Thailand Technology Summit 2016

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INSTALLED BASE MIGRATION SOLUTIONS
Staying Current
Honeywell Evolution Vision

- Keep your reliable system running longer with different modernization options
- Protect intellectual property and capital investments
- Provide services support for upgrade to the new technology

Delivering continuous evolution for 40+ years

Committed to Protecting Your Automation Investments
## Technology Development in the Past – Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>Technology</th>
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<tbody>
<tr>
<td>1975</td>
<td>TDC 2000</td>
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<tr>
<td>1983</td>
<td>TDC 3000 Universal Station</td>
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<tr>
<td>1988</td>
<td>Process Manager</td>
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<tr>
<td>1996</td>
<td>FSC integrated in TPS / TPN</td>
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<tr>
<td>2004</td>
<td>Experion Station TPS</td>
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<tr>
<td>2007</td>
<td>C300 and SM integrated in Experion PKS</td>
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<tr>
<td>2010</td>
<td>Unified HMI using Experion PKS</td>
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<tr>
<td>2013</td>
<td>Ethernet based EUCN and EHPM</td>
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**Classic Technology**

**21st Century Technology**
TDC/TPS Evolution to Experion

Experion Orion Console
Experion Station – TPS

History Module

Experion Server - TPS

Application Module

Local Control Network

Fault Tolerant Ethernet

Level 2 Switch

Universal Control Network

Data Hiway Control Network

Evolving in Managed Stages
TPS Merges into Experion

Fault-Tolerant Ethernet

Experion Station

EHPM

C300

Safety Manager

Vision

TPS Components Gradually Melt into Experion
Unified Control Environment Benefits

Sustainability
- Keeps your plant running longer
- Protects your Intellectual property (IP)
- Protects your CAPEX investments
- Utilize skills / resources

IP, CAPEX life extension to 2035

Process Expansion Efficiency
- Expansions with controllers of choice
- Replication of Control functions
- Replication of applications and HMI

Up to 50% reduction in engineering cost

Maintenance Efficiency
- Better diagnostics
- Reduced maintenance
- Skilled labor availability

Maintenance cost reduction >5% with modernization

Support Longevity and Improved Plant Performance
TPN/EPKS Control Networks as of Today

EHPM Solutions Phase 1
First Release in 2013

Expansions and One-Time UCN Upgrade Solution
Preparation for Modernization

FTE infrastructure engineering and setup

- FTE cables installation
- Level 2 switches installation
- CF9 firewalls Installation
### What is new: Simplified Migration Approach

<table>
<thead>
<tr>
<th>Addressed Customer needs</th>
<th>The Honeywell solution</th>
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<tbody>
<tr>
<td>• Investment Linearity</td>
<td>• Step-wise UCN controllers upgrade</td>
</tr>
<tr>
<td>• Investment planning flexibility</td>
<td>• TRUE on-process infrastructure setup</td>
</tr>
<tr>
<td>• Eliminate process downtime</td>
<td>• TRUE on-process HPM-EHPM upgrade</td>
</tr>
<tr>
<td>• Minimized engineering effort</td>
<td>• No changes - control, applications, HMI</td>
</tr>
<tr>
<td>• Minimized upgrade/expansion risks</td>
<td>• Coax &lt;-&gt; FTE devices peer-to-peer communication on the hybrid UCN</td>
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The Best Control Network Modernization We Have Ever Made
Step 1: Setup Hybrid UCN (NIM to ENB upgrade)

Reduced Downtime by TRUE On-Process NIM-ENB Upgrade

OPM & step-wise upgrades using ENB
Planned 4Q2016 – ENB (Enhanced Network Bridge)
TPN686.1; EPKS R432.1
TRUE On-process Upgrade : NIM to ENB

- Create a back-up – checkpoint
- Power down – secondary NIM
- Upgrade the hardware
  - Select 3 slot position
  - Setup FTE index, UCN address
  - Connect FTE cables
- Power-up/Load secondary
- Power down – primary NIM
- Upgrade the hardware
- Power-up/Load primary
- Upgrade - completed
Primary NIM to ENB Upgrade

Front View

ENIM node 17 - EUCN 4

ENB node 30 – (E)UCN 10

Rear View

EUCN 10 FTE

UCN 10 coax

ENIM node 17 EUCN 4

ENB node 30 (E)UCN 10
Step 2: On-process HPM to EHPM Upgrades

HPM to EHPM upgrade
Planned 4Q2016 – TRUE On-Process Upgrade
Retain peer-to-peer communication

Reduced Downtime by TRUE On-Process HPM-EHPM Upgrades
TRUE On-process Upgrade Steps: HPM to EHPM

- Create a back-up – checkpoint
- Power down – secondary HPM
- Upgrade the hardware
  - Setup FTE index, UCN address
  - Replace hardware
  - Connect FTE cables
- Power-up/Load secondary
- Power down – primary HPM
- Upgrade the hardware
- Power-up/Load primary
- Upgrade - completed
Step 3: Upgrade FSC Controllers to SM on EUCN

FSC to SM upgrade
Planned 3Q2016 - Off-Process Upgrade SM R160.2
TUV approved migration tools

No Application Changes for FSC - SM on EUCN Upgrades
Off-process upgrade steps: FSC to SM on EUCN

- Create a back-up – checkpoint
- Upgrade FSC software to R800
- Transition FSC software to SM
- Power down the cabinet
- Execute hardware changes
  - Replace card files
  - Install SM Central Parts
  - Connect FTE cables
- Power-up SM
- Install applications
- Reload Checkpoint
- Upgrade - completed
Step 4: Triconex-SMM to Triconex-TCMI on EUCN Upgrade

Triconex-SMM to Triconex-TCMI upgrade
Planned end 2017 - Off-Process Upgrade TPN R687

No TPS Applications and Displays Changes
Off-process Upgrade steps to Triconex-TCMI

- Create a back-up – checkpoint
- Upgrade Triconex to V10.3 or later & include TCM module
- Execute application changes on Triconex system
- Install Honeywell TCMI
- Power down Triconex
- Execute hardware changes
  - Install TCM card
  - Connect TCM-TCMI cables
- Power-up Triconex system
- Power up TCMI and Checkpoint load
- Upgrade - completed
Step 5: LM/IPC620 to ELMM/C300 on EUCN Upgrade

LM/IPC 620 to ELMM/C300 upgrade
Released 2015

Low- Risk and Minimum-Downtime Upgrade for LM
Upgrade steps: LM/IPC 620 to ELMM/C300

- **Execute Engineering Activities (Offline activity)**
  - Build C300 control strategies from IPC 620 Ladder logic using the LM – C300 conversion tool

- **Create Checkpoint - LMM and backup all the IPC data**

- **Shutdown IPC, LMM and LCS IOMs**

- **Execute Hardware Changes**
  - Remove LM, LCS IOMs and mount C300, ELMM
  - Connect CF9 with ELMM to L2 switch having the ENIM
  - Make all necessary power and switch connections
  - Follow standard C300 power on procedures

- **Load ELMM with TPN R685.3 or later personality**

- **Restore LMM checkpoint on ELMM**

- **Load C300 controller and Series C / PM IO**

- **Upgrade completed**
Step 6: Changeover ENB to ENIM

ENB to ENIM changeover
Disconnect coax UCN cables

Step-Wise Control Network Upgrade Completion
On-process ENB to ENIM Changeover

- Create a back-up – checkpoint
- Power down secondary ENB
- Disconnect UCN coax cable
- Remove EPNI and EPNI IO boards
- Power-up/load secondary – ENB becomes ENIM
- Power down primary ENB
- Disconnect UCN coax cable
- Remove EPNI and EPNI IO boards
- Power-up/load Primary – ENB becomes ENIM
- Changeover - completed
Additional Benefits from Simplified Migration

Production Downtime

- TRUE On-Process initial setup
- TRUE On-Process HPM to EHPM upgrade
- On-Process change to the final setup

Reduce up to 30% of production downtime for migration activities

Automation Planning

- Investment linearity
- Step-wise incremental upgrades
- On-process changes
- Changes during shutdown

Up to 80% automation planning accuracy improvement

Modernization Investment

- No changes in control, applications, HMI
- Independence from ageing workforce knowledge
- Minimal engineering / training requirements

Total upgrade investment reduction larger than 25%

Reduced Risk and Investments Savings
The TRUE On-Process HPM-EHPM Upgrade

Availability of process view / control at any time
C200/C200E Support

- **Support Status Updates**
  - 31st August 2015: C200/C200E and Series A I/O withdrawn from Sales for all new installations and expansions. Transit to Legacy Support Phase. Spare Parts are available.
C200/C200E and Series A I/O Support

- Migration Path
  - C200/C200E with PMIO
    - C200/C200E to C300 upgrade kit available to fit in the space of a single C200/C200E chassis
    - Minimal changes with engineering tools to import Control Strategies to C300
    - Graphics remain unchanged
    - Phase migration supported with retention of IO and field wiring
      - Upgrade may be conducted while system remains online through careful planning and mitigation of risk
  - C200/C200E with Series A I/O
    - Plan to move to C300 retaining IOs untouched
40 Years Honeywell Safety System Evolution

Table 1

- Y1975
- Y1984
- Pepper & Fuchs
- Wildevuur
- Euro-Relay
- Solid State
- TMR

- Y1994
- FSC
- Y1996
- Plug and Play – V2
- HD-AI

- Y1998
- Rel20x
- Rel50x
- Rel530
- New FTA
- ‘Flash’

- Y1999
- Rel60x
- FGS
- SM

- Y2000
- FSC-blue

- Y2004 '07
- Y2009
- Y2016

- Y1994
- Honeywell Integrated ICSS solutions

- Y2001
- QMR technology introduced

- Y2005
- First Safety Manager on process

- Y2010
- Universal Safety IO

- Y2012
- Advanced Experion Integration

- 1988
- First FSC system on process

- 1996
- FSC integrated in TPS

- 2000
- FSC integrated in Experion PKS

- 2001
- QMR technology introduced

- 2005
- First Safety Manager on process

- 2010
- Universal Safety IO

- 2012
- Advanced Experion Integration
Best Investment Choice for Life Extension (Minimal Disruption Option)
Continuous Innovation: Experion LCN

Moving towards the next Evolution: ELCN
ELCN Node Types

• **T-Nodes**
  - EST, ESVT, ACET, EAPP
  - Embeds Experion T-Node subsystem within Experion node
  - Deployment consistent with standard Experion node
    ▪ Eliminate LCNP4 and Coax LCN/MAU connection

• **Appliance Nodes**
  - AM, EHB, HM, ENIM, NG
  - LCN personality is standalone on platform
    ▪ No co-existence with Experion node software
  - Deployment options
    ▪ Universal Embedded Appliance (UEA) Physical - ARM based
    ▪ Virtual Appliance - x86 based
New Experion LCN Hardware

- Universal Embedded Appliance (UEA)
  - ELCN Bridge and Appliance Physical Nodes
  - Triconex Communications Module Interface (TCMI) replaces Triconex SMM
  - ¼ the size of a Classic LCN Node – LCN Cabinet, Dell Cabinet Mount

Front

Display
Migration and selection buttons
Key Switch

First Module
Second Module

1.75 in 44.45 mm
19 in 482.6 mm

Back

AC Power
Fan/Vent
Module Redundancy Port
MAU Ports
FTE A and B
TCMI Ports
Rear Module is removable
Honeywell Evolution Vision

- Keep your reliable system running longer with different modernization options
- Protect intellectual property and capital investments
- Provide services support for upgrade to the new technology
Thank You