



Human Performance Maturity Model

A Framework for Decision Making

WECC Human Performance Maturity Model Task Force

Approved: June 25, 2019

Executive Summary

In recent years, human errors have been cited in over 80 percent of post-event analyses, including in most small-impact (e.g., single breaker trip from relay procedural step missed) and large-impact events (e.g., 2003 and 2011 blackouts). Organizations are focusing more on decreasing human error. WECC started the Human Performance (HP) Maturity Model Task Force (HPMMTF) to help its members achieve this end.

Unlike many sources of error, human error cannot be eliminated completely. But by putting controls in place, members can prevent a human error from turning into an event. Through a variety of techniques, proper controls can also help address other forms of error like risky behavior or sabotage.

Maturity models are business decision-making tools. This white paper summarizes the HPMMTF's research and gives recommendations for WECC member organizations. This document shows the development of an HP Maturity Model, which is a metric to help organizations measure and plan for their maturity. The research includes measures associated with risks for differing levels of HP maturity, and measures of critical aspects such as quality, safety, reliability, robustness, and resiliency.

Organizations assess HP maturity using a variety of tools, with no consistent strategy across utility organizations. The HPMMTF's maturity modeling effort seeks to produce a clear and comprehensive analysis of these assessments. The researchers conclude that no one human performance tool (e.g., peer checking, or following reliability principles in an organization's mission statement) produces long-term maturity. Rather, it is an "all of the above" approach, one that incorporates several different tools, that produces the highest levels of HP maturity. HP maturity is strongly tied to continuous improvement, rather than a single effort to apply a vendor tool.

This research considered several tools and approaches, including practices from electric power, nuclear power operations, aviation, healthcare, military, and other industries. These approaches have different goals. For instance—

- Reducing human error (e.g., peer checking);
- Changing systems design to prevent people from missing information (e.g., reduction of nuisance alarms);
- Designing a culture to promote increased brain function (e.g., stress/freeze response reduction for better quality thinking); and
- Implementing designs to help operators switch quickly from normal operations to emergency operations (e.g., resilience engineering).

The WECC HP Maturity Model is based on well-accepted scientific analysis methods and approaches.



WECC Human Performance Maturity Model: A Framework for Decision Making

This document gives a decision-making framework for people who wish to reduce risks of events through human performance improvement. It offers guidance on metrics that matter, and avoids those that do not.

The HPMMTF identified five comparative levels of increasing maturity:

1. Exploring and Trying
2. Organizing and Stabilizing
3. Defining and Structuring
4. Orchestrating, Integrating, and Measuring
5. Optimizing

The WECC HP Maturity Model is crucial to making a community of practice in WECC and beyond, becoming stronger as the research continues to create and refine descriptions of human performance attributes, behaviors, and practices. The vision for the WECC HP Maturity Model use include:

- Self-assessment tools provided by entities.
- Self-assessment by utilities in the Western Interconnection regarding their maturity.
- Anonymous reporting of self-assessments, with demographic data to compare summary statistics.
- Anonymous identification of HP best practices, accessible by WECC entities.



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Introduction

The HPMMTF used this definition of human performance: Optimizing behaviors to achieve goals, by focusing on the intersection of the complex system with people doing the work.

The benefits of excellent human performance are well established. They include—

- Reduction in number and consequences of events;
- Increased employee involvement to achieve goals;
- Improved organizational processes;
- Attention to issues before they become significant;
- Improved quality and safety;
- Reduced operating costs; and
- Increased stakeholder trust in the organization.

To realize the benefits of human performance initiatives, despite limited resources, organizations must prioritize and manage the trade-offs among choices. Making the business case for human performance includes finding practices and behaviors that align for sustainability. One method for finding these practices and behaviors is maturity modeling.

Maturity models are tools for making business decisions. This white paper summarizes the HPMMTF research and gives recommendations for WECC member organizations. This research produced a model that can be used to help decide among competing ideas to achieve greater HP maturity.

Decisions will vary by organization; so, this model will help to create a community of practice in WECC and beyond, becoming stronger as research continues to create and refine descriptions of HP attributes, behaviors, and practices. This HP Maturity Model guides business decisions about safety, training, organization development (OD) leadership practices, and OD management, such as policy development and policy implementation.

Maturity Modeling Description

“Maturity” is a broad term that embraces competency, capability, capacity, and level of sophistication. Maturity models (see Figure 1) categorize a set of characteristics, attributes, indicators, and patterns representing an organization’s capability and development, and provide a benchmark for evaluating the current capability level of an organization’s practices, processes, and methods. Maturity models also serve as a basis for setting improvement goals and priorities and propose methods for carrying them out.



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Figure 1: HP Maturity Model Levels

| WECC HP Levels | WECC Behaviors and Attributes | |
|--|---|--|
| LEVEL 1 Exploring and Trying | <ul style="list-style-type: none"> • HP champion launches isolated efforts • High risk/worst thing focus • Symptoms vs. causes are HP targets • Counting as objective HP metric | <ul style="list-style-type: none"> • Flavor of the day HP skeptics • Right direction but fragmented practices • Tools for field personnel |
| LEVEL 2 Organizing and Stabilizing | <ul style="list-style-type: none"> • Recognizing the value of event analysis • Emergence of HP plan for training • Recognizing the importance of organizational HP culture | <ul style="list-style-type: none"> • Integrating the pre-conditions that will catch individuals • Expanding beyond HP champion to include additional stakeholders |
| LEVEL 3 Defining and Structuring | <ul style="list-style-type: none"> • Focus on process (beyond individuals) and repeatable HP practices • Emerging corporate policy HP drivers • Communication across business units to establish HP structure | <ul style="list-style-type: none"> • Mitigating risks before they happen, rather than counting what has happened • Identifying and acting on HP drivers |
| LEVEL 4 Orchestrating, Integrating and Measuring | <ul style="list-style-type: none"> • HP aligned growth that is more than a targeted experiment • Non-punitive culture to support near miss or issue reporting • Integrating HP processes across business units | <ul style="list-style-type: none"> • Using a control database for metrics • Aligning, quantifying and qualifying contributing factors, risks, errors, safety • Predictable HP outcomes |
| LEVEL 5 Optimizing | <ul style="list-style-type: none"> • Fully integrated HP practices enterprise wide, with no HP silos • Widespread understanding of HP practices and approach • Documented principles company-wide | <ul style="list-style-type: none"> • HP integrated with business strategy, goals, vision, mission, values • Organizational learning • HP is top-down approach, with business drivers, embedded in the culture, focusing on risks and outcomes |

Maturity Levels

To measure progression, this HP Maturity Model uses a commonly accepted 1–5 rating scale, applied to behaviors and attributes in the five maturity levels:

1. **Exploring and trying.** Ad hoc, and can be chaotic. Few processes are defined. Success depends on individual effort. This is the first maturity stage.
2. **Organizing and stabilizing.** Basic processes are learned and established. Discipline is in place to repeat earlier success with similar applications. This is the maturity level where behaviors



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and attributes first become repeatable, even if only in a single business unit or function such as Safety.

3. **Defining and structuring.** Practices are reinforced, coached/mentored, documented, and integrated into a family of processes for the organization. This represents an organizationally defined maturity level.
4. **Orchestrating, integrating, and measuring.** Detailed metrics of the practices and outcomes are collected so the initiatives can be understood and controlled. Practices become second nature. This is the maturity level where behaviors and attributes are actively managed by an organization.
5. **Optimizing.** Continuous improvement using feedback and piloting new ideas. This represents the highest level of maturity.

Maturity Model Value

Maturity models are descriptive, prescriptive, or comparative. A maturity model is descriptive if its assessments describe where we are now. It is prescriptive if it shows how to reach desired maturity levels, and how to implement and align improvement measures. Comparative maturity models enable benchmarking.

There are many paths to maturity. Maturity models help organizations answer questions like—

- Is the organization learning the right lessons from past mistakes?
- Is the organization using resources effectively?
- Does everyone agree on the highest priority opportunities?
- Does the organization have a clear picture of how it will improve and sustain the desired level of improvement?
- Is there leadership support and employee engagement at the right levels to sustain or increase maturity?

Maturity models should not oversimplify reality, nor use step-by-step recipes. Maturity models are useful guides, but must be considered in context for each organization. The focus should be on identifying and factors that increase maturity and positive change for each organization.

The value of having measurable transition points between maturity levels enables an organization to use the scale to:

- Define the current state of HP maturity;
- Determine a desired, more mature state; and
- Identify the capabilities, behaviors, initiatives, and resources needed to reach and sustain the desired level of HP maturity.



Research Purpose

The HPMMTF's research will help the utility industry and WECC members by achieving these objectives:

1. Create an HP framework based on established maturity modeling principles and practices.
2. Enable organizations to identify their levels of HP maturity.
3. Facilitate a shared frame of reference for communication among utilities (“Where are we with HP compared to our peers and compared to where we want to be?”).
4. Suggest practical ways to move forward, consistent with the maturity framework.
5. Recognize HP as part of an organization's existing programs, such as safety, compliance, and operator training, rather than a stand-alone HP program. This HP Maturity Model does not imply that a dedicated program must be established to achieve the benefits of the model.

Intended Audience

The HP Maturity Model will help organizations consistently evaluate HP capabilities, communicate HP capabilities in understandable terms, and prioritize aligned investments for improving HP. The HP Maturity Model benefits these roles:

- Senior Management Leaders with the responsibility for setting vision and mission, creating policy, allocating resources, and granting authority and responsibility.
- Decision makers who control choices about resources and practices.
- Evaluators responsible for assessing and communicating HP capability.
- Enforcers, such as managers and supervisors, who impact the organization's culture and individuals' perceptions of fairness and justice.

Research Methods

Experienced investigators using accepted methods carried out the maturity model research. The methods used were as follows:

Phase 1: Scope and Focus

The researchers determined the scope and purpose described in the Research Purpose and Intended Audience sections of this paper.

Phase 2: Context and Design

All research requires a literature review, which is a handy guide to the research topics. This involves reviewing and describing research on the topics (HP and related terms and maturity modeling). This recap gives the foundation for the research topics. The literature review shows



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our study in the context of the established research findings and business cases, and the definitions already in use.

The research design used rigorous methods for collecting, protecting, and analyzing data.

Phase 3: Data Collection and Analysis

The researchers collected data through interviews with WECC members who volunteered. The data were aggregated and securely stored to protect privacy. Rigorous coding methods guided the model development. Coding is the process of categorizing and labeling the data.

Phase 4: Results and Recommendations

The research results are reported in a comprehensive research paper and summarized in this white paper. The researchers will expand this research in other utilities and other industries to build the body of HP knowledge and validate and refine the research results.

Research Results Summarized

| WECC Human Performance Maturity Model Levels | WECC Behaviors and Attributes |
|--|---|
| Level 1 Exploring and Trying | <ul style="list-style-type: none">• HP champion launches isolated effort(s)• High risk/worst thing focus• Symptoms vs. causes are HP targets• Counting as objective HP metric• Flavor-of-the-day HP skeptics• Right direction but fragmented practices• Tools for field personnel |
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| WECC Human Performance Maturity Model Levels | WECC Behaviors and Attributes |
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| Level 4 Orchestrating, Integrating, and Measuring | <ul style="list-style-type: none"> • Growth that is more than a targeted experiment, with follow through • Nonpunitive culture to support near miss or issue reporting by all • Integrating processes across business units and entire organization • Using a central database for metrics • Aligning, measuring, and qualifying contributing factors, risks, errors, and safety • Predictable HP outcomes |
| Level 5 Optimizing | <ul style="list-style-type: none"> • Fully integrated HP practices enterprise wide, with no HP silos • Widespread understanding of HP practices and approach • Documented, entity level principles across the organization • HP integrated with business strategy, goals, vision, mission, values • Organizational learning • HP is top down approach, with business drivers, embedded in the culture, focusing on risks and outcomes • Link HP to executive level concerns, and optimizing key performance indicators |

Recommendations and Call to Action

Test the Model Further

Once a model is populated, it must be tested for relevance, reliability, and validity. Practical questions include:

- Does the model make sense on the face of it?
- Does it look the way that it is supposed to?
- Are the results consistent across similar organizations and over time?

The researchers plan to continue testing the model in the utility industry and with other sectors.

You can help: Participate in the continuing research.



Make the Model Available

Once the model has been tested, it is available to use. Use of the maturity model should not confuse the true goal of improving HP with the artificial goal of achieving a higher maturity level.

You can help: Participate in pilot projects via recommended use cases here and others you may propose.

Maturity Model Use Cases for Recommended Pilot Projects

Identify HP Maturity Model Target Group(s)

Describe how to do the work:

- Determine intent to use internally and externally (e.g., consultants);
- Identify the criteria for professionals; and
- Define what is to mature (e.g., improving processes or capability).

Clarification of Maturity Paths and Alignment

Use the maturity model to set a baseline of current maturity for WECC organizations. Determine a focus for improving HP by discovering possible paths with rationale and organization-specific behavioral indicators. Periodically apply the maturity model to measure progress (or decline) over time.

Shared Frame of Reference

Describe how we want to use the model for communication pathways with stakeholder groups. Define how specific terminology should be: Publish a glossary that is based on this research, including organization-specific terms.

Granularity and Layers

Specify level of detail the model needs, and where the detail is needed. More detail may be needed for different organizations, business units, or processes within an organization (e.g., describing safety more fully). Details in maturity modeling can refer to capability areas, domains, categories, key success factors, levels of change, enablers, and others. When threads like domains are used, the content areas need to be aligned.

Assessment Criteria and Decision Tools

Maturity assessment and the criteria for making decisions (e.g., develop and test a question bank and methodologies). A decision tool helps in evaluating options. Consider cost-benefit relations, risk profiles, and relevance of organization-specific objectives. It may not be feasible or worth the investment to mature to Level 5.



Adoption

From pilot project to adoption, create a guide that lists the steps for using the model and the aspects that can be adapted for specific use cases. Identify and describe the principles that are fixed and must be consistent for quality practices.

Maintain the model using evidence-based practices

This research has been conducted with academic rigor and a limited sample of interview responses. As the model is communicated, piloted, and interested organizations become more educated about maturity modeling, model updates will be needed. For the model to remain evidence-based, sound research methods should be used to make updates.

You can help: Join the WECC HPMMTF and use sound practices to make model updates.

Benefits

Although this WECC model is at an early stage, it offers several benefits:

- **A place to start:** Identify each organization's current state. This will help when planning initiatives to achieve goals.
- **A common language:** Setting a model creates a common reference that will ease communication.
- **A shared vision and framework for prioritizing actions:** Aligning goals with how they can be achieved.
- **A process:** Identifying practices and behaviors that should precede others, for the more mature efforts to be sustainable.

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