2012 Honeywell Users Group Americas

Sustain.Ability.

Tom Williams
ISA-106 and Automated Procedures

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ISA-106 Goals and Leadership

- Goals:
  - Develop Standards for Procedure Automation for the Continuous Process Industry (Analogous to ISA-88 for Batch Process Industry)
  - Issue Technical Report in 2012
  - Issue Standards in 2012-2013 for review
  - Promote Procedural Automation
- Leadership:
  - ISA Managing Director (ISA-106 Sponsor): Maurice Wilkins, Yokogawa
  - Co-chair: Yahya Nazer, Dow Chemical
  - Co-Chair: Marty King, Chevron moving into team role due to reassignment
  - Co-Chair: Bill Wray, Bayer Material Science, was Vice-Chair
  - Editor: Dave Emerson, Yokogawa

ISA-106 Membership

- Very Broad Group (about 150 persons)
  - Operating companies

    Oil, Gas and Petroleum Companies (ConocoPhillips, Valero, Shell, Chevron, Aramco, Total, Qatar, Irving Oil, ExxonMobil, BP Lubricants, Lubrizol, etc.)

    Chemical Companies/Pharmaceutical (DOW, AirLiquide, Bayer Material Sciences, Eli Lilly, Braskem, GE Energy, DuPont Metalandes, P&G, EastmanKodak, etc.)

    Nuclear Industry/Government (Savannah River, AREVA)
  - Vendors (Yokogawa, Emerson, Honeywell, Invensys, ABB, Rockwell, Siemens)
  - Consultants & Systems Integrators (Complete Systems Automation, ChemTech, ControlDraw, MAA, Inc., PAS, NNE Pharmaplan, Redstone Investors, Herman Storey Consulting, Skillpad)
  - Media (ARC Advisory, Putnam Media)
  - Universities (Oklahoma State, University College, Ghent)

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Technical Report & Annexes

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Hard work of a Committee

- Definitions
- Models
- Examples

These have generated nearly all of the discussion

Major Themes

- Models:
  - Procedure Automation Model
  - Physical Model
  - Procedure Requirements Model
  - Procedure Implementation Model
- Sharing of Best Practices and Examples

- Procedure Automation Structure using Process States (Advocated by DOW)
  - (state-based automation of procedures)

Basic Process Control System (BPCS)

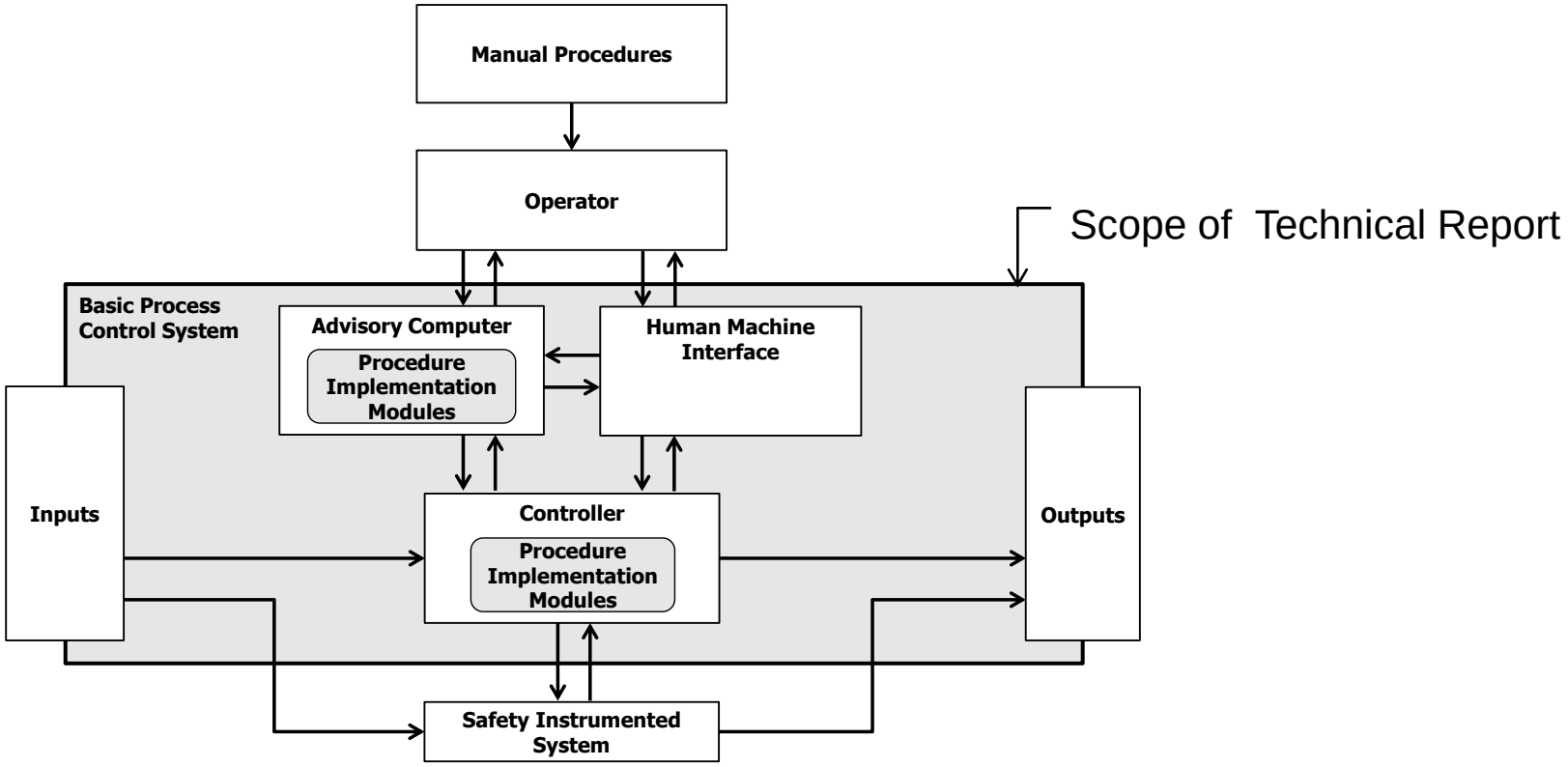

Figure 16 Implementation Modules Mapped to BPCS Components

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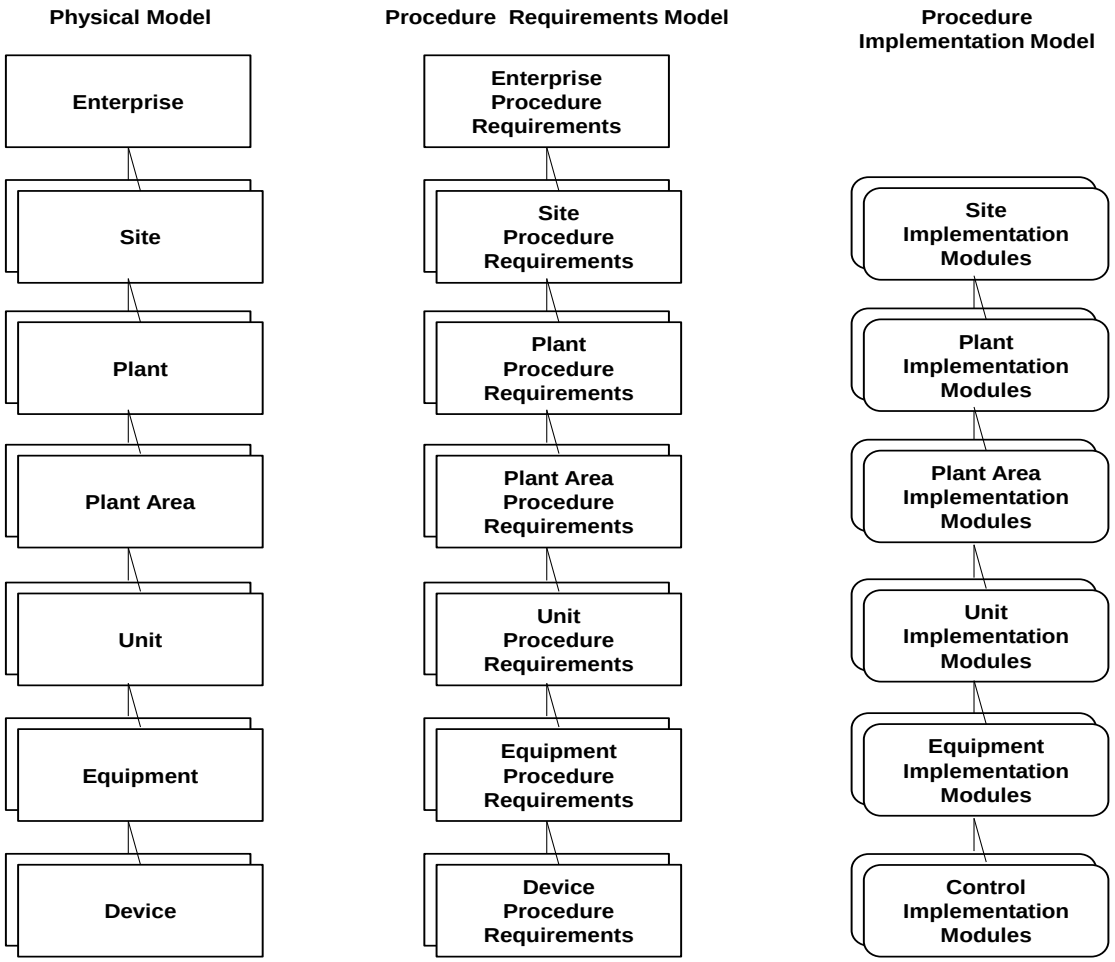
Mapping Between Physical Model through Implementation



Comparison ISA-95, -88, and -106

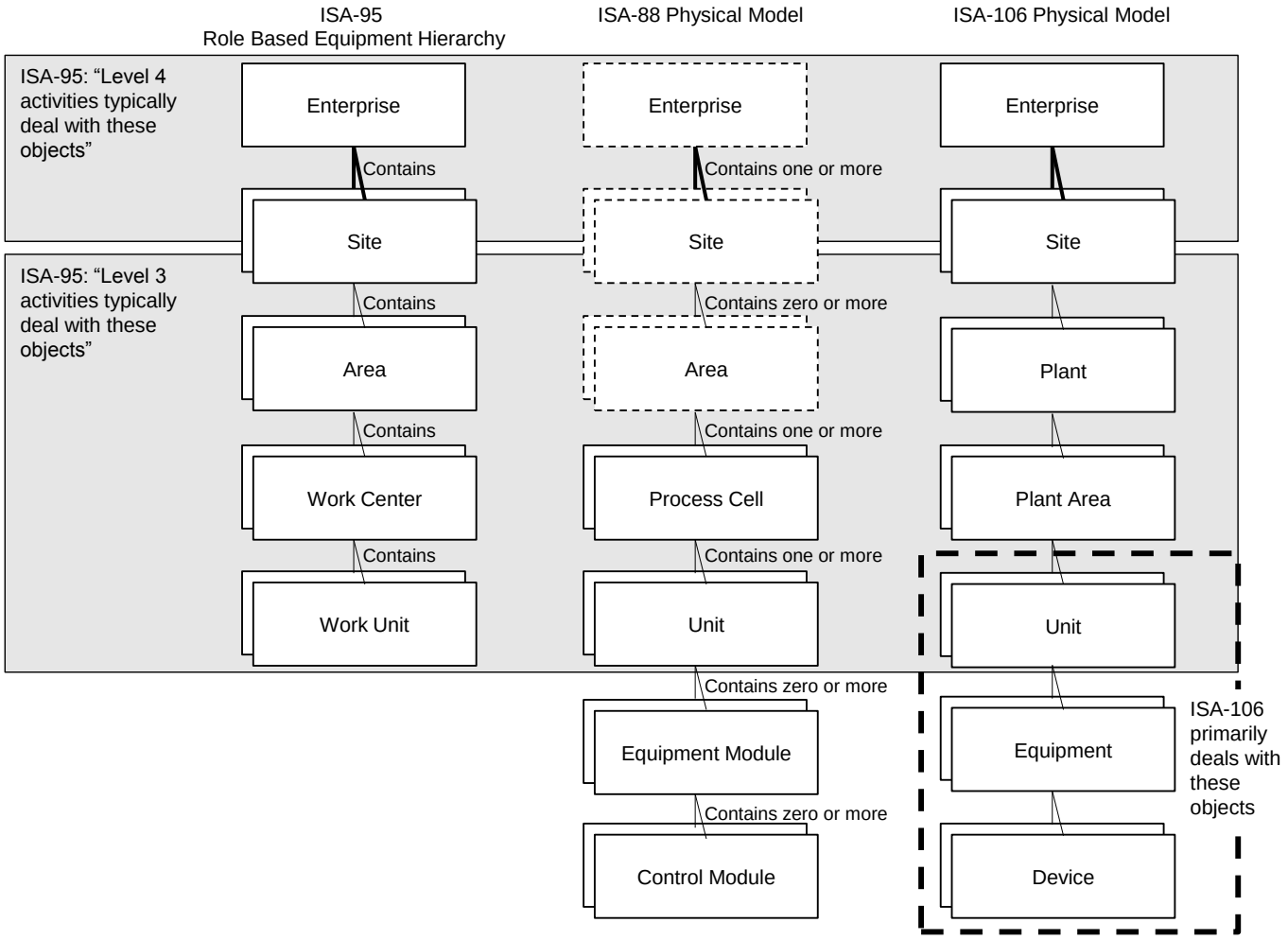
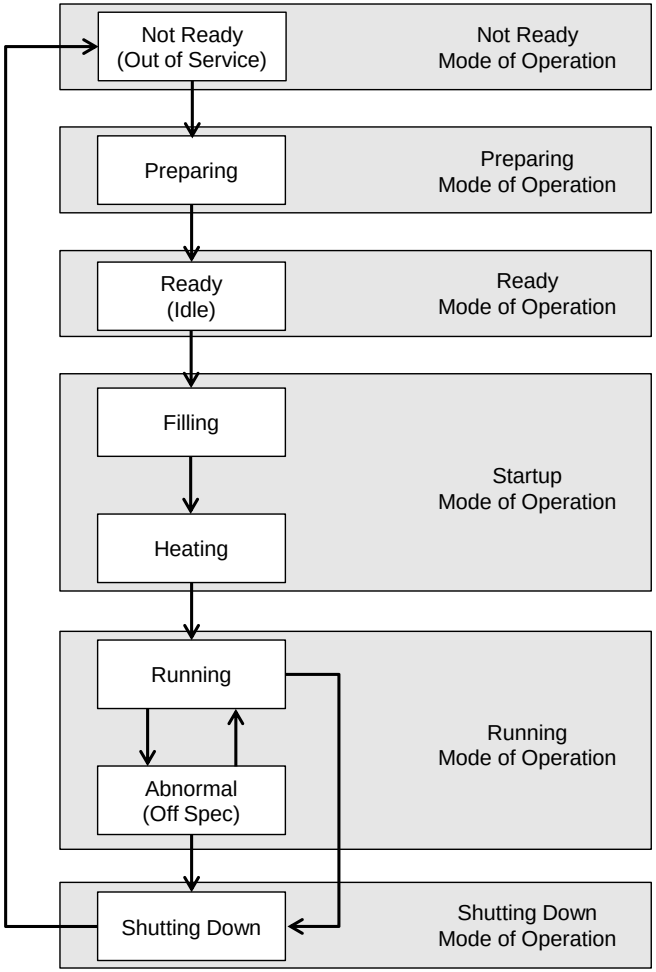


Figure 19 Comparison of ISA-95, ISA-88 and ISA-106 Physical Models and Equipment Hierarchy

Procedure Automation via Process States

Dow's Experience & Practices are described in the Technical Report



In each process state different functions maybe available to the operators via programming to allow predetermined actions, set predetermined alarm modes, etc.

In one mode an abnormal situation management handler may be invoked to deal with a specific problem that has occurred before or can be anticipated. In other modes this maybe a bad choice.

What is Operator Effectiveness?

"…Smart technology alone cannot ensure success without proper operating procedures and trained, motivated personnel."

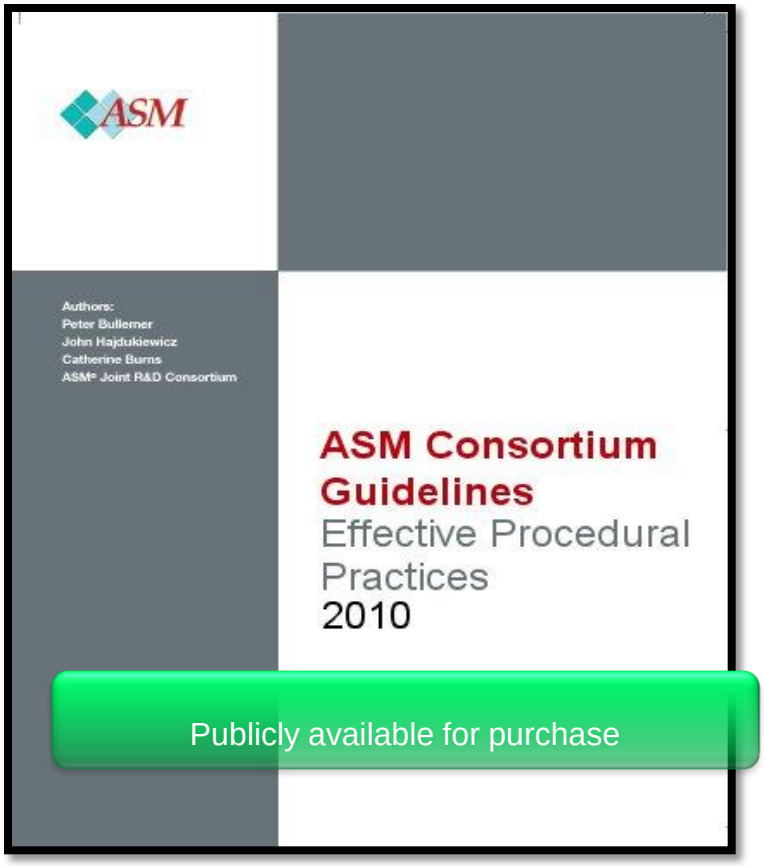
Joseph P. Shunta,
Achieving World Class Manufacturing Through Process Control, p. 3
Prentice-Hall, Inc. Englewood Cliffs, NJ 1995

Operator Effectiveness is the optimal combined use of environment, systems, operating discipline, and human operator skills to achieve the best possible results

Automation Philosophy and ASM Consortium

- Procedural Automation is one component of Operator Effectiveness:
  - Operator retains responsibility for outcomes
  - Use very carefully considered graphics, sequences, and recipes
  - Typical tools to assist Operator Effectiveness:
    - HMI Display (ASM Consortium)
    - Alarm Management (ASM Consortium)
    - Procedures, some automated (ASM Consortium)
    - Effective Process Control
    - Operator Training
    - Workflow, Expectations, and Span of Control

ASM Guidelines on Effective Procedure Automation



- Improve the effective use of procedures
- Content and Format
- Development
- Deployment
- Maintenance
- Training

Make Better Decisions, Faster

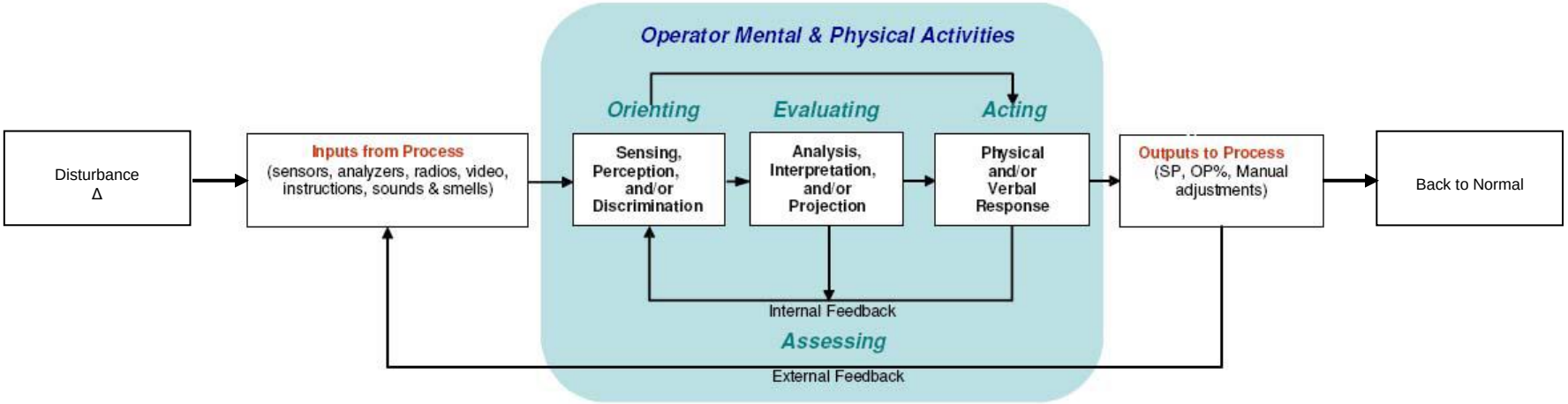


Figure B-2 ASM Supervisory Control Model for Normal Situations.

- ***Orienting*** – Sensing, perception, or discrimination
- ***Evaluating***– Information processing (thinking or interpretation)
- ***Acting*** – Physical or verbal response
- ***Assessing***– Information processing (thinking or interpretation)

Ref: ASM Consortium Guidelines: Effective Operator Display Design 2008, p.7

Procedure Automation Value

- Reduce Incidents
  - Environmental, Safety, Equipment Damage, Near Misses, etc
- Improve Financial Results
  - Increase Output, Reduce Costs & Waste, Nimbleness
- Capture Best Practices & Intellectual Property
  - Ensure Best Practices are followed: Standard Work
  - Capture knowledge of most skilled operator
  - Train new operators
- Reduce Stress on Operators
  - Relieve operators of repetitive tasks when no judgment is required
  - Use system vigilance

Section 5 in ISA-106 Report contains a detailed list

When to Automate Procedures

- Complex tasks, requiring vigilance:
  - Many steps
  - Ramping
  - Wait periods to meet trigger point criteria
- Lengthy tasks, longer than one shift or one day
- Tasks done infrequently, so operators rarely master it
- When past history indicates mistakes are easy to make
- Tasks that require absolute adherence to details for quality outcomes
- When strong financial incentives exist

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Financial Incentives: Procedure Uses

Most plants are not continually run at steady-state. Operators need to manage the following complex procedures:

Shutdown/Startup
Increased Production. Operator launched.

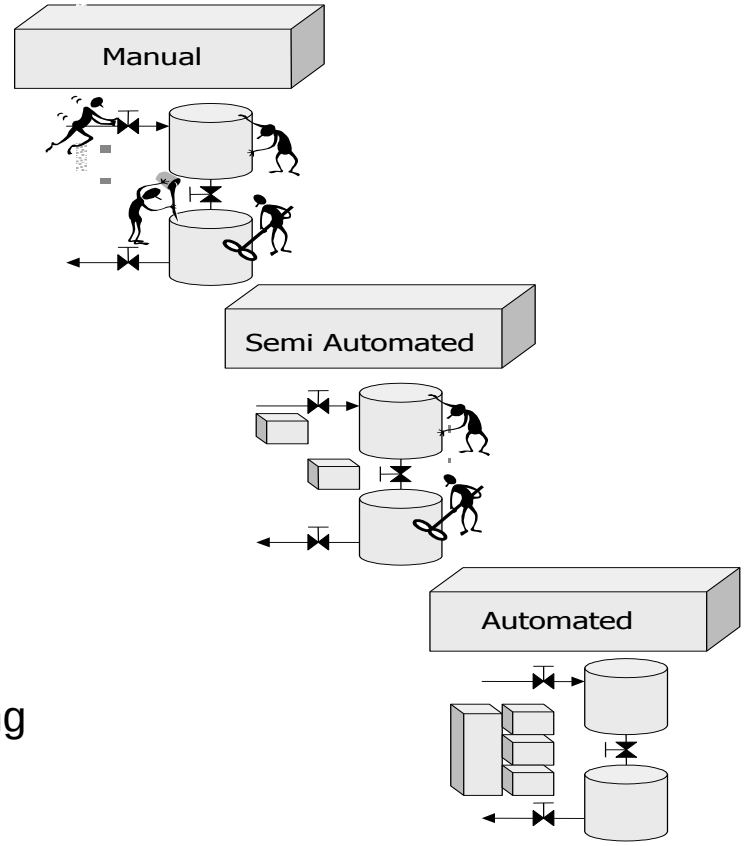
Grade Change
Pressure to minimize time to next grade: Production and Quality big factors. Operator Launched.

Abnormal Condition resulting in “SafePark”
Bringing plant to safe holding point to be ready to resume Operations, or shutdown plant. Automatically launched.

Cyclically Anticipated & Planned Activities
Tasks repeated based upon well defined criteria, normal operations (regeneration, pump changeover, decoking, etc…). Not capable of precise scheduling. Operator launched.

Procedure Automation has Varying Degrees

- Manual Procedures
  - Completely manual
  - Limited interaction with control system
  - Operator action/guidance at each step, possibly from automation system
- Semi-Automated Procedures
  - Some automatic sequencing and checking
  - Ensure consistent interaction with automation system
  - Manual intervention required
- Automated Procedures
  - Automated sequence advancement and checking
  - Coordinate automation system activities
  - Extensive exception handling



Different Levels of Automation May Be Appropriate

Summary

- ISA-106 Committee is preparing a Technical Report:
  - The report documents findings to-date
  - It considers and maps to prior work by ISA-88 and ISA-95
  - It recommends automating procedures
  - It recommends process state based systems
- Honeywell participates in ISA-106:
  - Voting member of main committee
  - Participating on at least three subcommittees
- What You Can Do:
  - Review and Comment on the Technical Report when Released
- Honeywell has considerable experience in automating procedures

Questions?

THANKS FOR ATTENDING