

From Awareness to Responsible Application

A Community AI Readiness Framework Linking Assessment to Needs-Based Capacity Building

This paper sets out the proposed framework and its intended operationalisation ahead of implementation.

Dr. Reem K. Alshammari (KACST / C4IR Saudi Arabia)

Abdullah G. Alanazi (KAUST)

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Executive Summary

This paper proposes an AI readiness framework that assesses residents of governorates and local communities and links the results directly to needs-based learning, training and access interventions. Individuals are assessed across three progressive stages: Awareness & Exposure, Understand, and Apply, with responsible AI treated as a cross-cutting layer present at every stage rather than a terminal level, and with contextual enablers and barriers reported separately from the readiness stages.

Individual results are aggregated to characterise the distribution of readiness within community and governorate populations. The framework specifies how that aggregation is performed: each resident is classified at one of three attainment levels per stage, and a community profile reports the proportion of residents at each level for each stage separately, with no composite score computed across stages. The purpose is to establish whether a shortfall originates in awareness, understanding, practical capability, responsible use, or access conditions, and to select the corresponding intervention.

The framework builds on UNESCO's Recommendation on the Ethics of Artificial Intelligence, its AI competency frameworks for students and teachers, and the Readiness Assessment Methodology. The Recommendation provides the ethical and policy foundation; the competency frameworks inform the progression from understanding to application; and RAM provides the basis for linking identified readiness gaps with capacity-building needs. The framework extends these foundations by assessing residents as the unit of analysis, aggregating results into community and governorate readiness profiles, embedding responsible AI throughout the readiness progression, and linking identified readiness gaps directly to targeted interventions through a specified prioritisation rule.

The intended users are governorate administrations and regional authorities that hold capacity-building budgets, together with the national bodies that support them. The decision the framework is designed to inform is the allocation of a fixed capacity-building budget across awareness, literacy, practical training, responsible-AI training and access measures within a given locality.

Keywords: AI readiness · AI literacy · responsible AI · AI ethics · needs-based training · capacity building · sub-national assessment

Key Points

Community AI readiness requires evidence below the national level. Local assessment can reveal differences in readiness and participation across communities and population groups that are relevant to capacity-building decisions.

Exposure to AI, understanding, and practical capability are distinct aspects of readiness. The proposed framework therefore assesses Awareness & Exposure, Understand, and Apply separately, and reports them separately.

Responsible AI is integrated throughout the readiness progression. Relevant principles from UNESCO's Recommendation on the Ethics of Artificial Intelligence are assessed from recognition and understanding through to their application in AI use.

Readiness is interpreted alongside local conditions. Connectivity, digital access, education and digital literacy, language and cultural context, learning opportunities, and demographic and socioeconomic characteristics provide context for community readiness profiles.

Assessment informs action, in a stated order. Identified needs are linked to public awareness, foundational AI literacy, practical training, responsible-AI training, or access and support measures, with prioritisation rules for communities presenting several needs at once.

Existing AI literacy instruments measure related constructs but not this one. The framework's items will be adapted from validated scales wherever those scales cover the same construct, and newly developed only where they do not.

1 Introduction: AI Readiness Beyond the National Level

Artificial intelligence is becoming increasingly embedded in everyday life, reshaping how people learn, work, communicate, access information and interact with digital and public services. As AI becomes integrated into smart cities and digital public services, public awareness, AI literacy, equitable participation and responsible AI use become important policy considerations (UNESCO, 2022).

Widespread exposure to AI does not imply equal opportunity to understand, access or use it responsibly. UNESCO's Recommendation on the Ethics of Artificial Intelligence recognises that AI technologies may increase existing inequalities both within and between countries, and calls for inclusive access, equity between rural and urban areas, locally relevant content and services, multilingualism and cultural diversity, and measures to address digital divides. In capacity development it calls for AI literacy education for the public and

for strengthening prerequisite skills in areas within countries where notable gaps exist (UNESCO, 2022, paras. 33, 101–103).

AI readiness is not uniform within national boundaries. Differences in linguistic and cultural contexts, governance arrangements, institutional capacity, infrastructure and access produce different readiness conditions across provinces, regions and communities. Sub-national assessment therefore requires more than applying national indicators at a smaller geographic scale; it requires indicators and evidence that reflect local responsibilities, available resources and the communities affected by AI. UNESCO's work on localising the Readiness Assessment Methodology emphasises participatory assessment involving affected communities and attention to locally available infrastructure, expertise and data (UNESCO, 2026).

Saudi Arabia provides a strong national setting for advancing this localised approach. UNESCO's Readiness Assessment Methodology for Saudi Arabia reflects the Kingdom's progress in developing its AI ecosystem, supported by national strategies, digital infrastructure and educational reform, while identifying continued capacity-building priorities: strengthening AI and data-science skills, developing and retaining talent, expanding training and upskilling, and continued development of AI infrastructure (UNESCO, 2024c). These priorities create a foundation for extending capacity building to the community level. The framework also aligns with the mandate of the International Center for AI Research and Ethics (ICAIRE) in Riyadh, established as a UNESCO category 2 centre to support implementation of the Recommendation through research, capacity building and ethics-oriented policy support in the region (ICAIRE, n.d.).

1.1 What existing approaches measure, and what they do not

Three bodies of work bear on community AI readiness, and each addresses a different level.

Readiness assessment at the national level. RAM examines the national enabling environment across legal, social and cultural, scientific and educational, economic, and technical and infrastructural dimensions (UNESCO, 2023), and its localised applications bring assessment closer to sub-national governance (UNESCO, 2026). These instruments assess systems and institutions. They do not assess residents, and they are not designed to produce a distribution of capability within a population.

Competency frameworks for defined groups. UNESCO's AI competency frameworks specify what students and teachers should know and be able to do (UNESCO, 2024a, 2024b). They define competencies normatively for role-holders within education systems, rather than measuring their prevalence in a general population.

AI literacy measurement. A substantial measurement literature has developed since AI literacy was first specified as a set of competencies for non-experts (Long & Magerko, 2020) and reviewed as an emerging construct (Laupichler et al., 2022; Ng et al., 2021). It now includes validated self-report scales, among them the AI Literacy Scale (Wang et al., 2023), the Meta AI Literacy Scale (Carolus et al., 2023), a competency-based measure of human AI literacy (Pinski & Benlian, 2023), and an instrument organised around affective, behavioural, cognitive and ethical dimensions (Ng et al., 2024). A systematic review of this literature identifies a large number of such scales and finds that reporting of their psychometric properties is uneven (Lintner, 2024).

This third body of work is the closest antecedent of the present framework, and the relationship to it needs stating precisely rather than by assertion of novelty. Existing AI literacy scales overlap substantially with the framework's Understand stage and partially with Apply, and the framework should draw on them rather than duplicate them. They differ from what is required here in four respects. First, they are predominantly developed and validated on student, university or convenience samples rather than general resident populations, so their reading level, item content and assumed technology access are not established for community administration. Second, they measure literacy as a person-level attribute and are not designed to be aggregated into a locality-level planning profile. Third, ethical or responsible-AI content, where present, is treated as one dimension among several rather than assessed at each level of a progression. Fourth, they do not record the contextual conditions that determine whether a measured gap should be answered with training or with access measures, which is the distinction on which a capacity-building decision turns.

The framework therefore adopts a deliberate position on instrument development: **items will be adapted from existing validated scales wherever those scales measure the same construct at a suitable reading level, and developed anew only where no suitable measure exists.** On present reading, adaptation is most likely to be productive for the Understand stage and for parts of Apply; new development is likely to be required for Awareness & Exposure, for the stage-wise responsible-AI descriptors, and for the contextual items. Section 5 sets out how this will be determined.

Beyond these three bodies of work, several national-level composite indices rank countries on AI preparedness. They operate at the level RAM addresses and share its unit of analysis, and are therefore not further considered here.

1.2 Contribution of this paper

Building on these foundations, this paper introduces a Community AI Readiness Framework that closes a specific gap: existing approaches operate at the national or group level,

while this framework assesses readiness at the level where AI is actually experienced. In practice, this means:

1. Assessing individual residents
2. Aggregating results into community and governorate readiness profiles by a specified rule
3. Embedding responsible AI throughout the readiness journey
4. Linking identified gaps directly to targeted, needs-based interventions, with a stated prioritisation order

The framework will first be applied across selected governorates in the Riyadh Region of Saudi Arabia. Residents will be assessed at the individual level and aggregated readiness patterns examined across governorates and local contexts, considering geographic, demographic and access-related conditions in interpreting differences. The initial application will provide an empirical basis for testing and refining the framework before wider use.

2 Foundations and Design Principles

The proposed framework is grounded in four principles drawn from international and national guidance on AI literacy, ethics, readiness and capacity development.

Principle 1: AI readiness develops progressively

UNESCO's AI Competency Framework for Students organises competency development across three levels: Understand, Apply and Create (UNESCO, 2024a). For community assessment, the proposed framework adds Awareness & Exposure before Understand and Apply to capture an earlier stage of readiness, including recognition of AI, exposure to AI-enabled systems and initial use. Create is not included in the core progression, as it represents a more advanced capability than general community readiness requires.

"Progressively" describes the ordering of the stages as constructs, not an empirical claim that individuals pass through them in sequence. The framework assumes only that the three are distinguishable; Section 3.1 and Section 5.4 treat their separability as a hypothesis to be tested rather than as an established property.

Principle 2: Responsible AI forms part of readiness at each stage

UNESCO's Recommendation addresses privacy and data protection, fairness and non-discrimination, transparency and explainability, human oversight, accountability, and public

awareness and literacy (UNESCO, 2022). Related human-centred and ethical competencies appear in the competency frameworks (UNESCO, 2024a, 2024b), while Saudi Arabia's AI Ethics Principles provide a national reference for responsible practice (SDAIA, 2023). Within the framework these principles are reflected in what people know about AI risks and responsibilities and how that knowledge informs their use of AI.

Principle 3: Readiness is assessed within its local context

The Recommendation addresses digital divides, rural–urban equity, local communities, multilingualism, cultural diversity and access to AI (UNESCO, 2022). Localising the Readiness Assessment Methodology further recognises that AI readiness can vary across provinces, regions and communities due to differences in governance, culture, language and capacity, and emphasises adapting assessment to local priorities and institutional contexts (UNESCO, 2026). These considerations inform the contextual component of the framework.

Principle 4: Assessment should provide a basis for capacity building

The Recommendation calls for public AI literacy, awareness programmes, skills development and ethical training, including attention to areas where prerequisite skills are limited (UNESCO, 2022); RAM links readiness assessment to capacity development (UNESCO, 2023); and the Saudi RAM identifies continued priorities in skills, training and infrastructure (UNESCO, 2024c). Assessment results are therefore used to determine appropriate responses rather than to rank communities.

Connecting assessment to delivery is itself a recognised problem of implementation rather than a matter of dissemination alone. The Interactive Systems Framework for Dissemination and Implementation distinguishes the systems that synthesise and translate evidence, those that build the capacity of delivery organisations, and those that deliver in practice, and shows that findings do not reach practice unless capacity-building support is treated as a distinct function (Wandersman et al., 2008). Section 4 of this paper is structured accordingly: the assessment identifies need, the framework names a response area, and delivery requires a local body with the capacity to act on it.

3 The Proposed Community AI Readiness Framework

3.1 Purpose, construct and structure

For the purposes of this framework, **community AI readiness** is defined as the distribution, within a defined local resident population, of individual awareness and exposure, understanding, practical capability, and responsible engagement with AI, interpreted alongside the contextual conditions that enable or constrain participation.

Two features of this definition are load-bearing. It is a **population-distribution construct**: it is a property of a population, composed of measurements taken on individuals, and it is not a measure of the institutional, governmental or infrastructural readiness of the area in which that population lives. And it is **multi-component and not summable**: the framework does not define a single community readiness score, because the diagnostic value demonstrated in Section 3.7 depends on the components remaining separate.

The Community AI Readiness Framework assesses readiness at the individual level and uses the resulting patterns to characterise readiness within communities, as presented in Figure 1. It consists of three readiness stages: Awareness & Exposure, Understand and Apply, supported by two elements that operate across the assessment: Responsible AI and Contextual Conditions. The readiness stages capture differences in familiarity with AI, understanding of its capabilities and limitations, and the ability to use it in practice. Responsible AI addresses the knowledge and practices needed for informed engagement, while contextual conditions capture factors that shape access, learning opportunities and participation.

The three stages represent a progression in readiness but are assessed separately. Individuals may show different patterns across the stages; for example, practical use of AI may occur alongside limited understanding of its capabilities or limitations. Separate assessment of each stage allows these differences to be reflected in the readiness profile. Whether the three stages are in fact empirically distinguishable in a general population is a testable property of the instrument, and establishing it is an objective of the validation study described in Section 5.2.

3.2 Awareness & Exposure

Awareness & Exposure is the entry stage. It captures whether individuals recognise AI in the technologies and services they encounter, are familiar with common AI applications, and have had direct experience of their use. An individual may regularly use an AI-enabled service while having limited understanding of how it works. For assessment, this stage covers recognition, exposure across everyday services, education, work and digital platforms, and initial use.

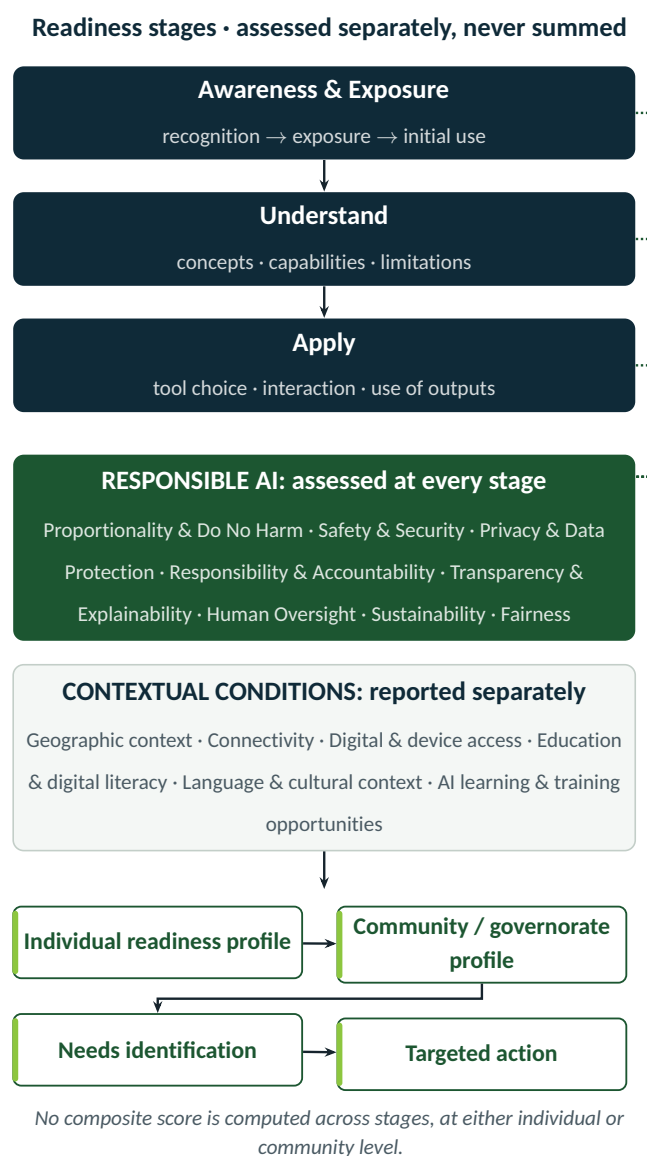


Figure 1. The Community AI Readiness Framework: a three-stage capability pathway, a responsible-AI layer assessed at every stage, a contextual layer reported alongside the stages, and the diagnostic sequence running from individual assessment to targeted action.

AWARENESS & EXPOSURE

Core question: “Are people aware of and exposed to AI?”

Progression: Recognition → Exposure → Initial use

3.3 Understand

Understand refers to the foundational knowledge needed to make sense of AI and its use, adapted from the Understand level of UNESCO’s competency framework for a general community population (UNESCO, 2024a). Individuals should be able to recognise basic AI concepts and understand common capabilities and limitations. Technical knowledge of AI development is outside the scope of this stage.

This stage is the closest point of contact with the existing AI

literacy measurement literature, and items will be adapted from validated scales at a suitable reading level rather than developed independently wherever the construct coincides (Carolus et al., 2023; Ng et al., 2024; Wang et al., 2023).

UNDERSTAND

Core question: “Do people understand what AI can and cannot do?”

Indicators: basic concepts · capabilities · limitations

3.4 Apply

Apply addresses the ability to use AI purposefully in practical situations, drawing on the application-skills competency of UNESCO’s Apply level (UNESCO, 2024a). Assessment considers whether individuals can use AI tools for everyday, educational or work-related tasks, choose an appropriate tool or use case, provide suitable inputs, and make practical use of the outputs. The emphasis is functional use rather than technical development.

Because a population survey measures reported rather than demonstrated capability, the instrument will pair self-report items with a small number of scenario-based items in which respondents select an appropriate action for a described task. This provides a partial check on self-reported capability without the burden of a performance assessment. The limits of this approach are stated in Section 5.4.

APPLY

Core question: “Can people use AI effectively for relevant tasks?”

Indicators: tool selection · effective interaction · task application · use of outputs

3.5 Responsible AI across the readiness stages

Responsible AI is integrated across the three readiness stages to assess how individuals recognise, understand and respond to the responsibilities associated with AI use. The component draws on UNESCO’s Recommendation on the Ethics of Artificial Intelligence (UNESCO, 2022), the human-centred and ethics dimensions of UNESCO’s AI competency frameworks (UNESCO, 2024a, 2024b), and Saudi Arabia’s AI Ethics Principles (SDAIA, 2023).

For community-level assessment, the component covers Proportionality and Do No Harm, Safety and Security, Privacy and Data Protection, Responsibility and Accountability, Transparency and Explainability, Human Oversight and Determination, Sustainability, and Fairness and Non-discrimination. UNESCO’s Awareness and Literacy principle is addressed

through the framework's main readiness stages, while Multi-stakeholder and Adaptive Governance and Collaboration is not included, as it concerns institutional arrangements rather than individual engagement.

EXAMPLE: PRIVACY AND DATA PROTECTION

Progression: Recognises that AI may process personal data → Understands the associated privacy implications → Protects sensitive information when using AI

The principles are assessed at each readiness stage. Awareness & Exposure addresses recognition of responsible-AI issues; Understand addresses knowledge of the principles and their implications; and Apply addresses how these principles are reflected in AI-related decisions and practices. The framework translates this structure into the stage-specific descriptors presented in Table 1.

3.6 Contextual conditions

Readiness is shaped partly by the conditions in which people access, learn about and use AI, so contextual conditions are recorded alongside individual readiness and reported separately from the readiness stages. The Recommendation identifies digital divides, rural–urban differences, language and cultural diversity, access to information and communication technologies, and differences in prerequisite skills as relevant to equitable participation (UNESCO, 2022); localisation work shows readiness varying across provinces, regions and communities (UNESCO, 2026). For community assessment, the framework considers geographic context, connectivity, digital and device access, education and digital literacy, language and cultural context, and AI learning and training opportunities. Demographic characteristics are also recorded to examine differences in readiness and access across population groups.

Contextual conditions are captured as reported by respondents. Where administrative, infrastructure or coverage data are available for the locality, these will be used alongside the reported measures; divergence between reported and recorded conditions is itself informative for interpretation.

3.7 From individual assessment to community readiness profiles

The framework uses the individual resident as the unit of assessment, with results aggregated at the community, locality or governorate level for analysis and planning (Figure 2). These aggregated results represent the distribution of individual readiness within the defined population rather than a direct assessment of the institutional or governmental readiness of the geographic area.

Responsible AI domain	Awareness & Exposure	Understand	Apply
Proportionality and Do No Harm	Recognises that AI use can have consequences for people and society.	Understands that the use of AI should be appropriate to its purpose and potential risks.	Considers potential harm and consequences when deciding whether and how to use AI.
Safety and Security	Recognises that AI systems can present safety and security risks.	Understands that AI systems have limitations and may produce unsafe or unintended outcomes.	Uses AI with appropriate caution and follows relevant safety and security practices.
Privacy and Data Protection	Recognises that AI systems may collect or process personal data.	Understands privacy and data-protection implications associated with AI use.	Protects personal and sensitive data when interacting with AI systems.
Responsibility and Accountability	Recognises that responsibility remains associated with human use of AI.	Understands that individuals and organisations remain accountable for AI-supported actions and decisions.	Takes responsibility for decisions and actions involving AI use.
Transparency and Explainability	Recognises the importance of knowing when AI is being used.	Understands why information about AI use and explanations of AI-supported outcomes can be important.	Seeks or provides appropriate transparency when using AI in relevant situations.
Human Oversight and Determination	Recognises the continuing role of human judgement in AI-supported activities.	Understands situations in which human oversight and decision-making are necessary.	Maintains appropriate human judgement and oversight when acting on AI outputs.
Sustainability	Recognises that AI can have social and environmental impacts.	Understands that the development and use of AI can consume resources and have wider environmental and societal effects.	Considers sustainability where relevant when choosing or using AI.
Fairness and Non-discrimination	Recognises that AI may affect individuals and groups differently.	Understands that AI systems can reproduce or contribute to unfair or discriminatory outcomes.	Considers fairness and potential discriminatory effects when using or acting on AI outputs.

Table 1. Proposed operationalisation of Responsible AI principles across the three readiness stages.

3.7.1 Aggregation rule

Aggregation proceeds in three specified steps, so that community profiles are reproducible and comparable across localities.

Step 1: Individual attainment per stage. For each of the three readiness stages, and separately for Responsible AI, a respondent is classified at one of three attainment levels: Not yet, Emerging, or Established, according to the proportion of that stage's items met. Item-level thresholds will be pre-specified before data collection and calibrated at the pilot stage (Section 5.2). No score is computed across stages for an individual.

Step 2: Community distribution. For each stage, the community profile reports the proportion of residents at each of the three attainment levels. The distribution is reported in full rather than as a summary statistic, so that two communities

with a similar central tendency but different spread remain distinguishable, a distinction a mean would conceal.

Step 3: Community-level descriptors. Where a short verbal descriptor is required for reporting, the proportion of residents at *Established* is classified as shown in Table 2.

Community descriptor	Proportion of residents at <i>Established</i> for that stage
Low	below 33%
Moderate	33% to 66%
High	above 66%

Table 2. Community-level descriptors by proportion of residents at *Established*.

These bands are provisional and stated here so that the descriptors used in Section 3.7.2 and in any reporting have a defined meaning rather than an impressionistic one. They will be reviewed against the pilot distribution before field application, and any revision will be documented and applied uniformly rather than adjusted per community. Descriptors are a reporting convenience; the full distribution from Step 2 remains the primary output.

Two constraints apply throughout. No composite is computed across stages, at either individual or community level: a single readiness number would defeat the framework's purpose, as Section 3.7.2 illustrates. And results are reported only for localities and population groups meeting the minimum cell size stated in the Ethics and Data Protection declaration, both to protect individuals in small communities and to avoid presenting estimates too imprecise for planning.

3.7.2 What a disaggregated profile shows

The community profile presents the components of readiness separately, allowing differences across the population to be identified. A community may, for example, show broad exposure to AI alongside lower levels of understanding, or frequent practical use alongside weaker responsible-AI knowledge. Where the sample allows, profiles can also be compared across population groups to identify differences in readiness and access. Two communities can show the same low level of practical use for different reasons.

EXAMPLE: HOW THE FRAMEWORK POINTS TO THE RIGHT RESPONSE

Community A: Awareness & Exposure: High · Understand: Moderate · Apply: Low · Responsible AI: Low · Contextual conditions: strong connectivity, good device access, local training available.

What this shows: residents can access AI but do not yet use it well or safely. The gap is in skills and responsible use, not access.

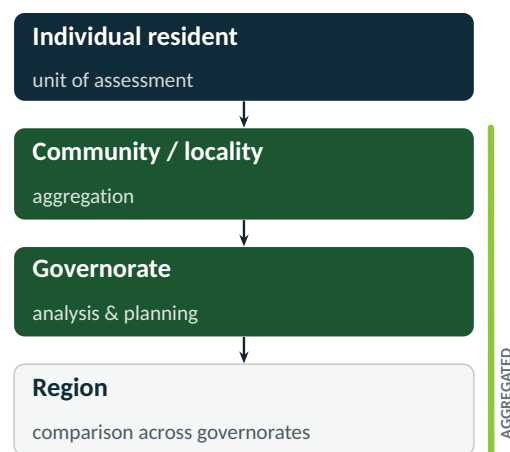
Response: practical training and responsible-AI training.

Community B: Awareness & Exposure: Moderate · Understand: Moderate · Apply: Low · Responsible AI: Moderate · Contextual conditions: weak connectivity, limited device access, few local training opportunities.

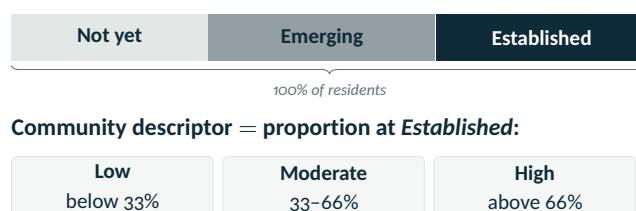
What this shows: the same low Apply result as Community A, but for a different reason: limited access, not limited skill.

Response: access and support measures.

Both communities are Low on Apply. A single readiness score would treat them the same and point to the same response. Reporting the readiness stages and elements separately shows that they need different help.



Aggregation reports the *distribution* of individual readiness, per stage:



Bands are provisional, to be calibrated at pilot.

Figure 2. Levels of assessment and analysis: individual resident assessments are aggregated to characterise the distribution of readiness within community and governorate populations.

4 From Assessment to Action

Readiness assessment provides a basis for identifying capacity-building needs and directing appropriate support. RAM links readiness assessment with capacity development (UNESCO, 2023), while the Recommendation on the Ethics of Artificial Intelligence calls for public AI awareness, AI literacy, skills development, ethics education, and measures addressing digital and access inequalities (UNESCO, 2022). Within the proposed framework, assessment findings are used to identify areas of need and inform appropriate responses, including public awareness, foundational AI literacy, practical training, responsible-AI training, and access and support measures (Table 3).

Identified need	Response area	Illustrative intervention
Low awareness & exposure	Public awareness	Accessible introduction to AI in everyday services
Weak understanding	Foundational AI literacy	AI concepts, capabilities and limitations
Limited application	Practical training	Hands-on tool use for life, study, work and enterprise
Responsible-AI needs	Responsible-AI training	Learning activities addressing relevant responsible-AI principles
Limited connectivity or device access	Access & support measures	Connectivity, devices and local support points
Language or relevance needs	Access & support measures	Arabic and locally relevant content and services
Limited local learning opportunities	Access & support measures	Local, mobile or decentralised training delivery

Table 3. Illustrative mapping of identified community needs to response areas and possible actions.

The mapping in Table 3 is illustrative. It identifies the response area that corresponds to each kind of gap; it does not establish that a given intervention shifts the corresponding readiness stage, which is a separate question of intervention effectiveness that this framework does not address.

4.1 Prioritisation when several needs coexist

Different needs may coexist within the same community and vary across population groups, and a governorate allocating a fixed budget must sequence them. The framework proposes four provisional prioritisation rules, in order.

- 1. Access precedes training.** Where contextual conditions indicate that connectivity, device access, language or the availability of local learning opportunities constrain participation, access and support measures take precedence for the affected population, because training delivered

into an access gap cannot be taken up by those it is meant to reach.

- 2. Active use with weak responsible engagement is treated as the highest-priority training need.** Where the proportion of residents at *Established* on Apply exceeds that on Responsible AI, the community is already using AI without commensurate safeguards. This combination is prioritised above a general literacy shortfall, because the exposure to harm is present rather than prospective.
- 3. Foundational literacy precedes practical training where Understand is the binding constraint.** Where a community is Low on Understand and Low on Apply, foundational AI literacy is sequenced before hands-on training.
- 4. Target the group, not the average.** Where profiles differ across population groups within a locality, the response is directed to the groups showing the gap rather than delivered uniformly across the locality, subject to the minimum cell size for reporting.

Similar gaps may therefore require different responses. Limited practical use arising from a lack of skills may require training, while limited use related to connectivity, device access, language or learning opportunities may require access or support measures. A governorate with broad AI exposure may require greater emphasis on practical skills or responsible use, while another may benefit from foundational awareness and literacy activities.

4.2 Reassessment

Reassessment examines changes following implementation and adjusts priorities as community needs develop. A reassessment interval of approximately 24 months is proposed as a default for the initial application, on the basis that it allows a capacity-building cycle to be delivered and taken up before measurement. The interval should be set to the expected effect horizon of the interventions actually delivered rather than applied mechanically.

Two constraints apply to interpreting reassessment. Change should be assessed against the pre-specified attainment thresholds rather than against revised ones, so that measured movement is not an artefact of reclassification. And because the design is cross-sectional (Section 5.4), a change in a community profile between rounds describes what has happened but does not by itself establish that the intervention caused it.

5 Implementation and Validation Roadmap

The framework is intended to move from conceptual design to a validated assessment approach through instrument development, validation and field application. This paper presents the framework: the readiness stages, the responsible-AI and contextual elements, the aggregation rule, and the logic linking assessment to action. A validated assessment instrument is the next stage of work.

The framework's first planned application is in the Riyadh Region of Saudi Arabia, which comprises Riyadh City and 22 governorates. The implementation will focus on selected governorates, providing an opportunity to examine the framework across communities with different geographic and access conditions and across population groups. The initial application will also examine the feasibility of producing governorate-level readiness profiles and linking identified needs to locally appropriate capacity-building responses.

5.1 Instrument development

Instrument development will translate the framework into measurable items covering Awareness & Exposure, Understand, Apply, Responsible AI and contextual conditions. Consistent with the position stated in Section 1.1, development begins with a mapping of the framework's constructs against existing validated instruments (Carolus et al., 2023; Ng et al., 2024; Pinski & Benlian, 2023; Wang et al., 2023), informed by the systematic review of available scales and their reported psychometric properties (Lintner, 2024) and by UNESCO's own instruments. Items will be adapted where a suitable measure exists at an appropriate reading level for general community administration, and newly developed only where it does not. The mapping and the resulting provenance of each item will be reported with the instrument.

Respondent burden is an explicit design constraint. Full coverage of three readiness stages, eight responsible-AI principles at three levels each, six contextual conditions and demographic characteristics would produce an instrument too long for general-population administration. The target is a core instrument completable in approximately 20 minutes. Two strategies will be tested to achieve it: a planned-missingness design in which each respondent is administered a subset of the eight responsible-AI principles, with community-level estimates recovered across respondents; and reduction of stage item counts to the minimum consistent with acceptable reliability. Any such reduction constrains what can be reported at the individual level, and that constraint will be documented.

Language and cultural adaptation. The instrument will be developed for administration in Arabic, with translation and

cultural adaptation of any adapted items documented, and reviewed for comprehensibility with residents rather than experts alone.

5.2 Validation

Expert review will assess the relevance, clarity and coverage of the items. Pilot testing with a smaller sample will check that items are clear and easy to complete, calibrate the attainment thresholds in Section 3.7.1, and provide an initial examination of whether the three readiness stages and the Responsible AI component are empirically distinguishable. Detailed statistical validation of the instrument, including its measurement properties and discriminant validity, is planned as a separate methodological study following this pilot.

5.3 Field application

Field application in selected governorates will examine readiness patterns within the framework and differences among population groups and local contexts. Contextual conditions will be analysed alongside individual readiness to support interpretation of the findings. Analysis will examine differences across population groups and local contexts to identify disparities in readiness, access and learning opportunities, so that the resulting interventions reflect both the assessment findings and local needs. The field application will also show whether the framework and its resulting profiles are useful for identifying capacity-building needs in practice. Findings will inform refinement of the framework, ahead of the separate work needed to validate the instrument statistically before wider use.

Community engagement will begin at instrument development rather than at interpretation. Consistent with UNESCO's emphasis on participatory assessment involving affected communities (UNESCO, 2026), residents and local stakeholders in the selected governorates will be involved in reviewing draft items for comprehensibility and local relevance, and again in interpreting the resulting profiles and identifying locally appropriate capacity-building responses.

5.4 Limitations and scope conditions

This paper presents a conceptual framework and its intended operationalisation; it does not report empirical results. The following limitations concern the framework's design and the assumptions on which its planned application rests.

The framework is untested. The readiness stages, the responsible-AI descriptors in Table 1, the aggregation rule in Section 3.7.1 and the need-to-response mapping in Table 3 are derived from international and national guidance rather than from data. Table 3 in particular is illustrative: the interventions it names are plausible responses to the needs identified,

but the framework does not establish that they shift the corresponding readiness stage. Evidence of intervention effectiveness is a separate question from assessment design and is not addressed here.

Stage separability is an empirical claim, not an established one. The framework's central design decision, assessing Awareness & Exposure, Understand and Apply separately rather than as a single scale, assumes the three are empirically distinguishable in a general population. If they prove not to be, the diagnostic distinction illustrated in Section 3.7.2 would not survive measurement. Establishing discriminant validity is a principal objective of the planned validation study.

Self-report constrains what Apply can measure. Apply is defined as the ability to select an appropriate tool, provide suitable inputs and make practical use of outputs. In a population survey these are measured as reported rather than demonstrated capability. The scenario-based items described in Section 3.4 provide a partial check but are not a performance assessment, and Apply results should be read as claimed practical use pending performance-based validation.

The responsible-AI items are exposed to social-desirability bias. The Apply-stage descriptors in Table 1 are normatively loaded: respondents are asked whether they protect personal data, take responsibility for AI-supported decisions and consider fairness. Such items invite over-reporting. The risk is greatest precisely where the framework's diagnostic value is highest, since an inflated Responsible AI profile would suppress the training need it is meant to detect, including under prioritisation rule 2 in Section 4.1, which depends on the comparison between Apply and Responsible AI. Item wording, indirect question formats and assurance of anonymity are mitigations to be tested at the pilot stage, but the limitation is not eliminated by them.

Non-response is likely to correlate with the construct. Residents least reachable by the chosen survey modes, those with limited connectivity, limited device access or lower digital literacy, are the same residents whose readiness the framework most needs to characterise. Non-response bias is therefore not random with respect to the outcome and will tend to overstate community readiness. Mode mixing, in-person administration in low-connectivity localities, and reporting of response rates by governorate are necessary partial remedies.

Community readiness is an aggregate of individual attributes. As stated in Section 3.1 and Section 3.7, community and governorate profiles describe the distribution of readiness among residents and are not assessments of the institutional or governmental readiness of those areas. Inferences from aggregated profiles to institutional capacity, or from community profiles to any individual resident, are not supported by the design.

The attainment thresholds are provisional. The item-level thresholds separating *Not yet*, *Emerging* and *Established*, and the 33% and 66% community bands in Section 3.7.1, are stated so that reported descriptors have a defined meaning. They are not empirically derived, and their calibration at the pilot stage will affect the resulting profiles.

Contextual conditions are recorded, not measured objectively. Connectivity, device access and learning opportunities are captured primarily as reported conditions. Where administrative or infrastructure data are available, triangulation is preferable, and coverage of such data is uneven across localities.

The design is cross-sectional. Reassessment can describe change over time but cannot attribute it to intervention in the absence of a comparison group or a staged rollout. Causal claims about intervention effect are outside what the framework as specified can support.

Instrument length remains a live feasibility constraint. The strategies in Section 5.1 are proposed rather than demonstrated, and a planned-missingness design reduces the precision available for individual-level reporting.

Scope of generalisation. The framework is designed for community-level assessment and its first application is in selected governorates of the Riyadh Region. Transfer to other regions or countries would require review of the contextual layer, the language and cultural appropriateness of items, and the relevance of the response areas in Table 3 to local institutional arrangements.

6 Conclusion and Policy Implications

AI readiness is increasingly relevant to how people participate in an AI-enabled society. National strategies, infrastructure and governance provide an important enabling environment, but readiness also depends on how people encounter, understand and use AI, and on the conditions that shape their opportunities to engage with it. Community-level assessment can provide policymakers with evidence on where needs differ across localities and population groups.

For governorate administrations and regional authorities holding capacity-building budgets, and for the national bodies that support them, community readiness profiles can inform a specific decision: how to divide a fixed allocation across public awareness, foundational AI literacy, practical training, responsible-AI training, and access and support measures within a given locality. Rather than applying the same response across communities, the framework provides a basis for directing capacity-building efforts according to identified needs, and through the prioritisation rules in Section 4.1, for sequencing them when several needs are present at once.

The proposed framework approaches community AI readiness as more than AI use alone. It considers who is aware of and exposed to AI, who understands it, who can use it effectively and responsibly, and which local conditions affect participation. By connecting these findings to appropriate capacity-building responses, community AI readiness assessment can support more locally informed decisions on AI awareness, skills, responsible use and access.

Its planned application in selected governorates of the Riyadh Region will provide an opportunity to test the assessment instrument and refine the measures and resulting readiness profiles before wider application.

Declarations

Ethics and data protection

The framework assesses individual residents and records demographic and locality information. The following provisions govern its planned application.

Approval. The study protocol and assessment instrument will be submitted to the appropriate institutional research ethics committee for review and approval prior to any data collection.

Consent and voluntariness. Participation is voluntary. Respondents will receive a plain-language description of the assessment's purpose, its expected duration, the categories of data collected, and the uses to which results will be put, in Arabic and English. Informed consent will be recorded before administration. Respondents may decline any item and may withdraw at any point without giving a reason and without consequence. The initial implementation will include adults aged 18 years and above only.

Anonymity and data minimisation. The assessment collects no direct identifiers. Demographic and locality data are collected at the coarsest granularity that supports the planned analysis of differences across population groups and localities.

No individual-level use. Individual responses are used only as inputs to aggregated readiness profiles. No individual-level result will be reported, disclosed to any employer, educational institution or public body, or used in any decision concerning an individual, including decisions on eligibility, employment, benefits or access to services.

Reporting thresholds. Aggregated results will be reported only for population groups and localities meeting a minimum cell size of 20 respondents, to prevent identification of individuals in small communities and to avoid presenting estimates too imprecise to support planning.

Data governance. Data will be stored in an approved secure storage environment, with the location and data controller

to be determined through the applicable institutional data-governance and ethics review prior to data collection. Access will be restricted to named members of the research team. The retention period, and whether data will thereafter be deleted or retained only in aggregated form, will be specified in the approved data-governance protocol prior to data collection. Processing will be conducted in accordance with the applicable institutional data-protection policy and with applicable national data-protection requirements, including the Personal Data Protection Law and its Implementing Regulations, at the version current at the time of fieldwork.

Consistency with the framework's own principles. The framework assesses residents' recognition of privacy and data-protection implications and their practices in protecting personal information. The provisions above hold the assessment itself to the standard it measures: consent, data minimisation, purpose limitation, human oversight of how results are used, and transparency with participants about both.

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Declaration of interests and independence

The authors developed the proposed framework and may participate in its future implementation and evaluation. To support research independence and mitigate potential researcher bias, the implementation will involve additional researchers, and the assessment instrument will undergo external expert review. The authors have no financial or advisory interests in any entity that may deliver the capacity-building interventions described in Table 3 and declare no other competing interests.

Consistent with Principle 4 in Section 2, that assessment results serve to identify appropriate responses rather than to rank communities, the authors will not publish comparative rankings or league tables of governorates or communities; readiness profiles will be released only in the disaggregated component form specified in Section 3.7.1, in which differing needs are visible and no composite score is produced; and results will be reported only at or above the minimum cell size stated in the Ethics and data protection declaration.

Author contributions

Reem K. Alshammari: Conceptualization, methodology, writing; Abdullah G. Alanazi: review & editing.

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Review

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