

Chris Belasco:

Greetings and welcome to our spotlight presentation, which we are calling Building the Cloud as We Fly It.

Jacque Rowden:

Good afternoon. My name is Jacque Rowden. I'm the assistant director for the City of Pittsburgh in the Innovation and Performance Department. I manage our IT operations team that's traditionally the infrastructure, network and service desk, desk side support groups. We call ourselves technical reliability because reliability is the foundation that you want out of any partner, and we like to think that that's what we're providing our employees for the City of Pittsburgh.

Chris Belasco:

I'm Chris Belasco, the senior manager of digital services and chief data officer. I run a team that takes data from source systems, retrieves it and shoots it up into this cloud that we're flying. We use it for helping decision support tools and analysis. I do a little bit more than that, but really, what we are here to do is to talk with you about the different uses of cloud technology in the city of Pittsburgh, our migration to cloud, our hybrid cloud approach, and some of the challenges that we've encountered as we make our migration. So our current state, I would say our cloud migration strategy was summed up pretty well by my colleague Jacque a few months ago, some time after she arrived on the scene here at the City of Pittsburgh with two words.

Jacque Rowden:

Chris asked me, "Can we continue our migration to some various cloud platforms?" I said, "Yes, please."

Chris Belasco:

We're looking to get as many items as we can to the cloud. So we're taking the six-word or seven-word summary for us is migrate what we can and host what we must. It is true that we're not going to be able to get absolutely everything on to the cloud, but at this point what we're looking to do with that is to get as much of it as we can on there. We have a cloud provider through which we get most of our compute and storage. We, of course, have on-premises cloud storage, or, excuse me, local storage and support resources. We have begun to bleed over into some other cloud providers as some vendor needs have required that we work in this environment or another environment. So those diverse application requirements have built out of necessity a multi-cloud environment. So the way that we think about hybrid cloud is that we have traditional cloud storage, traditional on-prem, and then, of course, other cloud implementations that are emerging.

Jacque Rowden:

I would say that when I was interviewed for this position about a year-and-a-half ago, it was explained to me that the City of Pittsburgh was moving or had moved about 75% of it to the cloud. I was tasked with managing the other 25%. So my default posture for every question I'm asked about computer storage is, "Can this be cloud-based?" I continue to be shocked at two things: one is that I'm apparently the first person to ask that question in many of these conversations, and the other is that sometimes the answer is no. We are really challenged with some applications and in particular as we'll mention in another slide, we're really challenged with video, for example, not being able to be truly migrated because of apparent latency. I say apparent because it's hard for me to wrap my head around the notion that that

CCTV footage is more easily and quickly accessed in the sixth floor of a 300-year-old stone building than it is across 10 gig or million gig fiber. But that seems to still be the truth.

Chris Belasco:

In some of our instances a vendor will say, "Yeah, we can build that for you, but we can build it in this environment that we're really comfortable in." So we've pushed out into other cloud environments as a result of that, and so that makes a hybrid multi-cloud strategy. Really, a necessity becoming the mother of invention here is really the way that that's happened. So we'd be happy to take you through a couple of our current projects to describe our present cloud migration. The way in which we're drawing the advantage of the cloud is through the improved reliability of services and the fact that we can rely on a managed service approach to our deployments. A handful of different examples that we're looking at right now is we retrieve data from source systems via data pipelines.

One of the things that we're doing is we're changing our scheduling tools to be a managed service so that a separate cloud provider gives us an image every day of the cloud scheduling tools that we have. We are on a bit of a journey to get that other 25% over into the cloud. One of the places that we're working to do so is to build a native cloud-hosted database environment so that all of our on-premises database servers at this point wind up over into our cloud environment and some of the native technologies that live there 'cause we think they'll be faster, that the services will be managed and will be able to ensure a better uptime for those results, and we'll be able to modernize a little bit more efficiently. One of the ends of that is getting off of some of our legacy computing systems, some of which are in their second decade.

Jacque Rowden:

Well, getting off them where we can, where we can. It's not always a given.

Chris Belasco:

In some of those legacy systems, the act of getting out of them as they currently are implemented is the act of getting on to something that's a software as a service. In some instances, that also gives us the ability to do cloud data warehousing pipelines into that sort of storage to be able to enable data analysis and better visibility into the work that we do with the City.

Jacque Rowden:

Chris, you mentioned software as a service, and when you and I were discussing this topic, I mentioned to you that it's incredible that I can think back to the days when a software upgrade was a huge monster project. It required planning and downtime and rollback and testing and preparing and training and now it just happens.

Chris Belasco:

Yeah.

Jacque Rowden:

It's just magic. It just happens. I think for me, that's the most obvious and impactful point of having anything in the cloud is that changes happen almost invisibly and with no impact.

Chris Belasco:

Yeah. That's real advantage to the user that we find is that their services being interrupted less gets us in a position where we're better able to deliver a reliable service to them continuously drawing on developer's ability to use continuous integration and continuous deployment puts us in a position to have a better product. One of the places where we're working on a migration to cloud currently is acquiring the tools to be able to take sensitive data that we could once only store on-premises under physical security conditions and migrate it to the cloud. We've done so very considerably and carefully with a strategy that we've put together over the last couple of years that we're aiming to execute in the next few months to store criminal justice information and video archive on the cloud. That's a change for us because with that, frankly we need the storage space, but also because it gives us the ability to do some of the cool data things that we like to do with that data that we typically could only store on premises. So that's an attraction. It's also a place where we've had some challenges.

Jacque Rowden:

Well this is in keeping with everything that we know about in city government that requires fingerprinting and background checks and everything else. Why go through all of that and then have your data somehow available to anyone who can access it?

Chris Belasco:

Yeah, absolutely.

Jacque Rowden:

So it's been, I think, a little bit of a challenge, at least I've seen in my short time here to convince the data stewards that their data is okay if it's not in a locked data center where only three people with this badge can badge into the data center so we know who touched it if someone did and I think that's still a journey to do that convincing.

Chris Belasco:

Right, and assuring people that yes, you're still going to go in with these kinds of accounts that will be auditable and traceable and create the secure computing environment that comes with this increased reliability that we're hoping to continue to leverage. A couple of other examples that we're moving towards is that as we've moved our cloud, or, excuse me, our HR timekeeping and scheduling software to the cloud, we are going to be able to leverage personnel timekeeping as a cloud function. What that will do for us is that there's lots of ways that many different departments manage their timekeeping at this point, but that'll unify that and increase the reliability of reporting and enable more real-time analysis about availability uptime. One could think of a winter weather event where we're concerned about how many people we have on staff who could go out and provide snow-

Jacque Rowden:

No plows.

Chris Belasco:

... removal. Yeah, right? Our teams are relying on paper to do that right now. That's a very common thing for that to happen. But if we were able to retrieve that information about when people are in or what they're doing when they've logged in to their timekeeping tool, then we know how many people are on shift to be able to go clear streets.

Jacque Rowden:

Well, and I think, Chris, something that you and I have been challenged with both here and elsewhere in our pursuits is single source of truth.

Chris Belasco:

Yeah, absolutely.

Jacque Rowden:

So I don't know about you, but in my experience, it's very difficult to get different stakeholders to agree on a single source of truth, especially when they can maintain their own in their own, God forbid, paper or database or whatever it is. So you and I are seeing more and more convergence of applications where we're able to get agreement that we don't have to replicate and duplicate employee information.

Chris Belasco:

Right.

Jacque Rowden:

We can find that there is a primary key that employee ID for example, or record number, whatever it is, and that that makes it easier to implement other cloud-based-

Chris Belasco:

Yeah, absolutely.

Jacque Rowden:

... applications, something that is a big part of both of our lives.

Chris Belasco:

Yeah, absolutely. So it's giving us the ability to do more systems integration and provide better information to our users, including just down to what their job is when they've sent the email. That's one of the challenges that we're aiming to tackle in the next few months. That's the kind of thing that you can automate once you've started to do some great pipeline work like some of our staff has done. So one of the places that we started to think about really early on in our effort was about moving our enterprise document management into the cloud. We do that on-prem right now, and we're not the only ones. Enterprise document management has been around for 30 years and getting it off of our servers and on to our servers in the cloud is going to be just great for our ability to continue to have the right amount of storage, the retrieval compute that we need to be able to do that. The searching and the indexing, we're really excited about it.

Jacque Rowden:

Chris, wait, just today, this is not a joke, I was just notified of a litigation hold. Now how am I supposed to do a litigation hold when I can't go put my hands on CDs? We're going to say, 'cause not tapes anymore, but how am I supposed to confirm and adhere to the requirements when the data is not even here for [inaudible 00:14:11]

Chris Belasco:

Not even huggable.

Jacque Rowden:

I can't hug it. That's right. I think that the goal is correct. I think the challenges are very grounded in inhabits and mindsets that we have to spend as much time massaging as we do when we talk about massaging data.

Chris Belasco:

Yeah, absolutely. So the great thing about a litigation hold on an Excel online file is that you can always refer back to the version that was relevant on that date, and it's just linked in the version history when it's persistent. So as long as we don't get rid of one of the vendors that provides that software then we've got it forever, and we can certainly archive it too.

Jacque Rowden:

That's a caveat there, Chris.

Chris Belasco:

That is a bit of a caveat.

Jacque Rowden:

I will just tell you too, Chris, that you're showing your age a little bit because document management systems have been around for more than 30 years.

Chris Belasco:

Oh, no.

Jacque Rowden:

Yes.

Chris Belasco:

Oh, no.

Jacque Rowden:

Yes. So for anyone out there who remembers Hummingbird and things, PC docs and things like that, they've been around a little longer than Chris would know about.

Chris Belasco:

Yeah. I was just thinking about medical records as a document management source, and so that's my history with it. But I think that we're really lucky to be in a position where we say, "Well, we've got this contract coming to a close, how do we make a cloud?"

Jacque Rowden:

Going forward.

Chris Belasco:

Yeah, right. Yeah.

Jacque Rowden:

Going forward. We're only going to re-up, if you can do this. Well, and now when we think about cloud, we think about probably the three common vendors. But I don't know about you, every application or renewal that I've come across here at the City in the past 14 months, that vendor, literally that vendor has said, "Well, I've got a cloud."

Chris Belasco:

Yeah, that's true.

Jacque Rowden:

There's cloud storage and there's vendors, and it's a cloud.

Chris Belasco:

Absolutely. We've encountered that with some of the vendors that we have that provide services that we're used to them doing something else, and they're like, "Oh, would you like our clouds service? It's like, "Okay, well, that's unique, that's interest ... " Well, let's see what it's about. Let's try to understand the field of play, so to speak, when we go through the cloud options available to us 'cause why not? What's it going to do other than introduce us to some alternatives? So we've been pretty open about that as we go. It's nice to learn a little bit about what the vendors have to offer.

Jacque Rowden:

I have a cloud in my house, Chris, just so you know. If the price is right, I'm going to branch off. Just kidding, it's not C just compliance-

Chris Belasco:

So it's not a-

Jacque Rowden:

... so you can't use it.

Chris Belasco:

You don't know if that uninterruptable power supply to your [inaudible 00:16:47]

Jacque Rowden:

We don't have that here. The building where we have our data center, Chris, is why we want to go cloud, another reason we want to go cloud.

Chris Belasco:

Risk management.

Jacque Rowden:

Well, you've talked about cloud migration present. I think we've got another slide here.

Chris Belasco:

So let's think a little bit about what cities have to offer and the provision of services and cloud migration into the future. The hybrid cloud is actually a place where this stuff can really shine. Being an organization that is no longer cloud curious, but cloud forward, we have some interests in some of the future implementations that we're doing, and we're working with other agencies to coordinate with their cloud work. One of the interesting places that I think is really important that a municipality has to govern is traffic management systems. This is a space where there is likely to be some edge compute in some instances. There's certainly going to be some centralization of compute resources. We think about this stuff as events data that we might also want to analyze.

Jacque Rowden:

Well, Chris, if I may just interject here-

Chris Belasco:

Yeah, please.

Jacque Rowden:

... the intelligent traffic management that you're talking about is a project that's very near and dear to me right now, and that just for folks who may not get the basics there, that is the ability for a police car or an ambulance or a firetruck to turn all the traffic lights green on a thoroughfare so that they are unimpeded as they race towards whatever they're racing towards, and of course, so that other traffic is stopped. So when we think about today where we might see an emergency vehicle weaving in and out of traffic, pausing at cross streets because they can't intelligently manage those traffic lights, that's what we're talking about. I'm going back to my comment earlier about wanting everything to be not on-premise if possible, the project we're talking about here for the City of Pittsburgh involves, for example, 250 Cisco switches mounted on street lights or I could say traffic lights or under the ground, but it also involves authentication to the state of Pennsylvania.

Chris Belasco:

Right.

Jacque Rowden:

Now, the state of Pennsylvania would like us, Chris, to have a server here in our data center that we authenticate to. I've asked if we can't please use a VPN. So there's an example of trying to push back against the traditional implementation and say, "Hey, do we really have to have a 2U piece of equipment in Iraq somewhere when that can really be done in the cloud?"

Chris Belasco:

But these guys need it, right? It's like, "Well, can we do it a little better? Can we do it a little bit more reliably?" With something like traffic management, you need that reliability, so it's a good sell. Another application of this is there is some smart technology to make traffic flow in areas that are congested dynamic and based on the knowledge or the sensing of the presence of cars so that that can ease up

traffic going through for the average vehicle or pedestrian or a cyclist. I think that those are great applications to help keep things moving around in the city.

We're working on a street light project and one of the things that we really have interest in doing is to make ambient light appropriate for the area. The City has adopted an ordinance called the Dark Skies Ordinance. What that means is that we're not going to light up the night sky to a point where no one could be able to see the stars. So with the ability to control the ambient light, we're looking forward to being able to monitor that, or in instances where there's a safety incident, perhaps even bring the lights up to a level that will enable people to act in the presence of an emergency.

Jacque Rowden:

Or just to navigate a sidewalk-

Chris Belasco:

Yeah. Yeah. Absolutely.

Jacque Rowden:

... at night.

Chris Belasco:

Yeah. Yeah. There are safety implications here and so far, we're probably going to do them centralizing, but if we decide to monitor, say, air quality as we're a city that's known for not having such great air quality, if we wanted to monitor air quality by sensing on our street lights, we might end up putting some computing out at edge.

Jacque Rowden:

We are actually going to. You're right about that. Chris, I'm a little sensitive to our time here.

Chris Belasco:

Oh, sure. Sure.

Jacque Rowden:

I'm just wondering, we could list slides and [inaudible 00:21:39]

Chris Belasco:

Oh, gosh.

Jacque Rowden:

... worth of projects we have as I'm sure all of the audience can as well. But one of the things that you and I continue to find are some challenges.

Chris Belasco:

Yeah. Absolutely. So there are certainly some challenges with this, would you ...

Jacque Rowden:



I insisted that we include this slide because this is my life. So what we find is not just our stakeholders who don't understand these concepts, but even our IT folks.

Chris Belasco:

Right.

Jacque Rowden:

I think you may have heard me use the metaphor that you don't want to climb Mount Everest without a guide who's already been there. I feel like one of the challenges that I have here at the City of Pittsburgh is that very few people have seen the light, so to speak, and have moved active directory, for example, which is a huge bear to move or storage or computing to the cloud because they know what they can see and touch. So at least for the staff that I have, there's a comfort level when you can do a backup and restore backup, you are comfortable that you've maintained that data. Their skills are not transferrable, they just aren't. The concepts are, but the command lines, the user interfaces where to click, even when we think, as you and I have talked about from active directory to Azure active directory, it's a whole different concept.

Chris Belasco:

Right.

Jacque Rowden:

That is as big to me a challenge as the stakeholders, the customers, and the financing-

Chris Belasco:

Yeah, sure.

Jacque Rowden:

... is just getting staff to buy in.

Chris Belasco:

Right. That's one area where we're still trying to educate our internals is that we have ... now we're buying something that we have to use to keep the lights on for the city's compute and storage resources. All of a sudden it's no longer a server that we buy that we deprecate the value of. So it's something that we need to continue to pay the bill of every month, even though what it's doing is that it's running our systems. So is it truly different than a capital expense in that way? Is it a utility that we pay to run at this point, and how do we make sure that all of our relevant stakeholders understand that we're really in housing several related expenses into one managed service that somebody will guarantee that we will continue to be able to access?

Jacque Rowden:

Well, I'd even go further, Chris, and say that as a government agency, we put things out for bid. We are obligated to choose the lowest bidder that meets-

Chris Belasco:

Responsive, yeah, yeah.

Jacque Rowden:

... whatever the parameters of are for the requirements for this bid. It is difficult for our colleagues in our finance and procurement departments to understand how we can put equipment, what used to be equipment, out for a bid, or how do you compare a bid that includes hardware to a bid that doesn't because the second bid is about cloud computing?

Chris Belasco:

Right. Right. Right.

Jacque Rowden:

I don't know about you, but I get a lot of pressure to at least go with something people understand.

Chris Belasco:

Right. Right. Yeah. We'll be working with our audience and helping to educate along and trying to build a system of trust that people can rely on our IT products for, I think, some years to come. I think that's okay. That's what you have to do as you socialize new ideas and try to put yourself in a position to be a leader. I think that we're on our way, and we're doing our best to move these things with our yes, please attitude.

Jacque Rowden:

Well, and I think we've got to turn that plane that we showed on our first slide. I think there's only two people in that plane right now-

Chris Belasco:

That's right.

Jacque Rowden:

... Chris, and we need to make that much more of a jumbo jet and get a lot of passengers-

Chris Belasco:

That's right.

Jacque Rowden:

... a lot of cargo in there.

Chris Belasco:

That's right. That's right. Bring everybody along. All right. Well, we'd like to thank you for listening to our story, and we look forward to meeting you at the next event.

Jacque Rowden:

Hopefully, if you have any questions or would like us to follow up or have some advice for us, I think our contact information's available. I would certainly love to hear from any of the audience on this.

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Chris Belasco:

Yeah. Thanks a lot. We look forward to hearing from you.