Questions Asked	Answers Given
Edge computing calls for on-premise IT infrastructure setup which was there before cloud came into market. Some customers say they want everything to be on cloud. How to convince such customers on importance of edge computing?	IoT in cloud and at edge complement each other. IoT data correlated with business process data can run on the Edge and the Cloud depending on scenarios. The smart edge (or edge computing) will take care of the routine within the constraints of the 'known', whereas the cloud will focus on the business and watch out for the unknown requiring a superior processing power. So Edge computing is not a replacement to on-prem, it is that the Edge processing is orchestrated from the cloud - in other words it is called as "cloud-edge interoperability". So to conclude - it is not about "edge versus in the cloud" or " edge vs on-prem", it is all about "cloud-edge interoperability". To explain this, customers can choose to run certain IoT enabled business processes on their Edge or on the Cloud allowing for distributed computing across the cloud and multiple Edge nodes. Customers can train predictive or ML models on the Cloud and deploy them on the Edge, customers can design rules and choose which rules to be executed in cloud and which rules on individual nodes and so on.

How IoT can help Oil and Gas industries specially in the times of pandemic?	Analysts are predicting that by 2024 at least 50% of all enterprise applications in production will be IoT enabled. If we look at the long-term effect of the COVID-19 pandemic on the IoT industry - companies now looking at their own ability to adapt and remotely manage their assets, so we expect a surge in IoT investment into intelligent assets and remote service and assistance. Oil and Gas being asset intensive - this will be at the top of most companies' agendas is what we believe. One area - Intelligent assets would be assets, which can be remotely monitored, remotely serviced. Customers need an easy way to onboard them and connect to them. Assets may require consumables for operation. Another one is contract tracing.
How the existing hardwares which do not have sensor mounted, can be adopted to IoT4.0? **OR** **How easy it's to retrofit older machines in the factories with sensors and connectivity to deliver analytics cost effectively? What's the way forward to get the large number of SMEs to embrace I4.0 at an affordable cost?**	In such cases of retrofit to older equipment, it was observed that sensor companies and Telco are taking lead in the IoT-ization of existing equipment by embedding sensors/connectivity to make them intelligent/ smart assets.

Where digital twin solution should actually be hosted? On-premise which is near to edge or on cloud which actually involves some latency?	There is difference between full on-prem solution and edge orchestrated from cloud and full cloud deployment. (refer 1st question answer for the same) Whether to use digital twin solution on cloud/edge depends on the use case scenario. 1) Use cases that require real-time analysis and response, or require reduction of data for restricted or costly bandwidth to the cloud will require some sort of local processing which is edge processing orchestrated from cloud For example: Crane collision detection or automated driving cars cannot wait for round trip latency to the core and back to recognize and respond to urgent events 2) Use cases with sensitivity of data location (e.g. sovereignty concerns) and data privacy (e.g. defense or government/public sector use cases might need full on-prem deployment) 3) Other IoT use cases can proceed with cloud option
What are the challenges currently in the adoption of IoT in India?	In general challenges in India or abroad for IoT adoption share the similar reasons: 1. Infrastructure availability especially network connectivity in the area of deployment 2. Service availability in the region where sensors are deployed (e.g. if the sensor based equipment in based in US and sensor manufacturer is in India with less presence in US then providing timely service or timely repair becomes an issue) 3. IoT project implementation involves CAPEX for hardware. If we talk about mass market devices e.g. if a company want to implement IoT by connecting 1 lakh coolers/vending machines and if each of this asset needs Rs. 1000/- for hardware that itself a capex of 10 crores. So, IoT project implementation is not just a software implementation but also involves capex and so implementation takes long time because of budgetary approvals. 4. Some companies do have concerns regarding security and privacy aspects

Is there any database architecture that we need to follow to develop IIOT or IOT applications? **Any basic Architecture of database?**	IoT by definition will generate voluminous amount of structured and unstructured data. Availability of big data storages these days is a key enabler to handle such volume, variety, velocity and veracity nature data. Ideally, these big data storages need to store not just time series data but also calculated time-series data, aggregated times-series data. Hence, it is important to have an automated tiered way of data storage across hot store, warm store, cold store (archival) and the data access needs to be abstracted via APIs. Since data grows over a period of time, it is important to have clear retention periods, archival mechanisms in place. You can learn more about this in during the 3rd session of the virtual masterclass series (refer the schedule - https://www.nasscom.in/virtual-masterclass-series-for-industry-4.0/)
If sensors fail, how other parameters will be tracked?	One of the fundamental rule that IoT service should support is the "sensor watchdog rule" - if a sensor stops sending data for more than x number of hours/days - appropriate users should be alerted about this or relevant action. An another case: if Sensor is technically working and sending the data but logically sensor is malfunctioned this should be captured in the digital twin service. In the digital twin appropriate thresholds needs to be maintained to ensure the correctness of the data. e.g. if a temperature sensor sends a double value like 12345678.8910 C. Technically, this value which got ingested from sensor to database is correct however you cannot have such an absurd value for the temperature reading.

What important role 5G is going to play in IoT in upcoming days?	5G networks are promising exponential improvements in connectivity speed, capacity, and latency to address Ultra-low latency IoT and edge use cases for specific industries (e.g. manufacturing, transportation, Energy , smart cities, etc.) Telco providing 5G are coming up with the capability of Multi Access Edge Compute (MEC) to process data at the source to support mission critical low latency use cases/scenarios.
What is the implementation time frame for this solution? Do we have any best practices available?	Sorry, question is unclear- which solution is referred here ? In general here are some thoughts about implementation: - In IoT projects, software implementation is easy where making the asset/equipment smart by embedding sensors/connectivity is the key - If you already identified telco/sensor vendor who can do the above task then the project implementation goes fast. If not it will be delayed - If the equipment is spread across multiple location then rollout plan takes more time. e.g. in one of the ecase company rolled out IoT implementation for 1 lakh vending machines across 5 countries . Now, unlike software shipping all these vending machines from manufacturer to company warehouse to retail stores across these countries took multiple months close to an year. - In an another case it is about manufacturing plant, then it was quick Best practice without identifying sensor/telco vendor do start the IoT software project
Edge computing should have strong applications in healthcare. Would like to learn more....	Edge solutions have multiple areas of application: any business that needs greater network resilience and work with very high volumes of data may find edge solutions a good fit
Are we going to talk role of IoT in MES side?	MES solutions and asset management solutions can deliver strong new capabilities with IoT enabled shop floors. We will talk about these solutions in our next webinars
This is regarding sensors. Do we need to calibrate the sensors frequently because of their aging?	This is dependent on the type of sensor.

How are you predicting adoption of IoT in case of manufacturing in countries like India where labor is cheaper?	It is reality today that majority of our toll collections happen with automated tag readers. Also, it is reality that we have several highly automated plants in operation in India. The future will see us directing human resources to higher value adding activities.
For the RAMI specifications do we need to buy from IEC? Is there any option? What is the validation process? We are having some of the components with us. What would be Development life cycle for RAMI?	There are multiple references: https://www.plattform-i40.de/PI40/Navigation/EN/ThePlatform/Structure-Organization/PlatformWorkingGroups/Reference-Architectures-Standards-Norms/reference-architectures-standards-norms.html
If you can be specific on some number say for the coffee use case, it will be helpful to contextualize on the benefits of Industry 4.0 and RoI	We shared the coffee example as an illustration to share how Industry 4.0 could make a difference to our favorite beverage. And did not carry out a true ROI analysis. As a part of our upcoming webinars, we will share some more detail on the ROI aspects based on our customer experience
The factory hierarchy that you demonstrated - are we moving towards more of human-less machine 2 machine communication where even the communication protocols and times/event triggers are defined by machines using intelligent learning?	Manufacturing processes have been consistently working toward enhanced productivity with automation. Intelligent learning, communication between assets help such productivity and quality goals.
I can relate the application of IoT/Automation in high volume / repetitive production line. Can you please elaborate on their application/prospects in a low volume high mix / labor intensive scenario, typically seen in Aerospace industries?	3d work instructions with real time feedback and machine support to bring down errors are critical enablers in the example you shared - aerospace Of course, apart from this, there is a lot of edge processing that is being carried out too.
Are we seeing an uptick in IoT adoption rate in India? Which verticals do we see this?	From our experience, we learnt about some "lights out" factory facilities that are operational in India. While adoption is not yet at an "advanced" stage, this is expected to strongly accelerate over the next years. In addition, product-as-a-service (Battery as a service, air purifier as a service, etc.) , smart city use cases, manufacturing, IoT in public services, etc. are picking up.

How to kick start our career in the IoT industry??	Passion for business solutions, programming knowledge and a willingness to continuously learn. If you want to start at home, acquiring a simple Raspberry pi device that supports quite complex computing already is a quick start.. This device + a subscription to any cloud provider for the server infra and start with a quick tutorial.. I (PVN) can follow-up and share further info, reach out at my credentials
Can you share case examples of RoI from IoT Projects in concrete monetary terms?	This is an industry specific answer. Good news is: it is not an all or nothing adoption. For companies that generate microprocessors/chips/PCBs, not having IOT enablement is possibly not even an option. Usage of cobots can help bring down the investment required. And could be quantified as the ability to produce more/at a higher quality within the same space/with lesser recurring cost of additional manpower. In the upcoming session, we are covering one such thing.
Today, the biggest challenge is connecting the legacy m/c to the system (connector). In this case, how easy we can connect with ERP (SAP)?	SAP Offers components called SAP PCo (Plant connectivity) and SAP IOT that makes it possible to bring data from the plant to ERP.
Can we have work from home for application of IoT in smart manufacturing similar to current IT industry in future?	If you specialize in integration/programming and drawing inferences/big data, these functions can be carried out from home.
Does IoT has a part to play in Data Engineering ?	Absolutely. You source IoT data, overlay business data and are able to draw new kind of inferences. Whether it is around predictive scenarios or quality metrics or planning insights, etc. Based on IoT data, you can create multiple types of analysis: Streaming Analytics Event Analytics Operational Analytics Physics-based Models Machine-Learning Models Predictive Analytics

If sensors are to be fixed in every inventory, which means, we may have 5000 parts as a inventory, should we fix 5000 sensors? If yes, how to manage the expenses in this tough cost competion market situation?	It depends on the kind of inventory. If we are producing a product that has a value > Rs.20000 and the sensor is < Rs.1000, it is already a fraction of the price. Imagine a car/tractor/truck/Automated lathe machine.. I (PVN) can follow-up and share further info, reach out at my credentials
Have we attained a stable position is industrial cybersecurity to make IoT as Business solution for all?	It is possible to achieve highly secure applications.
What is opportunity for starting up an IoT start up?	Many companies expect to invest in this area and an IoT startup has a very good prospect of growth
A question about digital twinning - Is this applied only when legacy equipment needs to be digitalized or have sensors attached? When inherently IoT-enabled equipment or machinery is available, would a digital twin be equally useful or relevant?	We could model a digital twin for any equipment that is interesting to monitor/manage. You can get more details in upcoming session
Can get more info. on Plant connectivity, what are all the connectors available to connect various protocol?	Quick link: https://help.sap.com/viewer/d6eafccefc124fc8a6ab57a358dc9127/15.4.0/en-US/4e428faf21bd5514e10000000a421937.html