

# Minds + Machines



# Accelerating User Adoption of Digital Solutions in the Operations World

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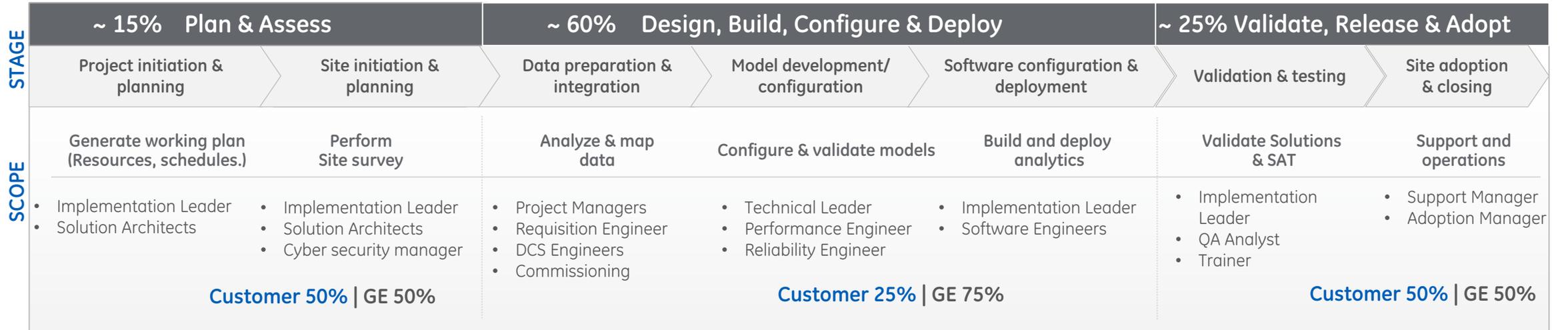
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GE Digital

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# GE Execution Methodology | GEM



## Process & methods

- Loosely based on standard project management methodology, developed by Project Management Institute
- Leverages agile & iterative methods in both development & deployment activities
- Requires close collaboration between roles, as many tasks are interdependent
- Weekly Rhythm between both working teams to discuss updates
- Monthly Steering Committee rhythm between Customer and GE
- Bi-Monthly Executive meeting rhythm between Customer and GE

## Supporting resources

- Local and extended resources allocated regionally & globally to support multiple activities from both sides
- XX qualified global FTEs allocated to program success, with concentrated skills in program management & engineering services
- Bi-weekly rhythm with GE executive team internally to ensure program success

**Establish 50/50 partnership between GE and GOC in order to ensure customer satisfaction**



# Accelerating User Adoption of Digital Solutions in the Operations World

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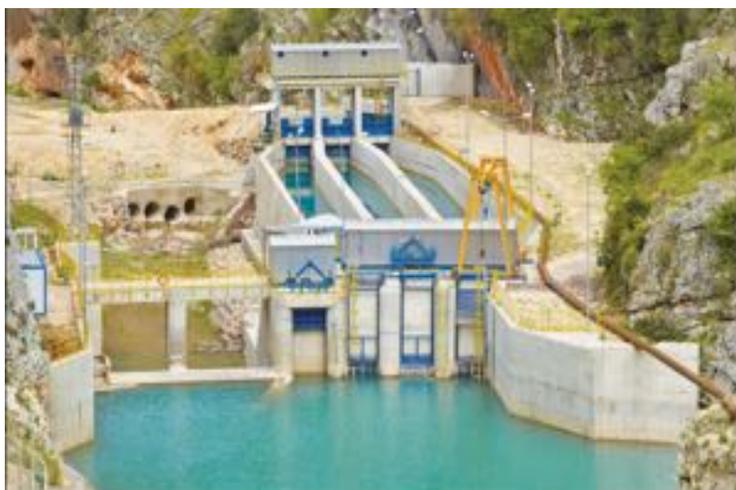
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# GAMA Areas of Operations



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# User Perspective – Who, where and what?

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- GAMA Energy is mainly a Turkish Utility Company.
- Turkey has a liberalized electricity market with some special conditions
  - Gas market is not liberalized
  - Developing economy - fluctuations in macroeconomics influences demand
  - Instability of the political environment influences policy and regulation

**Turkish Market is a perfect example of VUCA and therefore ideal for Digital Solutions.**

# User Adoption

## OUR JOURNEY TOGETHER

Customer Success = Customer Satisfaction



# User Adoption

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- Current Situation - Facts to consider:
  - Current User exposure to IT applications
    - CMMS, Weather Forecasting, Trading Platforms, Reporting tools, CCTV, ERP etc...
  - Current User perception of 'Need to Change'
    - In this case old habits are not hard to break. There is wide acceptance that these solutions will help operations excellence.
  - Vision for the Future
    - Near term focus is on 'decision support' and automation of basic processes.
    - Longer term focus on automation of operations may prove more problematic.

# User Adoption (2)

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- Future Scenarios and the role of the User
  - Comparing the role of Digital Solutions to that of a new employee
    - Phases - Orientation – Warm-up – Delegation – Promotion?....
    - Example – Automobile automation Levels 0-5. Where do we run into user adoption issues?
  - Digitalisation trend re-enforces the need for highly skilled workers
    - Workers are technical and open to the opportunity to develop technology such as Digital Solutions
    - Applications must be suitable for use and development by technician + skill level employees
    - Future focus on training (minds and skills) to develop proprietary solutions on Predix platform.

# Dos and Don'ts – Our Implementation Experience

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- Digital Solutions thrive on input data
  - Review and Maintain your databases (IT or OT)
    - Current restrictions on size of archive and level of detail recorded
  - Reconsider what you deem to be important to record
    - E.g. condenser leak and subsequent damage
    - CCTV, unstructured data
  - Consider exponential learning potential of machines
    - Machine learning will not be restricted to sources of corporate knowledge

# Dos and Don'ts – Our Implementation Experience

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- Manage Digital Solutions Implementation as other Change Projects
  - Fundamentals for success are similar to any other Project
    - Ownership, Sponsor, Scope Review, Time-schedule, Resource Allocation, Milestones etc.
    - Review scope of Digital Solutions with an open mind. Try to focus on future developments...
  - Measuring Expectations and Success
    - Procure Digital Solutions with clear targets in mind.
    - Prepare team for future development (platform advantage)
    - If the only constant is change – apply that to yourself and your employee also. Be prepared to adapt and be prepared to retrain

Thank You



# Overcoming IIoT Challenges for Power Operations Staff

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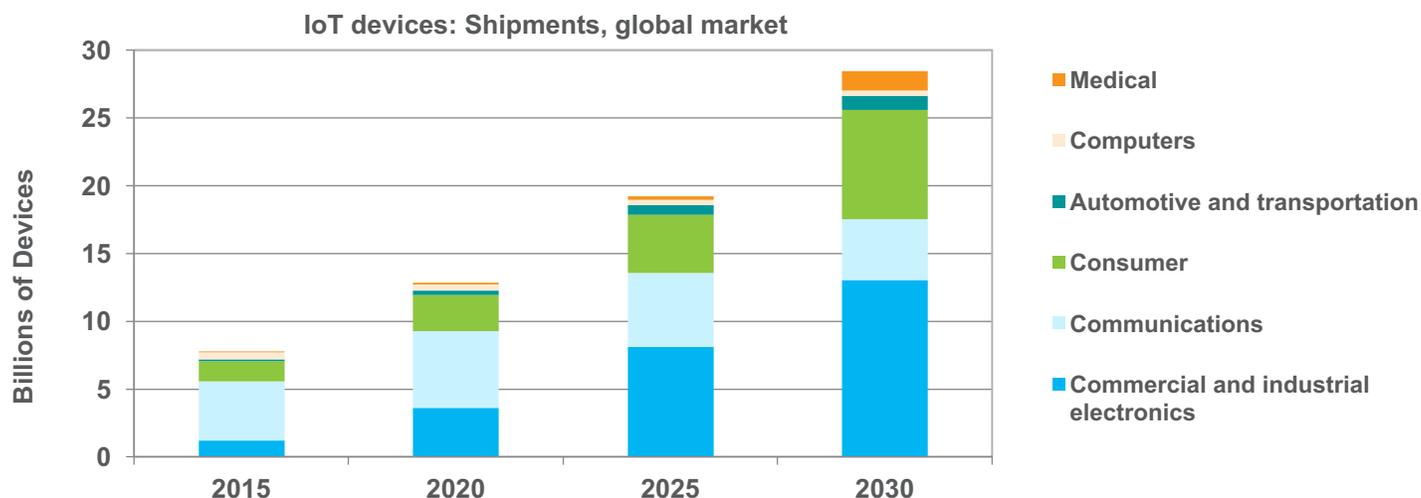
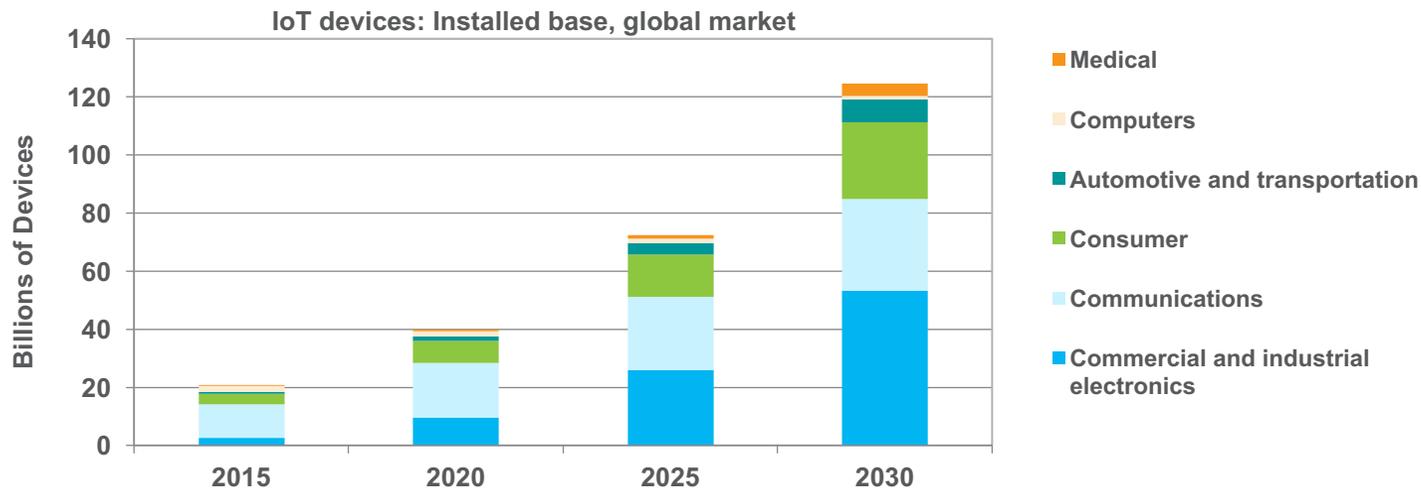
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# IoT connectable device development



## Commercial & Industrial Electronics

- Shipments will see strong growth: 2013–2030 CAGR = 20%
- Will contribute the largest margin of installed devices in the next decade (2021-2030)
- Devices in the market will surpass the communications segment in 2025, which includes mobile handsets



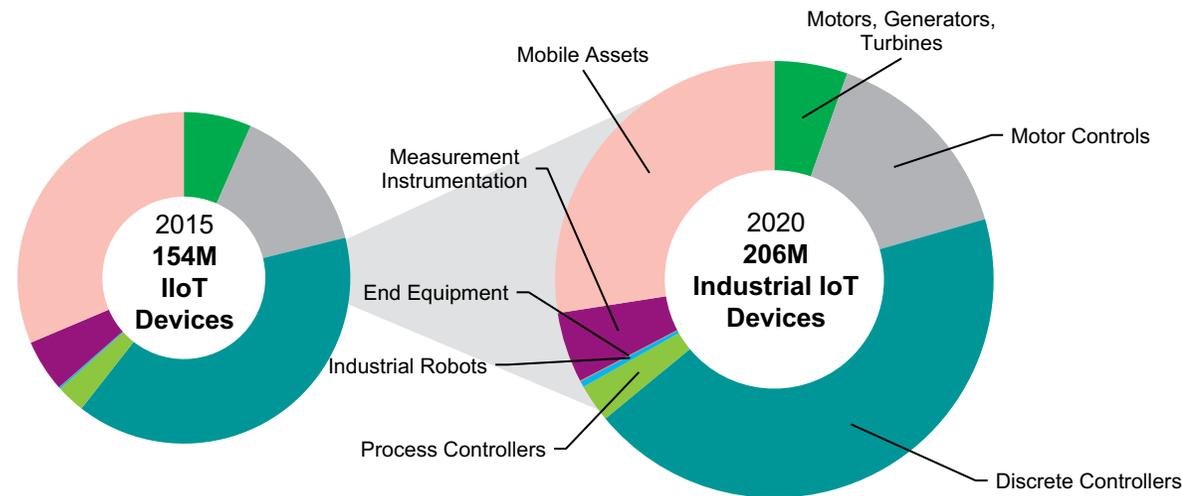
## Consumer

- Shipments will see moderate growth over the long-term forecast: 2013-2030: 12.5%
- Connectable devices will double from 2015 to 2020
- Total new connectable shipments increases 10% from 2013–2030

Devices included in both shipments and installed base are “connectable” and may not end up connected.

# Technology development enables, People Hinder

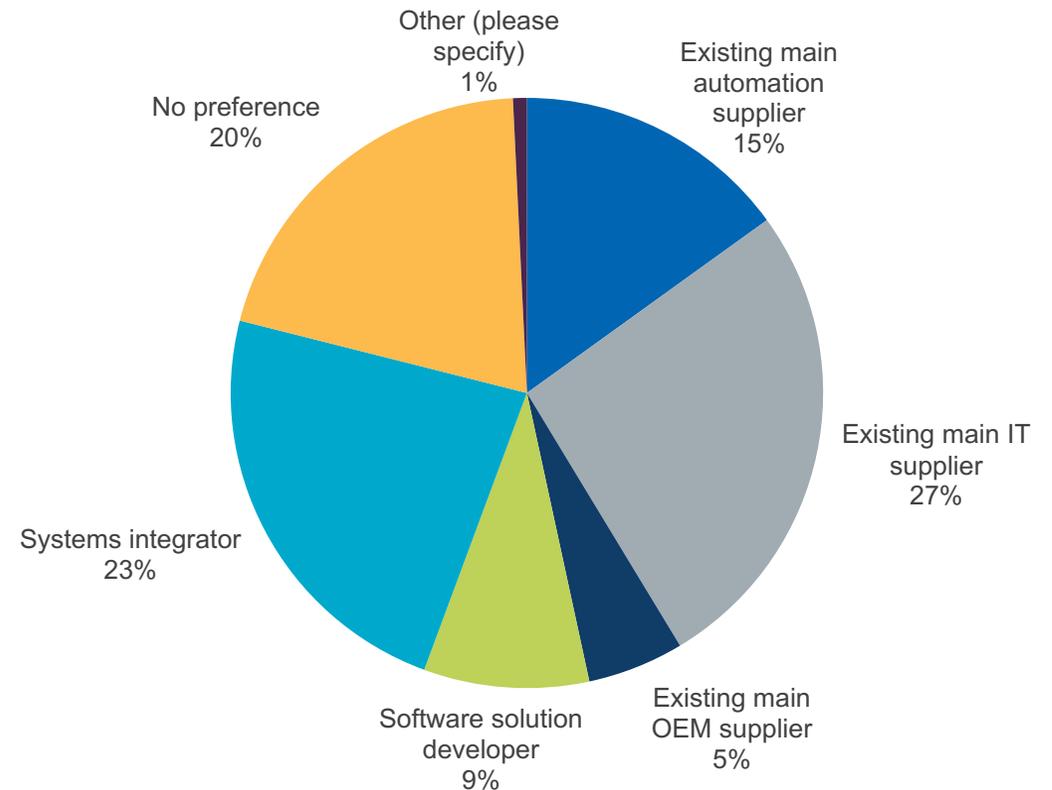
- Sensors are widely used in the manufacturing environment, and whilst their use will become more widespread the ability to connect and transmit more data faster and with improved integrity, will be the true enabler of IIoT.
- Connectivity protocols and frameworks, such as IO Link, which is quickly being introduced by sensor suppliers and OPC UA which is supporting greater interoperability and more secure transmission of information to the cloud are enabling customers to collect and transfer more data, quickly and more accurately from sensors up to the cloud for data aggregation and analytics.
- In the last 2 years numerous new IoT platforms have been introduced, by a range of players from both the OT and IT market. These platforms are a key differentiator that supports consolidation and communication of data across multiple machines, facilities and companies, creating connected organizations and supply chains.
- Arguably the most significant challenge in the introduction of Industrial IoT is people. This can be equally a problem from the Senior Exec level down to the operator on the factory floor. If people don't trust the data, or aren't convinced of its use projects will likely fail. Increasingly vendors of IoT solutions are including a change management consultancy element into their solution offering.



## Leading Industrial Internet of Things Remains Confusing

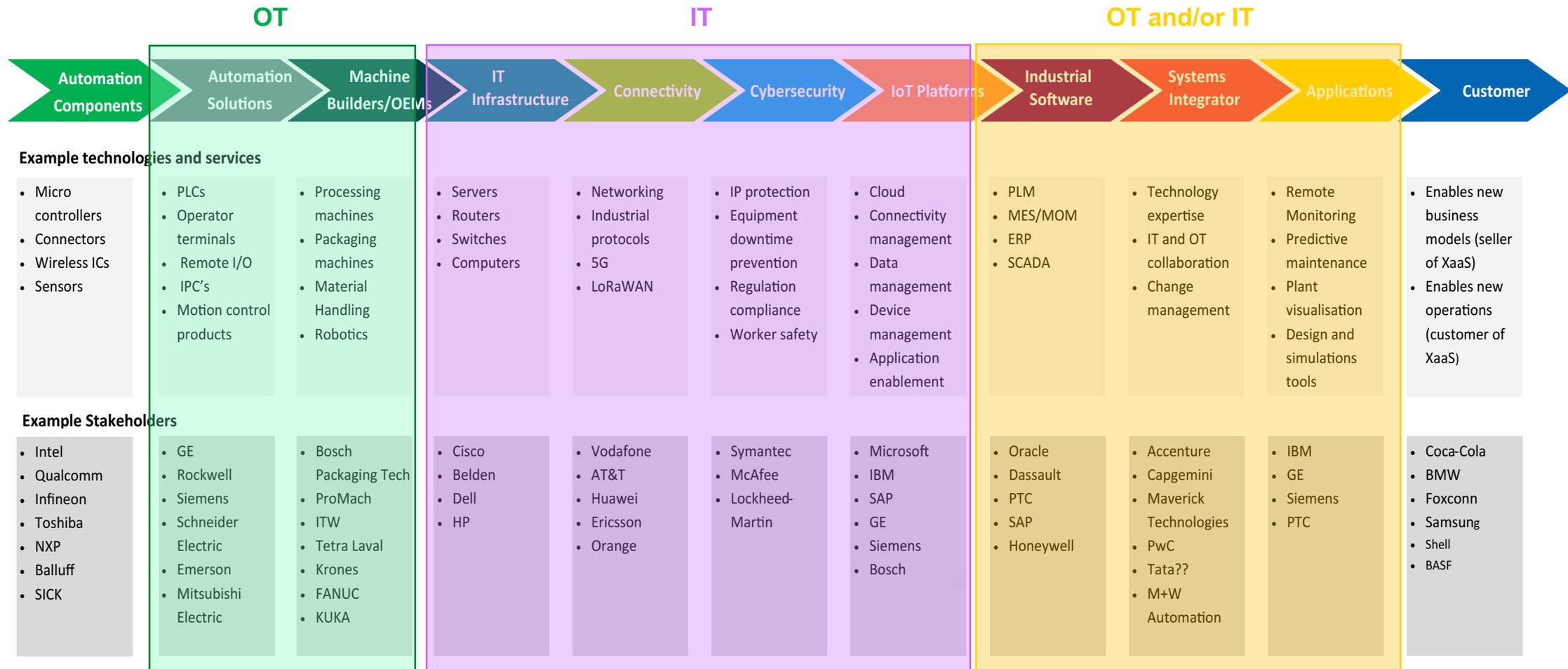
- IT – OT convergence remains a challenge
- Internal preference for team leading IoT projects is evenly split between engineering and IT teams
- C-Suite leads only 10% of respondents projects
- Centrality of automation products influences decision making process

What type of company do you prefer to lead the project for implementing your IIoT solution?



Sample size: 133  
 Sample frame: 133  
 Source: IHS

# A complex ecosystem of partners brings new challenges to OT/IT landscape



What challenges should Power & Utility operations staff anticipate?

## Key Utility Needs



# The cloud and data analytics

Cloud/Edge analytics use for manufacturing operations to double by 2020

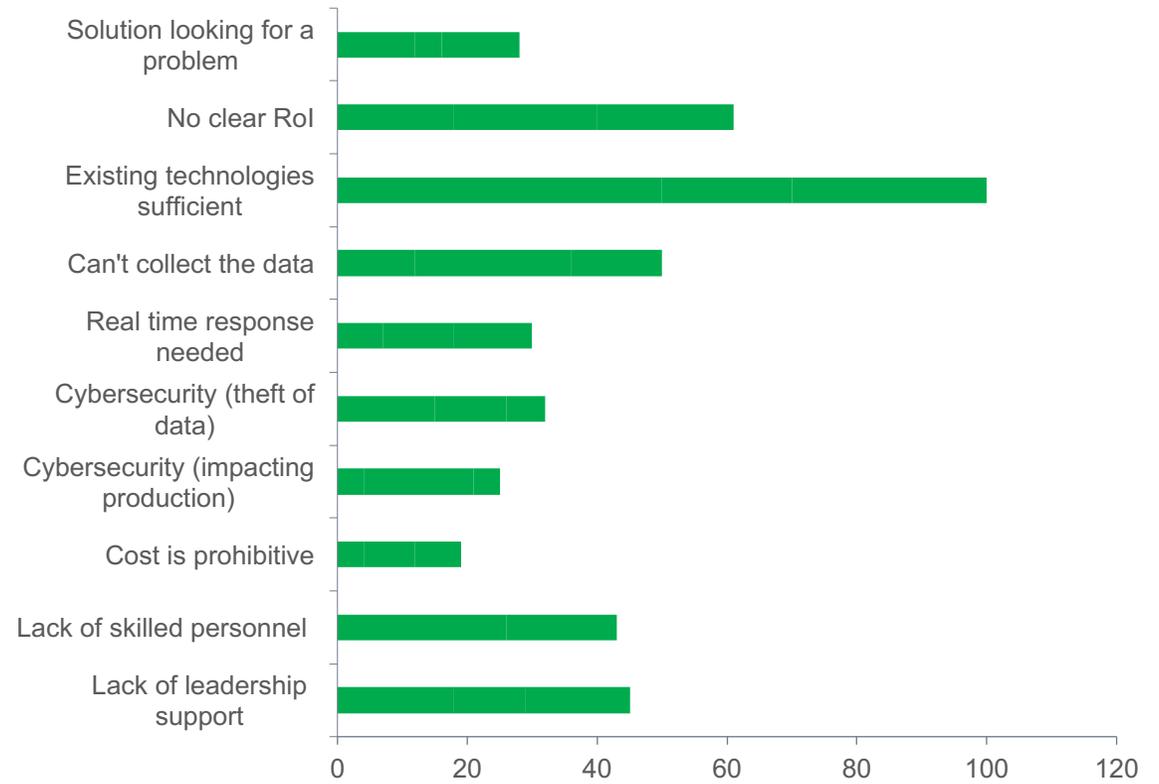
### Common concerns:

“We will never allow third parties to host our data”

“This is just marketing language for technologies we’re already using”

“We’d like to, but don’t have the ability to collect the data or people to make sense of it”

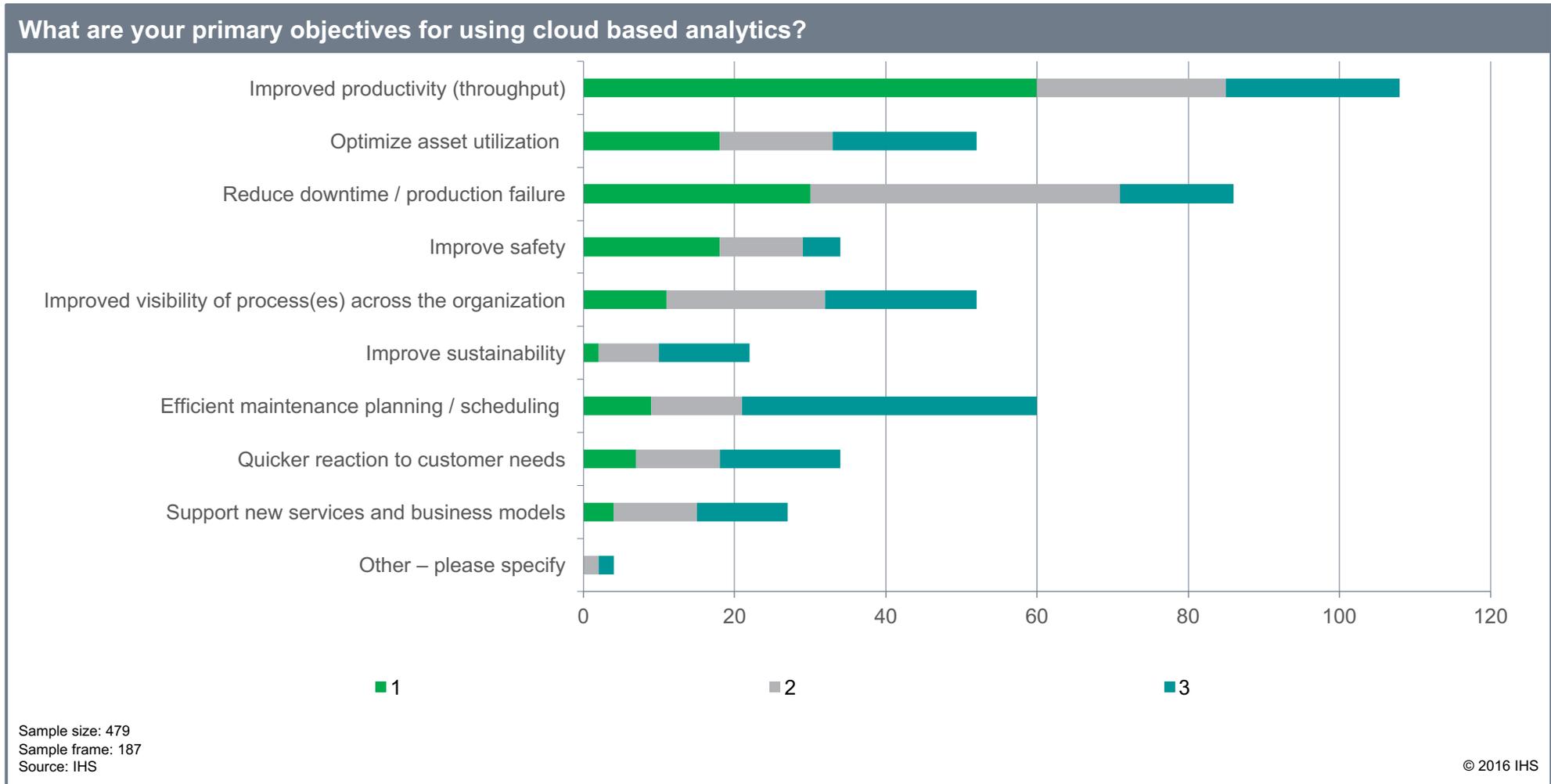
### What are the reasons your company is not using the Cloud and has no plans to do so?



Sample size: 433  
 Sample frame: 188  
 Source: IHS

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# The cloud and data analytics



## Security Policies - Similarities and Differences

Criteria	Industrial OT Network	Enterprise IT Network
Focus	24/7 operations, high OEE	Protecting intellectual property and company assets
Precedence of Priorities	<b>Availability</b> Integrity Confidentiality	<b>Confidentiality</b> Integrity Availability
Types of Data Traffic	Converged network of data, control, information, safety and motion	Converged network of data, voice and video
Access Control	Strict physical access Simple network device access	Strict network authentication and access policies
Implications of a Device Failure	Production is down (\$\$/hour ... or worse)	Work-around or wait
Threat Protection	Isolate threat but keep operating	Shut down access to detected threat
Upgrades	Scheduled during downtime	Automatically pushed during uptime

## Paralysis of Decisions around Digitalization in the Utility Industry

- **Utilities face increasing data points and decisions** - renewable integration and the rise of more engaged consumers or prosumers, plus the future demands of e-mobility.
- **Abundance of solutions offered** - from the high-end grid-scale solutions by the likes of Siemens MindSphere and GE Predix, through start-up companies offering “on-the-top” solutions such as the DEPSys GridEye solution, to using smart meters themselves to create low voltage grid mapping such as the NES Patagonia solution.
- **Overcoming paralysis of options to gain competitive advantage-** The digital transformation should be collaborative and modular, but focus is needed to create a long-term and long-reaching strategy

# IHS Markit Recommendations for implementing IIoT solution

## Starting a successful IoT implementation

- **Specify** - What problem / pain point to be solved?
- **Success** - Can you define the success of a project?
- **Start Small** - Proof of concept projects on limited number of lines or assets, then look to scale
- **Senior support** - Need senior sponsorship, and continuity
- **Shared responsibility** – are both the IT and OT teams involved
- **Support staff** - Get your people involved in the project (they can support in new applications), provide change management

## Addressing the “People” Issue

- Arguably the biggest challenge companies face in introducing big data solutions is with people rather than technology.
- **It's important to have long-term senior management** involved to promote adoption of technology across all facilities. In some cases, projects have failed because factory managers have not been convinced by the benefits and so have ensured compliance and best practice at their factories. Having strong senior leadership involvement supports adoption of best practices.
- This also avoids the need to apply annually for additional funding for continuation of the project – if the organisation has built big data in to part of its road map for manufacturing.
- **Addressing the IT OT divide** – there are very different attitudes to issues such as sharing data and how quickly projects should be rolled out when contrasting the IT and OT departments. Having the team responsible for the big data project including members from both groups will help buy-in and also support identification of potential problems and concerns early in the planning phase.
- **Providing training courses** on big data for employees helps to accelerate awareness and compliance of the technology down to the factory floor. This also improves the evolution of the technology as workers can better contribute suggestions on where else solutions can be implemented and how they can be improved.

## Determine a plan to deal with the data

- Transitioning from a manual to an automated process for data capture was identified as an important step in condition monitoring. This supports the capture of more data, and removes human error in recording data, supporting improved datasets from which analytics is conducted.
- A target for the frequency of data collection (for condition monitoring and predictive analytics), is that for the average time between the production of each unit 6 sets of data should be captured – to ensure a high confidence in the data used for the analytics. (So if a product is produced every 5 seconds, 30 data readings are taken).
- Tag data collected to the outcome of production – this produces labelled data which is easier to analyse (helps to more quickly identify data related to a faulty production run).
- Points of collection of data include soldering temperature profile condition of the soldering paste, position of components, vibration on the machine, fluctuations in pressure, speed of the process.
- Ensure readings are of a good quality (bad readings in = poor results out). This includes correctly mounting sensors at the correct points on a machine, so that data collected is consistent and accurate.
- Work with the cloud to ensure scalability of projects as they move from PoC (proof of concept) to mainstream applications (and so as the size of data increases).

## Create a strategy to take advantage on partnerships with vendors

- **BE OPEN** - Work with open and not proprietary software across different machine types. Specify that machine suppliers must support open software / solutions that can be used on an open platform. This is true both for hardware and software. Doing this reduces the need for interfaces, and reduces the loss of quality of data. This is particularly important as projects scale up and evolve to support new applications.
- **TRIAL PLATFORMS** - Work with more than one IoT platform, trial platforms from different vendors on different projects (in one example a platform for a quality management solution was from Microsoft, whilst a predictive maintenance solution used IBM, at the same site).
- **EXPOSE YOURSELF TO AN ECOSYSTEM** - Select a supplier that is able to coordinate with an ecosystem of partners. No one company can offer all the necessary solutions for an IoT project, so those companies that have partners in place to address areas (including cybersecurity, connectivity, cloud platform, data aggregation and analytics tools, apps development, visualisation tools, systems integration and even change management).

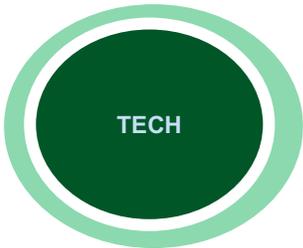
# Success Stories

# Case Study: Exxon Mobil and Lockheed Martin partnership



## COMPANY BACKGROUND

Exxon Mobil is a US based oil and gas company, operating in the upstream and downstream segments. Lockheed Martin is an aerospace, defense, security and information technology company formed in 1995 after a merger between Lockheed Corporation and Martin Marietta.



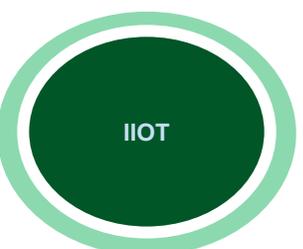
## OPEN PROCESS AUTOMATION

Exxon Mobile has brought on board Lockheed Martin to build the prototype for a standard based, open, secure and interoperable process control system. The idea is to develop an architecture that multiple vendors can engage, without the concerns of interoperability and security that chains a company to a single vendor.



## STANDARDIZATION

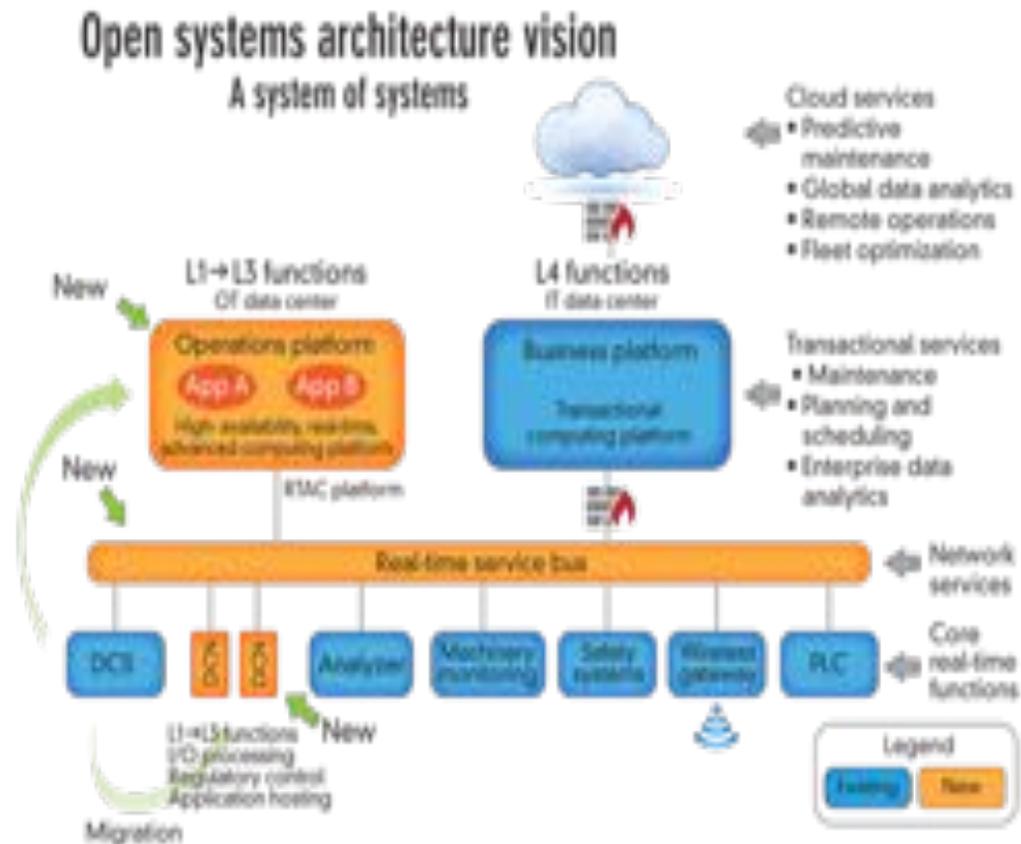
A **multi-vendor platform** can address the interoperability issue but would require collaboration among users, suppliers and system integrators to create a common standard. Exxon's first prototype from Lockheed takes into account information from other players in the value chain in an effort to stimulate collaboration and create a standard communication protocol.



## EXPANSION IN IIOT

Exxon aims to develop an automation platform that allows some level of equipment and component to interact regardless of vendor platforms. Current model deeply intertwines a company with a vendor solution and switching vendors would be a hassle which not many company are willing to embark on.

## EXXON SOLUTION:



Source: Exxon Mobil

An aerial night view of a city skyline, likely San Francisco, with a blue overlay. The text "Thank You" is centered in white. A horizontal line with dots is positioned below the text.

# Thank You

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