

# IEEE Guide for Taxonomy for Intelligent Process Automation Product Features and Functionality

IEEE-SA Board of Governors

Developed by the  
Corporate Advisory Group

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# IEEE Guide for Taxonomy for Intelligent Process Automation Product Features and Functionality

Developed by

**Corporate Advisory Group  
of the  
IEEE-SA Board of Governors**

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**IEEE-SA Standards Board**

**Abstract:** Utilizing terminology as established in IEEE Std 2755-2017, defined and classified in this guide are approximately 150 features and functions across five core areas of technology capability in the family of new technology products collectively referred to as Intelligent Process Automation. This guide is published to create clarity for individuals involved with Software-Based Intelligent Process Automation products so that industry participants may rely on a product manufacturer's functionality claims and understand the underlying technological methods used to produce those functions and how one might approach evaluating the relative sophistication and importance of each function or feature. This guide represents the consensus of a diverse panel of industry participants.

**Keywords:** AI, artificial intelligence, autonomic, business process automation, business process management, cognitive computing, digital labor, digital workforce, digital process automation, IEEE 2755.1™, intelligent process automation, machine learning, narrow AI, process choreography, process orchestration, robotic desktop automation, RPA, robotic process automation

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## Introduction

This introduction is not part of IEEE Std 2755.1-2019, IEEE Guide for Taxonomy for Intelligent Process Automation Product Features and Functionality.

Over the last three years, many new Software-Based Intelligent Process Automation products have been introduced in the market. The relative newness of these products and their capabilities continue to confuse interested parties.

This guide embraces all products in this field and defines features and functionality in their core architecture and the following five categories of feature sets:

- a) Architecture: Core design fundamentals of the underlying technologies
- b) Configuration, Build, Test: Environment provided to create production automation
- c) Orchestration: Sequencer of automation inputs, actions, and outputs
- d) Management: Production management console or command center
- e) Execution: Production run-time capabilities
- f) Intelligence: Presence and uses of predictive and prescriptive analytic data models (see below)

Significant consideration was given to the following four defined communities of interest that may find this guide useful:

- 1) The Business: The part of the enterprise consuming, configuring business logic, and utilizing the products
- 2) Procurement: Those evaluating products for purchase
- 3) Information Technology (IT): The IT function of the consuming enterprise
- 4) Audit: The internal or external function ensuring process control and compliance

Each function or feature has been defined, its importance described, how it should be evaluated, which community of interest would likely care the most about a specific feature or function, and finally, which community of interest would be most capable of performing the evaluation.

This guide is intended to establish a structured and consistent reference resource to enable an objective set of criteria for evaluating the capabilities of a wide variety of products in the Intelligent Process Automation family. Further, this guide is intended to improve the ability of consuming enterprises in assessing and selecting products that best meet their needs.

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# IEEE Guide for Taxonomy for Intelligent Process Automation Product Features and Functionality

## 1. Overview

### 1.1 General

This guide is provided to facilitate a comprehensive and objective evaluation of Intelligent Process Automation products. The variety and complexity of these product varies greatly. There are at least four communities of interest that either have an interest in the features and functionality or are most capable of assessing the feature and functions. Throughout the development of this guide, it became increasingly clear that the community of interest that might care most about a specific feature may be different than the community of interest best able to evaluate that feature. This guide provides a recommendation for which community of interest is best able to assess functionality and which community would likely be most interested in the result of that evaluation.

### 1.2 Scope

This guide defines and classifies a Software-Based Intelligent Process Automation product's capabilities and features in six major categories along with its underlying technology for the interested community.

### 1.3 Purpose

This guide creates clarity for all who are involved with Software-Based Intelligent Process Automation products so that industry participants may rely on a product manufacturer's functionality claims and understand the underlying technological methods used to produce those functions. This guide represents the consensus of a diverse panel of industry participants.

## 2. Feature set description and definitions

### 2.1 General

A wide-ranging variety of available Intelligent Process Automation products were included in the analysis to identify a consistent taxonomy for the broad categories of design and functionality present in all or most products. The following six categories are discussed in [2.1.1](#) through [2.1.6](#).

## 2.1.1 Architecture

The Architecture Feature Set explores the attributes of seven key areas, these being; supported infrastructure, scalability, communications, recovery and resilience, security, extensibility, and deployment options. It has been recognized that an Intelligent Process Automation product's architecture was an inherent component of all other feature sets. This gives context to a range of impactful differences such as cloud versus desktop deployment models and static versus elastic resource provisioning.

## 2.1.2 Configuration, Build, Test

The Configuration, Build, and Test Feature Set includes capabilities to develop and test configured automations. This includes such things as object libraries, available commands, graphical configuration environment, exception handling protocols, requirements descriptions, configuration build documentation, debugging, management of test environments, access and security, credential, and user definition.

## 2.1.3 Orchestration

The Orchestration Feature Set describes the product's capabilities that consume sequencing logic, static and conditional business rules, internal or external predictive and prescriptive analytics (ML) and gather current state target systems information to properly coordinate all necessary tasks to complete a series of processes, and their associated transactions.

## 2.1.4 Management

The Management Feature Set describes the abilities to: 1) centrally control tasks / processes, provide access control to a variety of system resources such as tasks, devices and administrative duties, while ensuring availability of the platform; 2) manage central storage of tasks, system workload and performance, resource behavior, licensing and user behavior; and 3) enable visibility of execution platform resources and processes, manage schedules, alerts, and log all aspects of automation.

## 2.1.5 Execution

The Execution Feature Set describes the set of functions available in the product's run-time environment that govern how a configured automation carries out its intended sequence of actions in the production software environment. This includes such things as: accessing target applications through a graphical user interface or application program interface, screen object recognition, consumption of pre-configured tasks and business logic, human attended process input, execution run-time logging, and exception handling and notification.

## 2.1.6 Intelligence

The Intelligence Feature Set evaluates the platform's ability to consume and apply learning or prediction capabilities to aid in the orchestration of configured automations without being configured with each specific instruction or conditional business rule. This includes abilities to incorporate process-specific data and capabilities to automatically generate and select high performing machine learning (ML) models, inspect results, and make decisions.

NOTE—For these purposes, Intelligence is broadly defined as the use of ML data models for a wide variety of purposes ranging from Optical Character Recognition (OCR) to process mining to Natural Language Processing (NLP) to process orchestration to exception prediction and others. Products vary greatly in this area, with some providing integrated ML capabilities, some with structured interfaces to consume external sources of intelligence and some with both or neither.<sup>1</sup>

<sup>1</sup>Notes in text, tables, and figures of a standard are given for information only and do not contain requirements needed to implement this standard.

## 2.2 Communities of interest definition and description

The communities of interest definition and description are as follows:

a) **Business**

Functional or business leadership and subject matter experts are those who:

- 1) Provide the demand originating an automation program
- 2) Are Process Owner (process design and workflow)
- 3) Declare operational requirements for automation
- 4) Realize the value and return on investment for automation
- 5) Provide expertise in developing use cases for automation
- 6) Determine the measure of success for automation
- 7) Business End users:
- 8) Whose work process is altered by the use of automation
  - i) Whose work process is dependent on automation, or whose work provides input or guidance to production automation
  - ii) Who participate in the development of new automation

b) **Procurement**

The function within an enterprise held responsible for the following:

- 1) Receiving requests for new technology products
- 2) Identifying qualified providers
- 3) Managing the evaluation and procurement process
- 4) Contracting and negotiation

c) **Information technology (IT)**

The function responsible for the following:

- 1) Evaluation of technology capability and requirements
- 2) Contributing to the selection process for new technologies
- 3) Management of data security, privacy, and protection
- 4) Implementation and operation of an enterprise's technology platforms
- 5) Security, access and identity management across enterprise technologies
- 6) Responsibility for enterprise technology architecture and infrastructure

d) **Audit**

The group(s) responsible for the following:

- 1) Establishing legal and regulatory requirements for an enterprise
- 2) Testing business processes for compliance
- 3) Identifying enterprise risk
- 4) Risk detection and oversight of remediation
- 5) Attesting and certifying financial and operational controls

### 3. Detailed taxonomy of features and functionality

#### 3.1 Architecture

Architecture is described in [Table 1](#).<sup>2</sup>

#### 3.2 Configuration, build, test

Configuration, build, test is outlined in [Table 2](#).

#### 3.3 Orchestration

Orchestration is outlined in [Table 3](#).

#### 3.4 Management

Management is outlined in [Table 4](#).

#### 3.5 Execution

Execution is outlined in [Table 5](#).<sup>3</sup>

#### 3.6 Intelligence

Intelligence is shown in [Table 6](#).<sup>4</sup>

<sup>2</sup>Products listed in [Table 1](#) are examples. This information is given for the convenience of users of this standard and does not constitute an endorsement by the IEEE of these products. Equivalent products may be used if they can be shown to lead to the same results.

<sup>4</sup>Products listed in [Table 5](#) are examples. This information is given for the convenience of users of this standard and does not constitute an endorsement by the IEEE of these products. Equivalent products may be used if they can be shown to lead to the same results.

<sup>3</sup>Products listed in [Table 6](#) are examples. This information is given for the convenience of users of this standard and does not constitute an endorsement by the IEEE of these products. Equivalent products may be used if they can be shown to lead to the same results.

**Table 1—Architecture**

| Sub-area       | Feature/Function/<br>Attribute | Description                                                                                                                                               | Importance                                                                                                                           | Judging criteria                                                                                                                      | Stakeholder                      | Assessor |
|----------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------|
| Infrastructure | Server Operating Systems       | The degree to which the architecture supports a server-based deployment (e.g., Windows®, Linux®, Unix®).                                                  | Determines compatibility and management requirements. In addition, it may impact the applications that can be interacted with        | Does the technology operate on an industry-recognized enterprise server technology?                                                   | IT, Audit, Business, Procurement | IT       |
| Infrastructure | Desktop Operating Systems      | The degree to which the architecture supports a desktop-based deployment (e.g., Windows, Linux, Unix).                                                    | Determines compatibility and management requirements. In addition, it may impact the target applications that can be interacted with | Does the technology operate on an industry-recognized desktop technology?                                                             | IT, Audit, Business, Procurement | IT       |
| Infrastructure | Containerization Technology    | The degree to which the platform supports various containerization technologies (e.g., Docker®)                                                           | Determines compatibility and management requirements. In addition, it may impact the applications that can be interacted with        | Does the technology operate on an industry-recognized enterprise containerization technology and how does this impact infrastructure? | IT                               | IT       |
| Infrastructure | Data Repository                | The degree to which the platform supports data repositories and if so what types [e.g., Database (MySQL®, MSSQL®, Oracle®), File Store, or Network Store] | Affects technical resource skills required to manage the platform                                                                    | Does the technology leverage an industry-recognized enterprise storage technology?                                                    | IT, Audit, Business              | IT       |
| Scalability    | Automatic Scalability          | The degree to which the platform supports automatic computing capacity scalability under the architecture configuration                                   | Determines to what degree the platform can automatically adjust to changing load requirements                                        | Is scale manageable without human intervention?                                                                                       | Business, IT, Procurement        | IT       |
| Scalability    | Manually Scalable              | The degree to which the platform supports manual computing capacity scalability under the architecture configuration                                      | Determines to what degree the platform can be manually adjusted to changing load requirements                                        | Is scale manageable with human intervention?                                                                                          | Business, IT, Procurement        | IT       |
| Scalability    | Scale to Zero                  | The degree to which the platform architecture supports a “scale to zero” approach where resources are offline if the work requirement is not present      | Determines whether resources and their costs can be eliminated when not in use                                                       | Can the technology deactivate infrastructure during periods of low/no utilization                                                     | Business, IT, Procurement        | IT       |

*Table continues*

**Table 1—Architecture (continued)**

| Sub-area      | Feature/Function/<br>Attribute                                                                         | Description                                                                                                                                                            | Importance                                                                                                                                                                      | Judging criteria                                                                                   | Stakeholder                  | Assessor     |
|---------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------|--------------|
| Scalability   | Vertical Scaling:<br>scale is achieved by<br>adding more power<br>(CPU, RAM) to an<br>existing machine | The degree to which the platform<br>architecture supports a scale-<br>up not scale-out approach                                                                        | Determines to what degree the platform<br>can adjust resources in each computing<br>environment versus adjusting the<br>number of computing environments                        | Can the technology<br>scale up its available<br>resources in a<br>single computing<br>environment? | Business, IT,<br>Procurement | IT           |
| Scalability   | Horizontal Scaling:<br>scale is achieved<br>by adding more<br>machines into the<br>pool of resources   | The degree to which the platform<br>architecture supports a scale-<br>out not scale-up approach                                                                        | Determines to what degree the<br>platform can adjust resources<br>by adding additional computing<br>environments versus adding resources<br>to the existing compute environment | Can the technology<br>scale out to include<br>additional available<br>compute environments?        | Business, IT,<br>Procurement | IT           |
| Communication | Systems<br>Management<br>Information<br>Communications                                                 | The degree to which the platform<br>architecture supports messaging<br>to management and monitoring<br>Information platforms                                           | Determines alignment to<br>organizational restrictions,<br>compliance and security model,<br>InfoSec standards, and monitoring.                                                 | Can Management<br>Information be<br>produced and<br>delivered at the<br>communication layer?       | Business,<br>IT, Audit       | Business, IT |
| Communication | Database<br>Communications                                                                             | The degree to which the platform<br>architecture may require or<br>support database communication                                                                      | Determines alignment to<br>organizational restrictions,<br>compliance and security model,<br>InfoSec standards, and monitoring.                                                 | Are database<br>communications<br>capabilities built in<br>to the platform?                        | Business,<br>IT, Audit       | IT           |
| Communication | Run-time<br>communications                                                                             | The degree to which the<br>platform architecture requires<br>or supports inter-bot or inter-<br>run-time communication                                                 | Determines alignment to<br>organizational restrictions,<br>compliance and security model,<br>InfoSec standards, and monitoring.                                                 | Are bot/run-time<br>communications<br>present in the<br>technology?                                | Business,<br>IT, Audit       | IT           |
| Communication | Internal Platform<br>Communications                                                                    | The degree to which the platform<br>architecture requires or supports<br>intra-platform communication<br>(within the components of the<br>automation product platform) | Determines alignment to<br>organizational restrictions,<br>compliance and security model,<br>InfoSec standards, and monitoring.                                                 | Are internal<br>communications<br>present in the<br>technology?                                    | Business,<br>IT, Audit       | IT           |
| Communication | Communications to<br>systems external to<br>automation platform<br>environment                         | The degree to which the platform<br>architecture requires or supports<br>communication to environments<br>external to the automation<br>platform environment           | Determines alignment to<br>organizational restrictions,<br>compliance and security model,<br>InfoSec standards, and monitoring.                                                 | Are communications<br>present to external<br>systems and<br>environments?                          | Business, IT                 | IT           |

*Table continues*

**Table 1—Architecture (continued)**

| Sub-area      | Feature/Function/<br>Attribute                      | Description                                                                                                                         | Importance                                                                                                                                                                                                                                                               | Judging criteria                                                                      | Stakeholder         | Assessor |
|---------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------|----------|
| Communication | Communications protocols used (TCP/IP, Proprietary) | The degree to which the platform relies on standard protocols (e.g., TCP/IP) or proprietary protocols                               | Determines alignment to organizational restrictions, compliance and security model. InfoSec standards, and monitoring.                                                                                                                                                   | Are supported protocols used in the communication channels?                           | IT                  | IT       |
| Communication | Application programming Interface (API)             | The degree to which the platform architecture produces or consumes published or consumable Application Programming Interfaces (API) | Determines alignment to organizational restrictions, compliance and security model. InfoSec standards, and monitoring.                                                                                                                                                   | Are published or consumable APIs required/used within the platform for communication? | Business, IT, Audit | IT       |
| Topology      | Application Interaction requirements and support    | The degree to which the platform architecture requires interactions with other applications within deployment landscape             | Determines alignment to organizational restrictions, compliance and security model. InfoSec standards, and monitoring.                                                                                                                                                   | Is communication with other applications needed for the technology to operate?        | IT                  | IT       |
| Communication | Virtual Private Network (VPN) support               | The degree to which the platform architecture supports communication over a virtual private network                                 | Determines alignment to organizational restrictions, compliance and security model. InfoSec standards, and monitoring.                                                                                                                                                   | Is communication over a VPN possible?                                                 | IT                  | IT       |
| Deployment    | Desktop deployment capabilities                     | The degree to which the platform architecture supports deployment into a desktop computing environment                              | Determines if investment / the level of investment needed to facilitate the implementation of the technology as well as methods used to deploy. Different options will align more accurately to the client's short- and long-term strategic goals for their organization | Is the deployment to a desktop solution possible?                                     | Business, IT, Audit | IT       |
| Deployment    | Server deployment capabilities                      | The degree to which the platform architecture supports deployment into a server computing environment                               | Determines if investment / the level of investment needed to facilitate the implementation of the technology as well as methods used to deploy. Different options will align more accurately to the client's short- and long-term strategic goals for their organization | Is the deployment to a server solution possible?                                      | Business, IT, Audit | IT       |

*Table continues*