

FINISHED TRANSCRIPT

ASIA PACIFIC REGIONAL INTERNET GOVERNANCE FORUM
MACAO 2015
EVOLUTION OF INTERNET GOVERNANCE: EMPOWERING SUSTAINABLE
DEVELOPMENT
JULY 1, 2015
N HALL
14:00 LOCAL TIME
ICT IN MACAO

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>> GEOFFROY THONON: Thank you for coming to the session.
My name is Geoffroy Thonon. And what I'll be doing is I'll be
trying to glue all three -- sorry, four presentations together
for the ICT economic development in Macao.

I trust that you had a good lunch, no matter how it was to
be. And what I'll do is I'll first introduce statistics, so
that you have an idea. So some people in the audience I can see
are from Macao. They probably will know this. There may be
some information which is always changing. As you know, the
Internet is a changing item. And also, the way that Macao
develops is also quite changing.

So I'll just do a brief introduction, get you up to speed,
if you're not from Macao, about what's happening around here.
Some of the issues, the ICT, and then I'll present -- I'll start
getting presentations from four speakers. Mine is at the end.

If you've come to Macao, you probably realize that indeed
we have a tourist Department, and one of the sponsors. And one
of the things is touching moments, experience Macao. So what I

want you to be able to do is for you to experience Macao in a bit in a way that ICT would see it. An application being thrown out, developed, put into use. And who would be the kind of users in Macao. Sort of like a good preper.

So Macao, yes, we have lots of people going through this little place. The total people in Macao, which are residing, is 640,000 -- and 700. That needs to be updated. All on 30 kilometers square, which means it's one of the highest density living places on earth. Mostly because it is a city state that depends on resources from outside.

But we have a whole lot of people coming in, as the Tourist Department knows, and also the Statistics Department knows very well. There's 31 million who went past. That's a lot. That's many times the population. Over a month, two and a half million. Over a day, 87 or so -- sorry, 84,000.

So I just wanted to be able to show it's 30 percent per day of the total volume. So think of it as a network. If Macao was where you were storing data, you've got 30 percent of your data, your whole data archives going in and out. That's the type of flow that's happening.

What type of -- where do they come from, people from Japan, China, I tried do a name Cloud of the number of people that come through. Fantastic.

But of the network, what is there? I mean, that's nice, people, people who use ICT. But what about when they come here, what infrastructure are they going to be using? Well, this is the statistics I brought out from these particular sources at the back and the bottom.

IP address, IPv4. Sorry about that, IPV addresses, you can see the Internet provider at this time is CTM. There is UMAC, there is M slot. M slot is not announcing any IPs so far, and MTEL who have IPs. And their interconnection, as it showed the interconnection of visitors coming in who may use ICT. Here is the interconnection of where the packets would go through.

So back to the people. 640,000 -- 640,700. How can they use ICT? Are they able to use ICT? What are they doing on their spare time with the spare money? Let's have a look at that. 1.8 percent unemployment rate. Fantastic. Although if you're an employer, it takes a different point of view. 74.3 participation rate. High. So that's what I mean.

Income in 2014 was roughly 14,000. Who would spend on this kind of stuff for new devices or services, whatever it may be? I listed out, again from statistics, the kind of people, the kind of jobs, and the relative pay. The first number is the pay per month. And the second number is the people employed in that sector.

So you can have a fair idea of basically if you are

targeting, you'd be able to have a look at which particular section of Macao you'd be more interested in.

That's it as an ICT. 640,000 people. Computers, almost half of them. 420,000 Internet users, as such, from a survey from the Statistics Department. 1.8 million mobile phone subscribers, lots of Internet subscribers. Basically, Macao is wired up. It's ready for a whole lot of things in ICT. So the development as you will see, you may have kept those at a stage, or there are much more opportunities in there which we will talk about.

Again, Macao, the particular borders are again getting blurred at this moment in time. There's a lot more happening with the type of -- so perhaps we will get a bit more in hand. So that was the statistics, just to give you an idea about ICT. If Macao is plugged in, yes, it is, it's ready to have a lot of services.

What we will have now are four presentations with different viewpoints. Opportunities in Macao, so Mr. Gilbert Chen will talk about ICT opportunities in Macao as an incubation center.

Authenticating. Doctor Tin will talk about wired applications and multi-factor. And its weakness, involving a new green intelligent lifestyle will be talked to by Mr. David Leong from Intel. And I'll be talking about security. Because that's what I do for a living. If I may, please ask Mr. Gilbert Chan to come up and talk about opportunities in Macao. Thank you

(Applause)

>> GILBERT CHAN: Thank you. Good afternoon. Welcome to Macao. I'm Gilbert Chan from Macao Technology and Computer Centre. Before my presentation, I would like to brief you on Manetic. Manetic is a non-government organization funded by the Macao SAR Government. The purpose is to facilitate the technology developments in Macao. We help people who would like to set up their own company and develop business related to technologies. We call these companies incubatees. And we have work with well-established companies from overseas which would like to seek business partners in Macao.

The purpose is to introduce advanced service and solutions to Macao, as well as align these companies with our incubatees to enhance the capabilities and to have better support and customizations. Nearly half of our incubatees are related to ICT. In fact, it relies on whether there is a proper enrollment in the ICT industry. We realize the importance of ICT and security to the development of the ICT industry. Therefore, we initiated the establishment of information system audit and control association, the Macao chapter in 2007. And we established the Macao Computer Emergency Response Team in 2010.

What I mentioned just now is some of the work that we do to facilitate the technology developments in Macao.

Now, back to my presentation. Today I'm asked to talk about the ICT opportunity in Macao. And I think in order to discover the opportunity in a place, we need to know about the economic environments. That's why what I will do is to share with you about some facts about Macao's economy, and then I will list out some opportunities in my own opinion.

Macao's economy. Right. Macao is a very small place. If you don't reckon, we only have a total area of 30.3 KM square. Even though we are still making some -- we are doing some construction, reclaiming the land. So maybe after a few years you'll see our area will be larger. And we only have a population of 640,000. I remember a few years ago, when people asked me about the population, I tell them we have half a million. But in just a couple of years our population has increased. This is because our economy has been boosting up in these few years.

Okay. This is some figures about our visitors. You can see from the previous three years and the first quarter of this year, roughly annually we will have around 30 million visitors annually. This is a huge number. Imagine Macao only has 30 KM square. And most of the visitors are from China, as you can see. Next are from other places like southeast Asia.

Our economy, we rely very much on the gaming and tourism and hospitality industry. And as you can see here, our gaming, tourism and hospitality industry is contributing more than 70 percent of Macao GDP and also 80 percent of Macao Government revenue. So that's why our Government is trying to find new points of economic growth, because we also realize that depending too much on our gaming and tourism industry is not healthy.

Some figures about the GDP. Well, you can see we have a very high GDP compared with other places in the world. Actually, we are leading in the world in terms of GDP. And you can see each year we are growing in double digits. In 2010, we grew with 33.4 percent. 2011, nearly 30 percent. 2012, not bad at all as well, 16.9 percent, even though it dropped a little bit. But in 2013, we go up a little bit again to nearly 20 percent.

Now, you can see in 2014 it drops to 8 percent. This is due to external factors. But even though it drops to 8 percent, but compared to other countries, this percentage of increment is already not bad at all.

Now, looking at our gaming revenue, you're right. We have a huge amount of gaming revenue. In 2011, we have 33.5 billion of U.S. Dollars. 2012, we have 38 billion. 2013 we have 45.1

billion. As I said just now, on last year, 2014, due to some external factors, our gaming revenue has dropped a little bit. But still, we have 43.9 billion U.S. Dollars.

And compared with Las Vegas, which they claimed last year they did quite well, they only have 6.4 billion U.S. Dollars. Our gaming revenue is seven times larger than, more than those in Las Vegas. Indeed, since 2007, our gaming revenue already exceeds Las Vegas. And now we are seven times more than Las Vegas. Imagine this number in a small place like Macao, with just a little bit more than half a million of population. This figure is significant.

Okay. Why would this happen? Why would this happen? Here is the reason. In 2002, our gaming monopoly system has ended. Since then, we have invited world class gaming operators to Macao. In 2004, the first one, the first resort came out, which was Sands. In 2006, we have Wayne and Star World. In 2007, we had a huge amount of mega resorts established, which are Boa, Crown, from Australia, and Wayne, the second phase, pulse 16, MGM, and this is why. On 2007 we start leading Las Vegas because we have all of these mega resorts coming out. Okay, and on 2009, we had City of Dreams and other casinos coming out as well.

Okay. Then after that, the gaming industry has cooled down due to the financial crisis that happened in 2008. But we quickly picked up. And on this year, in this year, we have the Galaxy Resorts phase 2 that just opened this May. Coming up this year, we will have Steel City Macao. And 2017 we will have the Sport Palace. 2018 we will have MGM, Cotai and Galaxy Mega Resorts, phase three. Look, we are only halfway through of the development. We still have the other half coming up. Imagine after all of this has built up, what will be the effect? The effect will be significant.

Now some figures about our hotel rooms. In 2006 we had 13,000 rooms available. This year we have 28,000 available. So the reason to increase this room number is so that we will have the capability to attract more global annual events happening in Macao.

Now look at the -- let's look at the employed population by industry. This is actually -- the last row actually is 30 point something percentage. You can see the cultural, recreational and gambling and other services. It covers nearly 30 percent. And the next thing is the hotel and restaurant covers 14.12 percent. Wholesale and retailer, 11 percent. These three added together cover nearly 60 percent of the population. And you can see all these are related to hospitality and tourism and gaming industry. So we are deeply relying on this.

And you see the construction part, we have 14.8 percent.

Of course, because from all this year, a lot of construction has been undergone due to the developments of the gaming industry. And we are also reclaiming lands, trying to get more resorts for the development of Macao. And we are actually building a bridge to Hong Kong. And imagine maybe after one or two years we will be able to drive from Macao to Hong Kong in less than 20 minutes.

Okay?

Employed population by occupations. clerk, it covers 27.1 percent. Sales, service and sales worker, 20.3 percent. And professional, unfortunately, we only have 4.8 percent. We depend on a lot of experts and foreign neighbors, actually.

Okay. Some figures about communications. You can see some figures for the past four years. In terms of fixed line, it is actually decreasing, as you can see from 166,000 now dropped to 153,000. Mobile users, we are increasing. As you notice, we have 640,000 in our population and you can see from the figures -- actually, nearly everyone has a mobile phone. And look at the SIM card, wow, prepaid SIM card. We have 1 million and 21 hundred thousand users.

For the Internet subscribers, it is increasing, nearly half of our population. In terms of the usage an hour it also keeps increasing from half a million to nearly a million of hours.

Okay. Now that you have some ideas about the economy of Macao, let's look at the opportunities. Yes. Being the world leading gaming industry, the biggest ICT opportunity is in the gaming industry, as you can see. Now, from the picture, you can see we have phase two of the Galaxy Mega Resorts. If you have time during these few days, you can go to visit them. It's actually next door.

And then coming up we have the Steel City and then Wayne Palace, Parisian, MGM Cotai and the phase three of Galaxy Mega Resorts. All of this gaming requires high end innovative and world class ICT service, infrastructure and solution, to support their operations and attract and retain their customers.

Since the second half of 2014, the competition among the gaming organizations is getting more serious. Gaming operators want to understand more about their customers, retain them, and attract new sources of customers. Before, from my understandings, those of my friends who work in the gaming industry, they said before they actually didn't have to do much things. People would just come and contribute money to their organizations, and there is massive money. But since the second half of last year, things have changed a little bit, due to some external factors.

So all these gaming operators are trying to find ways to understand their customers. Through this, that implies

opportunities on ICT. Like what? Like how to handle the big data. How to make use of business intelligence. And also apply proper information security measures to handle customer information.

In addition, all these gaming operators are looking for innovative ways to provide a better experience to their customers while staying in their resorts. And innovative ICT solutions definitely can help. And if your ICT solution is acquired by the world leading gaming operators in Macao, I'm sure all the other gaming operators in the world would like to follow.

Now, the second opportunity is the 30 million visitors annually. We have 30 million visitors annually. Other than the gaming industry, the tourism and the hospitality industry are also taking advantage with this big amount of visitors. Visitors will not only stay in the resorts during their time in Macao, they will also like to explore the other side of Macao. For those popular locations, there are so many visitors that they may not have enough time to serve them properly. For those not so popular locations, they want to attract more visitors. ICT can help streamline and advertise and attract visitors and enrich the experience of these visitors in both scenarios.

Now, the Government policy. The Macao SAR Government understands that Macao is too much relying on the gaming industry. Therefore, Government has been looking for new points of economic growth. Technology is one of the focal points. Therefore, the Macao SAR Government has initiated the establishment of MONETICs to facilitate the technology developments of Macao. The Government also established the Science and Technology Fund to provide funding and research and developments related to technology.

This year we also have a new set of Government leaders who are determined to solve the existing problems of Macao to provide a better environment to Macao citizens and visitors. And this creates ICT opportunities as well.

Last but not the least, Macao is now facing human resource issues. Macao is growing way too fast that we are very tight in human resources. We have expat and foreign labors, but most of the organizations are still running out of human resources. ICT would be able to ease and streamline the operation of organizations, so as to minimize the demands on human resources.

To conclude, this is the ICT opportunity. World leading gaming industry. 30 million visitors annually. Government policy and human resource issues. And I believe after knowing better the situation of Macao, you should be able to identify more opportunities for your own.

Should you have any assistance or you need any assistance

or want to know more about MONETIC, you are welcome to contact us. Thank you.

(Applause)

>> GEOFFROY THONON: Thank you, Gilbert Chan, for a view of the opportunities in Macao ICT.

Great. So I won't take your questions and answers right now, but we will go on through to the next speaker as fast as possible.

If I may be asking for the next speaker, Dr. Hung Chi Tin, to talk about his slides, Wide Applications of Multi-factor Authentication and Its Weakness. So Dr. Hung Chi Tin, please come up from Macau University Science and Technology. Please give a round of welcome.

(Applause)

>> DR. HUNG CHI TIN: Thank you, Geoffroy, and thank you for your loyalty to these actions.

Today my talk is about the Multi-factor Authentication System and Its Weakness. My name is Hung Chi Tin, as Geoffroy introduced, and I'm from the University here. And my talk will be about the -- actually, you see a weakness on the topic. So my talk will be about a weakness about the multi-factor authentications. It's a well-known issue.

First of all, I would like to introduce the user authentication. We all know that user authentication is the basic for the security, information security. So actually it's to present the credentials and the user identification to the system, to authenticate. So, actually, once the authentication pass through the system, the system will know what level of the security and what level of the authorizations will be granted to this user.

So actually, in the IS system, all the objects will have the different security levels, different authorization levels to different individuals.

So mainly the process of the authentication is to identify the users, identify the individuals. So usually we have the user name, password, token, digital certificate. Sometimes we have the Smart Card, we have the Java based Smart Card, we will have a certificate inside the card.

So, well, from the log-on process, we see actually in the first step is to identify the users. Identify. Usually we put -- because identification is important. Because -- the following process of authentication, authorization and access will be depending on the identifications. So this is also an issue of the current authenticating systems.

So in our common way, we need to prove what you know. Your user name, password. And so what you have, maybe you have a

token, maybe you have a cell phone receiving the one time password. So after that, when you are demonstrating who you are, and then the system will identify you.

Okay. So we all know that in a common way, we all have a single-factor authentication. This is the most popular one, user name and password and then we authenticate. Usually something you have is the key. Something you know is the password and something you are is what you have, your finger, your Iris or maybe your face, recognition, something like that. So -- well, there are drawbacks. Because, for example, something you have can be stolen. Something you have can be stolen. And something you know can be guessed. And something you have, you are in danger. If you have a hand -- well, we all have seen the movies, we all watch the movies, and some movies tell us the biometrics identification in some sense, in some scenarios, is dangerous. And people develop the two factors. So one factor is vulnerable, so we developed the two factors.

So the ATM is the case, so we put in the card and then key in the pin as the second factor. Sometimes in some high security ATM machines, maybe you will send a message. So two-factor authentication is one step further. But it's still in a very weak security level.

We all demand for the strong authentications, like Smart Card. Because I think most of you are the experts here, so I'm not going to go through the slide.

And the digital certificate. So this is quite secure, because we rely on a PKI, but it's not convenient to make use of it.

And also the biometrics. So biometrics is a way of -- you can have something you have and then presenting to the system and then the system can be built up as a strong authentication. But biometrics has its own weakness.

So people develop more factors, like geofencing. So you are sitting in a position. The position will be effective for authentication. Logging in within a timeframe. So the timeframe will be another factor. Or maybe some sensor will come with your authentication. Maybe the temperatures. Need to sit in an environment with a temperature and then you can log-in. So people develop multi-factors, and then more factors.

So for multi-factors, it's based on the same process. First we need to identify people and then authenticate people and then authorize people. So this is the traditional way of authentications.

And more than that, we have the single sign on. So well we all enjoy the single sign on, within some enterprise systems. But when we go out of the enterprise, we don't have a single sign on. Single sign on is a very -- it's a very desired

technology or desired future of our systems.

Well, we don't have a real single sign on solution, because the single sign on has some contacts or has some limitations. You need to have redeemed enterprise. And also for the multi-factors, in the first step, you need to identify. So we have something phishing, we have some fake websites. Because all the systems need to identify you. So how to identify? You need to provide your unique name and password to identify. So this is the main weakness of the current two factors or multi-factors authenticating systems.

And also for people, we also, in a situation where passwords are overloaded. So I guess most of you have more than, I guess, maybe more than -- because you are all from the IT area, can I guess maybe 50, more than 50? Anyone can raise your -- no? More than 50? More than one, right?

(Showing of hands)

Okay. Most of you have more than one. Actually, you have, I think, you have more than 50. Because some user names and passwords, some websites, you register, you forget, right? So that's why the "forget password" feature is quite important in most of the websites. So on average, I think average -- I have a statistic later, it should be 30 something, average, 30 something. So password overload. Yes. Here. Seventeen is the average for the whole world. Because you are the very smart guys working on IT, you are smart. I think most of you have more than that. So more passwords, smarter. Kidding.

So password overload. It makes you vulnerable to the hackers. Even myself, I met some fake websites but I cannot recognize it because it comes with an e-mail. I remember -- actually, fortunately, our IT officer is not here. So I'm working here. So I received some e-mail from them. Outlook. I received an e-mail saying that my e-mail code is over and asked me to click something and then to report to the IT administrator and say increase ten bytes, something like that. So I did. I clicked it. So actually, well, within a -- well, within the IT environment, quite a lot of fake e-mail or some phishing e-mail, not real. So, actually, I just clicked once. And then pull up another screen and then I know. But most of the population, most of the general people, they won't recognize this. They won't have this kind of alert like me, because I have more passwords. So I'm kidding...

Okay. So the password issue is a very important weakness in current authenticating systems. And, you see, there's 67 people will write down their password in a small notepad. Are you doing that? No? Okay. Because I saw a secretary writing down her boss' user name and password and stick a sign on the screen. So I think wow, this is quite -- the password issue is

quite serious. And over 35 percent of people always forget passwords. So it's common. Like myself, I'm not smart enough and I always forget my password and then I'm the main user of the "forget password" function.

Okay, phishing. Okay. So well, why phishing can be that serious and can be vulnerable for the most general people? Because general people don't have knowledge to identify the phishing. And also, the most important things is about the identification process, remember?

Sorry, I need to go back to the... okay.

So this is the main issue, identification. So in current authenticating systems, the first step, the real first step is to identify you. How to identify. Give me your user name and password and then I can identify you. And then two-factor system, I send you a one-time password. One time password, SMS, for example, sending to your cell phone. Because if I cannot identify you, I cannot send this message to you, right? So this log-on process is the main issue of the current authentication weakness, because of the identification.

All current authenticating systems need to identify you in the first step, at the first place. So this is the issue. So even the key logger can help you to capture your password. So the first time user needs to provide the user ID and password. Second, the one-time password.

So my invention, actually, the University has set up a company, a startup for my invention, because we need to push it to the market and for the users. It's called Singou technology. MUST is one of the partners and we also have other business partners. So sorry I can't disclose too much technical detail here, but I'll demonstrate it to you and invite you to download apps. So the method is to reverse, reverse multi-factors. So it's quite simple. Now we have the cell phone. Because the traditional way of authentication is assuming you don't have other computers. So now you have a second computer. So you only have one computer, you can only work on the authentication on the traditional way, log on the computer and then process your user name and password. But now we have a second computer so we make use of the second computer to make the secure pairing. So we call it secure pairing.

And the first step, we don't allow the system to identify me. No need. Because I need to build up the trust relationship between the other IS system. Because the other IS system, even when you look like, Google, look like, but I cannot trust it at the beginning. So I can have a second computer to set up a trust relationship with the system, with the opposite system.

So our method is quite simple. At the beginning, the log-on system, we show a random number. And then I can -- I have

five minutes, right? Okay. Thank you.

So I use my second computer to establish a trust. Or challenge the opposite system. So once it's trusted, then I can send my user ID and password, right? Sounds good, right? Okay.

This is our app. And this is our Web site. So we are big user of MONIC. So we have a monic domain. Actually, it's available in the app store. So within the four minutes, I would like to show you the demo. So I would like to invite you to have a test. Because you actually can open up a browser, using a browser to open the info.mo. It's easy to remember. So it shows you the Android download or the IOS download. So you can download it. So once you download it, I will show you how to use it.

The main idea is to set up the trust relationship. Because just -- this is just like the TPC, the trusting computer, trusting computing. So this is a philosophy similar to that.

So this is my Google. And I also installed the plug in, so this plug in is for the Chrome. Actually, I can show you the website. Okay. So this is in Chinese. So this is our website. You can install the extension here. And also you can use your mobile phone to download an app and also you can open the browser on your mobile phone to access the info.mo.

So from the browser side just install extensions. This is the quite interesting one. So if you want to access your e-mail in an airport public computer, do you dare to do that? Do you? No. Okay. But with single apps, you can do that. Because you don't touch the keyboard, you don't touch the keyboard.

So, for example, I tried this one. I have a team viewer. Because our extension detects the ID and password and I click it. So this is a random password. So I open my app. And I'm sorry, I scanned a QR code here. You can use your QR code reader. You can see it's a random one. It's a random session.

So, actually, you call up a screen on my small computer. Because I have this log in before, so I have my ID and password in my mobile phone. Most of your user ID and passwords are stored in your mobile phone. You never store in the Cloud. So even compare the URL. If the URL is a fake one or phishing one, it can recognize. It won't prompt you to save the ID and password. So I click log on. Sign-on. Okay?

So I tell you a metric application of this. You can -- for example, you have a website, well, you are not on the computer -- you are not -- you are not sitting on the computer. You want your friend, a very close friend, or you want your mother to open your website, for example, online banking, to transfer or pay a bill over the online banking, so you can do that.

Giving that, you are not giving your password to your mothers. But mothers can... giving that, you are not giving

your password to your friends. So you can, using the app or recheck to copy the random QR code - the random QR code just lasts for 30 minutes, and then this picture is sent to your -- actually, you ask your mother to log in and then click single. And with the single QR codes, ask your mother to picture the QR code, send to you, and then you can lock on, on a remote site. And giving that, you are not telling your secrets to other people.

So because Geoffroy warned me again, I'll show you the gmail. Gmail is popular. Click. Don't read my e-mail when I log on.

Okay. Thank you.

Take a photo. Okay. So you see how endangered you are. Okay. I signed on without touching anything. This is not magic. Okay. I hope you can be invited to download this app and give feedback to us, because this is the start up invention from the University. But we try to commercialize it and try to push it to the market.

Thank you.

(Applause)

>> GEOFFROY THONON: Okay. I'll clear the caches and do everything else. Okay. Good-bye. So then we can't read anymore emails of his. So, Doctor Hon Chi Tin, thank you very much for that presentation.

Look, what you saw pretty much was ICT. You've got the platform to be able to do development. And now you see from Dr. Hon Chi Tin the development that was done in here in Macao. So yes, there is development happening here in Macao. Fantastic. So thank you very much.

Next up, we're involving opportunities and building new green intelligent lifestyles in Macao. I'd like to invite David Leong from Intel to be able to give his speech. Give a round of applause to David. Thank you very much.

(Applause)

>> DAVID LEONG: Okay. Good afternoon, everybody. Actually, I'm from the second telecom company in Macao. Recently in the last year the local Macao telecom has been opened up. We have two telecom providers in Macao. So just now in the morning session, we had two telecommunication companies to explain Macao's current status and things like that. So in the afternoon we are having a nice time together with all of you to share some of our local experiences and knowhow of the current technologies.

I hope this will not bother you too much. My presentation is mainly on coming out from listening. So you will see why I'm calling this is a listening. Okay? So I may share with you some of the things that we are looking and focusing on in recent

years that, mainly because of the China economy is moving towards the IT economic. And no more traditional manufacturing industry. So what they are calling it in this year is Internet plus. And it's something like in Germany is called industry 4.0. It's an industry revolution.

So what is that about? There is mainly on the mainland China, so focusing on the market is technical aspect, International establishment. IoT is the Internet of Things that we were talking about for years and expecting much more revenues coming up in the next five years. And the industry expectations and things like that.

This line is coming from Asia, too, but many describe that China is moving towards using more RFID and things like that. So in this year, in the fourth quarter, I have heard that you all know about WiFi AP, right? This AP also includes Bluetooth transmission and receiver inside. So that means more RFID can make use of this kind of AP, can be connected together in the ICT infrastructure.

The second one is the transistor. Traditionally we have transistor and IC and things like that. And some of the people in technology told me that it would be better performance in ICT design and in electronic infrastructure inside, they have to make use of this ASIC. But this kind of ASIC can be programmable now. So it's much faster than traditional where you write programs and then a long distance to manufacture and then you come to market. But now it's growing faster.

The others may be in terms of more cheaper fiber optics and things like that. And also Macao is making use of this cheaper fiber, so that we can have more at once and faster networks and local.

The MIIT is the governing the development of the economic in China. So they give guidance to the understanding and the importance of the IoT worldwide and leading those important and getting the general idea of IoT inside China. So you are likely more seeing that there will be more workshops and expos happening in China talking about these kinds of things. And recently there is some -- IoT expo is having -- have their exhibition nearby.

This is another chart. It gives you some idea of how this Internet of Things is classified in China. So they can call in the five layers: Reception, transfer, platform, support and application. Mainly on the concepts, the design, and the network trends and network improvement on fiber optics and things like that, and software development, healing applications and things like that. And more importantly, they are taking care most regarding about the ITU-T standard. Mainly on the checking of the system valid is a good condition or not.

So there are four clusters mainly in China. So they are Bohai area. Mainly on the standard, development on a standard. And migrating and cooperation with International bodies and things like that.

On the demonstration project in transportation, like the latest railway in China, farming, animals, energy saving and things like that.

And the Yangtze River is mainly on the expos, simply because Shanghai is an International city. They try to have expos and exchange with outsiders to make more cooperation with others in the world.

So in the nearby province they are -- they establish an integrated circuit and sensor intelligent computing softwares together to improve in these areas.

Pearl River is much more closer to us. It's mainly on the demonstration of the system. Like the intelligent city, in transportation and things like that.

In the Midwest, what we call the Midwest, it's also aggressive in development of this Internet of Things especially in the development of fiber optics and intelligent things and things like that. They are concentrating on how the performance is guaranteed and provide in the lifestyle.

So we are using Internet every day. And actually Macao is only 30 years' experience on using the Internet. We have IPv4 and IPv6 nowadays. So we don't have much trouble in visiting these two networks. So the Internet comes with people. They try to communicate with emails and then file transfer and then go on. And now entertainment and things like that. But see about the next generation Internet, what are they going to talk about? They are going to talk about Internet of Things. That means things can communicate with things. How come? What are they going to talk about? They talk about people. Yes. They talk about people.

People communicate usually by using this kind of five senses to express how is our condition. So such as we hear, we taste, we smell, we touch, and then we see. Similarly, Internet of Things is going to transfer all of this kind of environment figures that is beside you to a location where we can do some analytics. Or some things that are more strictly killer applications, such as fire alarms, smoke alarms and things like that.

There are some places around the world, they are saying that people are using about 1.5 devices per person nowadays. But in 2020, people will be carrying about eight devices. How come? Most likely they are sensors. So the automobile is one of the examples that you can see in the news that they can drive home automatically. You don't need to worry about how you can

get a car back to home. And healthcare is most likely that you can see the performance that improves your healthcare treatment and things like that.

Consumer to electronic porters is in Macao it's like 3 devices per person already. So to improve your lifestyle, to better improve your lifestyle, it's mainly looking at health, safety, comfort, convenience and wisdom. Simply because wisdom is coming from the data. So you have to establish more sensors and then how come the sensor is -- happens around you? This is a very famous sensor that you can share with others, that the next coming up is something that is not new. The Sensor is inside. What is this? This is not a carpet, but actually his is a blanket that you are using every night. It senses the high temperature. Are you feeling well? Are you sleeping well? Things like that. So if this is happening to the elders that may have a heart attack and things like that, your family members can carry a band on their arm and they give you some signal, if the elders have some improper or abnormal things happen in the hot level.

So lastly I can share with you something as a Macao IT person and electronic engineers, I'm happy to deal with this. This is a small circuit board but it can run Linux. Okay? Based on that, they can plug into the TV port and have the wireless mouse and keyboard. And if you know Python, just type a few words, then it will control the LED. This is in -- these are just simple examples of how you can DIY at your home and have your ecosystems on hand yourself.

If you'd like to see this morn, I can give you something more to take home. Between person to person communication you need HTTP. And now machine-to-machine is coming, we need MQTT.

No more time for me. So maybe after the seminar you can discuss with me.

Thank you.

(Applause)

>> GEOFFROY THONON: Thank you, David.

From what I believe, we have a question from participants online. So we will try to get one of those questions up. And we will see if anybody of the speakers can answer it.

Okay. Great. If you'd...

>> YANNIS LI: This is Yannis Li speaking for the remote participant. We have one remote -- we have two remote questions, from Eshwara Kopparchy. The first question is: He has a general inquiry to improve the skill set of local citizens. With 61 percent of unskilled people at Macao, what initiatives is the Government taking to reduce this number? That is the first question.

He also has a second question. It's that where is the

usage of the info.mo product in the market? Is the end-user going to be a visitor to Macao, a guest in gaming rooms, or regular people? Does it have commercial use like in corporate, telecom banking, et cetera?

>> GEOFFROY THONON: Let's take one question at a time. So for the first, if any of the speakers would like to go up on the podium, so I suppose I'm going to be the one that is answering them.

So if I understood the question, the first question is, with the 61 percent who is unskilled in Macao, what are the Government initiatives to reduce the number of 61 percent to more skilled. Is that the question?

Okay. Does anybody -- does any speaker -- would you like to be able to take this question? No.

I don't come from the Government, so I cannot represent the answer. But what I can say is unskilled workers, unskilled -- I'm not sure exactly what you qualified as 61 percent unskilled. So I'm not sure where you got the number from.

Also, yes, there may be some need or requirements for support personnel in Macao. If you have a household and it comes with a maid, does that number increase as the unskilled?

Now I've got to also admit that what are the Government initiatives to improve? You know what? As a permanent resident, I know there are a lot of initiatives for learning, a lot of initiatives for you to go ahead and increase your education as an adult. There are courses here. We are in a university. Macao has a lot of teaching bases. So I would suggest that these are the steps.

Now, whether individuals do actually go ahead and pursue, perhaps the 61 percent may not -- are not keen to pursue. I cannot answer that. But for initiatives for support, for the structure to be able to reduce that number, there is.

So the second question?

>> YANNIS LI: The second question is -- just a minute. It's a pretty long one. So basically he is asking does it -- the info.mo product, does it have any commercial use?

>> GEOFFROY THONON: Right. I'm glad -- I hope, is Dr. Hon Chi Tin still in the room? Right. I'm afraid I'm not able to answer that at all. So my apology to the person asking online. Thank you very much nonetheless.

Okay. So for the last bit, what I've done is I've tried to buffer, just in case any speakers were speaking too fast, but they were actually speaking a lot of times, so I've got 44 slides to go through in 15 minutes. So it's okay. A lot of the slides are not really important. There are just some pictures in the background so I'll just go through items.

So what I'm going to be talking about. Basically, CERTS,

CSIRTs and cybersecurity in Macao, where the action actually happens. One industry which is always expanding globally is the security industry. So let me give you sort of an eye opener for what's happening. Threats and vulnerabilities. It's Internet in nature. It covers everywhere. So you need to be able to get information of what is happening, when it's happening, who to contact, and how to get the issues resolved. Not particularly easy to do.

If you see any product names in these slides, I'm not pro or con. I'm just neutral. It's just cases as it is. Some people may have seen these.

Okay. Why, why have CERTS or CSIRTS. You know what? This is where the businessman is going to say it's going to cost money. Does it make money? No, it doesn't. What it does is it provides protection. That's all. It provides protection for the case or the improbable case when you come up with statistics that you will be targeted and you will have all of your information taken over. But when it does, oh, it does.

So but other compromised items in Macao? No, really? No. That didn't happen. Nor did this happen to another website in Macao. Nor did this happen. No. Of course not. It doesn't happen to me. It doesn't happen to Macao. Guess again. It happens in Macao. Over and over again. It's not going to stop, either.

So we have got the pictures and I have contacted the organizations who have had these pictures posted. Does it happen with any other organizations? Well, I can talk to you about a school, let's put the factor, EDU, which has Japanese selling products on it. We're still trying to get them to wake up and say please clean your servers. The ones -- for those ones compromised, they have been cleaned.

Another one, sorry. Phishing. That's what is happening. No. No. It will never happen to our bank. Well, there is a product for info.Com, or Singou -- I'm not selling it -- and which talks about how to reduce phishing one certain way. Okay. Phishing happens. Now we have seen websites of a bank in Macao, and a website in dot mo. We have seen banking of websites put in here and banks in here put outside. It's an International issue. You have to be able to communicate. You have to be able to bring out that you have a problem and it may be bigger than what is affecting you.

Or why set up a CERT or CSIRTS. Because it's the law. Perhaps your industry is so regulated that you have to make sure that you report any hack attempt. That is the -- banks are required to report any issues, and one of the follow-ups have been taken care of.

Are there other CSIRTS in Macao? Yes, there are a lot of

CSIRTS in Macao. I've given you the hint that large players who have high impact, who have actually had some of the websites on them, perhaps not ones that we handled, but they have had incidents and have come into a habit of acting and reacting, and then forming processes in which it becomes a CSIRT. But the thing is, we need to provide more communication.

So what these considerations do, banks, payments industry, gaming sectors, Governments, if it is law, they will do their own protection. They will provide their own protection. And they will say no, sorry. We have no communication. You give it to us and we will handle it. It gets to the point that you give a delivery of notice, you don't hear from them ever again. So you deliver a letter and they build their fortress. They are strong inside. But they don't realize that if they don't talk about the problems that they have inside, the same issues are going to affect the people who haven't built castles, the EDUs, the ORGs, or others who cannot provide a CSIRT or haven't yet been affected. And then they can't figure out well why are these people or facilities, I should say, are suddenly turned against them from reflective DDOS attacks? Basically, they didn't know that they had to patch, because they don't have the resources to do it or understanding to do it. And they get compromised. And then they start attacking the castles. They didn't want to, but they had infrastructure which was weak.

CSIRTS, CERTS, if they communicate and cooperate with each other, can help other people out there avoid being used for an attack.

So what we're doing, CSIRTS and CERTS, is building communication. If there is an attack, we provide a signal. Or if there is a pattern, we spread out to other people. So that is what is required. Beyond building castles, you need to be able to reach out and say look, I see a pattern. Perhaps it's from my network, but can you alert anybody else who might have the same kind of problems? Because if they have the problem, the organization who has built up the castle will have. They're going to start to be attacked.

So attacked. We're going to need to be able to build our own networks. What is there in Macao? You've seen this slide and understand beforehand. It all comes through. We have different players, but most of the ISP is AS4609. So we have to provide communication if there is an issue. Sometimes if there is an issue and we have an IP address, we do know who it is, we can't contact who it is. It comes from an IP address and we need to provide to the person who has the IP address and then contact information of the person who can fix it. So at this moment in time, the AS4609.

The ASN complexity in Macao is simple. So yes, CTM is

under regulation.

So how do we as a CERT or CSIRT have a first contact? We have received attack reports from outside Macao saying we are trying to contact, trying to contact your ISP. Can you help us? You're on the ground. We are on the ground, but sometimes we have the same kind of information. Well, we do know who is taking care of the IT in CTM. So sometimes I contact the person directly. But I can't do it every time. It becomes suddenly numb. It will help. But is there a regular process that can happen? Well, there is an IRT kind of object. And this is from a who is.

Now, this is particularly CTM, and my apologies, it's just an example of what has happened so far. There is a phone number there to contact. Try calling it now. Try using the e-mail address. Look at the date; it has been changed. There are some issues. Now, the fact that there is perhaps not a very good way to be able to provide the fact that there is an attack happening, it may be that we can't communicate and try to protect other people when we know that there is an IP address, when someone is saying can you contact us, because we can't contact your ISP.

So we try to build the communication. The who is database is maintained by APNIC, maintained in the sense of like there is the hardware and the database, but the database information is updated by the members. It's the members who provide those IRT objects. So if there is an issue, we can -- people can contact us. And it's fine to advertise and go around a CERT if you want to, if you want to go around the CERT, by all means, it's okay. It's fine. Okay. But please, members, whoever you are, in your economy in Macao, wherever you are, if you're settings up another IP in Macao, please update the IRT. So that when there is an issue with your IP address, it can be contacted to you from MSCERAT, from other CERTs, from JPCERT, from NYCIRT and other places that that this can be cleaned up. So clean it up. Everybody's happy.

It's worse when, not in the case of Macao, for the Telnet, but there was -- but it was from overseas and we were trying to get the ISP and any kind of operators for that address. It was in the Americas, north or south, and it just didn't get through either. The incident took three weeks to solve. It was a phishing incident for a bank. Banks, castles, people who haven't set up a share information processes, and then they were going why are we being attacked? Okay? Because of these items. So incident response with ISPs.

Threat information from Macao. Fantastic. Having a look at what IPv4s are in here. I see Akamai. Perhaps they have some threat information about Macao. Look. Yes, there is a

report and there is no information.

Well, that's okay. Perhaps not a lot of things are happening, when perhaps not the traffic volume, but there is definitely traffic going here.

Internet users, yes. Okay. There is a third of a million doing it. Mostly IPv4. But what stuff did it put on there? I mean, you're free, net neutrality, you can do whatever you want to on the Internet, supposedly. And then you can put in servers, admin pages, whatever you like. But, please, also make sure that you have a process to update. Make sure it's secure. Because after a while people find a way in it.

Source of information about things that are going bad, different ones. Which is free of charge. Usually takes about three days.

In there, we can talk about what is really, really bad and happening. Drones, sync holes, whatever it may be. Weak cipher usage. Okay. If you're in IT security, part of the organizations that take care of these incidents, you will know exactly that it's out there for sure. The numbers are not that big. The numbers are not that big in Macao because of the amount of users, that is all.

NTP monitors, there was just an attack. These are real. Even though there's only 13.

You can pay for it to get information about what is happening in Macao. You can do subscriber, also, and get it. And here in Shodan you can get it. And here, webcams. Why a webcam? Well, you can pay for it or you can do it for free. You see, instant response doesn't have to be expensive. Instant response is what people do. People process technology. Just get people to know what to do, how to handle information, and then pass it through and then get it to people who can do action on it. You want to know about webcams? Go ahead. NMAP. You'll be able to see that there are some webcams in Macao. Why? It was an issue here in Macao. The Office of Data Protection here in Macao tried to bring down a website. And they brought down a website. And they brought down a Russian website, a Russian coder. I wouldn't call him a hacker. He may have used admin admin. Because users put admin admin for the Web Page, for the webcams.

This was showing what was basically coming out of when you logged in as admin admin. But are there still 50 online? No, there are 306. We need to be able to provide information on how to be able to, again, get these items taken care of. Provide the process, provide people with the opportunity to be able to - to take care of their own systems, not just the castles, but also the people outside of the castles.

Why am I talking about this? Because of admin admin. And

this compromised WAP? Wire access points being the point where an attack was coming from was also happening in two economies as we know of. And APCERT Drill, Asia Pacific CERT Drill response team, made the drill focus about that.

RDDoS participants. I told you Macao has already participated in these types of attacks, unwillingly, because of the NTPs, but these are the things that are on the Internet and which provide attacks.

So what do we do as a CERT? Well, sure enough, Early Warning System. It's great. Fantastic. Impact verification. When there is something that is going to affect Macao, we have a look and we actually scan if it's going to be of relevance in Macao. Web servers, fantastic. Server types. We are able to figure out what is happening in Macao.

But that's it. Of the people who are out there of those castles, there is still Microsoft IOS 4 running, one of them. But a whole number are on number 5. 6 is about to run out end of -- end of July, middle of July if I remember well. Not such a good idea.

1.3 Apache. It shouldn't be there, nor should 2.0. What are they doing there? They are vulnerable. They are material that can be used to leverage an attack. We have to provide this information back to the people who need to be able to do something about it. Sometimes you only have an IP address. And then we send it to the person who has the IP account, and if we have got Dit, Dit, Dit as a response ring, it's hard. It doesn't matter who it is. It could be another organization who just takes the information, doesn't accept what you reported.

Publications, we tried, Government, private. Topics include policies, controls, incidents, levels, lock, stock and barrel. These reports are out there. You can Google it.

Cybersecurity response. That's what I want to talk about because the talk is about CERTS, CSIRTS, and cybersecurity for Macao. Have a look at what came back. Out of incident response methods out there, most implemented 12 percent. Fully implemented 12 percent. Partially, planning, not two-thirds if not three quarters. Ouch.

So we do need to have more cooperation, more community -- communications within elements in Macao. What do we do? CSIRTS are for big and small organizations. To be able to reach out for smaller organizations. For big organizations, to be able to provide Intel about what's happening. Because if they're attacked, when they realize that people can't go through, then they will start for the easier fruits, for the people who are not updating. So CSIRTS are for big and small organizations.

We try to set up the CSIRTS function no matter what the size of the budget. If you don't have budget for technology,

well then there is open source. If you want to know whether you have open webcams on your part of the network, we can talk to you about NMAP and then we will be able to see whether the service page tells you if you have more than one.

We also set up cyber exercise drills. Why? Not because we want to know what is happening inside of your organization, but for the interaction between. If you've see this type of item, we don't care what is happening. A cyber drill helps you understand the interfaces. It makes you understand what kind of information you can give out to give back to the community. Some kind of protection because perhaps you see an attack to you, and maybe someone out there will be vulnerable to it. And if it doesn't come over, that vulnerable infrastructure may be the one that is going to be reflecting an attack towards you.

Summary, there is plenty of good information around of what is happening in Macao. It requires some scan of some kind. But there are CERTS and CSIRTS in Macao that need to be able to get together, develop their skill, and interact so that when they see a problem or fire happening, somebody else knows how to take care of it.

Thank you very much.

And I hope if -- if there are questions, please go ahead. Thank you very much. So this wraps up pretty much all that we have got for this session. If you have questions for the speakers, please state your name, organization and we will take your questions. If there are any questions from online, please introduce them.

(Applause)

Thank you very much. This concludes this session. I hope you enjoy the next sessions.

Great. Thank you.

(End of session 15:35)

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