



Dynamic Procedures Writer's Manual

June 2023

Changing the World's Energy Future

Steve McCord, Johanna H Oxstrand, Mitch Burke



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June 2023

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Battelle Energy Alliance manages INL for the
U.S. Department of Energy's Office of Nuclear Energy





Introduction and brief history

Johanna Oxstrand

Johanna Oxstrand

- Ringhals Nuclear Power Plant
- Idaho National Laboratory
 - Dynamic instructions research
 - Technology commercialization
 - Industry-wide initiatives
 - Process and workflow transformation

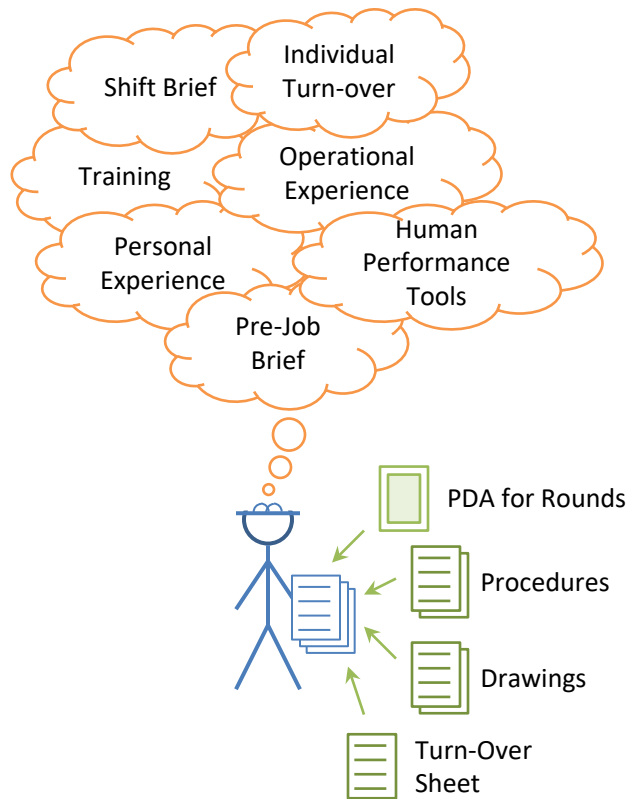
“The goal is to **reduce human error, increase productivity, and enhance safety** and comfort with a specific focus on the interaction between the human and the thing of interest.”

– Wikipedia, Human Factors



Business Process Architecture, Mgr.

Current Plant Status



Current

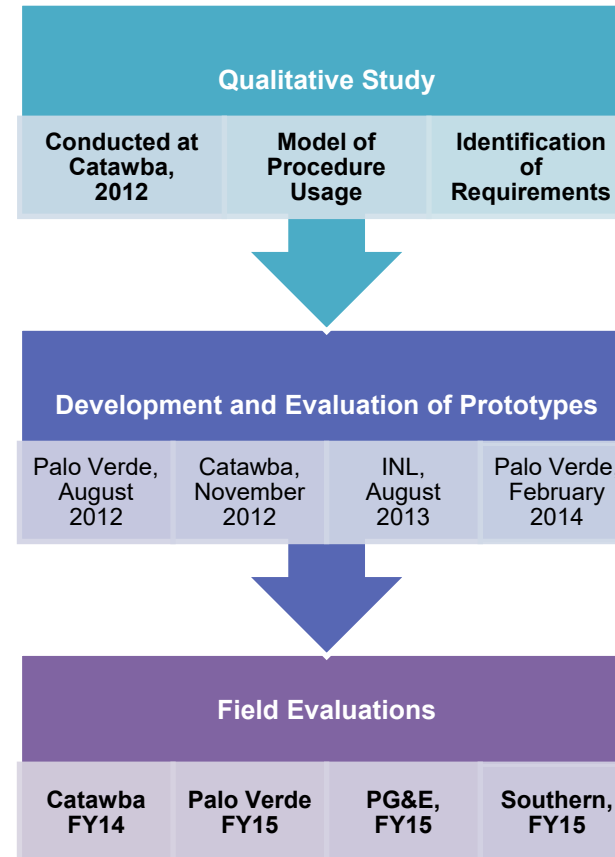


Future

LWRS – Computer-Based Procedure (CBP) Research

Research Objectives

- Define design requirements
- Streamline and distill information
- Use dynamic presentation to:
 - Increase efficiency
 - Improve the ease of use
 - Reduce opportunities for errors
 - Incorporate human performance tools
- We did **NOT** investigate how to display a document on an electronic device



Procedures usage

Error-Prone Situations

- Omitting steps
- Conducting steps out-of-sequence
- Making poor field decisions (failure to adhere to procedure)
- Manipulating wrong equipment
- Relying on worker memory and experience

Solutions

- Automated Place-Keeping
- Simplified Step Logic
- Automatic Verifications
- Dynamic cues to highlight important information
- Access to supplemental materials
- Automated aids

Targeted goals and benefits

- Reduced wait time
- Coordinated activities
- Data capture, management, and utilization
- Reusable content
- Digitalized worker



What is a Dynamic Instruction solution?



Integration platform



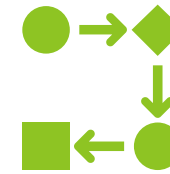
Electronic work management



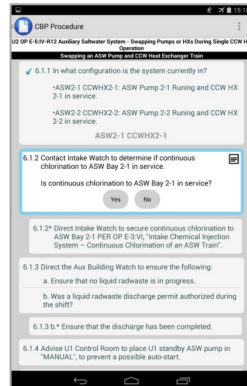
Paper instruction



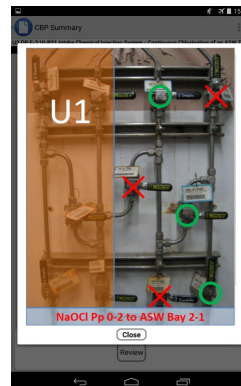
Structured data



Dynamic workflow



Desirable user interface



Work execution with dynamic instructions



Data collection in the field



Data analytics and trending

Background, INL-led initiatives

- NEWPER
 - 2016-2017
 - 119 members, 33 orgs.
 - Published 1 standard
- DIRECTOR
 - 2019-2020
 - 196 members, 67 orgs.
 - Published 2 standards
- Work Digitalization
 - 2022 – present
 - 160 members, 63 orgs.



DIRECTOR - Dynamic Instructions Editing Tool Requirements

• Topic Area Groups

1. Overall transition strategy from paper to dynamic instructions including software quality assurance, approval process and change management
2. Conversion of existing documents to dynamic instructions and documents
3. Editor tool and creation of new dynamic instructions and documents
4. Utility generic selection criteria for editing tool
5. Common dynamic instructions model

Dynamic Instruction Set Editor
Functional Requirements and
Implementation Considerations
(AP 907-005.002)

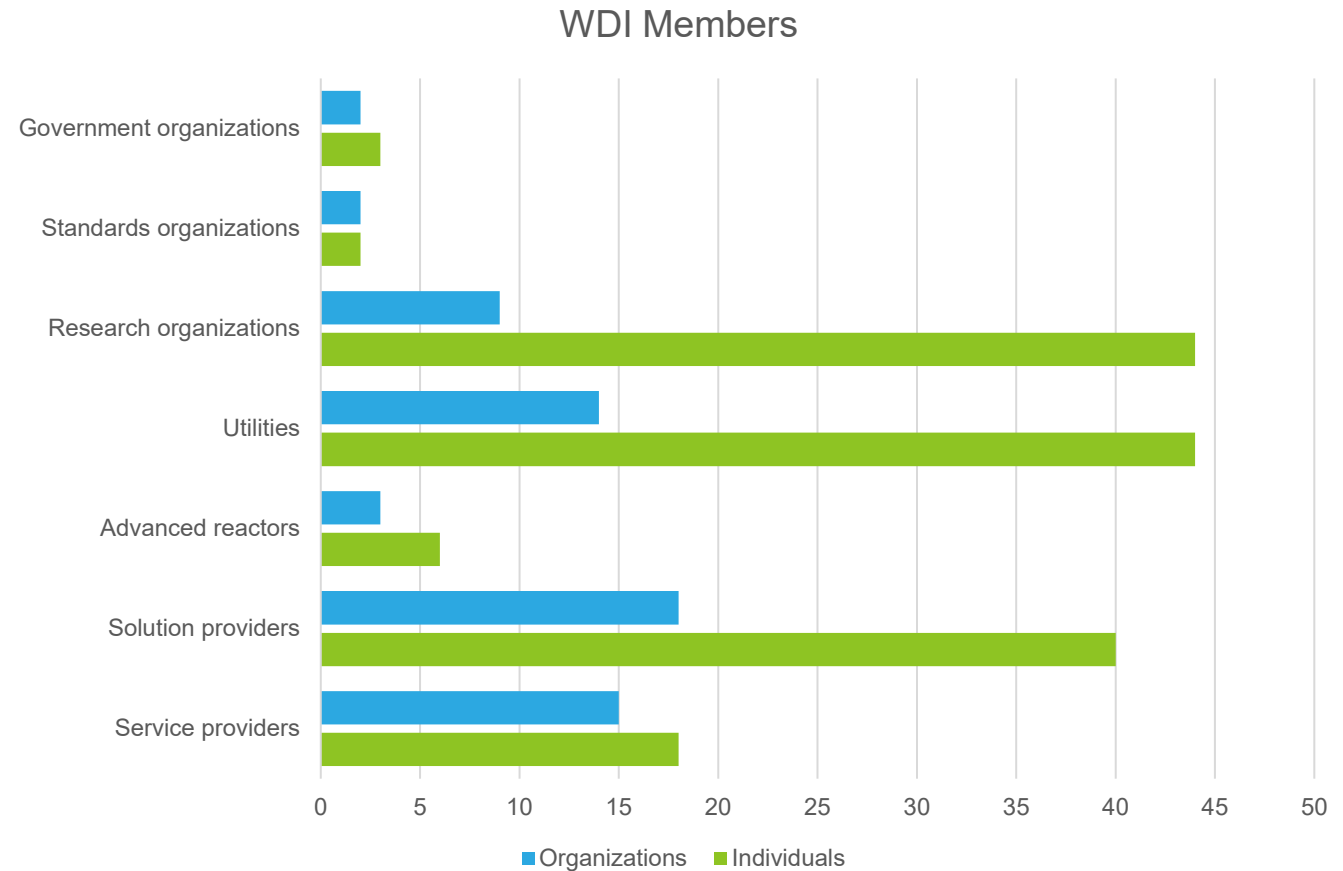
Common Dynamic Instruction
Model (CDIM)
(AP 907-005.003)



Work Digitalization Initiative

Topic Area Groups

1. Information Automation
2. Modern Workforce
3. Holistic Approach to Data Use
4. Human System Interaction



INL and PPA documentation

DOE LWRS research

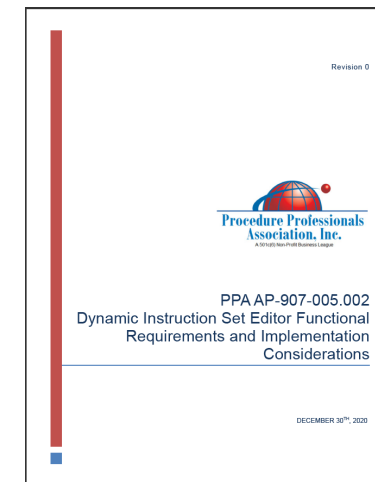
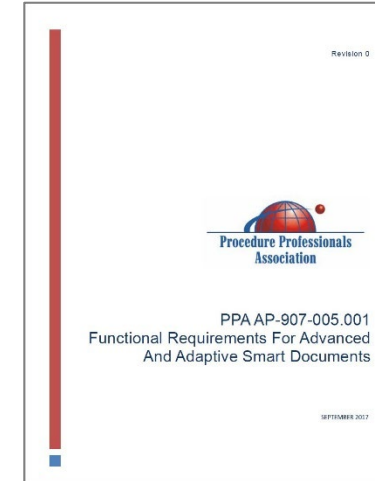
- Design guidance for computer-based procedures for field workers (INL/EXT-16-39808)

NEWPER

- Functional Requirements for Advanced and Adaptive Smart Documents

DIRECTOR

- Dynamic Instruction Set Editor Functional Requirements and Implementation Considerations
- Common Dynamic Instruction Model (CDIM)





Dynamic Procedures Writer's Manual

Mitch Burke and Steve McCord

Authoring in the Digital Paradigm

- Procedures drive safe and efficient operation
 - Written such that they are technically correct and clearly understood
 - Human-factored to prevent events with the understanding that people are fallible
- Paper-based procedures:
 - Rely solely on the cognitive ability of the user
 - Employ standard methods to focus users' attention in the support of error-free performance
- Dynamic procedures leverage technology to:
 - Dramatically reduce the probability of human error
 - Improve Safety
 - Reduce Dose
 - Improve Efficiency
 - Improve Resource Utilization
 - Enhance the User Experience

Authoring in the Digital Paradigm

Dynamic Procedures are much more than an enhancement

- Though the purpose for quality procedures remains, some of the standard methods used for writing procedures in the paper world simply do not apply in the digital world.
- Dynamic procedures are smart procedures. They incorporate smart containers, smart data, and smart controls to reduce the user's cognitive burden - all driving consistent quality, and all improving the user experience.

“We are what we repeatedly do. Excellence, then, is not an act but a habit.”

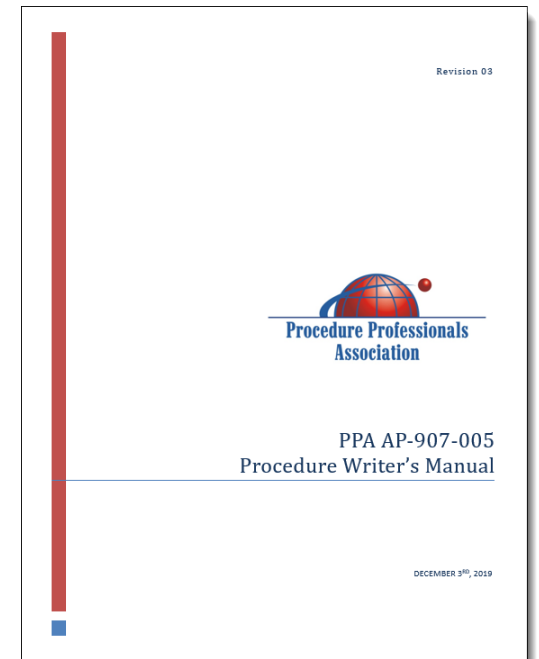
Aristotle

Greek philosopher (384 BC – 322 BC)

History

PPA AP-907-005, Procedure Writer's Manual

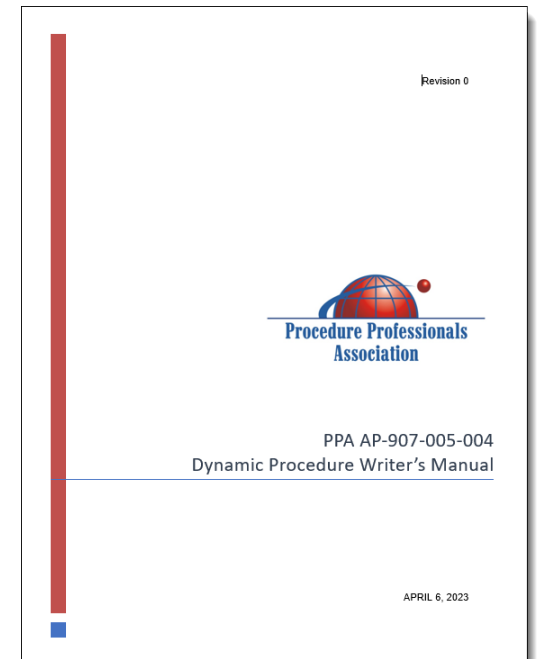
- Supports INPO 11-003, Guideline for Excellence in Procedure and Work Instructions Use and Adherence
- Contains years of user experience and lessons learned
- Widely used in the industry
- Excellent guidance



Today

PPA AP-907-005-004, Dynamic Procedure Writer's Manual

- Retains many features that make our industry's procedures the standard of excellence
- Embraces technology to provide an improved experience



Key Differences

Paper Writer's Manual	Dynamic Writer's Manual
Cover Page	Attributes
Page Layout and Orientation	Not Applicable
Page Headers and Footers	No Footer, No Page Numbers
Summary of Alterations	Not Applicable
Signoffs and Placekeeping	Automated
Branching	Natural Language
Emphasis Techniques	Expanded
Attachments and Supplemental Information	Expanded

Branching

THIS

- 4.2.1 **IF** the Turbo Encabulator test box command switch light is amber,
THEN GO TO Section 4.3.
- 4.2.2 **IF** the Turbo Encabulator test box command switch light is red,
THEN GO TO Section 4.4.

BECOMES THIS

- 4.2.1 What color is the Turbo Encabulator test box command switch light?


Green


Amber

Red

Emphasis Techniques

COLOR is a powerful information medium for human cognition. The proper selection and application of color can improve clarity, quality, and the overall user experience.

 **WARNING**
Electric shock hazard exists as the circuit may be energized.
[Acknowledge](#)

 **RADCON HOLD POINT**
ENSURE the locked hi-rad barrier placarding is in place.
[Complete](#)

Emphasis Techniques

Like color, icons can be a powerful information medium for human cognition. Icons can be used to represent a discrete object, action, or idea. They are meant to both draw attention and to be read and understood at a glance.

6.6 **HAMMER** out dents using a soft mallet as necessary.



Complete

★ **Critical Step**

6.7 Using torque wrench A15, **TORQUE** engine bearing bolts to 45 - 60 in-lbs.

Complete

6.10 **REMOVE** the vessel bottom cover AND clean with isopropyl alcohol.



Complete

Attachments

- Enable content to be organized separately from the main body of the procedure to aid in navigating performance and provide for a better user experience.
- Examples:
 - Predetermined contingency actions for example, steps to be taken in the event of a tooling failure.
 - Actions that are repeated periodically for example safety review steps to be performed every shift.
 - Summary tables used to display data or calculations captured throughout performance into a neatly organized presentation.

Supplemental Information

Examples:

- Illustrations
- Graphs
- Forms
- Tables
- Flowcharts
- Safety information such as Safety Data Sheet
- Manufacturer's information such as design specification
- Photographs
- Audio and video recordings such as how-to training
- References and Commitments





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Idaho National Laboratory

Battelle Energy Alliance manages INL for the U.S. Department of Energy's Office of Nuclear Energy. INL is the nation's center for nuclear energy research and development, and also performs research in each of DOE's strategic goal areas: energy, national security, science and the environment.

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