Continua Enables Standards-Based Mobile Personal Health Solutions

Rick Cnossen, M.S.C.S. (Moderator),[1,2] Brendan Jorgensen, B.A.,[3] Jayanth Krishna, B.E., M.B.A.,[4] Clint McClellan, B.S.,[5] and Rich Rogers, B.S.[6]

[1]President and Chair of the Board of Directors, Continua Health Alliance, Beaverton, Oregon.
[2]Director of Personal Health Enabling, Intel Corporation Digital Health Group, Hillsboro, Oregon.
[3]Business Development, Lamprey Networks, Inc., Durham, New Hampshire.
[4]Product Manager, MindTree Ltd., Bangalore, India.
[5]Senior Director of Market Development, Qualcomm, Inc., San Diego, California.
[6]Team Lead, Software Group Healthcare Life Sciences Standards, International Business Machines Corp., Armonk, New York.

Rick Cnossen: Continua is an international organization of 230-plus companies coming together to build an ecosystem of a standards-based personal health solutions. We recently put together a summit in San Diego, where we partnered with various other organizations in the industry, such as the Wireless–Life Sciences Alliance (WLSA) in San Diego. I'd like to discuss the key messages delivered at the summit and also talk about some of the demonstrations, particularly those germane to the "mobile space." Mobility is a big part of what we see in the future for personal health solutions, and we are trying to provide what is needed for our members to have quality solutions.

Relative to this concept, I think there are a few barriers in the market right now hindering standards-based personal health mobile solutions from taking off. The first is that the market is still maturing, and with that comes some uncertainty and trepidation, which has prompted us to take a close look at different business and marketing models.

The second barrier is that a few of the required building blocks are not easily accessible at this point in time. There are many that are accessible; however, something like an open-source mobile version of the complete Bluetooth health device profile (HDP) is not yet available.

A third barrier is that the regulatory environment can be confusing and intimidating in this type of space.

Therefore, to help our members overcome these barriers, we are taking several actions as an alliance. One of the first things we are doing is providing a Web site that has white papers, evidence, market analysis information, reference to pilot studies, and a list of building-block providers that people can use to easily piece these solutions together. In addition, we are trying to equip developers with the building blocks that are not easily available, making it relatively straightforward for people to come into this market, put pieces together, and develop these solutions. We are testing and hardening code, making it available, and sponsoring plug-fests with test tools, among other endeavors. Third, we are providing demonstration opportunities and orchestrating that with some of our partners, such as WLSA, and this is what we will be talking more about today. We also have Cellular Telecommunications Industry Association (CTIA) coming up and several other events coming up later on in the year.

On the regulatory implications barrier, we have been conducting a series of tutorials and really trying to ask the Continua membership what their biggest questions and concerns are to address them. We have about 60 companies in Continua that are very large stakeholders in this space and have been participating in interactive discussions about barriers, issues, and proposed solutions. As far as partners go, I mentioned WLSA. We also have liaison agreements in place with Global System for Mobile Communications Association (GSMA) and European Telecommunications Standards Institute (ETSI). In those groups, we are certainly trying to work with them to develop the same set of standards and guidelines to enable the market to move out in a consistent, standards-based fashion. There is a lot of interest in the health verticals within GSMA and ETSI to team with Continua and leverage those standards that we have already selected and that we are demonstrating. The last effort being made is to look at pilots and

DOI: 10.1089/tmj.2010.9969

work that is already being done. We try to get that information out so people can understand the market a little bit better.

I tried to give an overview of what Continua is, what we think some of the barriers are for standards-based mobile personal health solutions, and address a few of the actions that we are taking to foster this market. I would like to turn the discussion over now to our guests to discuss more of the specifics about the summit in San Diego and talk about the demonstrations that were shown during the meeting. Clint, maybe you would begin with some of the highlights and key messaging.

Clint McClellan: I think the event was a good combination of both technical and business components of the industry. The WLSA focuses on the business issues of wireless health. Continua is working on the specifications that will help ease the pain points for these companies to get to market with the different components. I think what we heard from the companies that presented at the WLSA Day was that they are close to getting to market. We are poised to realize the "hockey-stick" curve this year. Many companies will be getting to the Food and Drug Administration this summer and getting to market in late fall and early 2011. Many of these companies have to not only work on their wireless technology, but also their life science component—many of them are measuring biometrics from the body and then transmitting them to a caregiver or providing it to another service provider.

They will work on that, at which they are experts, and they also have to become experts in wireless. They have to find their own specifications, build their own gateways, build their own hubs, and figure out what phones they are going to use. This has been fairly onerous for many of them. They do not need to be experts in that component.

So that is where Continua comes in. The Continua Alliance works on pulling together interfaces and specifying certain standards. It is not a standards group, but it pulls in standards and sets specifications. The whole idea is to help these companies get to market even faster. Going forward, I hope this is something we continue to do, because it is a great symbiotic relationship. I think the importance for the Continua membership is that many times we are focused on the specifications and the nuts and bolts, so it was good to see where the companies are going and truly what we are building toward, and importantly, why we are doing all the work with the specifications, to see the companies that will benefit from this. Having said that, I think that many of the companies at the WLSA were enlightened to realize that, in fact, there was work going on with the specification piece to ease those pain points. I guess that at a high level, that would be my summation of the high points.

Rick Cnossen: Thanks, Clint. Now, I would like to delve into some of the demonstrations that we saw there. Rich, you are from International Business Machines Corp. (IBM) and lead the Software Group in Healthcare Life Sciences. Tell us about the demonstration that they brought to the event. You partnered with another group on the presentation, right?

Rich Rogers: Thanks, Rick. We definitely were attempting to deliver some key messages along with the demonstration. But first, you are correct. We definitely did work with some of the other Continua member companies here, specifically A&D and their blood pressure cuff and weight scale and Nonin, with their pulse oximeter. That was our selection of Continua-certified devices that we included in our demo. We also work with Vignet, which is a Continua member company. They provide application software that runs on a smart phone that is obviously applicable for this event. Their software basically performs as a gateway: it can collect the information from these medical devices and then route that data along to a remote monitoring server, in this case, the IBM middleware platform. Vignet also provided an application for the patient to use in context with the smart phone.

The mechanism for collecting the information from the devices, as well as for uploading the information to the IBM server, used the Continua standards. That is, clearly one of the messages we are all trying to drive is that with these standards we can start to bring together components from different companies fairly easily to provide an overall solution.

The other point that we try to emphasize is that this is really about a system of systems. There are a lot of parts to the overall system and we are trying to achieve better quality, good outcomes, and lower costs. What we did on the IBM side in this demonstration was to show how we could collect the data from the devices and also combine that with other data sources from the healthcare ecosystem (e.g., provider applications). The context of the presentation was that of a clinician portal that would make this information usable and actionable, to not just the patients, but also to the care team. So, we showed some examples of analytics that could be applied against them.

I think that is probably a good overview of the demo and some of the key messages that we were trying to drive at the symposium. It is about collecting the pertinent information in an open standards way using the Continua reference architecture and standards that Continua has adopted. There is the larger system of systems, and Continua has made conscious choices in terms of leveraging standards that are used in other parts of the healthcare world for things such as health information exchange with provider applications in various settings. Looking at it from a Continua perspective, this is very important in terms of the larger context of healthcare information technology (IT) transformation activities that are happening in the industry today.

Rick Cnossen: Rich, that was a great description. It is true that we are focusing a little bit on the mobile interface between the device and the interface, but ultimately what is needed is the entire end-to-end solution, where the data that we are transmitting from the user devices can easily fit into electronic health records (EHRs) and personal health records (PHRs). If you would take a few minutes and share what we showed at Health Information & Management Systems Society (HIMSS) relative to an end-to-end solution that utilizes these data we are talking about. I think you are in a unique position to talk about this, coming from IBM, which has available certified solutions for the EHR and PHR interface.

Rich Rogers: Clint mentioned earlier that Continua does not develop standards. We work with standards organizations to either adopt what is there or advance them to fit our scenarios. So in the context of the information that has been collected from the devices and from the gateways into a remote monitoring server platform, making that information available to the electronic medical record (EMR) and PHR and other clinical applications, Continua has adopted a set of standards from Integrating the Healthcare Enterprise (IHE) and Health Level 7 (HL7). The significance is that this is the same set of standards that are used for health information exchanges in various countries around the world.

At the HIMSS event in the states, in Atlanta, and then also at the World of Health IT event, which is held in Europe a little bit later on in the year, there is something called an IHE interoperability showcase. This is where various companies and organizations will demonstrate interoperability using these IHE and HL7 standards.

As Continua is approaching their work as a type of system of systems in a larger context and we are using the same standards that other parts of the industry are using, it provides a natural fit for us to "plug in," if you will, to a lot of the other ongoing activity. In this particular context, the IHE Interoperability Showcase, Continua was able to demonstrate truly an end-to-end story, where using the Continua reference architecture and standards, we can show device data flowing from the various Continua devices through Gateway, such as a mobile or another device, to remote monitoring services, and then on to EMR systems and the like.

At HIMSS and at the World of Health IT we demonstrated exactly that. We work with electronic medical record vendors, personal health record vendors, and other clinical applications. Quite honestly, it is very interesting to see how this comes together at meetings, because a lot of these vendors are not intuitively familiar with what we are doing in Continua. They may have very little or no visibility to what is happening on the front end, if you will, in terms of collecting data from devices, but they understand very well the IHE profiles and the HL7 standards. So that is our common language, and at these events such as the HIMSS and World of Health IT, we demonstrate how we can fit into this larger ecosystem pretty easily because of the standards choices that we have made.

Rick Cnossen: Thanks, Rich. Brendan, you work in business development at Lamprey Networks. Would you describe the solutions that your company demonstrated at the meeting?

Brendan Jorgensen: Actually, what we did in San Diego is somewhat similar to what Rich was explaining with IBM, and we actually used the same devices. We used a Nonin pulse oximeter and A&D blood pressure and weight scale, which were all Continua-certified Bluetooth devices. What LNI did was develop software on a G1 android phone that Google gave to us as a development phone. The reason we chose that phone was Google gave us access to the Bluetooth stacks, so we were able to use BlueZ. On top of BlueZ, LNI did its own implementation. It is not currently a certified implementation, but we did an implementation of an HDP as defined by Continua. We were showing device data from the various pulse oximeter or blood pressure device or weight scale going to our mobile G1 phone. Then the data were transmitted to LNI's back end, what is called a wide area network (WAN) device in the Continua end-to-end architecture, and, really, the WAN server, where professional services can be implemented at that point. From there it takes a hop-up to Google health, which is where the data are stored.

So, one thing we were trying to showcase, even though the Continua WAN is not quite finalized, was that our company was demonstrating a pseudo-WAN, what the WAN could look like with Continua. The WAN is an interesting interface, because a lot of different solutions can jump in at the WAN interface level. LNI is part of that development, so we have a pretty good sense of where it is heading. We were showcasing a part of what the WAN interface will actually be able to do.

Rick Cnossen: Lamprey Networks is fairly new in this space and it is a fairly small company. Could you speak to how easy it was to pick up these pieces and actually do it? Also, one of the responsibilities of Lamprey is developing the source code that we make available to all our members in Continua. Could you talk about that source code, and what that should enable our members to do—what, in fact, it has enabled you to do?

Brendan Jorgensen: Sure. To address the second question, the source code LNI developed under contract to Continua is a reference library. It is not a production-ready code, but almost like a blueprint for other companies to develop the Continua solutions. LNI has taken that code and developed manager software that would fit on a computer or a cell phone, something similar. These manager stacks would receive data from the medical devices and send the data on to various online repositories, EHRs, and PHRs. From this reference code, LNI has been able to develop some of the software products and also has enabled other companies to do that very same thing.

Rick Cnossen: Thanks, Brendan. To reinforce what Brendan is saying, as an alliance, we are trying to make it easy for companies to come in and implement solutions. One of the ways we do that is by providing all the source code that implements the standards that we select for the various interfaces, as well as offer free test tools that can be downloaded for use prior to sending a device for certification.

Jayanth, as a product manager, could you describe the solution from MindTree for us? I believe you presented several demonstrations. And I will have a follow-up question for you, as well.

Jayanth Krishna: Sure, Rick. MindTree has its own Bluetooth solution, the HDP solution, which is qualified by the Bluetooth special interest group (SIG). We also have an implementation of the Continua standards.

So what we did was to take a G1 phone and put this vertical Bluetooth HDP solution and the Continua standard solution onto it, and then, get this to work with the Nonin pulse oximeter. We are grateful to Nonin for them to have given it to us. The key message from our experience in doing this is that when we actually put everything on the G1 and started trying to interoperate with the Nonin device, it almost worked instantaneously. There were a few things to work out, but it worked pretty quickly. We did not expect it to do it so well.

We had a demonstration of being able to transfer data from a device such as a pulse oximeter onto a G1 phone very seamlessly, and this is a very important enabler for people to adopt these Continua standards.

Rick Cnossen: Thanks, Jayanth. We have been talking about open-source solutions and providing building blocks and source code that is certainly one viable way to go. However, another way to go would be if you want a turnkey system—You want someone to provide that for you and provide service, updates, and bug fixes. I think MindTree offers something like that for the Continua capability. Could you talk on that just a little bit, and also the notion out there that Bluetooth HDP seems to be working just fine for the disease management applications and some of the wellness applications that we have seen on cell phones and these devices? I know there are other wireless radios out there and other variants of Bluetooth, and I think those are all good to expand the ecosystem and expand what we can do with sensors that require lower power. But right now, the current solution that is on the table seems to be working just fine, and I think MindTree's experience bears that out. If you would say a few words about those aspects, that would be great.

Jayanth Krishna: As a business model, yes, MindTree has its own Internet pool (IP) in the Bluetooth HDP solution, and we also offer a range of services to enable, for example, original equipment manufacturers (OEMs) to put HDP onto their platform. We are pretty well equipped, because we also have a large services organization.

As Rick was saying, HDP today works very well for devices that are there today, like a pulse oximeter or a weight scale and so on. But going forward, if you are looking at something such as Bluetooth low energy, there also I think it is going to work really well, because there may be some things that are much more sensitive to the power that it takes. A good example is if you are looking at something more such as a fitness monitor, something in the fitness section where a person is jogging and there is a heart rate monitor, which is continuously going. So, Bluetooth now lets you do something that will be very useful to actually transfer data using really low power. Obviously, we can do more using these standards.

Rick Cnossen: Thanks. I think that the point I was trying to make, at least, is that we do not have to wait—the technology is there, today. HDP is a solution for health mobile devices today. There is a nice transition to Bluetooth low energy with a dual-mode silicon coming out on the handsets, and that should be a somewhat seamless evolution as we expand to more sensors that require much less battery power. I just wanted to make that point.

Clint, perhaps you and I could talk about a few of the speakers at the summit event and what their messages are. I will begin with the Continua speakers.

Clint McClellan: Great.

Rick Cnossen: From Continua, we had Dr. Mohit Kaushal, who is the Director of Healthcare at Federal Communications Commission (FCC). He really encouraged the audience by sharing several of the FCC initiatives underway to foster mobile healthcare, including the expansion of access and incentives for advancement. He talked about working tightly with, at least in the United States, the Food and Drug Administration and other organizations to try to make sure that the barriers are removed so we can proceed with mobile healthcare solutions. That was very encouraging to hear.

Another speaker was Dr. Eric Topol. He is a director at Scripps Health and also the chief medical officer at West Wireless Health Institute. He really encouraged and challenged the audience with demonstrations of several innovative, impactful wireless personal health technologies that are available today and that are truly changing the face of how we can detect and treat diseases. It is, in fact, somewhat of a revolution that is underway. I think Dr. Topol is out in front, showing people what can be done and inviting them to think about the possibilities. He was very encouraging to the group that was gathered there.

The last speaker we had was Chris Wasden, the managing director for Health Industries Advisory Strategy from PriceWaterhouse-Cooper. This was the first time they rolled out the new personal health study that they have at PriceWaterhouseCooper. He illuminated the audience by discussing some of the upcoming trends in the personal health market that showed a lot of promise and a lot of business potential. As well, he talked about some of the subtleties in the different market segmentations relative to those trends.

Clint, what about at WLSA? I know there were a few speakers there as well.

Clint McClellan: One of the best speakers was Glenn Lurie from AT&T, who is now responsible for building all of the nonvoice businesses at AT&T. What we are seeing is that large operators such as AT&T are currently realizing that there is a machine-to-machine business out there that is untapped. Voice users are reaching large penetrations, a large percentage of penetrations in the United States and around the world, so these operators are looking at how they can add new devices into established situations.

They have started this effort with e-books, such as the Kindle, and there are a few others out there. Now, they are looking at how they can get into the medical world, and they are beginning to embrace Continua as a source to learn more and as a spot where they can actually look for specifications and standards. Glenn directly encouraged the audience to actually call his team and gave his e-mail out, so that they can begin to start filtering through the different mobile health concepts, ideas, and companies to become a major provider of these services.

I know that my company works closely with AT&T and there are many other health companies that are working with them. I think that was probably one of the most inspirational moments, in the sense that for many years the operators have been reticent to look at any health-related device or service on their network. Now they realize that it is not any different than using a T1, the Internet, or a landline to access health services. With the wireless component, they realize that they actually have a brand-new market that they can begin to enable.

Then, of course, on the panels we had companies such as Jitterbug and Futura, which are building remote monitoring systems. Futura is building an in-hospital remote monitoring system that can also be taken home, and this would give you cuffless blood pressure, temperature, heart rate, ECG, and even improve safety in the hospital, but then allow the monitoring of patients at home. They were also talking about getting to market later this year or early next year.

Jitterbug is building health phones for the elderly, but they are also looking at expanding their markets into offering services beyond just the emergency phone with large buttons and a large screen to provide services for perhaps diabetics and other innovative offerings. Those were probably the standouts for me at the conference.

Rick Cnossen: Fantastic. Thanks for that. Are there any thoughts among all of you that you would like to offer or address as a follow-up to some of the conversations we've had here today? If you want to share personally what some of our companies are doing in the wireless health space, I think this is a good moment in the discussion to do so. I think we have a few minutes to go back and collect some miscellaneous comments or thoughts from the folks on the line. Rich, do you have anything you want to add, any final thoughts?

Rich Rogers: I think the only thing I would add is just the point that I was trying to make earlier, that this is really about a larger picture. An example is an organization such as Continua fitting into the larger story in the healthcare industry and thinking about scenarios where the information flows with the patient, if you will. This should include thinking about situations such as hospital-to-home scenarios, where we know that there are high percentages of patients who transition from the hospital to home, which end with the patients coming back into the hospital for various reasons. I believe we are going to find a lot of value with these technologies integrated in with the rest of the healthcare IT system.

Concepts such as the medical home and primary care models seem to be gaining traction, especially in the United States, and some other countries have already adopted these. The technologies and the open approach that Continua is taking, I think, complement those models very well in terms of improving approaches to primary care.

Those would be the key things that I would emphasize here as a closing comment, that what we are doing is important in terms of this area of telehealth, the mobile technologies, and the medical devices. However, it is important to underscore that we are doing it in a way that fits neatly into the context of the larger ecosystem in healthcare, which I think is going to drive the real value for all of us.

Rick Cnossen: Great. Thanks, Rich. Brendan, you are the marketing person for LNI. Do you have a closing thought?

Brendan Jorgensen: I think that this push toward mobility is a significant one, because the more focus groups I am involved in, the more I see, especially, the elderly generation are pretty terrified of static PC-type applications and having to use those. Also, I think the idea of mobility gives these individuals more flexibility so that their care does not have to completely dictate things; they can be a little bit more in control with the mobile-type functionality. I think the cell phone itself or some other mobile-type device is less intimidating to people 65-plus. Continua recognizes the needs of the elderly generations, an important shift from a marketing perspective.

Rick Cnossen: Great. Thanks, Brendan. Jayanth, do you have a closing thought?

Jayanth Krishna: My perspective is that financially this entire system is only a question of time now, because, as you see, there are companies, such as Vignet and MindTree, which are providing the last mile with the Bluetooth solution or the universal serial bus (USB) transport. Of course, the Continua components are stacked on top of it. Then we do have a lot of companies, such as Lamprey, which are providing apps. They are working to actually obtain the data and put it up onto the EHR or PHR. Finally, operators such as AT&T are becoming interested in pushing this onto the market. Everything is starting to fall in place, and I think it is only a question of time now.

Clint McClellan: I would like to say that Continua is really the only industry group out there right now that is promoting and helping to develop these mobile wireless health solutions that will improve care now. What is important is that the Obama Administration right now is looking at the IT side, and it is looking at insurance. Continua, on the other hand, is looking at systems and services that can be used soon—if not now, very soon this next year, to actually improve outcomes and lower health costs, because you can do much better monitoring. Honestly, I do not think there is enough attention on that in the United States or globally right now.

The other component Continua is looking at is getting these services reimbursed. That is an important component that we are working with in the policy group. I think you are going to see a lot of innovative systems come out of this group, and I think that hopefully we will get many of them reimbursed and heighten awareness of them. But this is the only group that is really looking, I think, at improving outcomes with brand-new systems.

Rick Cnossen: Thanks, Clint. I would like to make a few final comments. One is that we are very much an international organization. We feel like solutions need to be focused internationally. Many more companies are conglomerates that have employees working in different countries and people are traveling, and the people who are making the solutions and the people who are purchasing the solutions do not want them localized to a particular region. They want solutions that will be for the international market.

Relative to that, there are certainly challenges enough with mobility, and there are some additional challenges with the international market. We are trying to take all of those on. Having 60 mobile stakeholder companies in Continua is a great advantage in terms of talking about the challenges, the barriers, some of the needs of the carriers versus the needs of the handset providers versus the module providers, and about how we can work on a solution that meets all those needs, as well as how we can put in place business models that allow all of them to be successful.

I would like to note two events that have recently occurred. One was several weeks ago, a half-day press event in Tokyo, Japan, where 24 companies came together to show Continua-based solutions for health and wellness, mobility being some of the solutions being demonstrated there as well. Each of those companies had a demonstration of a Continua-based solution. I think Japan is a market that has really taken off quickly in this space. There were at least 70 reporters at that event, so I think you will see some large uptake in Japan this year, and like Clint mentioned, we are there. We are ready to go. There is nothing that should stop us at this point. We are just going to expand from here on out.

The next one is Europe. The European Commission has funded Continua to provide events across Europe in four cities, Barcelona, Brussels, Berlin, and Belfast. At those events, we are going to meet with key industry stakeholders of those regions, provide some demonstrations of personal health solutions, and raise awareness of standards-based solutions that are ready to go today, ones that can be put to use right away to help them with some of their needs. I think those are going to be good events to stimulate activity in Europe as well.

If you look right now, we are essentially a certification organization at heart; however, we do a great deal more than that. As Clint mentioned, we provide regulatory education and we try to raise awareness through education in Washington and other places. We have 14 products that are currently certified. By the end of this month we will probably have 17 products, and maybe 50 by the end of this year. The pipeline for getting products certified is full, and it is growing. In fact, in 2 weeks we will have opened our second laboratory for certification to help take care of some of the demand that is being built up. This is proof that certification is ongoing and very strong.

The mission of Continua is to really provide standards-based solutions for personal health, and this is ultimately going to drive quality up. It is also going to allow for innovation to take place and for costs to be driven down. We have seen this in other industries time and time again. If you look at the USB digital photo, if you look at the Wi-Fi Alliance, putting international standards in place such that there is a single coherent way that companies can work together to provide these solutions is a fantastic way to fuel the market and make sure that it is successful. Again, we have seen that happen time and time again. I believe we are well on our way and I am very encouraged by the progress we have made. We currently have over 230 members and Continua continues to grow. I am very excited about 2010, with what we are doing as an organization and what we can bring to people across the world who are trying to put personal health solutions in place. It has been a great panel and I would like to thank all of you for your thoughts and illuminations on this emerging industry. Working together, we can open up this market and make a positive impact in our world.