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Entertain -- Educate -- enVISION

And be so engaging that you don't do e-mail or check the internet while I am talking.

Slide 2

Time tunnel mentioned in session description

Time tunnel from web site

Predicting the future, planning for the future, executing in the present

What information do you need to execute?

How do you traverse the obstacle course of your business and moving freight?

What if you make a mistake?

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TARDIS

My favorite Science Fiction program, Doctor Who is now 50 years old

Slide 4

Doctor Who deals with multiple universes and multiple dimensions.

Let's focus on just our universe

Isn't it beautiful? So vast. In some ways, calming, overwhelming, incomprehensible.

But, we can break it down to smaller parts. In fact, some pretty small parts.

Atoms, just a few, arranged in particular order, are the basis of this vast universe.

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Sunday was Mother's Day. Anyone invest in a diamond for the mother of their children?

Carbon, the same thing that life is made of, makes a diamond, one of the hardest and most valuable stones in our universe. Atoms are arranged on the outside as a cube, with more atoms placed strategically inside the cube, including on the face of each surface.

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Silicon is another material immensely important to our universe, making up all the electronics we use. It has a very similar structure to the diamond.

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Copper is a bit simpler yet, but no less important. People gut new homes under construction to steal the copper and fence it for money. Our electronics would not be of much use without the copper to carry the information signals from silicon chip to silicon chip.

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Simplify the internal of the cube to a single, body centric atom and you get something like iron. Where would our trucks be without the iron in the frame rails, engine, transmission and brakes?

(Aluminum is lighter, but more complicated, with a face centered cubic structure like copper)

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The simplest structure is that of iron sulfide or pyrite. A simple cube. Sometimes called fool's gold. Yet, that fool's gold is used as the cathode material for Energizer brand non-rechargeable lithium batteries.

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The point of this chemistry lesson is that anything can be simplified. And, in the process we can learn much about what we are studying and trying to optimize.

[I might point out that the Tech-I-M logo is based on helping you connect these dots, whether you are looking inside the box at your own business, or looking outside the box at your customer.]

Now, let's move from the universe to transportation.

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We start again with a beautiful picture of a large portion of the transportation system. Isn't it beautiful? Just enjoy the serenity of the night picture.

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Now, we break into daylight and start thinking about moving that freight. We focus on a smaller part of the transportation system

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We go crazy, go fast to move that freight through the traffic congestion in just a few miles of the streets.

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But, we better focus on just a single vehicle or a single pedestrian and avoid an accident that could cause injury or death, untold grief and expenses, and, generally muck up the traffic.

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It would be a lot easier if we could clearly read the signals along the way

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Governments around the world, companies and universities, are trying to stitch together a plan for moving freight and people efficiently by using information at every small step. Multiple Names -- Intelligent Transportation System, Intelligent Vehicle Initiative (IVI), Autonomous Vehicles, Vehicle to Infrastructure, Vehicle to Vehicle, Vehicle to X. The worst to many people is the V2G--Vehicle to Government. But, that is here already with fuel taxes, hours of service, permitting, weigh stations and more.

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Let's simplify that diagram down to a single load of material being loaded onto a truck at the shipper, moved to its final destination, and all the paperwork associated with that single move. Walk through the slide and some of the items. DriveWyze for weigh stations. ZCon for fueling. 2020 portable for documents and navigation and messaging and EVIR. Accident reporting with camera images.

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Think for a moment about how this truck might relate to your everyday experience with information? Exponent upon how the truck is an information source, a web page, produces twitters and is linked to groups. It has both public information and private information. Now, I want to move toward talking just about a truck and its "guts" To do that, I need to talk about a term called "architecture"

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Most of us, myself included, think of a beautiful, large building such as this when someone says architecture.

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An important part of architecture can be to plan for future expansion of the building. Somehow, I'm not sure this building meets that expectation.

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An architecture can be very appealing, having a nice, sexy shape, but be lacking in some other aspect.

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The Eiffel Tower is a great example of an enduring, beautiful piece of architecture. Underneath its shape is a lot of technical detail. Back to our earlier discussion, all that gory technical detail is a way of breaking down the tower to its most basic elements of mechanical structures--even to the atomic crystalline structures that help define the ability of the iron and steel to carry the loads.

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Let me digress momentarily to reinforce the idea of simplifying something to its basic parts. There are over 6 billion people in this world, each one unique in some way, but with many similarities. This is a beautiful picture of DNA, the double stranded helix of just 4 nucleotides -- guanine, adenine, thymine and cytosine. All the variation of humanity can be described with just these four nucleotides. (as an aside, work is being done to use these strands of DNA as unbelievably large memory storage)

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But, doesn't it sound better to say that girls are made of "sugar and spice" than to say they are made up of a unique combination of 4 nucleotides?

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Another area of science looking to understand humans is now the Connectome Project. It's goal is similar to the Genome project, but focused on understanding the basic elements of our brains and how they process information. Now, let's return to vehicles with rubber tires and look at their networks and their basic elements.

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65 years ago, the electrical system of a car was much simpler than it is today. 55 wires, 138 feet long with 75 connections.

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Today, the chassis is jam packed with things. There's hardly room for anything. And yet. this picture is lacking something very important -- other than the cab.

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It's missing the wires and tubes that carry signals from sensors to computers to actuators. It's missing the guts that make the beautiful more than an object of art that stands still.

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This is the beauty that we all admire in a vehicle.

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A few of us, too few of us if we believe the need for more math and science and service technicians, look underneath the skin of the vehicle to see what makes it tick.

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And, even fewer understand all the wires and electronics inside.
How are we to break this down to its simplest structures, to make it more understandable to more people?

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Just as there are basic decisions that must be made in constructing a building, there are basic decisions that must be made in building a vehicle.
Here are the basic 8 for the electric/electronic architecture.

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There are on-board communications networks that have been around longer than the internet. Chances are you don't know anything about these, and you don't really need to. You also don't need to know how ESPN can stream video of sports to your iPhone. But, you do need to enVISION how that capability affects what you are trying to do with moving freight from a shipper to a customer safely and efficiently.

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That Audi car probably has 70 computers on it. European trucks can have more than 30 computers on them. Our North American trucks more typically have 10-20 computers on them. They are controlling so many things.

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How did we get here? Like life, one day at a time, one step at a time.
Initially it was the engine alone, then it was paired with the transmission as an option. Then the brakes came in as an option first, but then by law in the late 90's.

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Optional equipment such as telematics and safety systems came in early this century.

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Then a vehicle level computer was added by OEM's. For some, it was earlier than 2005. Mack Truck was probably the earliest, starting a decade earlier with a vehicle computer.

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More computers were added to the vehicles as new vehicle designs came out.

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With the 2010 emissions requirements, more computers and sensors were added.

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In the future, we might see additional computers--sort of like internet servers--added to the vehicle to help route and store information.

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A similar progression of complexity and capability can be seen at Mercedes-Benz Truck.

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Now it gets bad. Not only do we have arcane acronyms, we have them in German! The key point of this slide is this PSM module which serves as a firewall/bridge between the information on the vehicle and the outside world.

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The first implementation of the Mercedes-Benz Common EE Architecture was in the Cascadia in 2007. We are looking at something with 5 or more on-board communications networks and 10-20 or more computers.

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The New Actros started production in 2011. It has 12 or more communications networks and upwards of 30 computers.

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And that list of communications networks is only for the high speed ones. It does not include the multiple low speed networks called Local Interconnect Network.

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Volvo is not immune either. This slide shows a little bit about their networks and computers.

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Volvo just started production of a new FH model in Europe this year. I have not yet found a picture of it.

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In spite of all the work the truck OEM's have done, they really have not done much to create a dash that is as integrated looking as this one. Dashes are still a grouping of dissimilar gauges and driver interface devices. And they really have not planned well for portable devices. In my mind, they still don't understand "trucking." What you need to move freight reliably, safely, efficiently. They know something about the vehicle; but, even there, they are missing some key architectural and customer oriented items.

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Summarize these items

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And, my last thought-- ***Technology Is Manageable!***™