2013 Honeywell Users Group Europe, Middle East and Africa

Theo van Nes
Multi EPC Projects Strategy
Major Global Projects Today

• What is different?
  – Over the last 7 to 10 years, projects have gotten larger
  – No one EPC, often no one owner will or can take full ownership

• Implications
  – Work is often done by multiple EPC’s
  – Work can be done under multiple owner guidelines

• Some project deliverable impacted more severely
  – Plant operations must be seamless
  – Operators must all see and use same plant data
  – Plant wide systems must inter-connect

• Hence the need for a Global Integrated Main Automation Contractor
Global Main Automation Contractor

• Elements of success
  – State of the art technology
    • Technology built around integrating disparate systems
    • Technology which allows global team to interact in every project phase
  – A true global footprint
    • Not just people in multiple countries
      – But an integrated global team with global standards
  – A proven track record of execution to global standards
  – WITH a path to integrate lessons learned
Keys to Success on Mega Projects

• Strong executive ownership
• Strong Program Management Team
• Optimum Project Organization
• MAC empowered to drive standards
• Common Framework across EPCs
• Consistent Global Practices
• Incorporation of Lessons Learned
• Personnel Management
• Best Proven and Scalable Technology
From Pearl GTL to Top Performance

Learning captured via Knowledge Management and Organizational Learning applied to each subsequent Project

- Sharq Petrochemical Complex
- Codelco
- Alcoa
- Experion Orion Virtualization, U I/O
- Re-Org to Global LOBs
- Many Mega Projects lev’g GPM /Tools
- Borouge 1, 2 & 3 Petrochemicals

- SGD Start Up, Learning captured
- 2013 Top Quartile, Safe & Secure Mega Projects
- GPM – Global Project Methodology, latest update 2012
- Standards – Tools, Standard Builds, SUDS, etc
- Technology Experion 410, FDM, SM
- Equate 1 & 2 Petrochemical Complex
- Tasnee Petrochemicals
- 2004 First Multi-EPC Mega Project begins – Pearl GTL

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Advanced Solutions
Projects & Automation Solutions
Lifecycle Solutions & Services
Engineered Field Solutions
Field Products

Global Sales
Asia Pacific
EMEA
Americas

Global Marketing
Global Tech/Ops
Global Support Functions
Execution Methodology for FEED Package

Project Management
- A Program Manager and Program Team will be assigned at the start of the FEED Project
- Overall responsible for the project FEED delivery
- Develop and maintain detail FEED execution plan
- Maintain project FEED schedule updates and monthly reports
- Establish communications Plan for entire program
- Ensure issues are resolved or escalated to senior management (if required) for resolution

Engineering Management
- Program Engineer Manager and Standards Team will be assigned to follow project from FEED through FAT
- Leads will be assigned for all necessary Groups from Front Office location
- GES Engineers will be assigned to work on the project in the same location as the Leads
- FEED Team will set MAC Standards to control design of systems, configuration and graphics
FEED Deliverables – Control & Safety Systems

- Process Control & Safety System
  - Automation System Architecture Design
  - Operator Effectiveness Design
  - Operations and Control Philosophy
  - Alarm Management Philosophy
  - PCS Functional Requirements Specification
  - Packaged Equipment Integration Definition
  - Process Narrative Template Design
  - Control Strategy Templates
  - Hazop / SIL assessment support
  - Control Room Ergonomic Design
  - Standard Cabinet Design Basis
  - Power & Heat Loading Calculations
Execution Methodology for Detailed Engineering

Project Management

• PM assigned for EPC pkg. will be single point of contact for EPC Contractor and will report to Program Manager

• Overall responsible for the project delivery

• Develop and maintain detail project execution plan and Schedule. Produce Monthly Status Report

• Ensure issues are resolved or escalated to senior management (if required) for resolution

Engineering Management

• MAC Standards Team to control design of systems, configuration and graphics based on FEED project standards
  
  – Any deviation will need to be approved before implementation

• EPC Package Project Engineering Team will develop graphics based on approved HMI Shape Library from the FEED

• All detail design documentation will follow approved functional design documentation

• Package Engineer Lead will be assigned to assure smooth integration of third party packages

• Detail test procedures will be based on approved functional test procedures

• GES Engineers that worked on the FEED will be placed in back office to lead the back office engineering team and coordinate with front office team.
Staff location flexibility to achieve maximum alignment
### Typical Roles & Responsibilities Matrix

**Automation Management Organization**

<table>
<thead>
<tr>
<th>Major Category</th>
<th>AMT</th>
<th>AAG</th>
<th>EPC</th>
<th>MAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistent implementation of ICSS across EPC projects</td>
<td>Accountable</td>
<td>Support</td>
<td>Support</td>
<td>Lead</td>
</tr>
<tr>
<td>Communicate standards, design templates &amp; best practices to EPCs for long term benefits</td>
<td>Lead</td>
<td>Accountable</td>
<td>Support</td>
<td>Support</td>
</tr>
<tr>
<td>Interpretation &amp; enforcement of Automation standards</td>
<td>Accountable</td>
<td>Lead</td>
<td>Support</td>
<td>Support</td>
</tr>
<tr>
<td>Deploy &amp; enforce Frame Agreement</td>
<td>Accountable</td>
<td>Support</td>
<td>Support</td>
<td>Lead</td>
</tr>
<tr>
<td>SPI Implementation</td>
<td>Support</td>
<td>Support</td>
<td>Accountable</td>
<td>Lead</td>
</tr>
<tr>
<td>Conflict resolution/Technical issues/Schedule issues/Risk Analysis</td>
<td>Support</td>
<td>Accountable</td>
<td>Support</td>
<td>Lead</td>
</tr>
<tr>
<td>Standards Review</td>
<td>Accountable</td>
<td>Lead</td>
<td>Support</td>
<td>Support</td>
</tr>
<tr>
<td>Sharing of best practices</td>
<td>Support</td>
<td>Accountable</td>
<td>Support</td>
<td>Lead</td>
</tr>
<tr>
<td>Audit Requirements</td>
<td>Support</td>
<td>Lead</td>
<td>Support</td>
<td>Accountable</td>
</tr>
<tr>
<td>Control Strategies, Narratives, Logics, FAR, FGS &amp; 3rd party conceptual egp layouts</td>
<td>Support</td>
<td>Support</td>
<td>Lead</td>
<td>Accountable</td>
</tr>
<tr>
<td>Configuration Input design data, HMI Graphic layouts, Loop Segment diagrams</td>
<td>Support</td>
<td>Support</td>
<td>Lead</td>
<td>Accountable</td>
</tr>
<tr>
<td>FAT, SIFT, SAT procedures</td>
<td>Support</td>
<td>Support</td>
<td>Accountable</td>
<td>Lead</td>
</tr>
<tr>
<td>Desing Doc/drawings Reviews</td>
<td>Support</td>
<td>Support</td>
<td>Lead</td>
<td>Accountable</td>
</tr>
<tr>
<td>Safety, Health and Environment</td>
<td>Accountable</td>
<td>Accountable</td>
<td>Accountable</td>
<td>Accountable</td>
</tr>
<tr>
<td>All ICSS MAC scope of work &amp; Quality (equipment and services) as in the project specification</td>
<td>Support</td>
<td>Support</td>
<td>Support</td>
<td>Lead &amp; Accountable</td>
</tr>
</tbody>
</table>

**AMT** - Automation Mgt Team (Steering/Snr Mgt) / **AAG** - Automation Alignment Group (Client/MAC/EPC)
Technology Redefining Execution

• Tradition - Iterative Approach to Engineering Design
  • Results in Waterfall model – every stage relies on completion of the last stage
  • Forces early freeze dates – commits costly change into the program

• Technology led new approach
  – Separate the hardware from the software
  – Identify and optimize task dependencies
  – Encourage modularization and flexibility
Late data binding
- Less rework, joint development
- Secured end date
Essential Technologies & Processes

• Opportunities given by Universal I/O
  – Field cabling data
  – Marshalling still required?
  – Cabinet standardization
  – Less cabinets, less equipment room space required

• Opportunities given by Virtual Machine Technology
  – Early joint development of applications
  – Early Pilot Testing
  – Hardware and Application FAT fully segregated
    • System hardware shipped, continue application testing
Adaptable Universal IO for Safety

• 32 channels & redundant

• AI, AO, DI & DO on any channel
  – Four Cards to One using soft marshalling
  – HART Enabled

• Field Mount:
  – Temp: -40C to +70C
  – Single Mode Fiber – Up to 10km
Why Universal Channel Technology?

- Simpler project design
- Reduced hardware
- Adapts to late wiring changes

Reduces Project Cost and Risk
Virtualized Project Cooperation Concept

Honeywell Affiliate local to EPC
Lead Engineering

Honeywell local (end destination) Engineering
Commissioning support

Honeywell Global Engineering Services (GES)

EPC Contractor

Data Center imaging the Control System

Isolated Cyber Secure environment

CONTRACTOR/Client Project Director

Managing Technical Progress

Progress Monitoring and Pilot testing support

Application Development and Internal Testing

Application Support and Familiarization

Progress Monitoring

Isolated Cyber Secure environment

Managing Standards, Resources and Schedule

Resource Management

Progress Management and Executive Sponsoring

Managing Technical Progress

Commercial and Technical Communication

Functional and Technical Design Development

Project Director

CONTRACTOR/Client
Increases Engineering Efficiencies

• Better collaboration
  – Earlier and more integrated collaboration for standard setting
  – Reduced Engineering time
  – Improved quality

• Optimum use of resources
  – Shared resources across the globe – maximize usage
  – Better access to groups of subject matter experts for projects

• Better testing strategy
  – More decoupled
  – More flexible
Value of Virtualization

Traditional
People and equipment staged early in project in a single location

Virtual
Project staged in data center; people distributed; equipment not required until late in project

Experion Virtualization

Start Up with New System x Two-Year-Old PCs in Need of Refresh