Introducing the Smart Grid Maturity Model (SGMM)
Transcript

Part 1: Background, Objectives, and Structure

Julia Allen: Welcome to CERT's Podcast Series: Security for Business Leaders. The CERT program is part of the Software Engineering Institute, a federally-funded research and development center at Carnegie Mellon University in Pittsburgh, Pennsylvania. You can find out more about us at cert.org. Shownotes for today's conversation are available at the podcast website.

My name is Julia Allen. I'm a senior researcher at CERT, working on operational resilience and software assurance.

Today I'm pleased to welcome Ray Jones, a senior consultant in the Custom Solutions group at APQC. Today Ray and I will be discussing something I think pretty interesting, the Smart Grid Maturity Model. For our listeners' information, Ray was originally the project executive with IBM for the Smart Grid Maturity Model, and he filled this role until it was transitioned to the SEI in March of 2009. Also we have posted an introductory podcast on the Smart Grid, if you want to listen in.

So welcome Ray. Glad to have you with us today.

Ray Jones: I'm very happy to be here Julia. I have the greatest respect for your organization. So it's a pleasure.

Julia Allen: Well great. I know our listeners are going to find this topic very, very interesting today. So to get us started, why don't you give us a little background on the Smart Grid Maturity Model and why it was created?

Ray Jones: Well originally it was created by six utilities, and IBM and APQC, the not-for-profit research institute who facilitated the work. The utilities involved were four in the U.S.: CenterPoint Energy, Progress Energy, Pepco Holdings, and Sempra Energy; pretty much from one end of the country to the other. Also DONG Energy in Denmark; NDPL, which is North Deli Power and Light in India; and Country Energy in Australia. These organizations, along with IBM and APQC, wanted to do something with Smart Grid. They knew they were doing a lot of work in this area, but they wanted to figure out ways that they could do it even better. So they initially put it together so that they could determine what's working for them and what's not. Could they share something that they've learned? Could they use it as a guide to use best practices that were found in one organization and could be copied in another?

Julia Allen: Well it sounds like you had a pretty broad international representation. All the different perspectives were brought to the table in putting this together, right?

Ray Jones: That's right. Yes, we found that there were certainly differences. I don't know that they were that much nationally, although the regulations do vary by country, and Denmark has very different regulations, for example, than some that you find in the U.S. But most of the differences were the diversity of the type of utilities. We went from CenterPoint Energy in Houston, which is pretty much a densely populated metropolitan area, to Country Energy in Australia, which had miles and miles -- and tens of thousands of miles actually in the Outback. So there was a lot of diversity in this group.

Julia Allen: So let's get into the meat of the model a little bit, so folks understand what we're talking about. So what exactly is the Smart Grid Maturity Model? We've seen lots of press about the smart grid but what exactly is the maturity model aspect of this effort?

Ray Jones: More than anything it's a management tool. It is not a standard. It's not a requirement to follow. It is a guide, it is a roadmap, it is a way to measure what you're doing. So you can use it to apprise, guide, and improve transformation to smart grid, as many utilities are doing today. It helps you define a clearly articulated journey. Where are you on that journey? What are the next steps ahead?

One thing it really does -- in fact, in working with CMU a lot, and the SEI, we found it helps in conversations; that it provides a framework of where you base your discussion. Even if there might be something that comes up that's not in the model, you can point to part of the model and say, "Well, here's where it would belong." So it's a framework for a common language that people use as they talk about the opportunities. It helps you put together a vision of where you want to go, and it helps you prioritize what next steps do you want to take; which ones will bring the most bang for the buck and for the effort.

Julia Allen: Yes, we found in a lot of our maturity model and other framework work -- you mentioned this point about having a common language, a common set of definitions and terms. I suspect particularly when you're dealing with an international sector, having that common understanding is really key, correct?

Ray Jones: That's right. But there's a lot of other parts of an individual utility that have different languages. The IT shop might be quite different from asset management, which is different from customer support. So even within the utilities, the language varies of what they're interested in. In fact, that's one of the beauties about the model is when you work through a facilitated workgroup on the model, all of these people are in the same room, and they start hearing what parts of the total goal each one has individually. And it's a very interesting dynamic when they start sharing that information among themselves.

Julia Allen: So how is the Smart Grid Maturity Model structured? I know it has a structure of domains and levels and characteristics, which we'll be talking about. But why don't you walk us through the structure?

Ray Jones: Absolutely. Of course we followed some of the great work that SEI's been doing for years, mostly around the Capability Maturity Model, which has, 25 years it's been out there, and it's proven that this model can bring value. So when we developed the Smart Grid, we followed a lot of that structure.

It's really quite simple, and that's the beauty of this model. It has five levels of maturity and it has eight domains. So if you picture a matrix, for example, five lines and eight columns within those five lines, eight columns being the domains.

For Smart Grid the domains are strategy management and regulatory; organization and structure; technology; society and environmental, or societal and environmental; grid operations; work and asset management; customer management and experience; and value chain integration. If you picture this matrix, there are a good number of characteristics or capabilities that you would expect to find under each column on each line. In fact, this particular model has almost 200 of them. That goes back to the framework that we discussed, the terminology that we discussed. You can actually go to the SEI website and print out that framework on two pages. So it's a very simplified

view. Company executives can understand, they can get their arms around where they are and what they want to do by looking at that framework.

Part 2: Maturity Levels and Characteristics

Julia Allen: So Ray, could you take one of the domains, maybe pick one of your favorites, and give us a few details about one of the domains?

Ray Jones: Well I think one of the ones that's most exciting is Work and Asset Management. Grid ops is, of course, the core of their business. But work and asset management is one area that there's a great opportunity to improve when you have the intelligent grid in place along the grid.

Some of the other domains that are particularly fun is Societal and Environmental, of course; which is very important to all of us today, because without fixing the smart grid, or without making the smart grid capable of supporting the things that we need to do to solve climate change issues, we won't be able to do it. To enable support of new types of energy on the outer edges of the grid, such as solar or wind, things such as that, we have to do that. We have to improve the grid to be able to handle those types of things. And so that's one reason that's made this model so compelling.

Julia Allen: Thank you. So you had introduced the notion of maturity levels. I know in looking at the current definition of the model, there are five levels. Can you say a little bit about the maturity level aspect of the model?

Ray Jones: Absolutely. We normally start -- we stack them bottom to top if you want to visually consider it. And the bottom being, at Level 1 you are exploring and initiating. Actually there would be a Level 0 before that means you're not doing that much or you don't have the need. And by the way, you can stop at any level as you go up this model. It depends on your business objectives and your environment that you're in. You don't necessarily have to go to 5. But it starts at 1, which is exploring and initiating. You have a vision but maybe not a complete strategy. You're doing a lot of experiments. You've got prophets and heroes out there in the organization who are trying things out themselves. That's Level 1.

At Level 2, you're doing some real functional investment. In fact, most frequently in the smart grid area, people are starting with Automatic Meter Management or AMM; or AMI, Automatic Metering Infrastructures, depending on how sophisticated. But that's one place most people start. But you don't have to start there. Some organizations can start on reliability areas, or demand response areas. But you're investing in one, and you at least have one vertical tower of smart grid implemented. And that's what you have at Level 2. You have missionaries now who are out there supporting it, throughout the wider organization. You're doing a lot of proof of concepts and you do have a strategy.

At Level 3, you're now integrating these towers of functionality into one cohesive smart grid. So really at Level 3 is where the smart grid really first appears. You have these operational linkages established. You have cross-lines of business, champions within the organization. You have repeatable practices and shared information across the organization.

At Level 4 is when you really start getting the benefits. Because now that you have this end-to-end visibility of what's going on across the grid -- everything knows what else is happening -- you can now optimize, and you can start changing your business around taking advantage of these capabilities. Things like real- time corrections happen at Level 4.

And then at Level 5, you are innovating the next wave of improvements. And the next wave, in many cases, we don't even know what it's going to be. Things will happen by the time we get there. But you have new business models. You find new things that you never imagined were possible when you get to Level 5, based on the capabilities that the other levels have brought you to.

Julia Allen: Oh great summary. Well thanks very much Ray. I'm just kind of curious, because we've had this ongoing debate in some of our other maturity and capability modeling areas. Would it be possible, as currently conceived, to be at a different level of maturity by domain? So could I be at maybe Level 2 or 3, in work and asset management, but either, maybe even at a higher or lower level of maturity in something like societal/environmental? Is that part of the concept for the model?

Ray Jones: An excellent question. Yes it is. Now you can pretty much imagine that if people are balanced, and pretty much all at the same level, they might be more effective in their journey. But that doesn't happen in many cases. So very frequently we find people that are one or two levels higher in one level than another level. I think a balanced view is more optimal but it's certainly not a requirement. And again, this is flexible. It's based on your business needs and your business model. So even when I work with customers who are determining where they aspire to be, they might aspire to be at Level 4 on one domain, and Level 2 on another, for perfectly valid business reasons. So that's one of the beauties of the model, it allows you to do that.

Julia Allen: Okay, so we've talked about the eight domains, and we've talked about the five maturity levels. I certainly don't want us to get into all 200 characteristics. But could you give an example of a couple of characteristics just so our listeners understand that part of the structure?

Ray Jones: I've just picked a few. Let's say Level 1 in work and asset management. You start out at Level 1 by conducting value analysis for new systems. Or you're exploring remote asset monitoring beyond SCADA. It's a typical thing that you find at Level 1.

At Level 2 you'd be looking at the approach for tracking inventory and event history of assets; developing that approach. Because you need to have a history of assets because at the higher levels in that domain you'll be expected to do condition-based monitoring, for example. And you cannot do condition-based monitoring, even though you're having the real data coming in around this particular asset, unless you know the historical background of when it's likely to break, for example, or when it needs maintenance.

So, as you can see, these particular characteristics are also progressive. And one of the requirements in the model, by the way, is you don't have to do Level 2 before you do Level 3 in your organization. But in order to credit for being a Level 3, you have to have the correct foundation beneath it to build up. So that's one of the ways as far as scoring the model works.

Just to give you a couple of other examples. You would logically expect work and asset management in smart grid. But there's other businesses -- and this is what really makes it a business model.

Other domains are just as important, such as organization and structure. At Level 3, you're expected to have performance and compensation linked to the smart grid success. You're expected to have consistent smart grid leadership across the lines of business and the organization is adopting a matrix or overlay structure.

Just to do one more example; and this shows all of the really forward thinking sophistication that went into this model. Under value chain integration -- even how markets work. For example, at Level 1 you would be developing a strategy for a diverse resource portfolio. At Level 2 you're re-

defining your value chain. At Level 3 you have an integrated resource plan. And I'll skip one, and go all the way up to the top. At Level 5 you have dispatchable resources that are available for increasingly granular market options. Pretty sophisticated stuff -- things like locational marginal pricing, how you can use power on demand; those types of things are built into the actual characteristics and the capabilities in the model.

Part 3: Current Practice: Surveys, Results, & Business Case

Julia Allen: Excellent. Well let's turn our attention to maybe some practical aspects of how the model is being used today. I understand from some of your reports that you've developed a survey, and it's being used to help utilities who want to participate get started. So tell us a little bit about the survey.

Ray Jones: Well if you go back to where I started, where the original intent was to find best practices and share best practices; the original intent of the six or seven utilities that built this. The best way is the survey way because those rise to the top. And we and the group decided at that time that if everybody in the world took that survey, it would help everybody. Because in the smart grid business, or utility business let's say, they usually do not compete with one another. They usually have their patch. You don't want to have multiple people building power lines. So they usually are pretty willing to share -- when they've discovered something good, let someone else do it. So that's one reason why IBM and the coalition decided it would be best to put this in the hands of a global organization such as the SEI, one that is totally impartial, so that it can -- everybody can participate. So I encourage everyone to participate in the model so you'll get the best benefit for yourself and the world will get the best benefit.

So the survey is the way to do it. There are two surveys. One is one that, what we call the assessment. It can be done by -- usually if you have one person who understands what your smart grid looks like and how you handle it in your organization, maybe even one person can answer all 180 questions. It might take two or three hours. Send it off to SEI or APQC to be scored, and you'll get your report back to show what levels you are at. It's pretty simple. That's the assessment survey.

There's also a results survey, which is part of it, which actually gets hard data about your (organization) -- how many line miles you have; what is your SAIFI and MAIFI, your number of interruptions or the frequency of interruptions, and the length of Interruptions. So that you get some real hard data you can use behind your planning. So those are the two surveys. The results takes a little bit longer because you're going to have to dig through some data to get it. But you get the results back, and you see where you line up. And the nice thing about that -- and it actually comes back looking a lot like that matrix I mentioned earlier. You can then read up from where you are and see what the requirements of being at the next levels would be, and then set your aspirations. And then you'd look at those items between your aspirations and where you are, and those are your gaps. So as you're doing business planning, it makes it a very logical, methodical way to determine what benefit you can get from your gaps, and what those gaps are.

The questions are really quite simple in the assessment. It's things like "Has your smart grid vision, strategy and business case been incorporated into your corporate vision and strategy?" And all of them are multiple choice. And you have options like no, limited, extensive, or complete. So that gives you a feel how it works.

When you get back the results, not only will SEI be able to gather these best practices and publicize them to the world; of course, if the utility allows. And by the way, all the surveys can be

totally confidential if you wish -- except that the SEI wants to at least be able to say you took the survey. But nobody can see your results if you don't want anybody to see your results.

But what you can tell when you get the data back: things like how your organization compares to the other ones; the world aggregate; do you have any deficiencies in one area because one domain is lower than the others for some reason? Perhaps you have been very project oriented, and you spend all your time on work as asset management but you've let your strategy go. Those are the types of things that it takes the management team -- remember, this is a business tool. It helps people run their business, make decisions, point areas out that might need more focus -- those types of things.

Julia Allen: Okay, so who has participated in the survey thus far? What's the reach, and have you had a chance to synthesize any of the initial findings from the survey results?

Ray Jones: So far over 60 utilities around the world have participated. Roughly half of those are in the U.S., but the other half is elsewhere. There's utilities in Japan, China, Australia, numerous countries in Europe, several countries in South America have participated in the model. And they represent 100 million customers and 100 billion dollars worth of global revenue in that 60 alone. So as more participate, the more value the model can provide.

One thing that is perhaps startling when you first look at it, but then makes sense when you look under the covers, roughly 50% of the utilities that have taken the model are still at Level 0. And then almost 50% are at Level 1. And you think "Wow, what's going on here?" Remember, this is a brand new area. People are just starting their journey in smart grid. It's just being implemented. There are a couple of utilities that are at Level 2. There's one, I think, at Level 3. But this shows how valuable this tool can be because it's catching the industry right now at the beginning of the journey. So that's one of the interesting findings.

And by the way, I will tell you that even some of the utilities that created it, they don't mind it being known that they're at Level 0. They know that they have a journey ahead of them and they're very pleased to have that roadmap in front of them. So that's one of the values of it.

Some of the other interesting data: Technology seems to be the domain where it's leading the way. Some of the results -- this is the type of data you get back -- 88% have or are piloting connectivity to intelligent electronic devices; 79% have a data communication strategy in place -- at least the strategy is in place and partially deployed, which I think is great because communications is an integral part, of course, of the intelligent grid; 70% have aligned technical IT investments to their enterprise IT technology. So that's very positive.

On the other side of technology though, it's apparent that not all the deployments have fully integrated into their overall business. Twenty nine percent have aligned their business processes and their IT architecture. So getting into the business processes, there's a lot of work to do. Eleven percent have applied smart grid technologies to improve the performance across the line of business. That's the opportunity, that's the real opportunity. If we can grow that number to larger numbers, we will have made a big difference in the world application of smart grid. Eight percent have distributed intelligence and analytics across the line of business.

Societal and environmental also shows very good, by the way: 90% have active programs addressing environmental and societal issues. So you can tell that these utilities are really working toward the right goal.

Some of the things that are little bit slower though are the value chain integration. Only 17% have a strategy for creating and managing their diverse resource portfolio and things such as distributed generation or demand response. So that's again the opportunity areas. So that gives you a feel. There's a whole lot more in the report, if you want to look at the report at the SEI site.

Julia Allen: Let me ask you Ray -- it just occurs to me as you're talking about some of these preliminary results. In your experience, how hard has it been, or how easy has it been, to make the business case for Smart Grid Maturity Model adoption? For the organizations that have participated and see where their gaps are, are you observing that it's an easy sell, hard sell, somewhere in between, when it comes to actually putting improved practice in place?

Ray Jones: Well that's interesting you ask that. That actually was one of the main questions the utilities also said they wanted to start this for; and that's the purpose of the Results Report. Because it's not easy justifying. It costs money. You have to invest money, to make your grid intelligent. And so a lot of times when you go to the Public Service Commissions and say you're going to have to spend money before you get money back, that's a hard case to make. When you're talking about global climate change as being one of the reasons, the case gets a lot easier because there's a whole lot of value in that. But there's real dollars available in just new efficiencies, for example. Or the ability to better use, choose among the sources of electricity one has to get, for generation, for example. So the business cases are not easy. And that's one of the things that this model is designed to help with. Because if you can show that people at one level have less interruptions, for example, than people at another level, that's some real hard data. Interruptions are an important thing. Reliability of the grid is one of the important reasons that we're going through all this.

Julia Allen: Okay. Well I know we've just barely scratched the surface here. So do you have some additional resources or places where our listeners can learn more?

Ray Jones: Well in preparing for this, I just saw a new document -- I'm not sure how new it is but it's from the Department of Energy, and it's titled "How the Smarter Grid Promotes a Greener Future." And there's two pages there on the Smart Grid Maturity Model. It's put out by the DoE, U.S. Department of Energy, Office of Electricity Delivery and Energy Reliability. I believe Julia you're putting the link on the website so people can find it there, as well as all of the other SEI materials that they have available. There's a full overview of what it's about. There are the characteristics I mentioned; the matrix I mentioned; and the definition. All of those are available on sei.cmu.edu/smartgrid.

Julia Allen: Well Ray, I can't begin to thank you enough for your time, your expertise, your clear commitment to this very, very important area for both our national economy and for the global economy. So I thank you very, very much for your time and expertise today.

Ray Jones: It was my pleasure. Thank you very much Julia.