### Industry 4.0 Awareness Seminars Reports Template

MS Word File, Font Arial 12, space 1.5

<p>| | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>Date of the Seminar</td>
<td>09.08.2019</td>
</tr>
<tr>
<td>2.</td>
<td>Organizers</td>
<td>FSM &amp; FICCI</td>
</tr>
<tr>
<td>3.</td>
<td>Title of the seminar</td>
<td>AWARENESS PROGRAMME ON INDUSTRY 4.0 The Indian Perspective</td>
</tr>
<tr>
<td>4.</td>
<td>Programme</td>
<td>Enclosed Annexure-I</td>
</tr>
<tr>
<td>5.</td>
<td>Report: suggested contents</td>
<td>Enclosed Annexure-II</td>
</tr>
<tr>
<td></td>
<td>(1) Main takeaway / good suggestions,</td>
<td></td>
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<tr>
<td></td>
<td>(2) Clusters covered,</td>
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<tr>
<td></td>
<td>(3) Nos attended,</td>
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<tr>
<td></td>
<td>(4) Success stories that need to be compiled / shared</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>List of Speakers with contact details</td>
<td>Enclosed Annexure-III</td>
</tr>
<tr>
<td>7.</td>
<td>Presentations</td>
<td>Enclosed Annexure-V</td>
</tr>
<tr>
<td>8.</td>
<td>Resource persons for providing consultancy, skilling, guidance etc.</td>
<td>Enclosed Annexure-IV</td>
</tr>
<tr>
<td>9.</td>
<td>Photographs</td>
<td>Enclosed Annexure-IV</td>
</tr>
<tr>
<td>10.</td>
<td>Learnings from the seminar     </td>
<td>Industry has a basic understanding of the concepts of Industry 4.0 at a broader level (as understood from the participants who attended the workshops). They are keen on understanding in detail about the applications of how to benefit from implementing Industry 4.0 through specific case. Working models and demonstrations of Industry 4.0 Applications were very well received by the participants. It was also quite engaging and insightful.</td>
</tr>
</tbody>
</table>
ANNEXURE-I

AWARENESS PROGRAMME ON INDUSTRY 4.0
The Indian Perspective

Date: Friday, 9th August, 2019
Venue: GNEC II, Sector 30 Knowledge Park II, Greater Noida
Timing: 10:00 AM to 06:00 PM

Smart models of manufacturing and business are being created through collaborative and self-aware machinery and processes. This has a direct impact on competitiveness and quality of goods and services. Samarth Vyayam is the way forward for the Indian Manufacturing Ecosystem and is achievable in a manner that works for you. To strengthen the 'Make in India' eco-system with adoption of smart technologies, the Automation Industry Association and IIT Delhi have created a Special Purpose Vehicle, called the Foundation for Smart Manufacturing (FSM) to take the emerging wave of Smart Technologies and adapt it with relevance to the needs of Indian Industry. To facilitate, introduce and enlighten industry with an evolved genre of quality focused smart manufacturing, Department of Heavy Industry (DHI) supported by IED-AIA Foundation for Smart Manufacturing (FSM), Federation of Indian Chambers of Commerce & Industry (FICCI) and IIoT India, bring to you an awareness workshop on Industry 4.0 – The Indian Perspective.

<table>
<thead>
<tr>
<th>PROGRAM SCHEDULE</th>
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<td><strong>09:30 – 10:00</strong></td>
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<td><strong>10:15 – 10:35</strong></td>
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<td><strong>10:40 – 11:00</strong></td>
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<td><strong>11:05 – 11:25</strong></td>
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<td><strong>11:30 – 12:20</strong></td>
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<td><strong>12:25 – 12:45</strong></td>
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<td><strong>12:50 – 13:10</strong></td>
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<td><strong>15:55 – 16:00</strong></td>
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<tr>
<td><strong>16:00 – 16:30</strong></td>
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</tbody>
</table>

Expected Participant Profile

- Owners, CXOs and Functional Heads from Automotive, General Engineering, FMCG and Food Processing Sectors
- Machine builders
- System Integrators

Enquiry and Registrations

Mr. Naman Kapoor: +91-8076197190, email: nkapoor@iafsm.in
Mr. Karan Bishft: +91-8527710029, email: karan.bishft@singex.com

Event Partners

FICCI
AIFF
IIoT India
August 09, 2019
GNEC-IIT Roorkee, Knowledge Park-II, Greater Noida

On August 09, 2019 IITD-AIA Foundation for Smart manufacturing (FSM) in collaboration with FICCI and IIOT India conducted an Awareness program on Industry 4.0|SAMARTH Udyog Bharat 4.0 - an initiative of Department of Heavy Industry (DHI), Ministry of HI & PE, Government of India.

The event primarily focused to be a holistic perspective for manufacturing industries, to embark on the journey of Industry 4.0| SAMARTH Udyog and an assessment of concerned company readiness for Industry 4.0|SAMARTH Udyog. The Program was attended by 51 concerned delegates from relevant companies & academia who attended a range of sessions conducted by professionals of the industry addressing the problems arising in the field of manufacturing along with the applications of IIoT in manufacturing Industry. During this event, the attendees shared their suggestions & queries regarding the implementation of Industry 4.0|SAMARTH Udyog in an effective manner.

The Awareness program witnessed decision makers from relevant companies, Technical Advisors & academicians from prestigious Institutes coming together in synergy. The Program Speakers enlightened about the opportunities for OEMs, relevance for business owners, transformation of IT to OT and discussed various case studies relevant to Indian manufacturing & future course for Industry 4.0|SAMARTH Udyog.

A live survey with the participants present was conducted. The participants in the Awareness program on Industry 4.0 had an opportunity to assimilate ideas and experience from Industry experts. Moreover, participants could avail suggestions and could address their queries.
ANNEXURE-III

LIST OF SPEAKERS

CONNECTING INDUSTRY TO THE REAL POTENTIAL OF SMART MANUFACTURING

SPEAKERS

- Prof. Sunil Jha
  Professor, IIT Delhi
  Director, IAFSM

- Mr. Ravi Agarwal
  Managing Director
  Peppertech, Tuchi RPML

- Mr. Dilip Sawhney
  Managing Director
  Rockwell Automation

- Mr. Anup Wadhwa
  Director
  Automation Industry Association

- Mr. Saroop Chand
  Director
  Astra Corporation Systems Pvt. Ltd.

- Mr. Baldeep Singh
  Country Head
  Singer Exhibitions

- Mr. Sudharshan Gkesh
  Technical Manager
  PIC North & East

- Mr. Aashutosh Varma
  Customer Solution Advisor
  Industry 4.0

- Mr. Kaushik Saha
  CTO
  Samsung BTO

KEY TOPICS INCLUDED

- Opportunities for OEMs and their Supply Chain (Keynote)
- Industry 4.0 relevance for Business Owners / CIOs and ROI Concerns
- Bridging the divide between Machines and IT - Case Study of Cyber Physical Assembly Line
- Implementing Smart In-line Inspection Systems (Indian Case Study #3)
- Preparing your Enterprise for Digital Connectivity (Indian Case Study #2)
- IoT India: Reimagining the Future
- Assessment of Company Readiness for Industry 4.0
- Plant Monitoring Systems (Case Study #3)

WHY ATTEND?

- To equip yourself for the next big change in manufacturing.
- Get exposed to a global, all-encompassing outlook of the industry 4.0 world at this roadmap.
- An opportunity to interact, learn, share ideas and network with experts and industry leaders of the country.
- Explore and gather insights on investment opportunities in Smart Manufacturing.
- Discover end-to-end solutions that will help you optimize operations, reduce downtime and maximize profitability.

REGISTER NOW

Event Partners

For More Details Contact:
Naman Kapoor | email: nkapoor@iafsm.in | Mob: 9990601814, 8076197190
<table>
<thead>
<tr>
<th>SNo</th>
<th>Name</th>
<th>Designation</th>
<th>Organization</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prof. Sunil Jha</td>
<td>Professor &amp; Director</td>
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<tr>
<td>2</td>
<td>Mr. Ravi Agarwal</td>
<td>Managing Director</td>
<td>Pepperl-Fuchs FAPL</td>
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</tr>
<tr>
<td>3</td>
<td>Mr. Dileep Sawhney</td>
<td>Managing Director</td>
<td>Rockwell Automation</td>
<td><a href="mailto:dsawahney@ra.rockwell.com">dsawahney@ra.rockwell.com</a></td>
</tr>
<tr>
<td>4</td>
<td>Mr. Anup Wadhwa</td>
<td>Director</td>
<td>Automation Industry Association</td>
<td><a href="mailto:director@aia-india.org">director@aia-india.org</a></td>
</tr>
<tr>
<td>5</td>
<td>Mr. Saroop Chand</td>
<td>Director</td>
<td>Adroitec Information Systems Pvt. Ltd.</td>
<td><a href="mailto:saroop.chand@adroitecinfo.com">saroop.chand@adroitecinfo.com</a></td>
</tr>
<tr>
<td>6</td>
<td>Mr. Baldeep Singh</td>
<td>Country Head</td>
<td>Singex Exhibitions</td>
<td><a href="mailto:baldeep.singh@singex.com">baldeep.singh@singex.com</a></td>
</tr>
<tr>
<td>7</td>
<td>Mr. Tushar Ghosh</td>
<td>Technical Manager</td>
<td>PTC Inc.</td>
<td><a href="mailto:tughosh@ptc.com">tughosh@ptc.com</a></td>
</tr>
<tr>
<td>8</td>
<td>Mr. Aashutosh Verma</td>
<td>Customer Solution Advisor-India Region</td>
<td>Nokia</td>
<td><a href="mailto:aashutosh.varma@nokia.com">aashutosh.varma@nokia.com</a></td>
</tr>
<tr>
<td>9</td>
<td>Dr. Kaushik Saha</td>
<td>CTO</td>
<td>Samsung</td>
<td><a href="mailto:kaushik.s14@samsung.com">kaushik.s14@samsung.com</a></td>
</tr>
</tbody>
</table>
ANNEXURE-IV

PHOTOGRAPHS
Opportunities for the Indian Ecosystem
Samarth Udyog
Smart Manufacturing in India

Ravi Agarwal
MD, P+F FA
9th Aug 2019
Unlocking the Industrial potential?

Food
Water
Health
Air
Energy
Materials
Education
Environment
Transportation
Infrastructure

Information is now available, fast and democratized = Digital
Why Automation / Digitization / I4.0?

- Ease of use
- Better quality control
- Increased safety
- Increased productivity
- Improved design through simulation (CAD/CAM)
- To reduce labor cost / On Shoring
- To mitigate the effects of labor shortages
- To reduce or remove routine manual and clerical tasks
- To accomplish what cannot be done manually
- To reduce manufacturing lead time
- To increase labor productivity
- To improve product quality
- Energy saving
Replicate solutions elsewhere?

Cut
Copy
Paste
Wouldn’t work!
Inspiration & Ingenuity would!
Indian manufacturing I4.0 SWOT Analysis

**Strengths:**
- Relatively Young
- Big domestic market
- Capacity expansion plans
- Increasingly Educated
- Networked – Up downstream
- Local ecosystem
- Eager, Talented
- Highly capable hybrids

**Weaknesses:**
- Slow scaling
- Cash economy and transparency
- Lower skill levels
- Cost competitiveness
- Weaker scale of economies
- Unstable currency
- Lower through put efficiency
- Energy deficiency

**Opportunities:**
- New sunrise
- Play on strength
- Known IT Prowess
- High permeation of data
- Bridges deficient infra
- Strengthens service of D market
- Higher participation in global economy

**Threats:**
- Tardy awareness & action
- Reverse ballistics
- Data infrastructure
- Security of data
- Key hardware imported
- Speed and quality of skilling
- Quality and content of right education

Author: Ravi Agarwal
Date: 20.08.2019
Information driven manufacturing
The Indian Context

स्मार्ट Manufacturing – A balancing Act
Defining Problem – Half the solution

- Minimise Leakage/Wastage
- Optimise
- Matching Raw material Sources-Production capacity/capability-Market
- Demand & Supply – Land/Electricity/Housing/Mobility/Agri Produce
- Circumventing weak infra

Resources (संसाधन)
Defining Problem – Half the solution

Human Resources
(मानव)

- Deal with the Surplus
- IT Prowess
- Skill and Training
- E services – Doctor, Engr, Education
- Give Jobs / Increase Employment Opportunities
- Stop Migration
- Decentralise Production
Defining Problem – Half the solution

- E Auction/Sugam/ITR
- Cost of Non Smart too high
- Better Cost : Revenue
- Risk Mitigation
- Access to Capital
- New Genre of Business – High Liquidity

Finance/Cost (रुपया)
Defining Problem – Half the solution

- Jump Generational learning/cycle
- Higher absorption and Pliability/Acceptance
- Cyberway – Democratization of Technology
- Big brother – Market or Technology
- Enabler
It is about “How” not “Why”
Technologies

- IIoT
- RFID
- Augmented Reality for Enhanced Visualisation & Learning
- Cyber Physical System
- Computer Vision
- 3D Printing with Multi-material capability
- Collaborative Robots (Cobots)
- Manual Operating Station
- Smart Sensors
- Safety
- Network Security
- Implementation of OPC-UA
- MTConnect Agent based Services
- Pallet & different conveying system
- Manufacturing Execution System
- Manufacturing Analytics
- Grippers & Material Handling
Implementation of Samarth Udyog

Thank You!
Cyber Physical Lab

1. Raw part Storage, Loading & QC
2. Axisymmetric part Storage, QC & Insertion
3. Prismatic Part Assembly & Screwing
4. Connector Fitting
5. CNC Turning Station
6. Sealant Dispensing
7. 3D Printing
8a. Product Functional Testing
8b. Product Packaging
8c. Finished Product Storage
8d. Raw part Storage, Loading & QC
8e. Axisymmetric part Storage, QC & Insertion
8f. Prismatic Part Assembly & Screwing

Pallet with RFID

Cobot Manufacturing Cell

Conveyor
Production

- Data collection and collation
- Resources consumed and throughput
- Asset Utilization
- Demand Driven
- Resource Driven
- Waste cut
- Raw material and finished goods
- Reduction of downtime
- Cross expertise on shop floor
Quality

- Block chain and Genealogy
- Quick collation from end chain and correction
- Raw material inspection
- Inventory control
- Grading and pricing
- Authentication against duplication
Legacy, Asset Utilization

- Data collection
- Energy optimization
- De bottlenecking
- Cycle times and throughput
- Analysis
- Resource spread through Multilayer MIS
Supply chain

- Track and trace
- Aging
- ASRS
- Packaging
- Positioning
- Human interface
- Speed and safety
MIS

- ERP
- Cloud
- OT
- Dashboard
- Making the interpretation
- Software to make it comprehensible
Favorable demographics (unfavorable system and content)
High potential, Green shoots aplenty
Leapfrog weakness in education infra to create workforce
Indian IT 2.0
Lead IT and OT marriage
Implementation Army
Forging the path for Nokia Enterprise

Aashutosh Varma
CSA, Emerging Business
NOKIA NETWORKS
4th “industrial” revolution powered by Connectivity

Through the revolutions “Innovation and Technology” is the Bearer
THE JOURNEY TO INDUSTRY 4.0

TO DATE REPLACEMENT of physical using digital

INDUSTRY 4.0 CONTROLLING physical using digital
The imperative
A tale of two industries

Investment in ICT
Share of GDP
Annual productivity growth (15 year average)

Physical industries
Digital industries

Taking benefits from the few to the many unlocks massive opportunity

$3.8T to $11T
Economic value of IoT (by 2025)

up to 11%
of global economy (in 2025)
What’s different with Industry 4.0 Connectivity?

Expanding scope of business-critical applications

To unlock it, we must become adept at controlling the physical with digital means: go beyond physical-to-digital transformation.
Industrial Automation
Success Factors

- Reliability
- Connectivity
  - Distributed intelligence
  - Cable-free
- Security
  - Easy integration
  - Localization
  - Open standards
- Modularity
  - Flexible transport
  - Additive manufacturing
  - Transparency
- Software services
  - Transparent IT architecture
  - Security
The value chain can be split into 7 key components

Physical using Digital Value Chain for Industry 4.0

Machines/Devices
- Ecosystem based approach
- Leveraging on existing deployment

Network
- Multi-Access Network management
- Propose best fit technology

Platforms IT infra
- Interface Enablers
- Platform to nurture ubiquitous approach

Applications
- Industry specific use case
- Machine learning and Analytics

Solutions
- Business case creation
- Solution design & delivery

Operations
- Project implementation and Support
- Maintain Network and applications uptime, periodic upgrades for security and operations improvements

Project management
NOKIA & BSNL Initiative - Collaboration for Industry 4.0

NOKIA Chennai Factory

- Moving from traditional wired factory network to wireless network
- Improve equipment mobility for enhanced flexibility of manufacturing infrastructure
- Create a platform for early adoption of IIOT applications in industries
- Productivity and Operational Efficiency improvements
NOKIA Chennai Factory - Private LTE Network for Industry 4.0

Private LTE Network @ Chennai Factory

- Base Station (NB)
- S1
- Nokia IT (Intra-Network)
- Edge Server with Application
- Remotely Monitor / Control Robot

Private LTE Applications @ Chennai Factory

1) Tester and Machine connectivity
2) AGV Tracking and monitoring
3) UR5 Robot connectivity using LTE
4) SMART screw drive connectivity using LTE
5) Telepresence Robots connection
6) NOKIA 3rd Eye (AR for Test Engineers)
7) SMT IoT (MPM consumables usage status monitoring)
8) AR Enabled operator guidance
9) Voice over LTE (VOLTE)
10) Push to Talk/Push to Video

Private LTE Network Journey @ Chennai Factory

- Industry 4.0 - Nokia’s 1st LTE Network: Global Benchmark
- BSNL Collaboration
- LTE RAN BB - Terminal
- Private LTE Network - Inauguration
- BSNL Unit
- MoU Sign Off - BSNL + NOKIA
- Nokia’s 1st LTE Enabled Galaxy RFM Line
- LTE Enabled AR Guidance
- LTE Enabled AGV Tracking

BSNL Collaboration

BSNL Unit

MoU Sign Off - BSNL + NOKIA

Nokia’s 1st LTE Enabled Galaxy RFM Line

LTE Enabled AR Guidance

LTE Enabled AGV Tracking

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Connectivity Paving the way for Enabler Industry 4.0

- Automotive
- Oil & Gas
- Banking & Finance
- Information Technology
- Power
- Production
- Media
- Real Estate
- Healthcare
- Project Development
- Trading
- Aviation

Verticals Suitable for adopting private LTE
Changing landscape for OEMs and Supply Chains… *How Indian industrial companies can capitalize on digital transformation*

Dilip Sawhney, Managing Director, Rockwell Automation India

9 Aug 2019
Our strategy is to bring The Connected Enterprise to life. We integrate control and information across the enterprise to help industrial companies and their people be more productive.
“Our PEOPLE are the foundation of all we do, and creating an environment where everyone can do their best work is fundamental to our success.”

Blake Moret
President and Chief Executive Officer

<table>
<thead>
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<th>Ethics and Integrity</th>
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<tr>
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<td>Tetra Pak</td>
<td>FOR THE BEST OF</td>
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<tr>
<td>Top 100 Innovative Companies</td>
<td>BBB</td>
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<td>Top 100 Global Innovators</td>
<td>ABEA</td>
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<tr>
<td>One of 25 Best Tech Companies to Work for in America</td>
<td>The World’s Most Ethical Companies</td>
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<tr>
<td>2016 Acceleration and Transformation Award</td>
<td>Better Business Bureau International Torch Award</td>
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<tr>
<td>2016 Acceleration and Transformation Award</td>
<td>American Business Ethics Award</td>
</tr>
<tr>
<td>Gold Award for Excellence in Innovation in Manufacturing</td>
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Corporate Responsibility, Sustainability and Our People

- Catalyst Award
- Global Leadership Award
- FTSE4Good Company Index Corporate Responsibility
- Most Sustainable Companies
- Top 10 Newsweek Green Rankings
- One of the Best Places to Work in the U.S.
- FIRST Robotics Competition Crown Supplier
- China’s Top 100 Most Attractive Employer and Top Mover
- Tetra Pak Best-in-Class Supplier
- Asian Manufacturing Award Best Internet of Things Provider
- Human Rights Campaign Corporate Equality Index

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Industrial disruption is accelerating

1.0  
Mechanization, Water Power

1800  
Mass Production, Electricity

1900  
Computers, Connectivity, Automation

2.0  
IoT, Artificial Intelligence, Mixed Reality, Additive Mfg., Human-Machine Collaboration, Autonomous Systems

3.0  
2000

1700
Government Initiatives
Visions for fueling manufacturing leadership

Advanced Manufacturing Partnership 2.0
Industrie 4.0
Made in China 2025
Manufacturing Innovation 3.0
Make in India

Technologies
Innovations that redefine and create new value opportunities

IoT
Security
CPS

Industry Consortiums
Assemble and promote best practices

SMART MANUFACTURING
ENABLED BY
The Connected Enterprise

AVAILABLE Today and FOUNDATIONAL to Achieving These Visions...

Industry Standards
Drive interoperability and commonality

ADVANCE
MESA
SMLC

ISO
IEEE
IEC
OPC
ISA
WHY ARE DIGITAL INITIATIVES IMPORTANT TO MANUFACTURING?

$4T
Value driven by manufacturing IIoT by 2025

2X
Stock performance improvement

50%
Of companies expect IIoT to increase competitiveness

40%
Operating income improvement from digital transformations

4.0
Industry 4.0 impacts global competitiveness
DIGITIZATION CHALLENGES IN MANUFACTURING

1000s Applications across auto & tire, consumer packaged goods, mining & cement, oil & gas, chemicals, etc.

$65B The global installed base of legacy automation systems is very large.

21% Manufacturers have suffered a loss of IP in the past year.
Digital transformation as a standalone strategy
Separate from the company strategy

Yet, 71% of manufacturing digitization efforts are separate but parallel to digital supply chain initiatives

93% of manufacturers claim manufacturing operations are an integral component of their digital supply chain strategies

Source: Gartner

“Digital transformation only makes sense if it supports your organization’s overall strategy.”

CIO / IDG
Transformation impacts the entire value chain

Delivery and Service
Personalized customer experience
Outcome-based revenue models

Corporate/CXO
Performance benchmarking
Supply chain visibility and planning
Process Engineering, Continuous Improvement
Workforce transformation

Maintenance/Reliability
Asset Health Monitoring
Predictive Maintenance
Field workforce effectiveness
Environment, Health and Safety Management

Manufacturing Operations
Shop floor workforce flexibility and efficiency
Automated, touchless factory
Quality assurance, compliance and analytics
Energy monitoring and management
Real-time operational intelligence

Procurement
Supplier visibility, track and trace

Plant Engineering/IT
OT/IT/Human application innovation
Integrated information and control systems
Universal connectivity
Converged IT and OT networks
DIGITAL Transformation

IloT Information Infrastructure

EXECUTIVE FINANCE

OPERATIONS QUALITY IT

ENGINEERING MAINTENANCE OPERATOR

HIERARCHICAL - HISTORICAL DATA

TRANSPARENT - LIVE DATA
By anticipating challenges before they arise, it’s more likely that your digital transformation will be a success.

Challenges experienced:

- Lack of understanding
- Digital transformation as a standalone strategy
- Technology-thinking instead of problems-thinking
- Workforce skills challenge
- Custom and in-house applications
- Lack of scalability
- No clear business case or return of investment
- Difficulty integrating legacy infrastructure
- Picking the wrong partner
KEYS TO A SUCCESSFUL DIGITAL TRANSFORMATION

ORGANIZATIONAL STRUCTURE
BUILD A COLLABORATIVE TEAM

INFORMATION INFRASTRUCTURE
RELIABILITY AND SECURITY

TECHNOLOGY UPGRADE
MODERNIZE FOR THE DIGITAL WORLD

EDUCATE & TRAIN
DEVELOP THE SKILLS

PARTNERSHIPS
ESSENTIAL TO CLOSE THE GAPS

CHANGE MANAGEMENT
DON’T UNDERESTIMATE THE CHALLENGES AND REWARDS
The Connected Enterprise
Implementation & Transformation

Rockwell Automation

15 PLANTS

15 PLANTS

UP TO

200 SKUs

AVG ORDER

200 SKUs

AVG ORDER

387,000 SKUs

20 YEARS

AVG PRODUCT LIFE

20 YEARS

AVG PRODUCT LIFE

PRODUCT TYPES

• Stock + Configure to Order
• Engineered to Order

The Connected Enterprise
Implementation & Transformation

Rockwell Automation

15 PLANTS

UP TO

200 SKUs

AVG ORDER

387,000 SKUs

20 YEARS

AVG PRODUCT LIFE

PRODUCT TYPES

• Stock + Configure to Order
• Engineered to Order
The Connected Enterprise
Rockwell Automation transformation Results

<table>
<thead>
<tr>
<th>INVENTORY</th>
<th>CAPEX</th>
<th>DELIVER</th>
<th>LEAD TIMES</th>
<th>QUALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 days to 82 days</td>
<td>30% in capital avoidance</td>
<td>82% to 96%</td>
<td>Reduced 50%</td>
<td>60% reduction in PPM</td>
</tr>
</tbody>
</table>

PRODUCTIVITY > 5% PER YEAR
Productivity gains offset inflation and fund investments
The Connected Enterprise
Implementation at Rockwell Automation

Scalable computing | Rockwell Automation Cloud platform

Mobility | FactoryTalk®

Secure Network Infrastructure | Common Industrial Protocol (CIP)

Multi-disciplined Control & Information | Manufacturing execution mgmt.: FactoryTalk® ProductionCentre

Multidiscipline control & information: Logix

Smart Assets | Data collection
Thank you!
Making Indian Industry Samarth for the VUCA world & 4th Industrial Revolution

Anup Wadhwa
Director
Automation Industry Association
What we are used to…

Manual and partly automated Machines

Mechanized Operations

Improved productivity over Manual operations

Some process parameters controlled

Consistent Yield & Quality not predictable

Data Analysis is not a key skill set

Safety standards are soft
VOLATILE - Next Industrial Revolution
Making the old way will not sell anymore
Smart Plants are Emerging

Remote sensing of objects and environment

Subscribe to my status updates

In a plant, it’s not just about data...
INTEGRATED CONTROL & INFORMATION MATTERS

Cameras deployed for monitoring and security

Just plug me in! I am online and ready for configuration with the line. Here is my configuration

My yield will meet today’s production needs

Everything has a URL

Clean me next shift

7100kWh of energy used today
Opportunity to Transform with New Benchmarks

- **Quality**: Next generation quality management including closed loop control and traceability will shift the definition of quality from “compliance of specification” to customer satisfaction.

- **Productivity**: Integrating people process, technologies along the value chain pushes total productivity to next level.

- **Speed**: Shorter innovation cycles for ever more complex products cuts short “Time to Profit”.

- **Flexibility**: Flexible production system, value chain, and agile workforce, enable individualized mass production in ever changing market condition.
Disruption in Ecosystem

Cloud Products
Automation OEMs
IoT Solution Provider
IoT Platform Vendors
Networking Panel
Panel Builders
IT Infra Network providers
New Products
Distributors
IT Systems
EPC
Smart Machines
Intelligence Line Builders
Cyber Security Providers
Management Consulting Firm
IoT
Enterprise Software OEMs
New Business
Control Integrators
Cloud Providers
Open Networks
Cloud Environment
Robotics
De/skilling

IT Systems
EPC
Smart Machines
Intelligence Line Builders
Cyber Security Providers
Management Consulting Firm
IoT
Enterprise Software OEMs
New Business
Control Integrators
Cloud Providers
Open Networks
Cloud Environment
Robotics
De/skilling
Smart Manufacturing means creating a competent, collaborative and competitive manufacturing process...

India’s needs are unique...

(स्मार्ट विनिमय का मतलब एक सक्षम, सहयोगी और प्रतिस्पर्धी विनिमय प्रक्रिया बनाना है... भारत की जरूरतें अनूठी हैं...)
Collaboration is the bridge

SAMARTH

COMMUNITIES

EDUCATION

SKILLING

ADVOCACY

UDYOG

IITD-AIA Foundation for Smart Manufacturing
Digital, agile businesses outperform traditional business

Typical reaction of traditional Companies to unplanned events

- Event
- Insights about event Become available
- Analysis Completed
- (Counter)-Measure approved
- (Counter)-Measure takes effects
- Value of adaptation
- t
- Insight
- Analysis
- Decision
- Action
- latency
- latency
- latency
- latency

Digital, agile businesses outperform traditional business because they have lower latency and can react more quickly to unplanned events.

Value of adaptation decreases over time as delays and loss of value occur.

Companies with higher latency and slower reaction times are at a disadvantage compared to digital, agile businesses.

www.iafsm.in
Digital Empowerment for People

designed to increase the degree of autonomy and self-determination in people and in communities in order to enable them to represent their interests in a responsible and self-determined way, acting on their own authority.”
It’s a new World!

- VIDEO 1 (Sepak Takraw)
Assess Your Firm’s Readiness

PROCESS
- Operations
- Supply Chain
- Product Lifecycle

TECHNOLOGY
- Automation
- Connectivity
- Intelligence

ORGANISATION
- Talent Readiness
- Structure & Management

Vertical Integration
1. Vertical Integration
2. Horizontal Integration
3. Integrated Product Lifecycle

Shopfloor
4. Shopfloor
7. Shopfloor
10. Shopfloor

Enterprise
5. Enterprise
8. Enterprise
11. Enterprise

Facility
6. Facility
9. Facility
12. Facility

Workforce Learning & Development
13. Workforce Learning & Development

Inter- and Intra-Company Collaboration
15. Inter- and Intra-Company Collaboration

Leadership Competency
14. Leadership Competency

Strategy & Governance
16. Strategy & Governance
LEVERAGE AUGMENTED REALITY (AR) FOR IMPROVING WORKFORCE PRODUCTIVITY

Tushar Ghosh
Technical Manager, North & East
Global software company, headquartered in Boston, MA

$1B+ Revenue

30 years heritage in **Digital Definition**, software & Lifecycle management of things

Industry leading:
- IOT & AR Solutions
- CAD & PLM Solutions

Helps companies accelerate digital transformation

Provides IoT/AR solutions to drive operational excellence and increase workforce productivity
3 LEVERS OF OPPORTUNITY FOR DIGITAL TRANSFORMATION

- Differentiate Products and Services
- Improve Operational Efficiency
- Increase Workforce Productivity
PHYSICAL DIGITAL CONVERGENCE UNLOCKING THE VALUE
Augmented reality (AR) places a digital layer of information over live visuals of the real world...

Also known as “AR”
AR VALUE ACROSS THE INDUSTRIAL ENTERPRISE

- **Design**: 11%
- **Sell & Market**: 13%
- **Manufacture**: 22%
- **Operate**: 14%
- **Service**: 24%
AR KEY CAPABILITIES

**Visualize**

**Enhance** the user’s view of the physical world with the overlay of real-world or hypothetical digital information:
- IoT data
- Digital models
- Third-party data
- Business systems information

**Instruct/Guide**

**Train or guide** users on how to perform a task through the overlay of **digital instructions** or **real-time expert guidance**:
- Real-time transfer of knowledge and expertise
- Digital step-by-step instructions to guide user

**Interact**

**Manipulate** digital graphics or extend a product interface through an **AR interface**:
- Expanded and customize control of product functions
- Modify digital designs
- Enhance physical products with digital experiences
HOW AR CAN HELP IN INDUSTRIAL SPACE?

- 3D AR Work Instructions
- Augmented Process Operation
- Step-by-step 3D guided service instructions
- Expert Knowledge Capture
- Remote Assistance
- Augmented Training

SERVICE, OPERATION & MAINTENANCE
What this means

• 3D step-by-step digital content overlaid on real-world equipment
• Up-to-date & in-context information at your fingertips
• Ability to visualize real-time IoT data and see inside products
AUGMENTED PROCESS OPERATION

What this means

• Augmented digital display of factory floor process parameters
• Augmented health checking of assets for maintenance requirements
• Visualize contextual Safety Instructions
GUIDED INSTRUCTION FOR SERVICE

What this means

• Step by step guided service instructions at the point of execution
• Safety Instructions before executing service
• Contextual service information
What this means

• Digital learning contents on the live view of the physical asset for greater understanding

• Virtual products - walk around and view inside

• Demonstrate large immobile equipment
EXPERT KNOWLEDGE CAPTURE

What this means

- Video capture of tribal knowledge and “best practices” while experts work

- Create step-by-step guidance for set-up, changeover & maintenance

- Publish procedures as hands-free instructions or digital documents
REMOTE ASSISTANCE – SEE IT SOLVE IT TOGETHER!

What this means

• Allows technicians to effectively connect with experts to solve critical issues
• Combines live video, audio and annotations on the live shared view
• Mark-up the real-world
• Precise annotations anchored to real-world
VIEW AR EXPERIENCE ON YOUR FAVOURITE DEVICE

<table>
<thead>
<tr>
<th>Mobile</th>
<th>3D Eyewear</th>
<th>2D Eyewear</th>
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<tbody>
<tr>
<td>iOS</td>
<td>Windows</td>
<td>HoloLens</td>
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<td>Android</td>
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<td>Microsoft</td>
<td></td>
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<td></td>
<td>Vuzix M300</td>
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<td>Realwear HMT-1</td>
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</tbody>
</table>
PTC AUGMENTED REALITY - VUFORIA PRODUCTS

**vuforia® studio™**

**for Enterprise Content Creators**
Powerful AR content creation and publishing solution for industrial enterprises

**vuforia® chalk™**

**for Remote Assistance**
Allows an expert to “see what I see” and annotate in a shared workspace

**vuforia® expert capture**

**Rapid Expert knowledge capture**
Rapidly capture and transfer 1st person perspective expert knowledge

**vuforia® engine**

**for Developers**
Allows custom apps to “see” and puts content in the world
VUFORIA CUSTOMER - INDIA

Use case:
- Inspection
- Manufacturing operation
- NPD

Use case:
- Marketing & Sales

Use case:
- Training
- Manufacturing

Use case:
- Presales
- Manufacturing Process
- Service

Use case:
- Marketing
- Genuine Accessories

Use case:
- Training
- Manufacturing Instruction
- Project Review
Vuforia Customer - India

- Stryker
  - Service
  - Product Visualization

- TVS
  - Training
  - Knowledge capture

- ElectroTherm
  - Sales & marketing
  - Training

- DigiTech
  - Training
  - Service

- NIET
  - Student Projects
  - Education

- IIT Delhi
  - Assembly operation
  - Service
Surface Inspection System for Digital TV Production Line

Kaushik Saha
CTO, Samsung R&D India - Delhi
PURPOSE

• Reduce human operator intervention in DTV production line
  • Increase throughput
  • Reduce errors in product inspection
• Need a standard inspection system for DTV surface to replace inspection by human operator
• Need 0.1 mm resolution to detect defects
System Operation

• Support capturing TV surface image from camera devices
• Develop post-processing system for image captured by camera to make image amenable to automatic detection
• Develop automatic surface defect detection algorithms on pre-processed image
• Distinguish real defect from false defect on DTV
• Provide enough flexibility for differently sized DTV model (32”-55”).
System Functionality Requirements

• 1D/2D Bar Code detection – Various standards to be supported
• Multi Bar Code Detection – Different orientations, Need to separate out barcode from whole TV image
• OCR – Optical Character Recognition
• Image Matching and Pattern Inspection
• Image Correction and Enhancement
  • Correction for Camera distance, Zoom, Different placement of Barcodes & Text
  • Correction of Image Artifacts (Lack of focus, Low contrast, Damaged)
Surface Inspection Technology Developed

✓ Automatic Scratch Detection Front Panel and Rear Cover
  I. Shallow Scratch (>0.1 mm & <0.3mm)
  II. Deep Scratch (>0.3mm & <1mm)
  III. Scratch on Textured surface

✓ Tear Mark or Poly-Cover Damage Detection in Bezel
  I. Machine Learning based classification

✓ Missing Screw Detection in Rear cover
  I. Machine Learning based

✓ Automatic Bad Logo Printing Defect
  I. On white Printed Plastic Bezel
  II. Metal Printed Logo
  III. Back-Light Logo

✓ Multi-Image Stitching Algorithms
  I. Tested on 6/8 Image 14 Megapixel DTV Rear Images
  II. Advance Edge based Correlation technique
Final Stitched Output
Very Large Size Image, 29,000,000 pixels – view @400% to see scratch
Output – 4 out of 5 scratches detected successfully (Image 1)
Surface Defect Inspection Software and User Interface Capabilities

**FRONT**
- PANEL
- SCRATCH Detection

**MIDDLE**
- BAD LOGO PRINTING Detection
- TEAR MARK/ POLY COVER DAMAGE Detection

**REAR**
- SCRATCH Detection
- SCREW MISSING Detection
- BARCODE Detection
- IN-LAY COMPONENTS

**Image Stitching**

**User Interface Development**
- Implementation C# on Windows
- Operator Teaching Window
- Main UI
- Parameter Setting UI
Achievements

• Developed User / Operator Interface of the complete system
• ~98% accuracy in logo segmentation and bad logo classification
• Tear Mark Defect Detection in Middle Region Sensitivity = 89.4%, Specificity = 88.2%
• Panel Scratch Defect... ~88% accuracy
• Screw Missing Detection tested on real production images, sensitivity = 92%, specificity = 84.2%
• Algorithms Timings – Rear Defect Detection ~5.6 sec; Front defect Detection ~1.5sec
THANK YOU
IIoT INDIA

RE-IMAGINING THE FUTURE

#iiotindia
5-6 DECEMBER 2019
IIT DELHI, INDIA

SMART MANUFACTURING  SMART INFRASTRUCTURE

Organised By

Industry Partner

Ecosystem Partner

Co-located Event

SingEx
AIA
FSM
EELERATE INDIA
Introduction
Introduction To TEMASEK & SingEx Holdings

TEMASEK

Temasek Holdings is a state-owned holding company owned by the Government of Singapore. Incorporated in 1974, Temasek owns and manages a net portfolio of S$275 billion (as of 31 March 2017), with S$18 billion divested and S$16 billion invested during the year, and 68% exposure to Asia - 29% Singapore and 39% Asia ex-Singapore.

SingEx

SingEx Exhibitions India harnesses industry insights and strategic networks to develop, curate and organise a series of trade exhibitions and conferences in various emerging industries in India. These events aim to connect businesses in India with Asian and international organisations, and facilitate business matching opportunities and knowledge sharing.
Vision For IIoT India Platform
**Vision For IIoT India Platform**

IIoT India is an event to bring together an ecosystem of manufacturers, government agencies & businesses ranging from multinational corporations (MNC) to small and medium enterprises (SMEs) to shape and support their transformative initiatives by creating collaboration and knowledge sharing opportunities in the Smart Manufacturing & Smart Cities value chain.

**Vision:**

- To build IIoT India into a leading business platform in India which will shape and course correct the efforts towards future growth of Industrial IoT
- An annual gathering of industry players to learn, understand, share, collaborate, do business and sustain growth; a “must attend” calendar event.

**Objectives for 2019:**

- Establish IIoT India as a credible & recognized platform for facilitating industry-wide efforts & collaboration
- To showcase and demo innovative technologies and digital solutions from global players and budding innovators
- Build content and inspire influencers and leaders from industry to take definitive action. *(By The Leaders, For The Leaders)*
Stakeholders

Broad Level National Agenda
- Get support and strategic insight in terms of policies.

Specific Industry Focus
- Provide insights on industry trends and guide in the development of market relevant content, the overall theme and framework for the event, and develop Assessment Framework for India.

Promote and Represent Members’ business interest
- Region wide engagements and content curation for the event, information dissemination, and developing baseline dataset from Assessment Framework for India.
India’s Take on IIoT & Industry 4.0 and What’s being planned?
SMART MANUFACTURING

SMART INFRASTRUCTURE
Historically China has been the hardware base of the world whilst India catered to the software market. However, India is poised to jump up to 5th spot in Manufacturing competitiveness by 2020 as per Deloitte’s Predictive study. Factors facilitating this paradigm shift are:

- Labour Costs
- Global giants entering India (From CBU > SKD > CKD > Manufacturing)
- Cost of Production
- Ease of Doing Business
- Transportation Costs
- COST COMPETITIVENESS ??
IIoT market size is expected to be US $ 4.95 Billion by 2020 in India.

Utilities, Manufacturing and Healthcare are expected to see the highest adoption levels of IIoT in India.

- Smart Utilities IIoT market size to be US $ 1.8 Billion by 2020 in India
- Manufacturing IIoT market size to be US $ 0.4 Billion by 2020 in India
- Healthcare IIoT market size to be US $ 0.3 Billion by 2020 in India
- IIoT market size to be US $ 2.3 Billion for other industries, by 2020 in India

Source: GE Estimates*
Connected Growth
Internet of Things has reached industrial production and might soon extend to the consumer market as well.

**IoT Market in India (₹ cr)**
- 2015: 29,600
- 2020*: 1,00,900

**IoT LANDSCAPE IN INDIA (%)**
- Start-ups: 60-65%
- Mid-sized firms: 20-25%
- Integrated firms: 15-20%

*Estimated: start-ups setup in 2012 & after, mid-sized firms setup between 2005 & 2012, integrated firms are IT-BPM firms offering IoT Services & Products. Sources: Nasscom

**IIOT PLATFORMS FOR MANUFACTURING**
- **Global IIOT Platforms for Manufacturing Market**
  - 2018: $1.7B
  - **2024: $12.4B**
  - CAGR: 40%

**Fast growing (40%) IIOT Platforms for Manufacturing Market:**
- 60% of the market is within factory environments.
- Discrete manufacturing is the biggest segment, followed by Process and Batch manufacturing.
- Asia to become the biggest region for IIOT platforms.

**TOP USE CASES IN MANUFACTURING**

A "Learning Journey" approach to be followed to engage companies based on different level of adoption of IoT in Smart Manufacturing & Smart Cities

**Profile**

- Innovators
- Taking successful strategic experiments and implementation mainstream ‘enterprise wide’
- Have some projects underway
- Using strategic experiments & prototyping as a business case and roadmap – ‘Pilot run’
- Some awareness of Industrial IoT
- Local operating structure and processes
- Open to embrace new technology and ideas

**Learning Journey Application**

- Advanced track targeted at integrated product lifecycle solutions / skills training
- Contributor at conference sessions
- Intermediate track targeted at vertical integrated / horizontal integration solutions provider
- Recommended demonstration areas and key notes to deepen understanding of Industrial IoT transitional phase and to help future proof their businesses
- Simplified track with recommended list of solution providers to meet
- Recommended demonstration areas and key notes to attend to understand Industrial IoT concepts, evaluate readiness and empower them to take first step
WHAT ALL IS IN STORE?

EXHIBITION
Unique IoT solutions and products will be featured at this platform focusing on the niche & substantial arena of Smart Manufacturing & Smart Cities.

CONFERENCE
Illustrative case studies, highlights of new & innovative technologies, and the changing face of competition & collaboration in India will be the core focus of the two-day seminar.

EXPERIENCE ZONE
The Experience Zone at IIoT India will bring together leading brands and tech innovators to demo new technologies and witness some of the brilliance from the industry.

BUSINESS MATCHING
Business Matching feature will offer all attendees and exhibitors the opportunity to pre-schedule one-on-one meetings based on business preferences.

WHAT TO EXPECT – IIoT INDIA 2019 IN NUMBERS

- 3500 + Industry Players
- 3000 + Industry Players
- 200 + Delegates
- 100 + Exhibitors
- 8 Focus Sectors
International Advisory Committee Members
# Conference Agenda

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<table>
<thead>
<tr>
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<tr>
<td>1</td>
<td>Human-touch enhanced (India &amp; Industry 4.0)/ Machine to human interaction (India &amp; Industry 4.0)</td>
</tr>
<tr>
<td>2</td>
<td>Automation – Innovative development in India</td>
</tr>
<tr>
<td>3</td>
<td>The story of an MSME and its fight with Industry 4.0</td>
</tr>
<tr>
<td>4</td>
<td>India’s path to Industry 4.0 – Machine as a service</td>
</tr>
<tr>
<td>5</td>
<td>IoT in telecommunication and 5G</td>
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<tr>
<td>6</td>
<td>Jobs 4.0</td>
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</tbody>
</table>
2018 Edition At A Glance

**CUSTOMER’S VOICE**

**Visitors**

- Satisfied In Terms Of Meeting Objectives
  - 49% Overall Satisfied
  - 78% Very Satisfied

**Objectives For Attending IoT India 2018**

- 10% To Look For New Products, Technologies, Solutions
- 36% To Look For New Suppliers
- 34% To Meet New & Existing Suppliers
- 20% To Place & Procure Orders

**Exhibitors**

- Satisfied With Participation At IoT India 2018 In Terms Of Meeting Commercial Objectives
  - 48% Overall Satisfied
  - 72% Very Satisfied

- 58% Likely To Exhibit In The Next Edition

**Participation from more than 50 Exhibitors from across the globe**

- Over 30 Speakers from leading global MNCs
- 150+ Delegates attended 20+ Conference Sessions

**More Than 1500 Visitors attended the Inaugural Edition**

- Co-located with Xelerate India, a platform to foster & bolster the potential of Indian Start-up Ecosystem
- 40+ Hosted Buyer Meetings conducted

www.iiotindia.co.in
Thank You