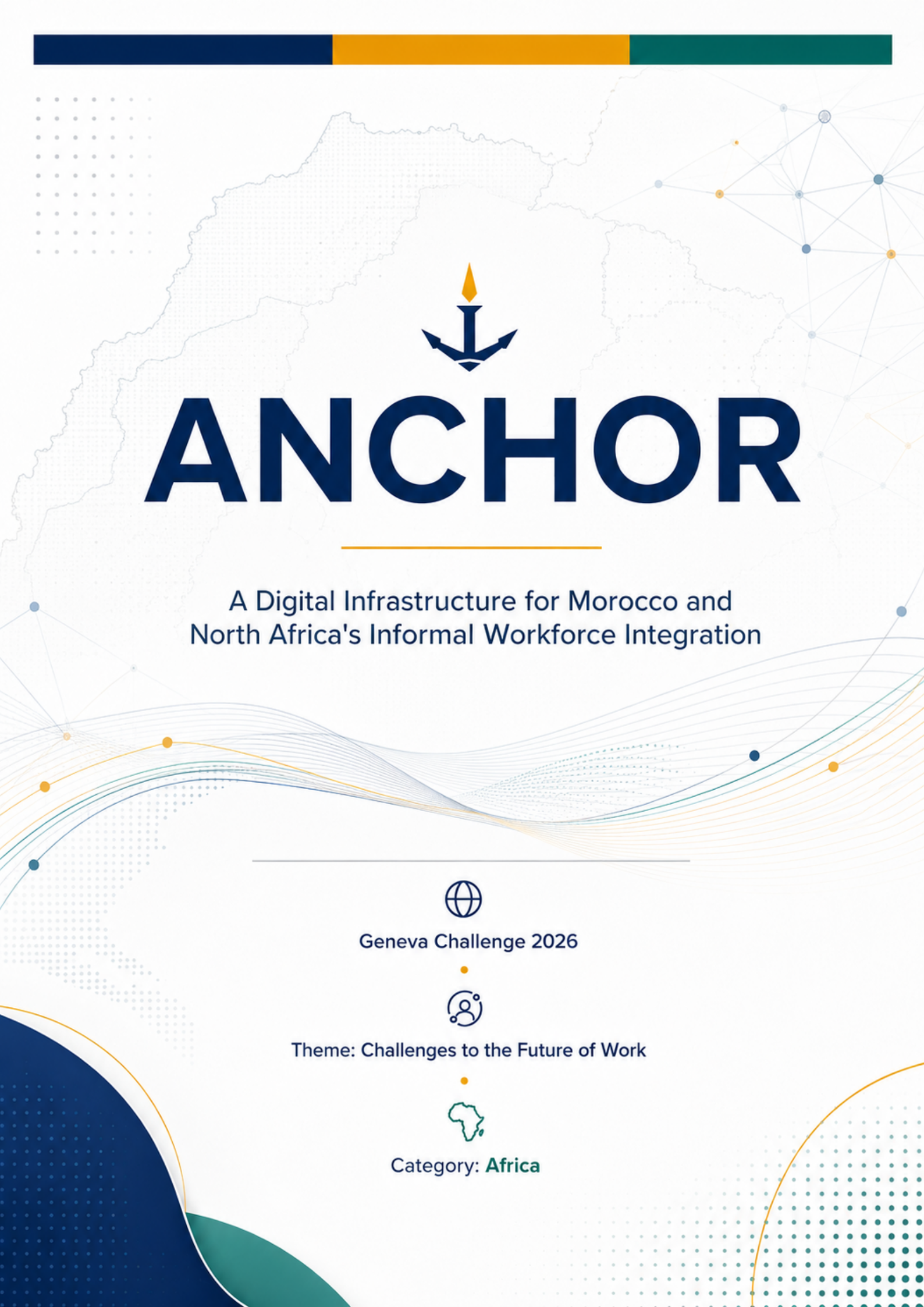




ANCHOR

A Digital Infrastructure for Morocco and
North Africa's Informal Workforce Integration



Geneva Challenge 2026



Theme: Challenges to the Future of Work



Category: **Africa**



ABSTRACT

Two billion workers in the global informal economy are being displaced by artificial intelligence at the task level with no system in place to tell them which of their skills are at risk, certify the competencies they have already acquired, or deliver the training they need in a language they speak. ANCHOR is a three-layer public infrastructure designed to close this triple failure simultaneously.

Layer 1, the **AI Task Observatory**, applies natural language processing to real-time job posting data to produce a continuously updated Task Displacement Index the first open, task-level labour market intelligence system designed for policy use in the Global South. Layer 2, the **Global Portable Skills Passport**, issues cryptographically verifiable digital credentials for formally and informally acquired competencies, portable across national borders through a bilateral labour ministry consortium. Layer 3, the **Voice-First Adaptive Learning Platform**, delivers personalized, competency-mapped micro-learning modules in Moroccan Arabic (Darija), Tamazight, and French accessible on any mobile phone without a data plan.

The Stack's defining contribution is the integration feedback loop: Observatory signals inform Passport credential design; Passport gaps trigger personalized learning paths; learning completions automatically update skill records. Morocco serves as the pilot anchor operationalized through ANAPEC and OFPPT targeting 500 workers in the construction and logistics sectors within 12 months, and 25,000 workers across two bilateral-recognition corridors within 36.

Team Members Full Profile



Salaheddine Ghamas “Labour Economics & Institutional Design. MSc Purchasing Supply Chain Management, ENCG Casablanca. World Economic Forum Global Shaper; member of the WEF Youth Pulse Taskforce on the Future of Work; McKinsey Forward alumnus; Euro-Mediterranean Young Leader. Leads the economic analysis, Observatory governance design, and the bilateral consortium strategy



Yassine Rahmani « Data Science & AI / Finance. MSc Finance, Groupe ISCAE Casablanca. Founder of SuppliFlex, a technology venture in supply chain automation. Background in external audit (KPMG) and applied AI. Leads ANCHOR's technical architecture, the Observatory's predictive data pipeline, and the Platform's AI personalization engine.



Rania Farhate “ Marketing Strategy & Stakeholder Adoption. Msc in Marketing and Communication, Groupe ISCAE. Experienced in market research and certified in Visual Elements of User Interface Design by CalArts. Track record translating social-impact missions into institutional buy-in, including work with Le Foyer d'Action Sociale Lalla Yacout equipping a Casablanca NGO serving unhoused individuals with tools for long-term sustainability. Leads employer and consortium adoption strategy, and ANCHOR's public communications



Ghita Lahlou “Education Policy & Development Studies. Msc Finance Groupe ISCAE Casablanca. Ambassador with Les Citoyens, a national youth civic education initiative, with direct experience designing and delivering skills workshops for out-of-school and informal-sector youth. Certified in Cloud and AI.

SECTION 1 -THE PROBLEM: A THREE-LAYER FAILURE IN WORKFORCE

In 2025, a construction foreman in Casablanca let's call him Khalid received his first smartphone under a government digital literacy initiative. His employer, pressured by a new client contract requiring Building Information Modelling (BIM) software, needed half the site team retrained within three months. No agency could tell the employer which specific BIM tasks were most at risk of automation. No system existed to certify Khalid's twenty years of spatial reasoning and project coordination. No training module existed in Darija Morocco's spoken Arabic for the software in question. Khalid lost the opportunity. His employer lost the contract. The economy lost a skilled worker who had nothing wrong with him except that the infrastructure designed to support him had failed at three distinct points simultaneously.

This story is not exceptional. It is the structural condition of a global crisis unfolding as artificial intelligence restructures the tasks that constitute work.

1.1 The Scale of AI-Driven Task Disruption

Technological change has always displaced some tasks while creating others. What distinguishes the current AI-driven transition is its speed, its breadth, and its granularity. Unlike previous automation waves that primarily affected routine manual tasks, large language models and multimodal AI systems now disrupt cognitive, relational, and creative tasks simultaneously. According to the World Economic Forum's ***Future of Jobs Report 2025***, two-fifths (39%) of workers' existing skill sets will be transformed or become outdated over the 2025–2030 period a pace that dwarfs the adjustment capacity of existing labour market institutions. The same report estimates that 59 out of every 100 workers will require reskilling or upskilling by 2030 (WEF, 2025).

The distributional consequences are not random. Task-biased technological change the mechanism by which automation substitutes for some tasks while complementing others tends to hollow out middle-skill roles while expanding demand at the high-skill and low-skill ends of the distribution simultaneously (Acemoglu & Restrepo, 2018). In North Africa, where formal labour markets are already fragmented and youth unemployment in Morocco (ages 15–24) reached a historical record of 35.8% in 2023 (OECD, 2024; HCP), the displacement risk compounds structural vulnerabilities that predate the AI transition.

The problem is not that people cannot adapt. It is that the infrastructure designed to support adaptation has not kept pace with the rate of change. Three sequential, mutually reinforcing failures not one account for this gap.

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1.2 Three Sequential Failures

The global reskilling crisis is routinely diagnosed as a skills gap. This framing is incomplete. Skills gaps are the symptom; the underlying disease is a three-layer infrastructure failure that makes adaptation structurally impossible for the majority of the world's workers.

Failure 1 Signal: The Information Blind Spot. Labour market information systems were built for job-level analysis tracking which occupations grow or shrink in aggregate. But AI disrupts at the **task** level: a radiologist's image-reading task is being automated; her diagnostic synthesis and patient communication tasks are not. No publicly available system tracks task-level displacement in real time, disaggregated by sector and region. Governments, employers, and training providers are therefore navigating one of the most disruptive economic transitions in history using instruments built for a slower, coarser world. Without accurate task-level signals, reskilling investments are made blind targeting the wrong skills, the wrong workers, or the wrong timeline.

Failure 2 Recognition: The Credential Gap. Even where a worker acquires new competencies through informal on-the-job learning, community training, or self-directed study no portable, interoperable system exists to certify those skills in a way that crosses employer or national borders. The International Labour Organization estimates that 2 billion workers globally operate in the informal economy (ILO, 2023). For these workers, skills exist but are invisible: employers cannot verify them, workers cannot leverage them, and policymakers cannot measure them. UNESCO's Recognition of Prior Learning (RPL) frameworks exist

in principle but remain disconnected from employer hiring systems and from any digital infrastructure capable of making recognition automatic, trusted, and cross-border.

Failure 3 Delivery: The Access Barrier. Where training programmes do exist, they are almost universally designed for workers who already have stable connectivity, baseline literacy, and unstructured time — three resources systematically scarce among informal, rural, and low-income workers. In Morocco, national internet penetration reached 84% in 2022 (ANRT, 2022), yet rural communities still rely on limited or unstable connections, and virtually no formal vocational training content exists in Darija or Tamazight at scale — a gap extensively documented in research on Morocco's digital divide (SMEX, 2024). Voice-based, offline-capable, culturally localized learning is not a premium feature. For hundreds of millions of workers, it is the only viable modality.

These three failures are sequential and mutually reinforcing. A government cannot fix the delivery problem without first knowing which skills to deliver (Signal). A worker cannot benefit from a recognition system without first having access to training (Delivery). No credential system can gain employer trust without being grounded in live labour market intelligence (Signal). The chain is broken at every link.

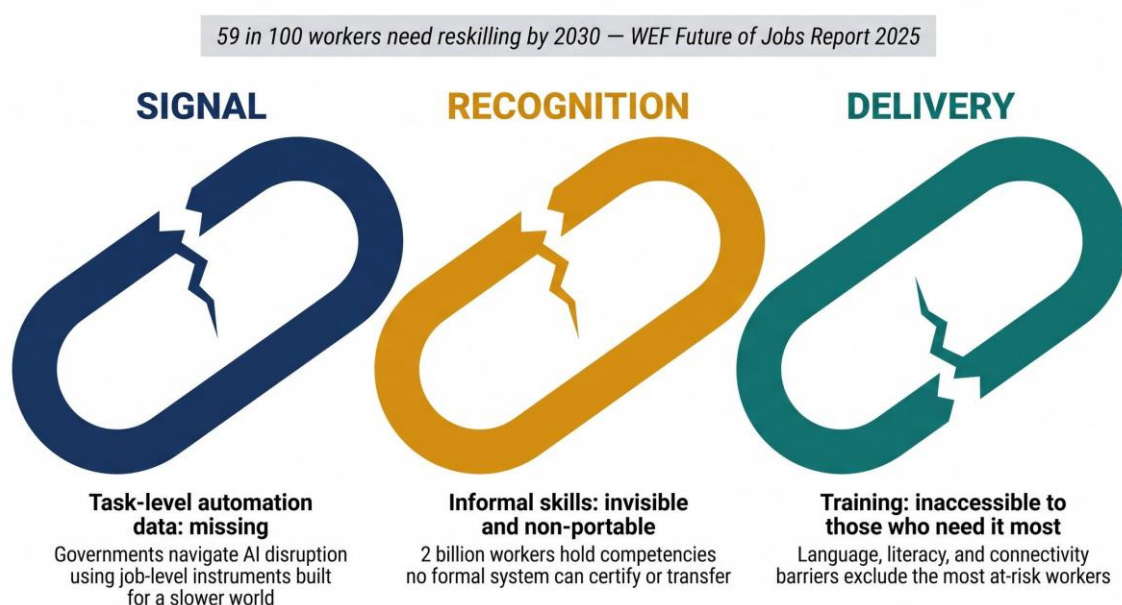


Figure 2. The Three-Layer Infrastructure Failure Preventing Workforce Adaptation.

1.3 Morocco: A Diagnostic in Miniature

Morocco concentrates every dimension of this failure in one observable, policy-active context making it the ideal pilot for a systemic solution. As Africa's fifth-largest economy and a country whose National Development Model

(2021) explicitly targets reskilling as a national priority, Morocco offers both urgency and the institutional scaffolding a pilot requires.

Morocco's National Employment Agency (ANAPEC) and High Commission for Planning (HCP) produce detailed labour market surveys but neither tracks AI-driven task displacement. Morocco's Office de la Formation Professionnelle (OFPPT) trains hundreds of thousands of learners annually but curricula update cycles lag employer demand by years. And with approximately 80% of Moroccan jobs classified as informal (ILO/HCP), the vast majority of skilled workers hold competencies that are entirely invisible to any formal recognition system.

The Moroccan case is not exceptional: it is representative. The same three-layer failure appears in Egypt, Tunisia, Kenya, and across the Global South wherever AI is accelerating faster than institutions can respond. A solution piloted in Morocco government-operated, grounded in task-level data, delivered in local languages is precisely the kind of anchor-to-scale architecture that addresses both feasibility and global transposability. It is the architecture the ANCHOR is designed to be.

SECTION 2 — ANALYSIS & LITERATURE

Three bodies of scholarship illuminate why the three-layer failure documented in Section 1 is not accidental and why resolving it requires integrated architecture rather than marginal improvements to existing systems. Task-biased technological change theory explains the economic mechanism of disruption; Recognition of Prior Learning (RPL) frameworks reveal why the recognition failure is a predictable market outcome; and digital divide scholarship explains why delivery barriers are structural rather than incidental. Together, they identify a specific institutional design gap the missing integration layer that the ANCHOR is built to fill.

2.1 Task-Biased Technological Change and the Skills Obsolescence Spiral

The foundational economic insight behind this project is the distinction between task-level and job-level analysis. For most of the past century, the dominant model skill-biased technological change treated technology as broadly raising productivity for high-skilled workers relative to low-skilled ones, justifying a generation of reskilling policy built around credentials and years of schooling. This model has now become insufficient.

Acemoglu and Restrepo's task-based framework (2018; 2019) refines the picture considerably. Rather than analysing workers by their overall skill level, it disaggregates roles into automatable tasks those for which technology can substitute human labour and complementary tasks those it augments, creating new demand for human judgment. The decisive finding is that the same worker, regardless of education level, typically holds both automatable and

complementary tasks simultaneously. A project coordinator who manually enters scheduling data (automatable) also manages stakeholder conflict and interprets ambiguous instructions (complementary). Automating the first task cluster does not eliminate the job it restructures the task portfolio, making new complementary competencies essential.

This carries two implications that most current reskilling policy has not absorbed. First, the intervention unit must be the **task**, not the job or occupation. Job-level retraining the dominant model in TVET systems globally targets the wrong unit of analysis: it prepares workers for entire occupational profiles when what is needed is targeted augmentation of the specific task clusters that remain viable. Second, the pace of obsolescence has accelerated beyond what stable qualification frameworks can absorb. National qualification frameworks update curricula on five-to-ten-year cycles; large language model capabilities are being extended quarterly. Eloundou et al. (2023), applying a task-exposure rubric to the full U.S. occupational taxonomy, found that approximately 80% of workers have at least 10% of their tasks exposed to significant productivity disruption from large language models a scale and speed with no precedent in previous automation cycles.

The policy consequence is structural: any reskilling system that does not track task-level displacement in real time will be perpetually behind the displacement frontier. Morocco's ANAPEC and the majority of comparable national observatories were built to track occupation-level trends on annual cycles. They are not calibrated for this environment.

2.2 The Recognition Gap: When Skills Exist but Go Unseen

The second failure has an equally precise theoretical antecedent. Akerlof's analysis of information asymmetry in markets (1970) demonstrated that when buyers cannot verify the quality of goods on offer, markets default to credential proxies and systematically exclude sellers whose quality cannot be communicated through those proxies. Applied to informal labour markets, this produces the credential trap: workers who have accumulated genuine competencies through non-formal pathways cannot signal them to employers, who therefore screen by formal qualifications. The result is a systematic market failure in which a large share of actual productive capacity is stranded or misallocated.

UNESCO addressed this structural problem through its Recognition of Prior Learning (RPL) framework, codified in the 2012 Guidelines for the Recognition, Validation and Accreditation of the Outcomes of Non-formal and Informal Learning (UIL, 2012). RPL systems have since been adopted across OECD economies and a growing number of middle-income countries, with the EU formalizing its approach through the 2012 Council Recommendation mandating national validation systems by 2018. In Morocco, the OFPPT administers a

Validation des Acquis de l'Expérience (VAE) pathway yet take-up remains marginal. The process is paper-intensive, administratively burdensome, and critically, non-portable: a certificate earned through Morocco's VAE system carries no institutional weight in the Gulf labour corridors through which a significant share of the informal workforce seeks mobility.

The technical infrastructure to resolve this portability failure already exists. The W3C Verifiable Credentials Data Model, standardized in March 2022, provides a decentralized, cryptographically verifiable architecture for digital skill records that are tamper-proof, machine-readable, and interoperable across institutional and national boundaries (W3C, 2022). The European Digital Credentials for Learning system pilots this approach at scale within the EU. No MENA-region national RPL system has yet operationalized this standard despite more than three years of its availability. The gap between technical feasibility and institutional deployment is precisely the space Layer 2 of the ANCHOR is designed to close.

2.3 The Delivery Barrier: A Structural Account of the Digital Divide

The third failure is routinely described as a connectivity problem. The International Telecommunication Union's 2023 Facts and Figures report documents that 67% of the global population 5.4 billion people was online in 2023, while an estimated 2.6 billion remained offline: disproportionately concentrated in lower-middle-income countries, rural areas, and populations with lower literacy (ITU, 2023). In Africa, average internet penetration stands at just 37% half the global figure. Within Morocco, the headline figure of 84% national penetration (ANRT, 2022) masks severe urban-rural disparities that suppress effective access in precisely the regions of highest informal employment concentration.

But connectivity is only the surface layer. Two structural barriers compound it. First, language: the global online learning ecosystem is overwhelmingly English-dominant. For Morocco's estimated 12 million daily Darija speakers and the Amazigh-speaking rural communities documented in SMEX (2024), mainstream digital learning content constitutes a foreign-language infrastructure. No major platform currently offers vocational content at scale in Moroccan Arabic or Tamazight. Second, literacy: UNESCO data place the number of adults globally who lack basic literacy skills at 739 million as of 2024 a figure that has grown in absolute terms in Sub-Saharan Africa and North Africa even as literacy rates improved, because population growth is outpacing educational coverage (UNESCO, 2025). For this population, text-based e-learning is not a suboptimal option, it is not an option at all. Voice-first, orally navigable delivery is not a feature enhancement; it is the foundational modality for reaching the most at-risk workers.

2.4 The Integration Gap: What Existing Responses Miss

The literature above converges on a finding that is rarely made explicit: existing

responses to AI-driven displacement address each failure layer in isolation, and their coordination failures are as damaging as their individual limitations.

National reskilling funds Canada's Sectoral Workforce Solutions Program, Germany's *Qualifizierungschancengesetz*, Morocco's IDMAJ and TAEHIL programmes target delivery: they fund training access for at-risk workers, often demonstrating efficacy within their direct reach. But they do not address recognition: a worker who completes a publicly funded course typically receives an attendance certificate with no employer-verifiable mechanism and no portability across sectors or borders. Digital credentialling initiatives the EU's Europass eDC system, Australia's Microcredentials Framework address recognition without addressing signal: they issue credentials for competencies that are not mapped to real-time labour market intelligence, making it structurally possible to certify a skills profile that is itself already being automated. National labour market observatories address signal without addressing delivery or recognition: they produce dashboards and policy briefs that inform governments without reaching the individual workers who need to act on the intelligence.

The consequence is a coordination failure that individual actor rationality cannot resolve. Workers, employers, training providers, and governments each respond optimally to the incentives and information available to them yet the aggregate outcome is a reskilling infrastructure that fails the majority of the global workforce it nominally serves. The missing element is not any single component but the **integration layer**: an architecture in which task-level intelligence automatically informs credential design, credential gaps automatically trigger adaptive learning pathways, and learning outcomes automatically update skill passport records. This feedback loop from signal to recognition to delivery and back is the design principle from which the ANCHOR is derived.

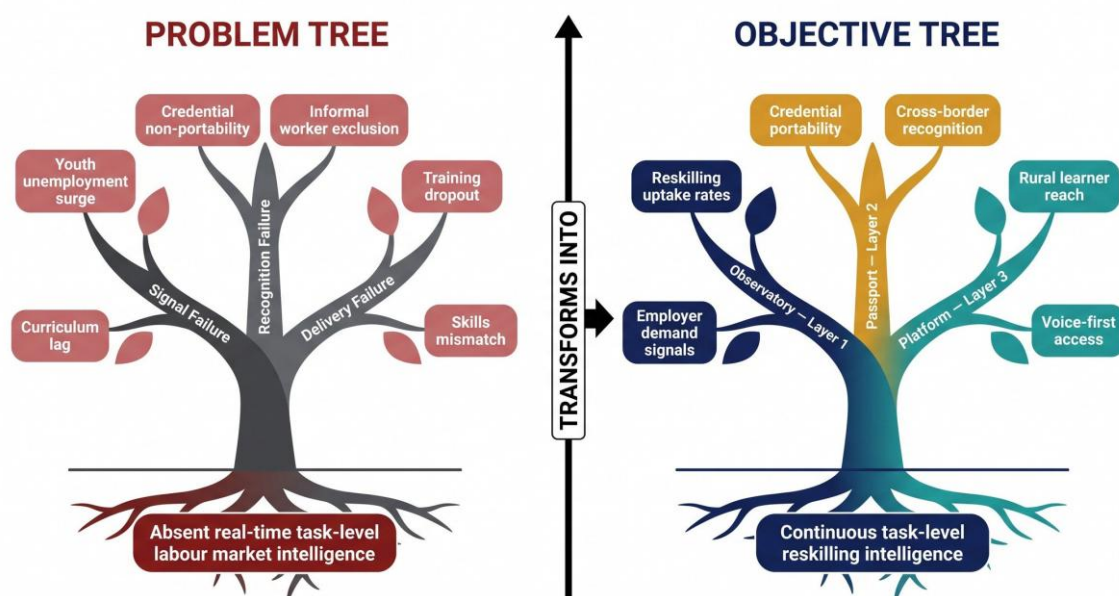


Figure 3. From Problem Tree to Objective Tree: The Integrated Solution Logic

SECTION 3 SOLUTION DESIGN: THE ANCHOR

The ANCHOR is a three-layer public infrastructure designed to close the signal, recognition, and delivery failures identified in Sections 1 and 2. Its defining characteristic is not any individual layer each of which has partial precedents in existing policy experiments but the integration architecture that connects them: a closed feedback loop in which task-level intelligence automatically informs credential design, credential gaps automatically trigger personalized learning, and learning outcomes automatically update skill records. The Stack is designed to be government-operable, built on open standards, modular for phased adoption, and grounded in the specific institutional context of Morocco as its pilot anchor.



Figure 1. ANCHOR: Architecture and Feedback Loop.

3.1 Layer 1 AI Task Observatory: From Job Postings to Task-Level Intelligence

The Observatory is the Stack's intelligence engine. Its function is to monitor the labour market continuously at the task level not the occupation or sector level and produce a real-time Task Displacement Index (TDI) that quantifies, by sector, occupation, and region, which specific task clusters are being automated and at what rate. This signal is the input that makes Layers 2 and 3 responsive rather than static.

Data architecture. The Observatory ingests three categories of data on a continuous basis. Primary signals come from job posting data the largest real-time proxy for employer skill demand collected through structured scraping of national job portals (Morocco's ANAPEC job platform, Gulf labour exchanges, European employment services) and complemented by structured employer surveys administered quarterly by HCP. Secondary signals come from

automation research: benchmarked AI capability assessments, sector-specific automation studies, and academic task-exposure analyses (aligned with the Eloundou et al. methodology verified in §2). Tertiary signals come from OFPPT training completion and dropout data, which reveal where learning demand is unmet.

Processing pipeline. Raw job posting text is processed through a natural language processing (NLP) pipeline that extracts task statements, maps them to a standardized occupational task taxonomy adapted from the O*NET Content Model the U.S. Department of Labor's 900-occupation, 19,000-task-statement database (O*NET, 2024) and cross-references them against known automation exposure scores. The output for each task cluster is a quarterly TDI score (0–100), where higher scores indicate greater observed reduction in employer demand, and a trend indicator (accelerating/stable/reversing). The taxonomy is open and version-controlled; all underlying code is open-source, removing proprietary vendor dependency.

Precedent. This architecture is not speculative. The Egyptian Center for Economic Studies has operationalized a structurally equivalent system, systematically analysing over 350,000 unique job postings across 13 consecutive quarters using automated NLP extraction demonstrating that this approach is feasible at national scale in a comparable MENA context (ECES, 2024). LinkedIn's Economic Graph has deployed a 'Skills Observatory' in partnership with SkillsFuture Singapore specifically to monitor real-time task-level changes in roles exposed to high obsolescence risk (LinkedIn Economic Graph, 2024). The Observatory builds on these models with the critical addition of a standardized API output layer that feeds Layers 2 and 3 automatically.

Morocco anchor. ANAPEC operates the Observatory as a public data infrastructure. Its existing mandate labour market information and employment facilitation is directly aligned with this function, requiring institutional extension rather than new entity creation. HCP's quarterly labour surveys provide a stratified offline complement to job posting data, extending coverage to informal and rural workers not represented in digital job boards. Observatory outputs are distributed through three channels: a policymaker dashboard for ANAPEC and OFPPT curriculum planning; a public API consumed by Layer 2's credential taxonomy; and direct worker-facing alerts via Layer 3's learning recommendation engine.

HEADER ROW				
	LAYER	← INPUT ←	⚙️ PROCESS ⚙️	OUTPUT →
ROW 1 –	LAYER 1 OBSERVATORY	 Job postings (ANAPEC portal)  HCP quarterly surveys  Automation research	NLP Task Extraction Large language model classifies task statements against occupational taxonomy → TDI score (0–100) generated per task cluster	 Policymaker dashboard  Open API → Layers 2 & 3
ROW 2 –	LAYER 2 PASSPORT	 Observatory TDI API feed  Worker RPL assessment	W3C VC Issuance Cryptographically signed digital credential issued → EQF-mapped for EU portability → stored in worker's mobile wallet	 Worker digital credential  Employer-readable verified record
ROW 3 –	LAYER 3 PLATFORM	 Passport gap profile  TDI highest-risk task clusters	AI Personalization + IVR Delivery Curated micro-module sequence in Darija / Tamazight / French → voice-based formative assessment → mastery threshold verified	 Learning module completions  Automatic Passport skill record update

Figure 4. Layer-by-Layer Input–Process–Output: How the Stack Operates.

3.2 Layer 2 — Global Portable Skills Passport: Making Competency Legible

The Skills Passport converts the recognition failure the credential trap documented in §1 and theorized in §2 into a legible, verifiable, and portable record. It does so using open technical standards rather than a new proprietary platform, enabling adoption without creating dependency on a single vendor or government.

Technical architecture. Each Passport is a W3C Verifiable Credential (VC) record, structured according to the Verifiable Credentials Data Model v1.1 standard (W3C, 2022). A VC is a cryptographically signed digital assertion: the issuing institution (ANAPEC, OFPPT, or a recognized training provider) signs the credential; the worker holds it in a lightweight mobile wallet application accessible on low-specification Android devices; employers verify it by scanning a QR code or querying the public resolver without contacting the issuing institution and without any centralized database storing the underlying credential. The decentralized architecture is critical: it means the Passport is portable across national borders without requiring bilateral data-sharing agreements between governments.

Dynamic competency mapping. The key innovation over existing digital credential systems is that the Passport is not static. Each skill record in the Passport contains a linked 'displacement horizon' field, automatically populated by the Observatory's TDI output via API. An employer scanning a Passport sees not only what the worker can do, but how that competency cluster is trending relative to current automation exposure. This transforms the Passport from a historical document into a forward-looking labour market signal immediately

distinguishing it from existing certificate-based systems such as paper VAE records or static PDF diplomas.

Portability and governance. Cross-border recognition is operationalized through two mechanisms. First, the Passport's competency taxonomy is mapped to the European Qualifications Framework (EQF) — the EU's eight-level, learning-outcomes-based translation standard for qualifications across all member states and partner countries (European Commission, 2023). EQF mapping allows Moroccan credentials to be read, compared, and accepted by European employers and educational institutions without requiring new diplomatic agreements. Second, a bilateral consortium pilot — Morocco plus a Gulf Cooperation Council partner (targeted: UAE or Saudi Arabia, given the scale of Moroccan migrant labour in those markets) — establishes mutual Passport recognition for cross-border job verification. The consortium pilot is an institutional agreement between labour ministries, not a treaty; it is achievable within an 18-month implementation horizon.

Issuer network. ANAPEC serves as the primary public issuer for competencies validated through RPL assessment. OFPPT issues Passports upon completion of formal or semi-formal vocational training. Accredited private training providers participate as secondary issuers under quality standards set by the consortium's governance board. All issuers operate the same VC issuance stack, ensuring interoperability across the network.

3.3 Layer 3 Voice-First Adaptive Learning Platform: Delivering Training to Those Who Need It

The Learning Platform addresses the delivery failure by abandoning the premise that workers must adapt to existing training infrastructure, and instead designing training infrastructure around the modalities, languages, and connectivity profiles of workers. The core design choice voice-first delivery is not a compromise; it is the appropriate primary modality for the population this layer is designed to serve.

Architecture and modality. The Platform operates on two parallel delivery channels. The primary channel is an Interactive Voice Response (IVR) system accessible on any mobile phone including basic feature phones via a toll-free telephone number, requiring no smartphone, no data plan, and no literacy.

The secondary channel is a lightweight smartphone application that mirrors the IVR content with visual reinforcement, optimized for low-bandwidth conditions and offline caching. Content is delivered in Moroccan Arabic (Darija), Tamazight (standard and Tachelhit variant), and French, with automatic language selection on registration. This is not a translation of existing French-language content: modules are written natively in Darija by local pedagogical teams, incorporating culturally familiar analogies and sector-specific vocabulary.

Personalization engine. A worker enters the Platform by scanning their Skills Passport QR code or entering their ANAPEC registration number. The system queries the Observatory API for that worker's occupational task profile and cross-references it with their Passport record to identify the specific task clusters with the highest TDI scores that is, the skills most immediately at risk and least currently documented in their credential record. A personalized learning path is generated: a sequence of 5-to-8-minute micro-modules targeting those task clusters, delivered in the worker's language of choice, with formative voice assessments at the end of each module. Completion of a module automatically generates a micro-credential update to the worker's Passport record, visible to employers without further action by the worker.

Pedagogical design. The Platform uses a spaced repetition model modules revisited at algorithmically determined intervals validated by cognitive science research as significantly more effective than single-session training for long-term skill retention. Formative assessments are voice-response: workers answer questions by speaking or pressing numbered keys, removing the literacy barrier from testing entirely. Mastery thresholds (80% correct before advancing) ensure credential issuance reflects genuine competency rather than participation.

Precedent. IVR-based mLearning systems have been operationalized in comparable low-literacy, rural contexts with measurable efficacy. CapacityPlus's Senegal programme demonstrated sustained knowledge retention among rural health workers trained entirely via IVR, with the voice architecture specifically validated as 'especially well suited to reach illiterate or semiliterate workers' (O'Malley, Perdue, & Petracca, 2013). The Shaqodoon programme (Kenya/Somalia) used IVR-based quizzes for workforce development training, measuring learner progress against vocational competency frameworks. The g.Maarifa platform issued Ministry-of-Education-backed certificates upon IVR course completion in Kenya, providing a direct precedent for the Passport-integration model.

3.4 The Integration Feedback Loop: What Makes the Stack a System

The three layers are individually defensible as policy innovations. Their integration is what makes the Stack transformational.

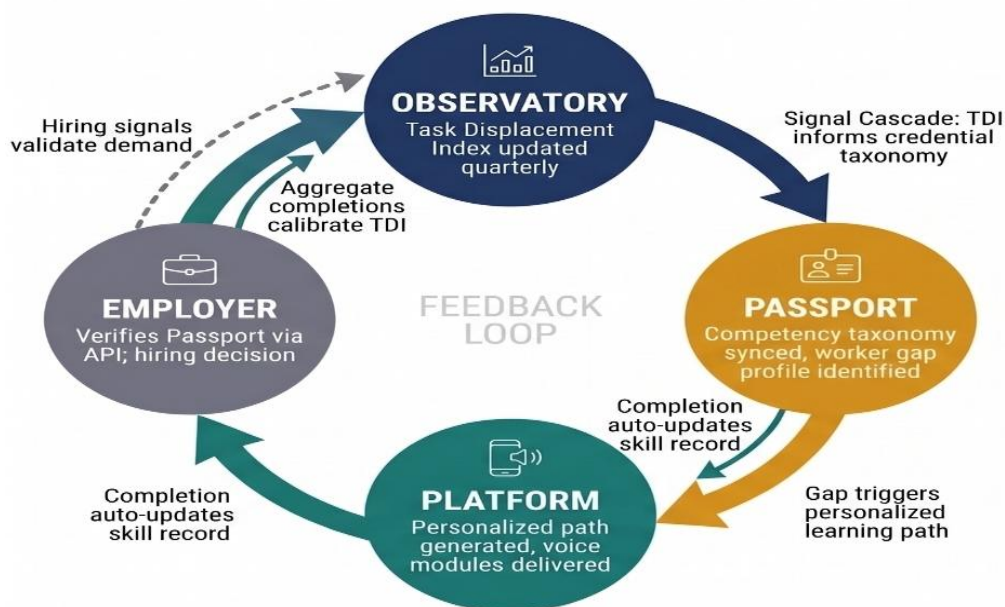


Figure 5. ANCHOR: Data Flow and Feedback Loop.

The integration logic operates in three directions. The **downward cascade** from Observatory to Passport to Platform ensures that what is being taught is always anchored to what is currently being demanded in the labour market, at the task level, in real time. This eliminates the structural lag that makes conventional TVET curricula obsolete before learners complete them.

The **upward validation return** from Platform completion through Passport update back to Observatory closes the loop from the demand side. When a worker completes a learning path targeting a specific task cluster, the Observatory receives an aggregate signal that supply-side capacity is building in that cluster. When employer hiring decisions preferentially select workers with certain Passport credentials, the Observatory registers that demand validation. Over time, the system develops an empirically grounded picture of which skills, once certified, actually translate into employment and adjusts its TDI scoring accordingly.

The **portability multiplier** the Passport as the integration point between all three layers is what converts the Stack from a national programme into a global architecture. A worker who begins their Passport in Morocco can continue building it in Dubai, in Brussels, or in Casablanca after a period abroad: their learning history, credential record, and displacement risk profile travel with them, seamlessly, across every institution in the consortium network. This is the design feature that makes the Stack genuinely scalable not through replication of the full system in every country, but through bilateral consortium expansion that adds new issuers and verifiers to a common credential infrastructure.

SECTION 4 - IMPLEMENTATION ROADMAP

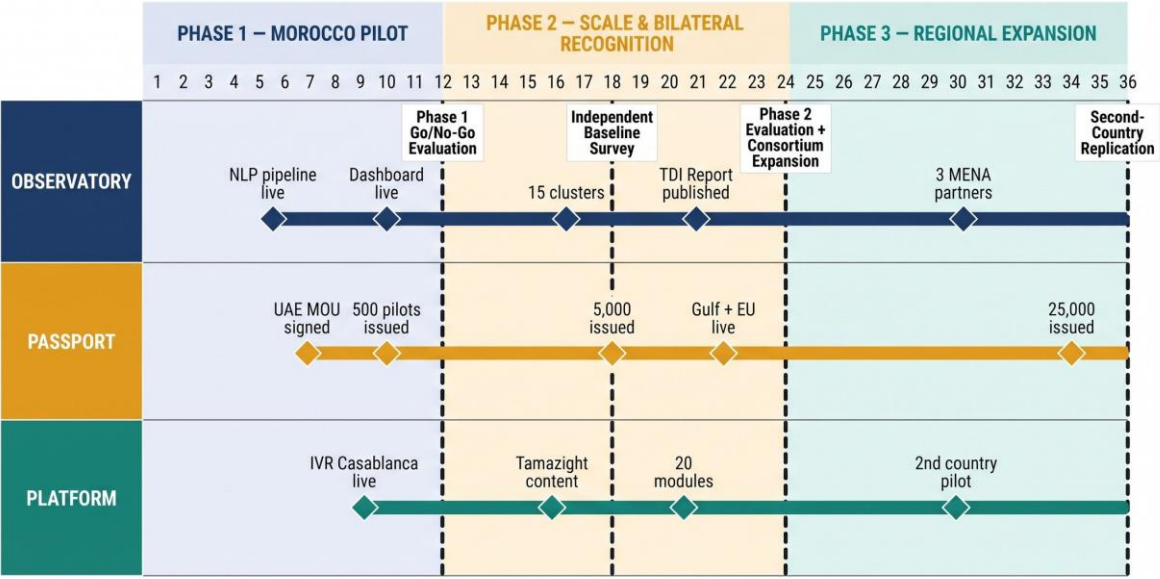


Figure 6. 36-Month Implementation Timeline: Phased Deployment and Governance Milestones.

Phase 1 - Pilot: Morocco Anchor (Months 1-12)

The pilot targets two sectors with the highest immediate automation exposure in Morocco's formal economy: construction and logistics. Both sectors have existing ANAPEC registration bases, are OFPPT-served for training, and were represented in the §1 diagnostic.

Observatory: The NLP pipeline is built on ANAPEC's existing data infrastructure and trained on job postings from the national ANAPEC portal and the two sector employer associations. Five occupational task clusters receive full TDI scoring by Month 6; policymaker dashboard goes live by Month 10. Output format validated with HCP's labour statistics directorate.

Passport: VC issuance stack is deployed for ANAPEC and OFPPT. Five hundred Passports are issued to workers enrolled in Morocco's IDMAJ employment support programme an existing cohort with registration data, reducing onboarding cost. The bilateral consortium Memorandum of Understanding (MOU) targeting the UAE Ministry of Human Resources and Emiratisation is signed by Month 8.

Platform: IVR infrastructure is deployed for the Greater Casablanca region. Three pilot learning modules are released in Darija: BIM foundations, logistics workflow automation, and digital administrative skills. Voice assessment and Passport auto-update are functional by Month 9.

Go/No-Go Gate / Month 12: Proceed to Phase 2 if: (a) $\geq 80\%$ of pilot workers report the Passport was consulted or cited in at least one job interaction; (b) ≥ 5 verified employers confirm use of Passport API for candidate screening; (c) Observatory TDI incorporated into at least one OFPPT curriculum planning document.

Phase 2 - Scale and Bilateral Recognition (Months 13–24)

Observatory: Coverage expands to 15 occupational clusters across 5 sectors. HCP quarterly survey data is formally integrated. The first annual ***Morocco Task Displacement Report*** is published as open data, establishing the Observatory as a public information resource beyond the Stack's own users.

Passport: Five thousand Passports issued. Cross-border credential recognition with the UAE partner is operationalized workers can present Passports at UAE employer verification portals. A second Gulf partner (Saudi Arabia's HRDF) and one EU partner (via Europass eDC interoperability) are added to the consortium.

Platform: Deployment expands to three additional cities and two rural governorates. Tamazight-language content is released. The module library grows to twenty courses. An independent evaluation baseline survey is commissioned at Month 18.

Go/No-Go Gate /Month 24: Proceed to Phase 3 if: (a) $\geq 3,000$ documented employment outcomes linked to Passport completion; (b) independent evaluation confirms statistically significant employability improvement in the pilot cohort versus matched control.

Phase 3 -Regional Expansion (Months 25–36)

Observatory: Open data API extended to three additional MENA government partners (targeted: Egypt, Tunisia, Jordan). Integration with OECD AI Policy Observatory explored for global benchmarking.

Passport: 25,000 Passports issued. A multilateral mutual recognition agreement formalizes the consortium as a standing institution beyond the pilot horizon.

Platform: Fifty learning modules in production. Morocco achieves national coverage. A second-country replication pilot begins (Egypt or Tunisia), using the Stack's open-source codebase and published implementation framework the primary mechanism of global scalability.

SECTION 5 - IMPACT ASSESSMENT

Impact is assessed at three levels worker, employer/labour market, and government followed by a scalability projection. Where evidence-based benchmarks exist, they are cited; where the Stack's design introduces a novel integration that has no direct precedent, projections are labelled as design targets derived from validated component precedents, not empirical outcomes.

5.1 Impact on Workers

The Stack's primary beneficiary is the worker currently excluded from workforce adaptation: the informal, semi-literate, rural, or language-minority worker who has skills but lacks the systems to signal, develop, or certify them. For this population, the three-layer design changes four structural conditions simultaneously.

Visibility. The Skills Passport converts informally acquired competencies into employer-verifiable digital records. The ILO's evidence base on Recognition of Prior Learning confirms that skills certification is consistently associated with improved labour market access, higher earnings, and reduced discrimination against informal-sector candidates, with effects strongest for workers with prior informal experience in skilled trades, logistics, and construction precisely the sectors targeted in Phase 1 (ILO, 2019; OECD, 2022). In Morocco's context, where approximately 80% of jobs are informal and formal credential screens systematically exclude qualified workers (§1), even partial Passport adoption represents a structural shift in who is legible to employers.

Relevance. The Observatory's task-level intelligence ensures that what workers are trained to do is anchored to what employers currently need removing the structural lag that causes workers to complete training in skills that are already being automated. This is the design feature that most distinguishes the Stack from existing TVET programmes.

Access. The voice-first, Darija/Tamazight-language delivery of Layer 3 removes the three access barriers identified in §2 simultaneously: connectivity (IVR works on any mobile phone without data); language (content native to the learner's primary language); and literacy (oral assessment requires no reading). Workers in rural governorates currently unreachable by formal TVET infrastructure become substantively reachable.

Portability. A worker who builds a Passport record in Morocco can have it verified by a Gulf employer, a European training institution, or a domestic employer without any intermediary step. For Morocco's significant emigrant labour population, this represents an entirely new capability: their skills travel with them in a machine-readable format accepted across consortium borders.

Design target for the 36-month pilot: **25,000 workers** receive at least one Passport credential; **≥3,000** document an employment outcome attributable to Passport use or Platform completion.

5.2 Impact on Employers and Labour Markets

Screening efficiency. Employers currently cannot verify the competencies of informal-sector job applicants, forcing reliance on credential proxies that exclude large shares of qualified candidates. The Passport's employer API reduces candidate screening to a single QR-code scan, returning a verifiable competency record with live TDI displacement indicators. Reducing verification friction is one of the most consistent mechanisms through which digital labour market infrastructure improves matching quality and reduces hiring time (McKinsey Global Institute, 2015).

Talent pool expansion. In Morocco's construction, logistics, and digital services sectors where informal worker participation is highest employers currently face a paradox: acute skills shortages coexist with large numbers of unverified informal workers who may hold precisely the competencies required. The Passport makes this hidden talent pool legible, expanding effective labour supply without increasing actual supply.

Forward planning. The Observatory's publicly available Task Displacement Index gives employers a three-to-six month lead signal on which task clusters are being automated in their sector allowing proactive upskilling of existing staff rather than reactive replacement hiring. This shifts employer behaviour from displacement-and-replace toward augment-and-retain, with direct implications for workforce stability.

For the Moroccan labour market as a whole: with 1.63 million unemployed workers as of Q2 2024 (HCP, 2024), and youth unemployment at a historical record of 35.8% (OECD, 2024), even a modest improvement in matching quality and credential recognition creates measurable macroeconomic spillover.

5.3 Impact on Governments and Public Finance

Policy intelligence dividend. The Observatory produces a public good real-time, task-level labour market data that benefits government planning well beyond the Stack's direct users. ANAPEC and OFPPT gain a continuous, granular signal for curriculum design and employment programme targeting. Morocco's National Development Model (2021) explicitly prioritizes reskilling as a national objective; the Observatory directly operationalizes the monitoring infrastructure that objective requires but currently lacks.

Return on existing investment. Morocco's IDMAJ and TAEHIL programmes already reach tens of thousands of workers annually with employment facilitation support. The Stack's Passport layer is designed to integrate with

these existing programme beneficiary databases enabling the same public investment to generate credential-verified, employer-readable outcomes rather than attendance records. This is a quality-of-return improvement on spending already committed, not a demand for additional funding.

Scalability through open architecture. The Stack's open-source codebase and published implementation framework mean that a second-country replication (Phase 3 target: Egypt or Tunisia) requires institutional agreement rather than infrastructure rebuild. The ECES observatory precedent in Egypt (§3) demonstrates that comparable institutions already exist; the Stack offers an integration layer above them, not a replacement beneath them.

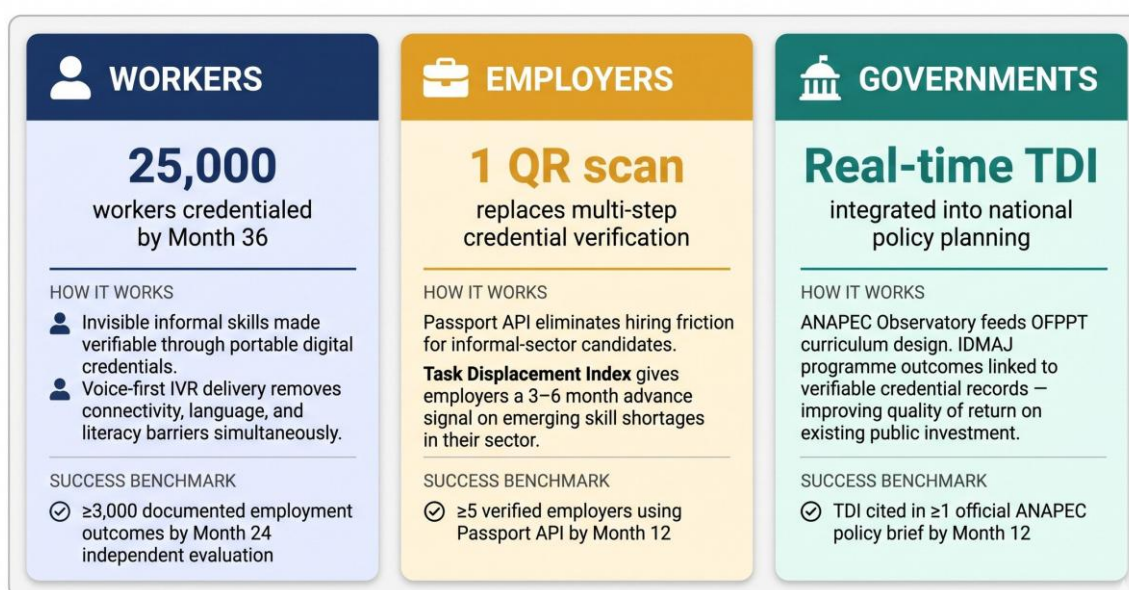


Figure 7. Stakeholder Impact Summary: Worker, Employer, and Government Outcomes.

5.4 Scalability Trajectory

The addressable beneficiary population is defined by the ILO's estimate of 2 billion workers in informal employment globally (ILO, 2023) the population for whom skills are most likely to be informally acquired and therefore invisible to formal credential systems. The Stack does not claim to reach this population directly; it claims to demonstrate an architecture that can be replicated at national scale and extended bilaterally to reach progressively larger shares of it.

The replication mechanism is the design feature that makes scalability credible. A country joining the consortium as a Layer 2 partner extending mutual Passport recognition adds its informal worker population to the legible credential network without rebuilding the Observatory or Platform from scratch. The open standard (W3C VC) ensures that Passports issued anywhere in the network are readable everywhere in it. The open-source codebase reduces second-country deployment cost substantially relative to first-country development.

Morocco → Egypt → Tunisia

→ Gulf represents a natural corridor expansion that maps to existing labour migration flows, ensuring that portability adds immediate value rather than speculative future value.

SECTION 6 - GOVERNANCE, ETHICS, AND SAFEGUARDS

A system that uses AI to shape which skills workers are told to acquire, what their competency records say about them, and which learning opportunities they receive carries significant ethical weight. The Stack is designed from first principles to address these risks rather than defer them. Governance provisions are embedded at each layer, not appended as an afterthought.

6.1 Observatory: Algorithmic Accountability and Bias Mitigation

The Task Displacement Index is an AI-generated output that will directly influence government training allocations and employer hiring signals. This concentrates significant power in the underlying NLP models — and creates specific bias risks that must be structurally mitigated.

The primary risk is data representativeness: job posting corpora systematically over-represent formal, urban, online-registered employers, and may therefore generate TDI scores that are accurate for formal sector workers but systematically blind to the task evolution of informal and rural workers precisely the population most vulnerable to displacement. The mitigation is architectural: HCP's quarterly labour surveys, which use stratified random sampling across informal and rural workers, are formally integrated as an offline complement to job posting data, and the TDI methodology weights both sources explicitly.

The second safeguard is the advisory principle: TDI outputs are public, version-controlled, and explicitly labelled as decision-support tools requiring human review before any policy action not algorithmic mandates. An independent technical panel conducts an annual methodology audit, published in the annual Stack performance report, assessing model bias, data representativeness, and score stability. Consistent with the ILO and OECD's joint conclusion that AI in labour market contexts requires 'human oversight, explainability, and worker participation in governance frameworks' (ILO, 2025; OECD, 2023), the methodology documentation is open-access and subject to civil society comment.

6.2 Passport: Worker Sovereignty and Privacy

The Passport's privacy architecture operationalizes two principles: data minimization and worker sovereignty. On minimization, the Passport records only competency-level outcomes what a worker can do, and when it was

verified not process-level learning logs, geographic tracking, or behavioural data from the Platform. The learning system and the credential record are functionally separated: what workers struggle with en route to a competency is not transmitted to employers.

On sovereignty, the decentralized W3C VC architecture means there is no central government database of worker skill records. Each credential is held in the worker's mobile wallet; employers cannot query it without a worker-initiated QR code scan or explicit digital consent. Workers retain the right to deactivate individual credentials or the entire Passport at any time, consistent with both Morocco's Law 09-08 on personal data protection (CNDP, 2009) which requires data minimization, explicit consent, and the right to erasure and EU GDPR standards that govern the bilateral European consortium partner. Cross-border data transfers within the consortium are governed by a data-sharing protocol aligned to both frameworks, reviewed by the CNDP before activation.

6.3 Learning Platform: Consent and Non-Discrimination

Worker entry into the Platform is explicitly opt-in. The AI personalization engine which generates a worker's learning path from their Passport gap profile and Observatory TDI data is explainable by design: workers are shown, in plain Darija or French, why each module is recommended and which task cluster it addresses. Recommendations can be overridden at any point; workers may select their own modules without engaging the personalization system at all.

The voice-first, orally navigable interface carries an embedded non-discrimination benefit: it removes the literacy, connectivity, and device barriers that cause conventional e-learning to systematically exclude the most vulnerable workers. Workers with limited reading ability, low-specification feature phones, or intermittent data access are full participants, not edge-case accommodations.

6.4 Institutional Accountability Structure

The consortium governance board comprises representatives from each member government's labour ministry, at least two independent civil society organizations with a mandate in workers' rights or digital inclusion, and one academic observer from a member-country institution. It meets biannually and publishes decisions publicly.

The annual Stack performance report covering TDI methodology, Passport issuance volumes, learning completion rates, employment outcomes, and bias audit findings is a public document, distributed to the CNDP, the ILO Regional Office for Arab States, and all bilateral consortium partners. A formal grievance mechanism allows workers, employers, or civil society actors to flag algorithmic bias or data misuse; all substantiated complaints trigger mandatory methodology review within 90 days.

This governance architecture reflects the central finding of the ILO's 2025 brief on AI and work: that trust in AI-augmented systems 'will not emerge from technology alone it must be earned through' institutional accountability, worker participation, and transparent remediation. The Stack is designed to earn it.

SECTION 7 — LIMITATIONS AND RISKS

Intellectual honesty requires naming the conditions under which the Stack could fail, the assumptions it rests on, and the risks its designers cannot fully mitigate. Four categories of limitation are material.

Institutional dependency. The Stack's Morocco anchor depends on sustained political will within ANAPEC and the Ministry of Employment. Government leadership changes, budget reallocations, or a shift in national development priorities could suspend the Observatory before it reaches the data density needed for reliable TDI outputs. The mitigation is partial: the open-source codebase and published methodology mean the system can be transferred to a different institutional home, but the data assets and political relationships are not portable in the same way. The bilateral consortium structure partially hedges this risk by distributing governance across multiple sovereign actors but the anchor-country commitment remains load-bearing.

NLP model accuracy. The Observatory's task extraction pipeline is only as reliable as the NLP models underlying it. Current large language models produce strong results on formal English-language job postings; their performance on Arabic-language, sector-specific, or informal labour market text is less established. If TDI scores for Moroccan occupations systematically misclassify task automation risk overstating or understating displacement the downstream recommendations to the Passport and Platform could direct workers toward irrelevant or premature reskilling. The mitigation is the HCP survey integration and the annual methodology audit; neither fully eliminates the risk.

Employer adoption lag. The Passport creates value only if employers verify it. If the construction or logistics sector employers targeted in Phase 1 do not integrate the Passport API into their hiring workflows within the first twelve months, the credential loses its signalling function and workers have no incentive to complete learning paths that generate it. Employer adoption is the Stack's most significant first-mover coordination challenge. It is addressed structurally through the bilateral consortium's employer engagement programme, but it cannot be guaranteed in advance of demonstrated value.

Digital access floor. Despite the Platform's voice-first design, a segment of the target population remains unreachable: workers without mobile phones of any

kind, those in areas with no network coverage at all, and those with significant cognitive or hearing impairments not accommodated by the current IVR interface. The IVR model assumes at minimum a feature phone and occasional network signal. In Morocco's most remote Atlas or Saharan communities, this assumption may not hold for the most marginalized workers precisely those most in need of access. Future versions of the Platform must address this residual floor through offline-first community access points or radio-integration models; Phase 1 cannot fully close it.

These limitations are acknowledged not as fatal objections but as the honest boundaries of what the Stack, as designed, can achieve in its pilot horizon. The go/no-go gate structure in §4 is the operational expression of this humility: the Stack earns the right to scale by demonstrating what it claims, not by assuming it.

SECTION 8 - CONCLUSION

The argument this report has made is ultimately simple, even if its solution is not. Artificial intelligence is restructuring work at the task level, faster than any national reskilling system was built to absorb. The workers most exposed to this disruption are not the ones with access to retraining programmes, digital credentials, or responsive labour market intelligence. They are Khalid and the two billion informal workers the global economy has structurally forgotten to include in the systems designed to protect them.

The ANCHOR does not propose to solve this crisis at scale from day one. It proposes a design principle that signal, recognition, and delivery must function as a closed feedback loop rather than three unconnected policy instruments and a proof-of-concept architecture capable of demonstrating that principle in a real, policy-active context. Morocco is not a simplified test case. It is one of the most representative stress-tests available: a country where automation is accelerating, where informal employment is the norm, where language barriers are structural, and where the institutional will to address the problem exists but the infrastructure does not yet match the ambition.

What makes the Stack original is not its components in isolation task observatories, digital credentials, and mobile learning platforms all have precedents but their integration. The feedback loop that converts task-level intelligence into personalized credential pathways, and credential gaps into adaptive learning, and learning outcomes back into updated market signals, is the contribution.

It is the piece that does not yet exist at operational scale anywhere in the world. What makes it feasible is the same quality that makes it responsible: it is built on open standards, operated by existing institutions with existing mandates,

anchored in a country with an explicit national commitment to reskilling, and designed to extend through bilateral agreement rather than through the creation of new supranational bodies. It is a scaffold for coordination, not a demand for surrender of sovereignty.

The Geneva Challenge asks what serious, scalable responses to the future of work actually look like. The ANCHOR is our answer: an architecture that starts with the worker the system has failed, builds the infrastructure around their actual constraints, and earns its right to scale by proving its value one verified competency, one cross-border credential, one reachable rural learner at a time.

SECTION 9 - AI-USE DECLARATION

AI-Use Declaration

This report was researched and drafted with the assistance of Claude (Anthropic), used as a writing partner for drafting, structural editing, and citation organization. All research claims were verified against primary sources by the authors before inclusion; all cited URLs were confirmed live at time of submission. All strategic, analytical, and design decisions are the authors' own. AI assistance was not used to generate fabricated data, invent citations, or produce content the authors could not independently verify. This declaration is made in accordance with the Geneva Challenge 2026 AI-use disclosure requirement.

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