

# Adoption of Innovation by Healthcare Organizations Prerequisites Scale (AIHOPS)

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## Introduction

This document presents the Adoption of Innovation by Healthcare Organizations Prerequisites Scale (AIHOPS). The scale calculates a score based on various factors specified by the user to evaluate the readiness of a healthcare organization to adopt an innovation.

## AIHOPS Score Calculation

### Variables and Definitions

- $A$ : The set of all assessors, where  $|A| = m$  (the total number of assessors).
- $F$ : The set of all factors being assessed, where  $|F| = n$  (the total number of factors,  $n = 8$ ).
- $s_{a,f}$ : The score given by assessor  $a \in A$  to factor  $f \in F$ , where  $s_{a,f} \in \{0, 1, 2, 3, 4\}$ .
- $S_a$ : The overall score assigned by assessor  $a$ .
- $P_i$ : Probability (in decimal form) assigned by an assessor to damage severity level  $i$ , where  $P_i \geq 0$  and  $\sum_{i=1}^5 P_i = 1$ .
- $sf_i$ : Severity factor corresponding to damage severity level  $i$ .
- $d_{\text{assessor}}$ :  $d$  score assigned by an assessor, calculated using the severity factors and probabilities.
- $d$ : Overall  $d$  value, the average of all assessors'  $d_{\text{assessor}}$  scores.
- **AIHOPS Score**: The calculated score ranging from 0 to 1, indicating the likelihood of successful innovation adoption.

### Calculation Steps

#### Step 1: Calculate Each Assessor's Overall Score $S_a$

For each assessor  $a \in A$ :

##### 1. Zero Score Check:

- If any  $s_{a,f} = 0$  for any  $f \in F$ , then:

$$S_a = 0$$

This means that if any factor is scored 0, regardless of the scores given to other factors, the innovation cannot be implemented.

##### 2. Average Score Calculation:

- If all  $s_{a,f} > 0$ , then:

$$S_a = \frac{1}{n} \sum_{f \in F} s_{a,f}$$

**Step 2: Calculate the AIHOPS Score Numerator**

$$N = \sum_{a \in A} S_a$$

**Step 3: Calculate the AIHOPS Score Denominator**

The denominator  $D$  represents the maximum possible total score across all assessors:

$$D = S_{\max} \times m$$

Where  $S_{\max}$  is the maximum possible  $S_a$  score, which is 4 (since the maximum score per factor is 4, and the average of maximum scores is also 4).

This ensures that  $\frac{N}{D}$  represents the proportion of the maximum possible total score achieved by all assessors.

**Step 4: Calculate the  $d$  Value**

**Severity Factors  $sf_i$**

Damage Severity Level	Level	Severity Factor $sf_i$
No to Negligible Damage	(Level 1)	0.5
Minor Damage	(Level 2)	1
Manageable Damage	(Level 3)	25
Severe Damage	(Level 4)	100
Catastrophic Damage	(Level 5)	400

**Table 1:** Severity Factors

**Calculation Steps for Each Assessor**

For each assessor  $a \in A$ :

**1. Assign Probabilities:**

- Assign probabilities  $P_i$  (in decimal form) to each damage severity level  $i$ , ensuring:

$$P_i \geq 0 \quad \text{and} \quad \sum_{i=1}^5 P_i = 1$$

**2. Compute  $d_{\text{assessor}}$ :**

$$d_{\text{assessor}} = \sum_{i=1}^5 (P_i \times sf_i)$$

- 3. Impact on AIHOPS Score:** The  $d_{\text{assessor}}$  value reflects the assessor's assessment of potential damage severity. Higher  $d_{\text{assessor}}$  values indicate greater potential risks, which will inversely affect the AIHOPS Score by reducing its overall value.

**Calculate the Overall  $d$  Value:**

$$d = \frac{1}{m} \sum_{a=1}^m d_{\text{assessor}}$$

The overall  $d$  value represents the average perceived damage severity across all assessors. A higher  $d$  value signifies greater potential risks, leading to a lower AIHOPS Score and indicating a lower likelihood of successful innovation adoption.

**Step 5: Calculate the AIHOPS Score**

$$\text{AIHOPS Score} = \left(\frac{N}{D}\right)^d$$

Here,  $\frac{N}{D}$  represents the proportion of the maximum possible total score achieved by all assessors. The exponent  $d$  adjusts this proportion based on the average perceived damage severity, thereby influencing the final AIHOPS Score.

### **Impact of $d$ on the AIHOPS Score**

The value of  $d$  inversely affects the AIHOPS Score. Since  $0 \leq \frac{N}{D} \leq 1$ , raising it to a higher power  $d$  will result in a smaller AIHOPS Score. Therefore, a higher  $d$  value, indicating greater potential damage severity, will reduce the AIHOPS Score, reflecting a lower likelihood of successful innovation adoption.

The AIHOPS Score is most sensitive to  $d$  when  $\frac{N}{D} < 1$ . While  $\frac{N}{D} = 1$  is theoretically possible, it is highly unlikely in practice. In cases where  $\frac{N}{D} = 1$ , a different assessment method should be used instead of AIHOPS.

## Factors Index

Below is the index of the factors used in the AIHOPS formula, indicating the considerations in assessing innovation adoption readiness:

1. **Innovation Availability:** The readiness of the innovation for integration into healthcare settings.
2. **Organizational Attention:** The level of organizational focus on the matter the innovation is meant to improve.
3. **Implementation Timeline Likelihood:** The proximity of the anticipated implementation date, reflecting the organization's readiness and planning for adopting the innovation.
4. **Stakeholder Support:** The level of support or resistance among key stakeholders toward the innovation, including cultural alignment.
5. **Financial Feasibility:** Evaluation of the net financial impact of adopting the innovation, considering both costs and expected returns.
6. **Training Requirements:** The amount of training required for staff to effectively use the innovation.
7. **Workflow Impact:** The extent to which the innovation will affect existing workflows, focusing on both positive and negative impacts on efficiency and processes.
8. **Regulatory and Ethical Compliance:** The extent to which the innovation meets regulatory requirements and ethical standards necessary for adoption.

## Detailed Scales

### 1. Innovation Availability

Score	Description	Explanation
4	Immediately Implementable	The innovation is available, tested, and ready for integration.
3	Available with Modifications	The innovation exists but requires some modifications before use.
2	Proven Concept	The concept is proven, but the innovation is not fully developed or tested.
1	Unproven Concept	The innovation is possible, but the concept is unproven.
0	Theoretically Impossible	The innovation is not feasible based on current understanding.

**Table 2:** Innovation Availability Scale

### 2. Organizational Attention

Score	Description	Explanation
4	Critical Metric	Core to the organization’s operations; closely monitored.
3	High Priority	Important to operations; monitored regularly.
2	Noted	Recognized but not a priority; infrequently tracked.
1	Marginal Interest	Seldom considered; minimally tracked.
0	Ignored	Not recognized or tracked within the organization.

**Table 3:** Organizational Attention Scale

### 3. Implementation Timeline Likelihood

Score	Description	Explanation
4	Immediate Implementation	Ready to implement now.
3	Short-Term Implementation	Planned within the next 12 months.
2	Medium-Term Implementation	Planned within 1 to 3 years.
1	Long-Term Implementation	Planned for more than 3 years from now.
0	Indeterminate Implementation	No specific implementation date planned; uncertain if or when it will be adopted.

**Table 4:** Implementation Timeline Likelihood Scale

## 4. Stakeholder Support

Stakeholders include all parties affected by or involved in the adoption of the innovation, such as staff, management, patients, and partners. This factor also assesses how well the innovation aligns with the cultural values and practices of the organization and all its stakeholders.

Score	Description	Explanation
4	Strong Support and Cultural Alignment	Widespread enthusiasm; stakeholders are eager for adoption, and the innovation fully aligns with cultural values and practices.
3	General Support with Minor Reservations	Most stakeholders are supportive; minor concerns or cultural adjustments needed.
2	Mixed Support	Stakeholder opinions are divided; significant effort needed to build consensus or address cultural resistance.
1	Minimal Support with Major Resistance	Few stakeholders support; substantial resistance or cultural misalignment present.
0	Active Opposition	Critical stakeholders oppose the innovation; conflicts with core cultural values make adoption unacceptable.

**Table 5:** Stakeholder Support Scale

## 5. Financial Feasibility

This factor evaluates the net financial impact of adopting the innovation, considering both costs and expected returns.

Score	Description	Explanation
4	High Net Financial Benefit	The innovation offers significant financial returns greatly exceeding costs; strong positive net profit expected.
3	Moderate Net Financial Benefit	Financial returns exceed costs; positive net profit expected.
2	Break-Even or Marginal Net Benefit	Financial returns roughly equal costs; minimal net profit or loss.
1	Net Financial Loss	Costs exceed financial returns; a net loss is expected but may be acceptable due to other benefits.
0	Significant Net Financial Loss	Costs greatly exceed financial returns; net loss makes adoption financially infeasible.

**Table 6:** Financial Feasibility Scale

## 6. Training Requirements

This factor assesses the amount of training required for staff to effectively use the innovation.

Score	Description	Explanation
4	No Training Required	Staff can use the innovation immediately without additional training.
3	Minimal Training Needed	Brief orientation or simple training sessions are sufficient; easily manageable.
2	Moderate Training Required	A moderate amount of training is needed; achievable with current resources.
1	Extensive Training Needed	Significant training efforts required; may strain resources.
0	Unrealistic Training Demands	Training required is so extensive it's unattainable or impractical for the organization.

**Table 7:** Training Requirements Scale

## 7. Workflow Impact

This factor evaluates the extent to which the innovation will affect existing workflows, focusing on both positive and negative impacts on efficiency and processes.

Score	Description	Explanation
4	Workflow Significantly Improved	The innovation greatly enhances workflow efficiency; processes become faster, simpler, or more effective.
3	Minor Workflow Adjustments	Some adjustments required; manageable changes to existing workflows that are beneficial.
2	No Change to Workflow	Existing workflows remain unaffected; no disruption.
1	Significant Workflow Changes	Major changes needed; extensive adjustments may strain resources.
0	Unfeasible Workflow Overhaul Required	Adoption requires a complete redesign of workflows that is impractical for the organization.

**Table 8:** Workflow Impact Scale

## 8. Regulatory and Ethical Compliance

Score	Description	Explanation
4	Fully Compliant and Ethically Sound	Meets all regulatory requirements and ethical standards; no additional approvals needed.
3	Minor Compliance or Ethical Issues	Small adjustments needed; approvals are likely to be granted.
2	Moderate Compliance or Ethical Challenges	Significant effort required to address issues; achievable with dedicated resources.
1	Major Compliance or Ethical Barriers	Serious concerns make approval unlikely without substantial changes.
0	Non-Compliant or Ethically Unacceptable	Cannot meet regulatory requirements or ethical standards; adoption is prohibited.

**Table 9:** Regulatory and Ethical Compliance Scale