to think of all the things that, by what you just described, are changing. The historical model that you're connected to a wire is changing, right? The security model, which we want to have incorporate both a firewall and this group connectivity, is

changing. The manageability of the network and the manageability of these spaces is getting to where the operations cost is such a huge percentage of the capital outlay that you can't – so you're kind of dealing with that – and this will exacerbate their problem rather than simplify it, at least in the short term. So if you look at the next five years, to answer the question that you started with, I think in the next five years, at least at the corporate level, we all have to – as a team of people, we all have to go after that. That's a nontrivial change from where we are. I don't think we necessarily can increment ourselves into that.

Anderson: That's a new architecture.

Swope: I think so. I think it's actually a fundamentally new architecture.

Anderson: We have to get ready to make up a name for it.

Swope: Good point. We're behind in our marketing already, and we've just started the conference. *[Laughter]* I'm assuming that it will have "FiRe" somewhere in it.

Anderson: It will. *[Laughter]*

Swope: But "FiRe *breathing*" may not be exactly the place you want to start.

Anderson: I want to have a little bit of a chance for people to ask questions.... We have five minutes now for Q&A, and this is your chance. I see one hearty fellow doing this. Alright.

FiRe Participant 1: The security architectural problem you're discussing is actually what's going on in the purview of something called Global Grid Forum, which is a standards organization, and there is an architecture something like you describe. It's called the "open grids services architecture," and it's essentially based on Web services and new security models, where the issue is not to use firewalls as a sort of – as I agree 100%. – it's a giant leap backwards; it doesn't really provide security. But instead to focus security at the right layer, which typically is going to be the service, via flexible access control models. So that is in fact underway already in another community, and there's a lot of war going on there because they recognized early on that these sort of classic, secure, trusted-base security models simply don't work in this new environment, where you have rapidly changing dynamic virtual organizations that you need to maintain. I just wanted to say that the architecture is winding its way through the process right now in the standards process.

Ozzie: I agree. I don't know enough about it specifically to understand the characteristics of whether the design center is grid computing or whether the design center can scale down to dynamic teams and things like that, but that's terrific. Virtualization in general is another whole subject.

The problem is that we probably have two or three hours' worth of subjects here. We haven't talked about enterprise software, we haven't talked about what's going on in the data center, but virtualization is another big, big, big, big, issue moving forward both in terms of virtualizing computing and virtual machines taking on a much, much, much higher degree of importance within the OS, making everything managed instead of running unmanaged code. Because mobile code is the norm right now; having code running around on the Net that you download is the norm. Over the next three to five years we have to take a shift to moving the whole industry away from writing unmanaged code to writing code that is inherently mobile.

Anderson: And managed.

Ozzie: And managed.

FiRe Participant 2: Ray, I think I heard recently that the installed base of Notes – I know that we’re supposed to talk about the future, but sometimes we have to look back a little bit to see the future. *[Laughter]* Some large percentage, say 60% or 70%, primarily use it as an e-mail environment to send messages. I wonder how you feel about that, given that you’ve dedicated your life to helping people collaborate in softwaring, and perhaps how did that inform your design around Groove, and what do you learn from that going forward?

Ozzie: That’s a really good point. First of all, if they’re using the software I feel good. E-mail is the least common denominator, which everybody understands, and it just works, most of the time. It’s really annoying for many reasons that we don’t need to go into here, but the incredible use of e-mail is actually what catalyzed the creation of the company Groove back in the mid-’90s, because what happened was we noticed – probably ’95, ’96 – in our customer base, we noticed Notes was being used within enterprises pretty dramatically within certain global enterprises, and it was being used probably pretty well in maybe 60% of those companies. But we started to notice a trend where people were doing more and more and more communication and collaboration with people outside enterprise boundaries, and Notes by its architecture could not easily be deployed across enterprises.

Again, this is a fundamental issue that has to be dealt with in the next three to five years. When you’re in a line of business within an enterprise and you need to do something with someone else, the notion of you telling or asking your IT organization to go to battle with another company’s IT organization, or two, or three, or 10, or 20, in order to get some product installed, and you have different directory environments, different security management environments, different – totally different – systems, yet the people need to work together, it’s very challenging. So what do people do? They go use e-mail.

Because it just works. And so fundamentally, what we basically came to the conclusion of, was we know as an industry that e-mail is not the future because it’s become so noisy – the signal-to-noise ratio has become so dramatically tough, the signal is very hard to find. You can try to clean up e-mail, but ultimately it’s not a good tool. It’s 30 years old; the paradigm’s not good for interacting with other people with it.

So what we basically said was, Okay, invert it. What is the most key essence of e-mail? And that is the decentralized, end-to-end nature of it. How do you build something upon, instead of maybe SMTP messages, little XML messages flying back and forth, that matches architecturally how e-mail works but really starts to take the tooling at a level that’s more appropriate for the task at hand? I mean, I think e-mail will be with us forever, and I feel good that Notes had a part in that, but I think we can do a whole lot more in terms of, I guess what I would refer to as “superconductive relationships,” getting people to work together as though they were one, reducing the friction between our minds and what we’re doing.

Anderson: I think we have to say something that John Seely Brown would say if he were here, which is – he wanted to be here, by the way, but he’s in Japan – that if you look at the information flow, in workforce, a lot of that very vital information that’s coming into a corporation does not come from within the pyramid. And so any system which shuts that down is a bad system. You want to have a system which expands those contacts.

Ozzie: I just want to add one thing, though. I don't know if people out here have heard of John Arquilla, but he edited a great book, about a year, a year and a half ago, called *Networks and Netwars*, and it talks about issues of centralization and decentralization, not so much from a technology context but from other organizational contexts. And the reality is that in order to have an effective business structure, you need a mix of centralization and decentralization, and the key here, 99.9% of all – even though we have decentralized technology in Groove – all the deployments are a mix of centralized and decentralized systems; it connects the business practice with the business process. And so I think, to quote him, the right thing is, it's all about the network form, and whoever can find the optimal network form will survive and thrive.

Anderson: Okay; I think we have to close this off. Thank you, gentlemen, very much. And we have some Hotspots folks – you know who you are. Bill Janeway, you're up.