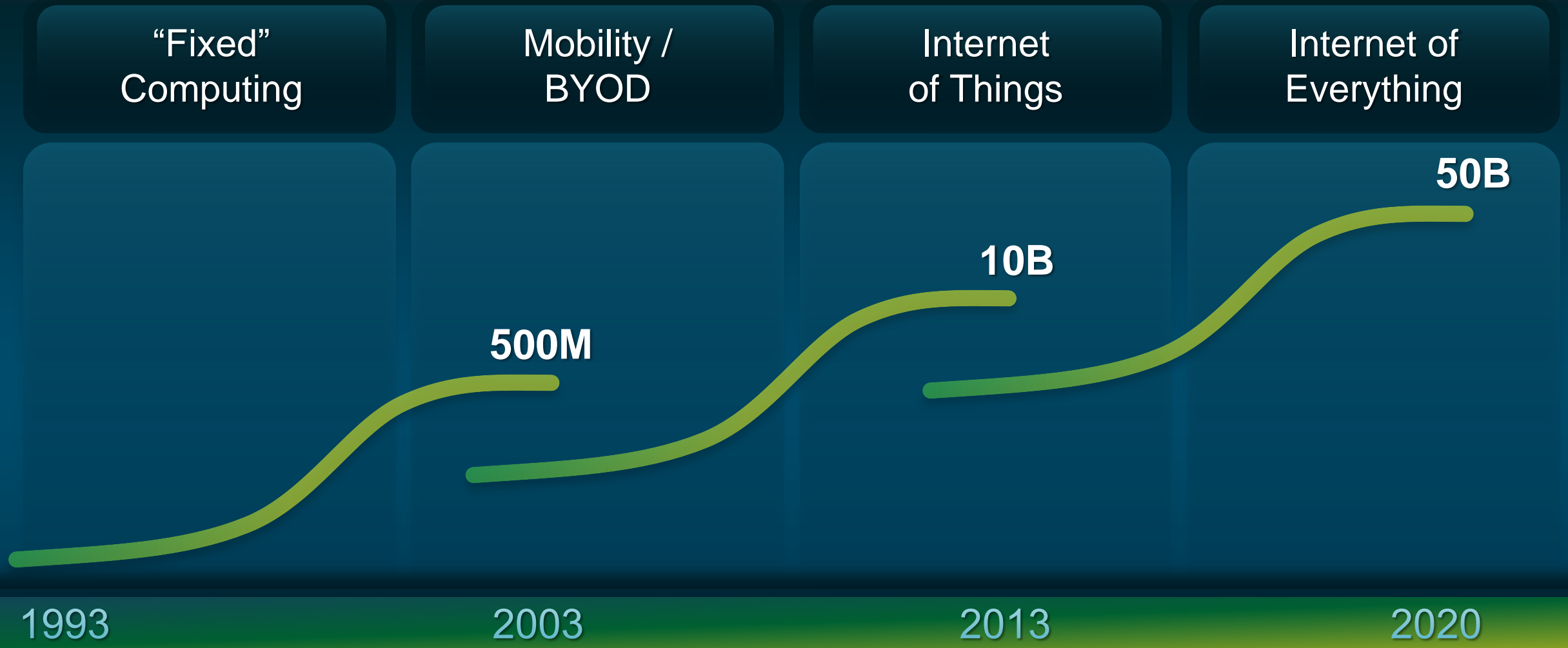# The Internet of Everything – Connecting the Unconnected

Nal Gollagunta, Director-Business Development, Cisco - India

Sumanta Roy, India Sales Head, TCS
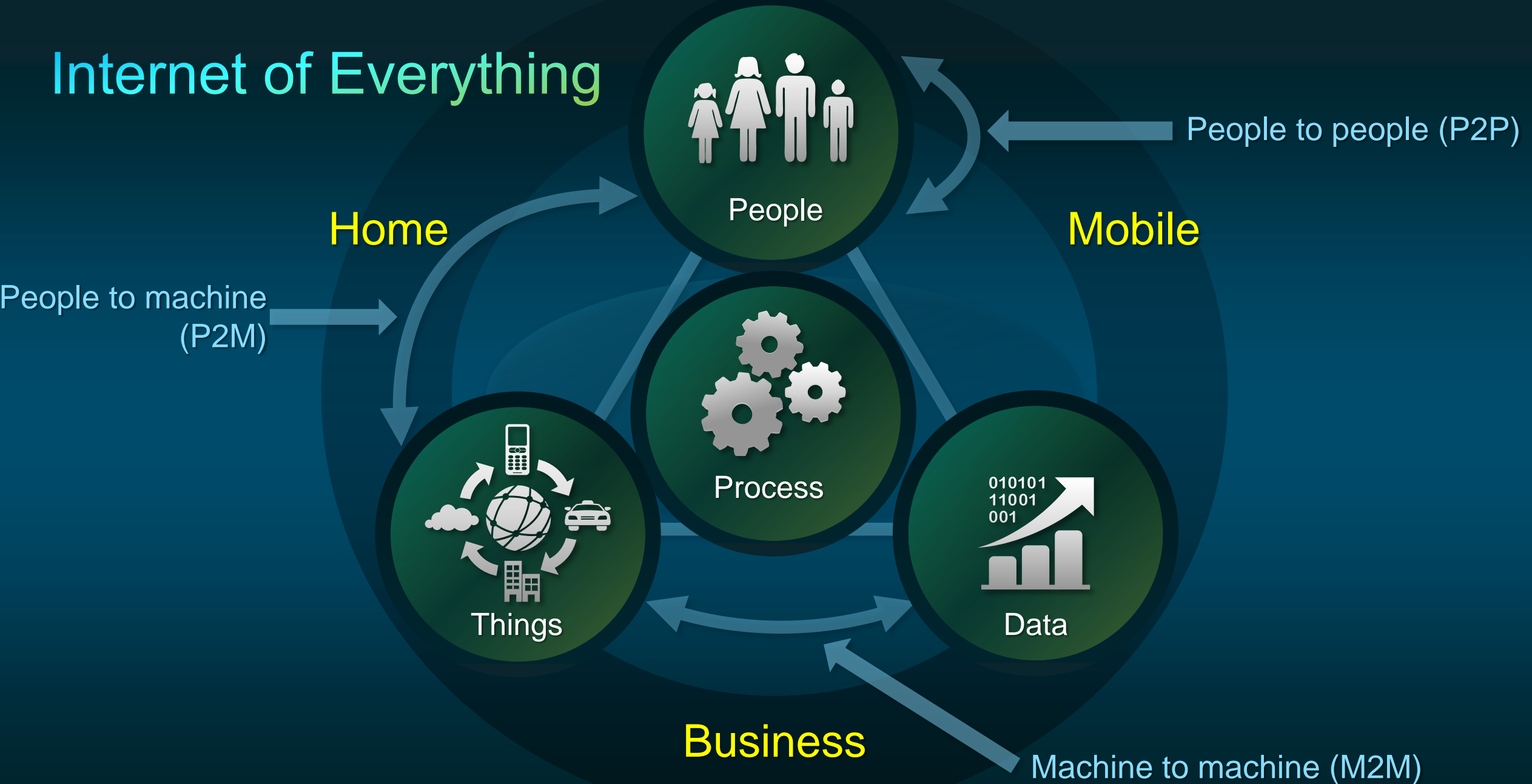
Tarun Mishra, CEO, Covacsis

6 December 2013

Internet Growth Occurring in Accelerating Waves

"Fixed" Computing	Mobility / BYOD	Internet of Things	Internet of Everything

50B

10B

500M

1993   2003   2013   2020

Internet of Everything

People

Process

Things

Data

People to people (P2P)

People to machine (P2M)

Machine to machine (M2M)

Home

Mobile

Business

What is the IoE Value Realized in India ?

$18 BILLION

What Fuels Internet of Everything Value Realized ?

Asset Utilization	Employee Productivity	Supply Chain/Logistics	Customer Experience	Innovation
$1.4 B	**$0.9 B**	**$8.3 B**	**$2.7 B**	**$4.7 B**

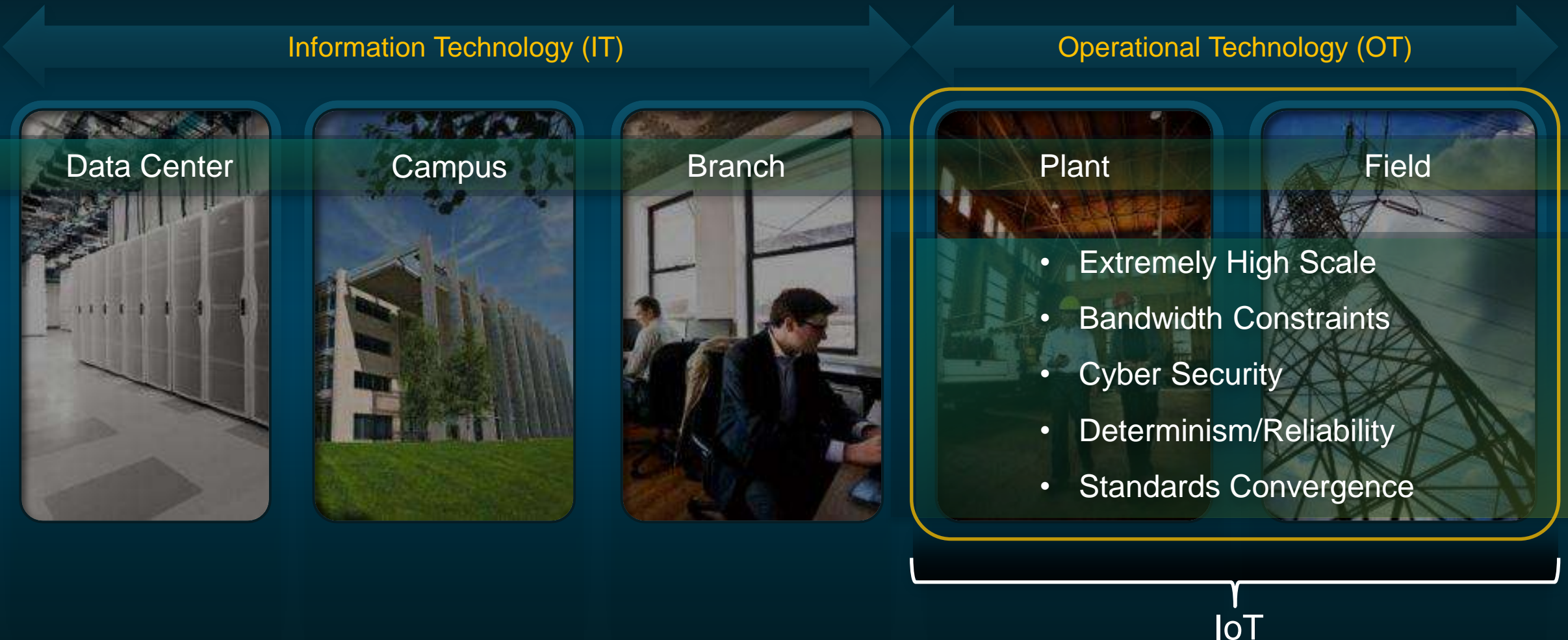The Internet of Everything has the potential to grow global corporate profits by 21% in aggregate by 2022.

Internet of Things – Role of Cisco

Internet of Things: New Places In the Network (PINs)

Data Center

Campus

Branch

Plant

Field

- Extremely High Scale
- Bandwidth Constraints
- Cyber Security
- Determinism/Reliability
- Standards Convergence

IoT

Cisco Internet of Things Portfolio

| Manufacturing | Mining | Energy-Utility | Oil and Gas | Transportation | City | Defense | SP/M2M |

Plantwide Ethernet, Intelligent Transportation, Smart Cities, S&C Refinery, Smart Connected Vehicle, Smart Grid

IoT Wireless
1550 Series Ruggedized Wireless AP

Field Routing
819
CGR 1K

Network and Device Management
NMS

Plant Switching
IE 2000
IE 3000
CGS
2520

Plant Routing
CGR 2K

Embedded
59XX ESR
2020 ESS

Security
819 based FW
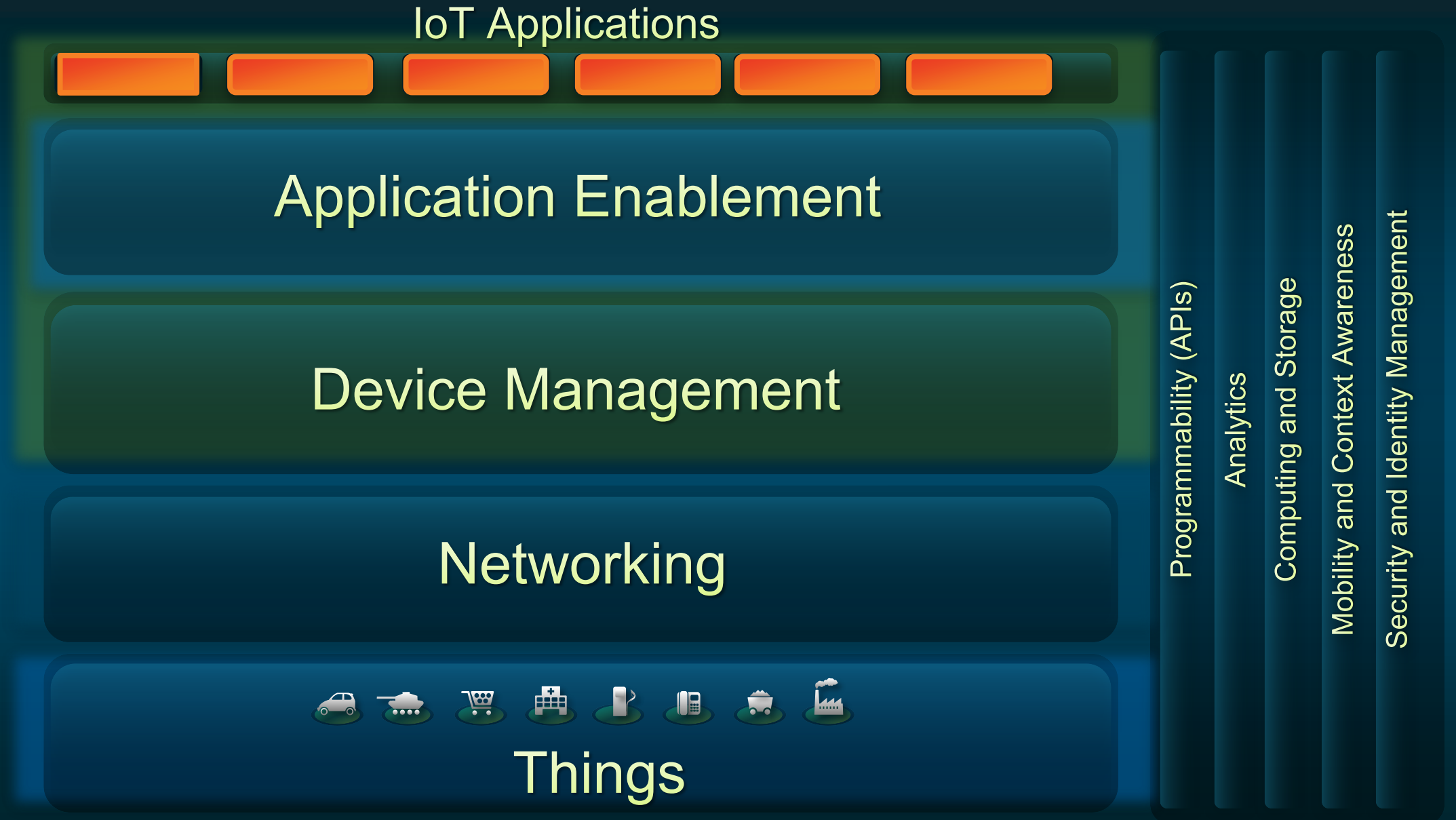Sourcefire/ASA

Connected Safety and Security
IPICS, VSM, Cameras

Network Management and IoT Security

Fog Computing

Data Center/Virtualization

IoT Detailed Layers

IoT Applications

Application Enablement

Device Management

Networking

Things

Programmability (APIs)

Analytics

Computing and Storage

Mobility and Context Awareness

Security and Identity Management

Industry Mapping, Anchor Solutions and Use Cases

Industry	Vertical	Sub-Verticals	Solutions	Use Cases
Industrial	**Manufacturing**	Auto, Heavy Equip/ Discrete, CPG	Connected Factory	Converged Factory Information / Factory Control Room Mobility / Secure Factory Controls
		Materials & Mining	Connected Mine	Connected Mining Vehicle / Connected Mine
	Transportation	Rail, Transit Fleet, Public Safety	Connected Train	Positive Train Control / Connected Train / Connected Trackside
	Energy	Utilities	Connected Energy	Distribution Automation / Automated Meter Infrastructure / Substation Automation / Workforce Enablement
		Oil and Gas	Connected Oilfield	Oilfield Remote Operations / Collaborative Operations
Public Sector	Government	Local Government	Connected City	Smart Parking / Smart Traffic / Smart Lighting
		Government Defense & Safety	Connected Battlefield	Common Operating Picture / Connected Battlefield
Service Provider	Service Provider/ M2M	SP/M2M	Connected IoT Service Provider	Service Provider Remote Ops / Connected Mobile Supply Chain

Internet of Things – Ideas in Action

Connected Mine

Connected Mine Vehicle

Connected Mine

Enables monitoring and control of equipment safety and operations with rugged/embedded network for the equipment fleet

Enables connection of mining equipment to control rooms, at the mine site and far away.

Remote Asset Tracking – Mining Case Study

Customer Profile

UCIL envisions fulfilling India's power needs of the future and has positioned itself with a thrust to harness the unlimited potential of nuclear power.

Business Objectives

- Save on valuable production time in responding to breakdowns of mobile equipments.
- Locate mobile equipments and key personnel for reducing time to respond
- Provide more efficient bi-directional communication among selected key personnel inside underground mine for improved collaboration and asset utilization
- Cut down on cost of production by counting the number of valid trips made by individual Mine Trucks.

Cisco-TCS Delivers

- TCS has Implemented RFID Technology to capture the number of trips made by a particular MT in real time and has put the system online.
- Customer Application integrated with Industrial Communication Network Infrastructure in an underground uranium mine
- Planning, Design, Implementation and Support Services
- Deployment of IT in a core operations domain creating direct business impact

Business Need

COMMUNICATION: Fail Safe & Pervasive

- Address challenges in communication between supervisors, the maintenance crew & the equipment drivers for reduction in response time to breakdowns and proper management
- Provide communication facility even if employees are away from the existing/limited PSTN lines

PRODUCTION: Effective high-value asset tracking

- Prevent loss of Time in responding to breakdowns in mining machinery
- Address the issue of prolonged downtimes due to time spent in tracking & guiding the Maintenance Crew & Equipment

MAINTENANCE: Real-time operational visibility

- Generation of real-time operational data for better planning and governance
- Minimize the production loss due to operational issues like Trip Counting on Mine Trucks

- Tracking of Vehicles & Key Personnel
- Voice Communication among Key Personnel, and mobile equipment
- Production Monitoring by Trip Counting
- Training of workforce towards system adaptation and usage

Remote Asset Tracking – Solution Delivered

Application Stack Adds Intelligence

Wireless Control System (WCS) Tools
- Wireless LAN planning and design
- Location tracking capability
- Systems configuration, monitoring, & management

Mobility Services Engine (MSE)
- Appliance-based solution that supports a suite of software services to provide centralized and scalable service delivery

Software-based Intelligence
- RFID Middleware to filter & provide time-stamped truck tags to trip tracking app
- Passive RFID tagging on Mine Trucks providing time-stamp and truck info
- RFID readers at unloading docks (Grizzly) for logging operational data from Mining trucks

Pervasive WiFi Coverage

- TCS implemented the Context-Aware Mobility solution which can capture and use the information about the client (Assets or Workforce) automatically through Wi-Fi connectivity
- Cisco Unified Communications Manager - based communication platform
- IP phones are provided to the key personnel (to be carried always when underground) for two way communication using the Wireless network

Delivers Real-time Data

- Each time the truck approaches for dumping the load, the RFID is capturing the equipment ID
- The above transaction is being registered in the database and the local display is showing the equipment id with some additional detail such as trip count, date, time etc
- Various Reports are generated as per UCIL requirement

Remote Asset Tracking System in Operation
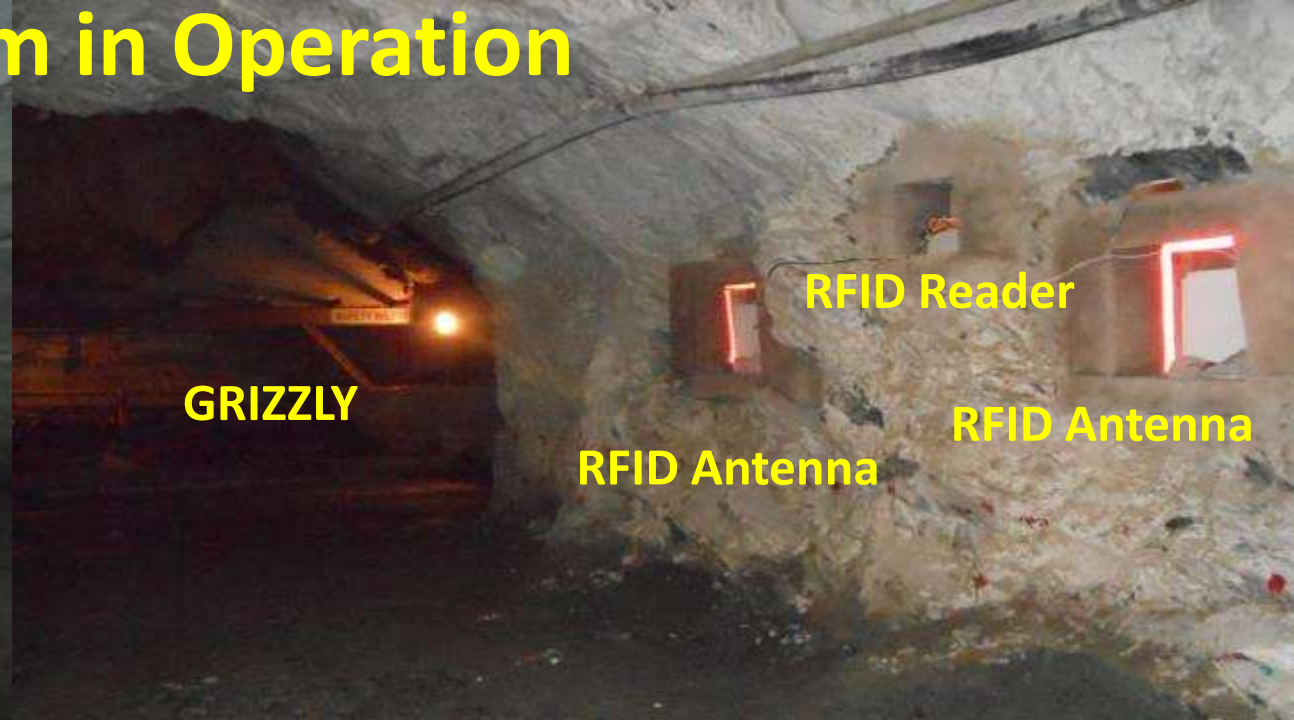
Remote Asset Tracking – Business Value Delivered

Measured Business Metrics

3% to 5%

Production Loss

Time to Respond

Safety & Asset Utilization

- **Reduction in Mining Production Loss by 3% to 5% through**
  - Accurate trip logistics, real-time online tracking of equipment and maintenance crew led to reduction in Time to Respond to situations
  - Improved communication among maintenance crew, Supervisor, and Mobile Equipment Operator leads to improved asset utilization, & worker safety

"Our remote RFID asset tracking system has served as an optimization mechanism wherein the movements of the high production equipment are tracked online, instructions provided in case of problems or safety issues and all necessary data transmitted/stored for more effective mine planning"

As told to Engineering Watch by UCIL

Connected City

Smart Parking / Traffic   **Smart Security**   **Smart Lighting**

Connected City

Smart Parking / Traffic

Smart Security

Smart Lighting

Connected and camera-instrumented roadways enabled for timely traffic signal optimization/ incident response.

Connected and sensor-enabled parking areas enhance parking space finding for citizens, and timely enforcement.

Public areas connected to automate optimized lighting for energy efficiency and citizen experience/peace of mind.

'Internet of Things' Enables *Smart City Safety in India*

'Connected Safety & Security' solution in action for Navi Mumbai Municipal Corporation

A **Comprehensive**, **Industrial-Grade** & **Integrated** video solution enabling government agencies to deliver higher levels of citizen safety & traffic management, while significantly enhancing response times to events and crime resolution

Business Need

Smart & City-Wide Safety Alert system
- Intelligent Video-based monitoring / feedback to the Police about abnormal movement / suspicious objects etc.

Faster response to security breaches
- **Robust video infrastructure** across the city for routine as well as emergency response

Accelerated and accurate case investigation
- **Improved turnaround time** in responding to any investigation case, faster access to evidence

Value Proposition (Complete E2E Cisco solution)

Pervasive Video Infrastructure
- **City-wide IP Based HD Fixed /PTZ camera canopy**
- Mission Critical Network back to Police HQ

Smart Analytics Engine & Control Room
- **Video Analytics for detection & alert/ number place recognition for entry/exits (customized for local language)**
- **Video Live View, Recorded View Export for Forensic Search / Analysis**
- **Virtual Matrix Display for viewing multiple camera**

Impact for Customer

- Swift reaction to traffic accidents (e.g., high-profile hit-and-run case resolved within 24 hrs)

- Petty thefts criminal ring busted (e.g., Biking gang involved in 20 chain snatching cases)

- Other potential users evinced interest (e.g., Octroi / Excise department for truck ingress/egress)

Connected Factory

Factory Control Room Mobility

Secure Factory Controls

Converged Factory Information

Connected Factory

Factory Control Room Mobility

Secure Factory Controls

Converged Factory Information

Enables Control Room visibility to operations personnel, even when out on the plant floor

Secures industrial control networks from internal and external threats

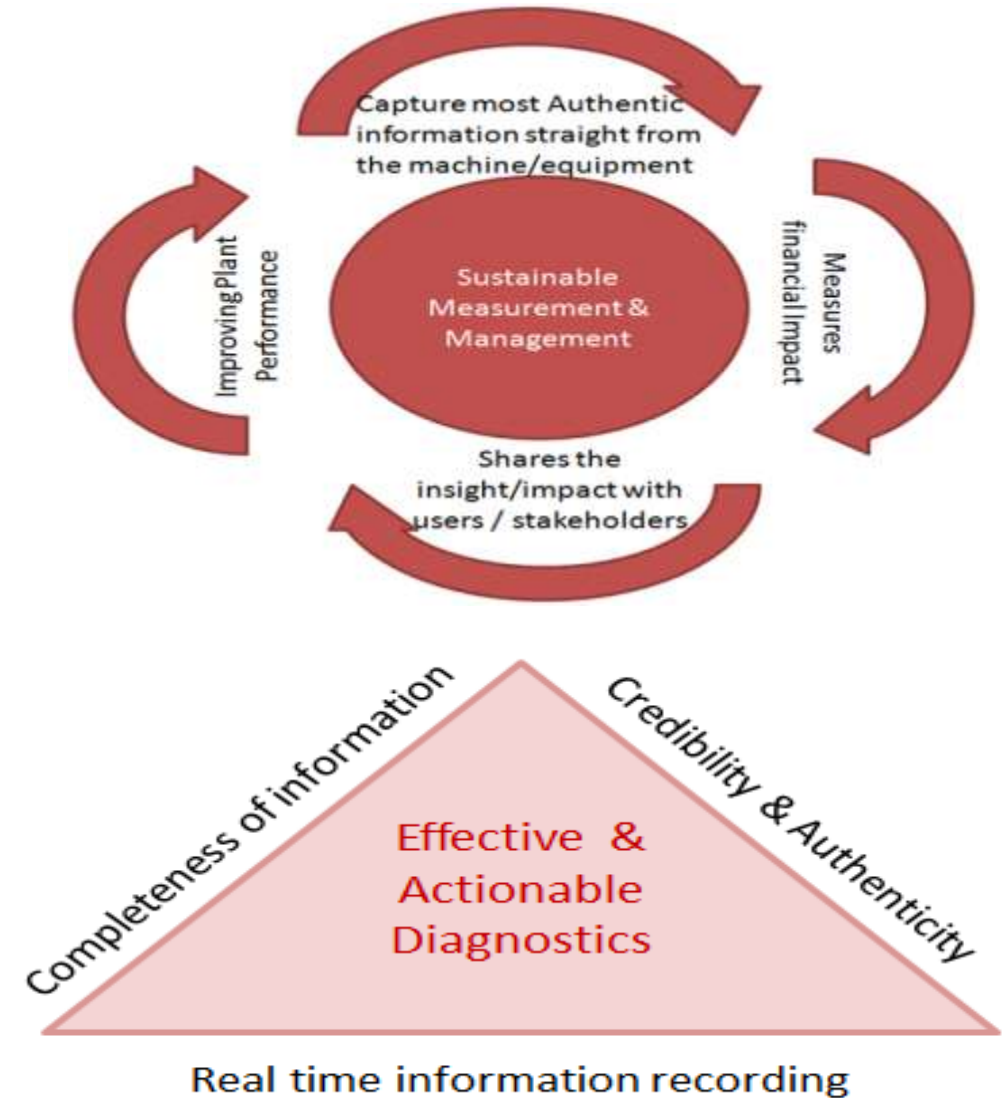**Securely converges plant floor systems for realtime analytics, nimble control , reduced downtime**

1. Measuring right metrics – Gain 360 degree perspective

2. Applying right methods – most credible and authentic method

3. Knowing at right time – while things are going wrong

Conversion Cost due to hidden Inefficiencies across production floors cost more than USD 1 Trillion globally

COVACSIS

1. To design cost effective solution for diagnosing the production state at any point of time- by capturing various parameters straight from the machine in real time

2. To convert acquired data into actionable knowledge report in real time – by translating the contributions of these incident into topline and bottomline over a given period of time

Capture most Authentic information straight from the machine/equipment

Improving Plant Performance

Sustainable Measurement & Management

Measures financial Impact

Shares the insight/impact with users / stakeholders

Completeness of information

Credibility & Authenticity

Effective & Actionable Diagnostics

Real time information recording

COVACSIS

Case1 - Impact of capturing real picture on shop floor

Problem:
Higher occupancy with lower production.

Solution:
RTPD helped production team visualize the huge gap between actual occupancy & required occupancy.

Benefit:
RTPD highlighted potential loss of Rs 3.32 Cr. in a span of just three months.

Machine Occupancy (%)

"Covacsis helps to visualize different cost saving matrices on the production floor"

COVACSIS

Big Data, Intelligent Network & Deep Analytics

Covacsis system acquires more than 10 TB data from one plant /year

There are more than 3000 such plants only in India resulting into "Exploration of more than 100 TB of manufacturing data every day"

A network of more than 27 Million devises feeding data to the network across 7 sectors in India

More than 1 million concurrent decision making across 3000 plants.

An intelligent network – Can not only carry data but do analysis simultaneously.

"Covacsis aspires to create next generation collaborative decision making platform for complete manufacturing value chain.

COVACSIS

Q&A

Manufacturing Firms: Real-Time Data Analysis Can Increase Value Realized from IoE

Type of connection	M2M	M2P	P2P
Share of VAS	39.0%	40.3%	20.6%
Top use cases	• Smart factories • Smart grid • Supply-chain efficiency	• Connected marketing and advertising	• Next-gen workers • Faster time to market
IoE enablers: current strengths	• Managing energy consumption through smart, connected systems	• Viewing KPIs through information dashboards	• Unified communications
IoE enablers: largest opportunities	• Intelligent machines/robots • Remote tracking of physical assets	• Decision support through real-time, multi-dimensional data analysis	• Integrated video collaboration
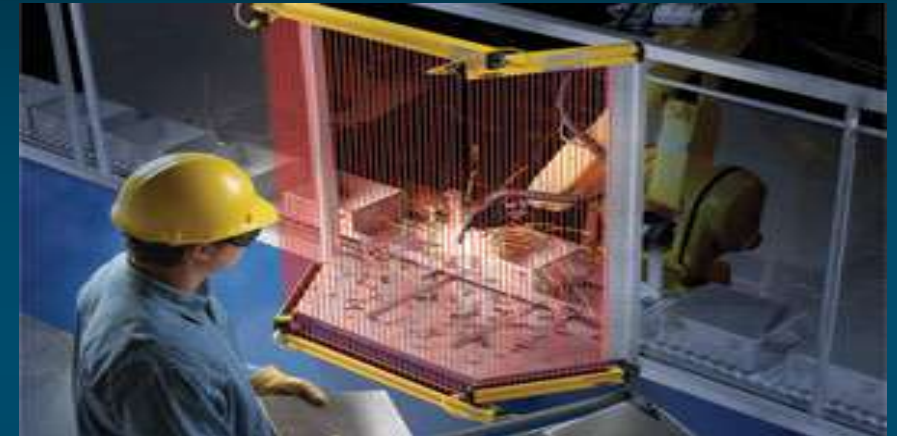
The largest opportunity areas for manufacturers are "intelligent" robots, remote tracking of physical assets, decision support, and integrated video collaboration

Energy Firms: Integration of Sensor Data Can Increase Value Realized from IoE

Type of connection	M2M	M2P	P2P
Share of VAS	49.0%	23.6%	27.5%
Top use cases	• Smart factories / automation • Smart grid	• Faster time-to-market	• Next-gen workers • Smart buildings
IoE enablers: current strengths	• Proactively monitoring energy production and supply equipment	• Analyze and use large amounts of data	• Unified communications
IoE enablers: largest opportunities	• Making operations more sustainable through sensor data	• Predictive analytics	• Ability to locate experts

The largest opportunity areas for energy firms are sustainable operations, predictive analytics, and expert location

Retailers: Data Visualization and Predictive Analytics Can Increase Value Realized from IoE

Type of connection	M2M	M2P	P2P
Share of VAS	21.5%	47.7%	30.8%
Top use cases	• Innovative payments • Supply-chain efficiency	• Connected marketing and advertising • Connected vending	• Next-gen workers • Virtual attendants
IoE enablers: current strengths	• Remote inventory tracking	• Viewing KPIs on information dashboards	• Unified communications
IoE enablers: largest opportunities	• Mobile payments • Remote customer monitoring	• Predictive analytics • Data visualization	• BYOD • Rich-media customer interactions

The largest opportunity areas for retailers are mobile payments, predictive analytics, and BYOD

Internet of Everything:
How It Delivers Value — and How Much Is at Stake

IoE Value at Stake: $14.4T

(2013-2022 10-year NPV)*

* Net present value

21 use cases

Asset utilization: $2.5T
- SG&A and CoGS reduction from improved business process execution
- Improved capital efficiency

Employee productivity: $2.5T
- Improved labor efficiency
- Fewer or more productive man-hours

Supply-chain / logistics efficiency: $2.7T
- Improved process efficiency
- Reduced waste in supply chain

Improved customer experience: $3.7T
- Improved customer lifetime value
- Additional market share (more customers)

Innovation: $3.0T
- Improved RD&E speed, reduced TTM
- New business models and new sources of revenue

Cisco's Role

Manage Private and Public Networks

Enable Service Providers' M2M Services

Connect to All Things, Even Unintelligent Ones

Secure the Infrastructure

Compute Data In Motion

The Platform for Partner Ecosystem

IoT Connectivity Platform

Intelligent, High-Scale, Secure, Open, Resilient

IoT Detailed Layers

IoT Applications

Application Enablement	Event Management	Data Aggregation	Protocol Translation
	Workflow / Rules Engine	Data Normalization & Modeling	Enterprise App Integration

Applications

Management	Device Management	Service Management	Business Management
	Thing Management	Element Management	Network Management

Networking	Core	Aggregation	Access
	Mesh	Field	Plant

Things	Gateway		Protocol Translation
	IoT Agent	Sensor	Device	Client Application

Things

- Programmability (APIs)
- Analytics
- Computing and Storage
- Mobility and Context Awareness
- Security and Identity Management

Building an IoT Ecosystem

Verticals

Smart Solution

Connected Factory	Connected Oil Field	Connected Mine	Connected Train	Connected City	Connected Battlefield	Connected Energy	Connected IoT SP

Industry Partners

Rockwell Automation   Honeywell   EMERSON Process Management   Itron   ALSTOM

M2M
Mobile SPs

CISCO
Advanced Services

IoT Enablers

Time Sync	Pervasive Cyber Security	Scalable Routing	Deterministic Ethernet	Guaranteed Delivery	Big Data Management	SP services

Ruggedized Products

Ruggedized Wireless AP   **Industrial Routers & Switches**   **Industrial Security**   **Hardened Mobile M2M Gateway**   **IP Cameras**   **Video Security**

Cisco's Approach to IoT

"Customer-In" Approach
- Understanding of key business care about and pain points
- Relevance to LOB leaders / CXOs

Products/Technologies
- Best-in-class ruggedized products
- Smart solutions for verticals
- IoT architectures

Strategic Partnerships
- Industry partners
- Vertical software / service partners
- Service providers

Cisco Vision: IoT Network Platform

Sensors and Devices

- Location
- Identity + Policy
- Aggregation
- Security
- Mobility
- Lightweight IPv6

Networks, Computing, Storage

- Scale + Reliability
- Resource orchestration
- Difficult networks
- Privacy + Security
- Service Provider M2M
- ASICS + Software

Data Analytics

- Data Aggregation
- Video Analytics
- Streaming Data
- Data Federation
- Embedded analytics

Control Systems

- Determinism
- Safety
- Latency
- Virtual Machine Control

IoT Platform

Data Center

Intelligent Network

Cloud

Architectures

The Internet of Everything

People
Connecting people in more relevant and valuable ways.

Process
Delivering the right information to the right person (or machine) at the right time.

Data
Leveraging data into more useful information for decision making.

Things
Physical devices and objects connected to the Internet and each other for intelligent decision making.

People-to-People + People-to-Machine + Machine-to-Machine