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Reconceptualizing Competence through Facets: ATHENA as a Strategic Framework for Adaptive Talent Management in the Age of AI

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ABSTRACT

Human resource management (HRM) remains predominantly organized around competency and occupation-based representations that implicitly presume relative stability in work content. Yet artificial intelligence (AI) increasingly changes work at the level of tasks, activity sequences, decision criteria, and human–tool interaction. This theory-building article introduces ATHENA (Advanced Tool for Holistic Evaluation and Nurturing of Abilities), a facet-based framework that reconceptualizes competence as an emergent, context-bound configuration of mobilizable human resources rather than a stable entity attached to job titles. ATHENA proposes an intermediate analytical layer through facets specified at developmental mastery levels to connect activity-based work analysis with recruitment, learning design, internal mobility, and strategic workforce planning under task volatility. The framework is organized around five interdependent dimensions: cognition, conation, knowledge, emotion, and sensorimotor resources. These dimensions are decomposed into nineteen sub-dimensions and sixty facets, each interpretable through four progressive mastery levels. We clarify how the framework was theoretically derived, distinguish it from competency models, KSAO (Knowledge, Skills, Abilities, Other Characteristics) approaches, ability requirement scales, work analysis, psychometrics, and skills-based HRM, and specify how different AI modalities alter activity demands and facet configurations. The article provides a worked example of an AI-augmented analyst role, operationalizes five testable propositions, and defines boundary conditions, governance requirements, and a

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research agenda. ATHENA is not presented as a validated measurement instrument; rather, it is a conceptual and methodological scaffold for empirical validation and responsible organizational experimentation.
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1. Introduction

For decades, human resource management (HRM) has relied on competency-based frameworks as its primary scaffolding. By standardizing recruitment, training, and appraisal around shared descriptors, organizations sought to align individual capabilities with overarching strategic goals [1–3].

This logic, however, hinges on a premise that no longer holds: the idea that work requirements remain stable enough to be well represented through fixed competency models.

Recent shifts in the workplace have made this assumption increasingly untenable, with the rapid integration of artificial intelligence (AI). AI does not merely replace occupations; it reconfigures them from the inside out [4]. As Acemoglu and Restrepo observe [5], job titles often persist while the underlying tasks shift in uneven, context-driven ways. Today, two employees with identical titles might navigate entirely different cognitive demands and performance risks depending on how they interact with automated tools.

This creates a structural lag: while actual work becomes fluid and tool-mediated, HRM frameworks remain anchored to static role descriptions. The result is competency dictionaries that become increasingly bloated and generic, thereby losing diagnostic precision. On the other hand, purely activity-based descriptions fail to capture the transferable human qualities needed for long-term mobility, even when the activities are described extensively.

This creates a central challenge for HRM: mapping human capability when the job itself becomes a moving target heavily dependent on a changing environment. Current models often oscillate between broad, vague job families and granular, yet disconnected, task lists. Neither extreme effectively supports development in a volatile environment [6–10].

To address this, we introduce ATHENA, a facet-based framework that treats competency not as a static trait, but as an emergent configuration of resources mobilized within a specific context. ATHENA moves away from the idea of stored competency, focusing instead on how these dimensions are "enacted" under technological constraints.

The theoretical core of ATHENA lies in its use of "facets" and "mastery levels." By positioning these as an intermediate layer between raw activities and abstract competencies, we can capture how performance happens. This allows the framework to stay relevant even as AI shifts the nature of daily tasks.

Recent HRM literature increasingly frames AI-driven transformation not only as a technological shift, but also as a reconfiguration of how organizations develop, mobilize, and sustain human capabilities under changing work conditions [6].

The article proposes four contributions. First, it clarifies the ontological status of competence as a situated and configurational phenomenon. Second, it presents a list of facets that is sufficiently granular to support analysis while remaining structured enough for organizational use. Third, it specifies an activity-to-facet mapping mechanism that can be applied to AI-mediated work transformation. Fourth, it formulates operationalizable propositions and candidate research designs.

The article is not an empirical validation study and does not claim that all facets are currently measurement-ready. Its aim is to offer a rigorous conceptual architecture for subsequent empirical work and responsible practice.

2. Conceptual Positioning and Methodological Approach

This manuscript is a theory-building article rather than an empirical validation study. Its purpose is to develop constructs, define relationships among constructs, and derive propositions that can guide future empirical research. This methodological positioning is important because ATHENA is not yet presented as a psychometric instrument, a validated selection battery, or a prescriptive HR technology. It is a conceptual and analytical framework intended to organize inquiry at the interface of work analysis, competency modeling, psychometrics, instructional design, and AI-mediated work transformation.

The postponement of empirical validation is justified by the status of the framework. Before a construct can be tested, its unit of analysis, conceptual boundaries, expected mechanisms, and scope conditions must be specified [11, 12]. Prematurely validating poorly defined constructs would risk producing measurement artifacts rather than cumulative knowledge. The present article therefore focuses on construct clarification and mechanism specification. Future studies should examine content validity, inter-rater reliability in activity-to-facet mapping, construct validity of facet measures, criterion-related validity for performance and adaptation outcomes, and the effectiveness of facet-targeted learning interventions.

The ATHENA architecture was derived through an integrative conceptual synthesis rather than through factor analysis, large-scale survey data, or a formal Delphi study. It builds on prior theoretical work proposing that skills can be decomposed into five generic components (knowledge, active cognition, conation, affection, and sensory-motor resources) [13] and on subsequent work applying ATHENA to creative professional activities and pedagogical design [14]. The present article extends those foundations into the domain of AI-mediated talent management. In doing so, it reframes ATHENA from a pedagogical and creativity-oriented model into a strategic HR architecture for task volatility, role redesign, mobility, and workforce development [15].

The derivation of the five dimensions, nineteen subdimensions, and sixty facets followed four principles. First, each facet had to refer to a mobilizable human resource rather than to a task, an occupation, a trait label, or an outcome category. Second, facets had to be interpretable across multiple activities, allowing transfer analysis without assuming context-free measurement. Third, the list of facets had to be fine-grained enough to support instructional and HR reasoning, but not so granular that it became unusable in organizations. Fourth, the framework had to remain compatible with existing work-analysis and skills-taxonomy systems, including O*NET and ESCO, without being reducible to them [8, 16–18].

More specifically, the construction of the list of facets relied on iterative comparison across several knowledge traditions, including cognitive psychology, work analysis, motivational and self-regulation theories, instructional design, and HR competency modeling. Candidate facets were retained when they simultaneously satisfied three criteria: theoretical interpretability across activities, developmental relevance for learning and adaptation, and practical usability in work-analysis contexts. Constructs traditionally associated with personality psychology, adaptive functioning, or domain-specific expertise were not excluded a priori, but were interpreted through the functional and configurational logic of the framework.

Because this derivation remains conceptual and expert-informed, the list of facets should be read as a theoretically justified grounded conceptual structure, not as a finalized empirical ontology. The claim is not that the sixty facets are exhaustive, invariant, or psychometrically equivalent. The claim is more limited: a facet-at-level representation is a promising unit of analysis for studying how human capability requirements shift when work activities are reconfigured by AI.

3. From Competencies to Facets: Positioning ATHENA among Existing Frameworks

Competency models have helped organizations create a shared language for talent decisions. They support strategic alignment, role clarity, and consistency across HR practices [1, 2]. Their limitation is not their practical usefulness but their tendency to become semantically overloaded. In many organizations, competencies describe desired outcomes, behavioral indicators, personality tendencies, values, and knowledge areas at the same time. This creates ambiguity for assessment and weakens the link between diagnosis and development.

Work analysis offers a more granular view by decomposing work into tasks, activities, work contexts, and worker requirements [15, 16]. O*NET remains one of the most influential infrastructures for describing occupations and their activity requirements. Its content model distinguishes tasks, generalized work activities, detailed work activities, skills, abilities, knowledge, work styles, and other descriptors [17–19]. However, activity descriptions alone do not explain how performance is produced. They identify what must be done, but not the configuration of cognitive, conative, emotional, knowledge-based, and sensorimotor resources required to do it.

Psychometric traditions offer the opposite strength. They provide rigorous construct models and validity principles, especially in the study of cognitive abilities, personality, and personnel selection [11, 20–25]. Meta-analytic evidence demonstrates that predictive validity depends on construct relevance, measurement quality, and structured use [26–28]. However, psychometric models are not, by themselves, HR architectures. They often explain variance across persons but do not directly translate changing activity demands into learning design, role redesign, or mobility pathways.

Skills taxonomies and skills-based HRM attempt to solve the interoperability problem. ESCO, O*NET, and related initiatives create standardized descriptors that can support matching, labor market analytics, and workforce planning [17, 19, 29–33]. Skills-based organization models similarly argue for moving beyond jobs by deconstructing work into tasks, projects, and capabilities [34, 35]. These developments are aligned with ATHENA's concern, but they do not fully solve the theoretical problem of competence. They often treat skills as portable units without specifying the underlying resources and configurations that make performance transferable.

AI-mediated work makes this gap more visible. Empirical studies show that AI affects tasks unevenly. Machine learning exposure measures indicate that most occupations include some tasks that are suitable for machine learning, but few occupations are fully automatable [36]. Recent HRM literature also highlights that AI adoption increasingly reshapes the managerial and organizational capabilities required for workforce coordination, learning, and adaptation under technological volatility [7].

Experimental evidence on generative AI shows productivity gains in some writing tasks [8], conversational support work [9], and consulting tasks inside the "jagged technological frontier", while also showing that performance can deteriorate when workers rely on AI for tasks outside that frontier [10]. These findings strengthen the case for a representation of human capability that is neither fixed at the job-title level nor dissolved into isolated tasks.

ATHENA is positioned within this conceptual space. It does not replace competency models, work analysis, psychometrics, or skills taxonomies. It introduces an intermediate layer that links them, as shown in **Table 1**. Activities define situated demands. Facets represent the mobilizable human resources required by those demands. Configurations explain how several facets combine in performance. Competency labels remain useful as communicable outcome summaries, but they are not the primary explanatory unit.

Table 1. Comparison of ATHENA with adjacent frameworks.

Framework	Primary Unit	Strength	Limit for AI-Mediated Work	ATHENA Extension
Competency models	Broad competency labels	Strategic alignment and shared language	Labels often mix outcomes, behaviors, traits, and knowledge; weak diagnostic precision under task volatility	Decomposes broad labels into mobilizable facets at the level and configurations
KSA/KSAO approaches	Knowledge, skills, abilities, other characteristics	Strong personnel-selection tradition and construct discipline	Often remains category-based and does not model activity-to-configuration shifts	Specifies resources at the facet level and links them to situated activity demands
Fleishman Ability Requirements Scales	Abilities required by tasks	Systematic ability requirement analysis	Primarily ability-centered; less explicit on conation, emotion, knowledge transfer, and developmental mastery	Integrates cognition, conation, knowledge, emotion, and sensorimotor dimensions with mastery levels
Work analysis/O*NET	Tasks, work activities, worker requirements	Granular description of work	Does not fully explain the human resource configurations that produce transferable performance	Adds an interpretive layer between activities and competence
Psychometrics	Latent constructs and scores	Validity, reliability, and prediction	Not an HR architecture for changing tasks; often difficult to translate into role redesign and learning design	Uses psychometric principles while postponing high-stakes measurement until use-specific validation
Skills taxonomies/ESCO	Standardized skills and occupations	Interoperability and labor-market matching	Semantic inflation and variable construct depth	Uses facets as a deeper substrate beneath local skill labels
Skills-based organization models	Skills, tasks, projects, work without fixed jobs	Strategic reconfiguration of work beyond job titles	Often under-specifies psychological mechanisms and developmental levers	Provides the human-resource mechanism behind task and skill adjacency

4. ATHENA: A Facet-Based Conceptual Framework

4.1. Core Definitions

ATHENA is based on four core constructs: work activity, facet, configuration, and competence.

A work activity is a structured, goal-oriented set of behaviors performed in a specific context, often mediated by tools, technologies, social expectations, and organizational constraints. Activities are observable and can be decomposed into tasks, actions, and decision points. They are the primary input of the ATHENA mapping process.

A facet is a mobilizable human resource that can contribute to performance across activities. Facets are not tasks, behaviors, or competency labels. They refer to functional resources such as working memory, uncertainty management, emotional regulation, technical expertise, or fine dexterity. A facet may be supported by traits, knowledge, habits, and learning histories, but it is not identical to any of these.

A configuration is the patterned combination of facets mobilized in a given activity or role. ATHENA assumes that competence emerges from configurations rather than from additive lists of isolated resources. The same performance outcome may be achieved through different configurations, and the same person may adapt their configuration when tools, constraints, or activity sequences change.

Competence is defined as effective performance in context. It is not treated as a stable entity possessed by an individual. It is an emergent result of resource mobilization under constraints. This definition preserves the practical value of competency language while preventing reification. Competency labels can remain useful for communication, but the analytical work should occur at the level of facets-at-level within configurations.

4.2. Conceptual Boundaries

The facet construct requires clear conceptual boundaries. Facets differ from tasks because tasks describe external work requirements, whereas facets describe mobilizable human resources that may contribute to performance across situations. "Verifying an AI-generated market analysis" is an activity; working memory, sustained attention, factual knowledge, and uncertainty management are examples of facets that may be mobilized within that activity.

Facets also differ from traditional competencies. A competency such as "analytical thinking" may combine several heterogeneous elements, including reasoning, knowledge, attention, epistemic discipline, communication, and contextual interpretation. ATHENA decomposes such broad labels into more analytically tractable functional resources that can be mapped, developed, and studied in relation to activities and performance conditions.

ATHENA does not assume that facets correspond to fully isolated psychometric constructs, strictly orthogonal latent variables, or immutable dispositional entities. Some facets may partially overlap with constructs traditionally studied in personality psychology, motivational research, adaptive functioning, or cognitive science. However, ATHENA approaches these constructs from a functional and configurational perspective centered on mobilization in context rather than on stable dispositional measurement alone.

Accordingly, a trait, disposition, prior experience, environmental condition, or organizational structure may influence the probability, intensity, or stability with which a facet is mobilized in practice. The framework therefore treats facets as context-sensitive and mobilizable human resources whose functional role depends on the interaction between the individual, the activity, the technological environment, and the organizational setting.

Finally, facets differ from broad general abilities such as general intelligence because they are intended primarily for work analysis, learning design, developmental reasoning, and HR decision support. ATHENA is therefore proposed as a functional and configurational architecture for analyzing human resource mobilization under changing work conditions rather than as a finalized psychometric taxonomy or universal ontology of human functioning.

4.3. Contribution of the Present Article

Two previous publications are directly relevant to ATHENA. Lamri and Lubart [13] proposed the generic skills component approach, arguing that hard and soft skills share a common multidimensional structure. Lamri et al. [14] applied ATHENA to creative work and instructional design, presenting the model as a systemic framework for creativity and complex skill development. The present article is not a replication of those contributions. It makes three distinct extensions.

First, it relocates ATHENA into HRM and strategic talent management rather than creativity education alone. Second, it specifies the role of AI-mediated task volatility as a mechanism that changes facet demands. Third, it formulates operationalizable propositions for empirical studies in selection, learning, mobility, and workforce planning. The novelty of the present article therefore lies in the integration of ATHENA with activity-based work transformation and HR decision systems under AI-mediated volatility. **Figure 1** shows the main architecture of the ATHENA framework as intended from dimensions to HR decisions.

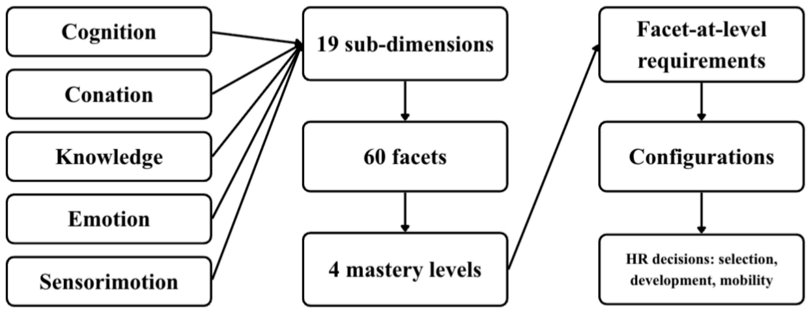

Figure 1. ATHENA architecture: From dimensions to HR decisions.

4.4. The ATHENA Architecture: Five Dimensions, Nineteen Sub-Dimensions, Sixty Facets

Table 2 reports the complete list of facets at the level required for readers to assess the internal coherence of the framework. Definitions are provided in **Appendix A**. The table should be interpreted as a theoretically derived conceptual structure rather than as a validated factor structure. Several cognitive and attentional facets are consistent with established work on executive functions [36], although ATHENA does not claim to reproduce a psychometric factor structure.

4.5. Mastery Levels and Qualitative Growth

ATHENA's operational unit is not the facet alone but the facet-at-level. Four mastery levels are used to capture qualitative differences in how a resource is mobilized, as shown in **Table 3**. These levels do not measure frequency alone. They describe increasing autonomy, stability, transferability, and contextual sensitivity. The levels are generic and must be interpreted relative to a target activity. A person may demonstrate advanced self-regulation in a familiar activity and only intermediate self-regulation in a new AI-mediated workflow.

Table 2. ATHENA facet list.

Dimension	Sub-Dimension	Facets
Cognition	Reasoning	Inductive reasoning; deductive reasoning; abstract reasoning
Cognition	Memory	Short-term memory; long-term memory; working memory
Cognition	Attention	Sustained attention; selective attention; divided attention, attentional flexibility
Cognition	Creative and innovative cognition	Divergent thinking; cognitive flexibility; conceptual synthesis
Conation	Motivation	Intrinsic motivation; extrinsic motivation; self-efficacy
Conation	Volition	Self-regulation; perseverance; time management
Conation	Proactivity	Initiative; decision-making; problem solving
Conation	Adaptability	Behavioral flexibility; uncertainty management; lifelong learning
Knowledge	Declarative knowledge	Factual knowledge; concepts; principles
Knowledge	Procedural knowledge	Technical expertise; heuristics
Knowledge	Metacognitive knowledge	Learning strategies; self-awareness; cognitive self-regulation
Knowledge	Contextual knowledge	Knowledge transfer; systems thinking; cultural intelligence; awareness of trends
Emotion	Emotional competence	Emotional perception; emotional regulation; adaptive use of emotions
Emotion	Resilience	Stress adaptation; optimism; post-traumatic growth
Emotion	Empathy and social emotion	Emotional recognition; perspective-taking; compassion; social intelligence
Sensorimotion	Perceptual acuity	Visual acuity; auditory acuity; proprioception
Sensorimotion	Coordination	Hand-eye coordination; balance; fine dexterity
Sensorimotion	Motor performance	Speed; precision; endurance; automatization
Sensorimotion	Sensorimotor integration	Functional synesthesia; sensorimotor adaptation; sensory compensation

Table 3. ATHENA developmental mastery levels with a worked facet example.

Level	Generic Label	Criteria	Detailed Example: Uncertainty Management in AI-Assisted Analysis
1	Emergent	The resource is mobilized only in familiar situations, with external Guidance, limited transfer, and unstable performance.	Recognizes that an AI answer may be uncertain only after explicit reminders or Checklists.
2	Functional	The resource is mobilized in common situations with partial autonomy; transfer remains limited when conditions change.	Identifies several sources of uncertainty in routine AI outputs and requests additional evidence.
3	Adaptive	The resource is mobilized autonomously across varied situations; the person adjusts strategies to context and constraints.	Compares AI outputs with independent sources, distinguishes epistemic uncertainty from stylistic ambiguity, and adapts verification depth to risk.
4	Generative	The resource is mobilized fluidly in novel or ambiguous contexts; the person can model, teach, and redesign practices around it.	Designs a verification protocol for the team, anticipates failure modes, and calibrates acceptable uncertainty according to business and ethical stakes.

The same developmental logic can apply across dimensions. For example, emotional regulation may evolve from reactive emotional containment under supervision toward autonomous modulation and interpersonal stabilization under pressure. Similarly, technical expertise may evolve from context-specific execution to the adaptive redesign of procedures under novel technological constraints.

4.6. Mapping Mechanism: From Activity to Facet Configurations

The mapping mechanism proceeds through four steps, as shown in **Figure 2**. First, a target activity is described in functional terms: goal, outputs, constraints, tools, interaction patterns, risk points, and performance criteria. Second, the analyst identifies the facets required by the activity and qualifies each facet by expected mastery level, frequency of use, intensity of demand, and criticality for performance. Third, facets are combined into a configuration, usually represented as a vector or profile of facet-at-level requirements. Fourth, the configuration is used for a defined HR purpose: selection, role redesign, learning design, mobility analysis, or workforce planning.

This mechanism does not remove professional judgment from HR analysis. It structures judgment, makes assumptions explicit, and creates objects that can be tested empirically. Inter-rater reliability, mapping stability, and predictive validity are therefore not assumed; they become research questions.

4.7. AI-Mediated Reconfiguration: Specifying the Mechanism

Figure 3 shows how the AI mechanism should not be stated as if AI were a single force. Different modalities change activity demands in different ways. Robotic process automation tends to remove or standardize routine procedural steps, increasing the relative importance of exception handling and process monitoring. Machine-learning classifiers and recommender systems shift demands toward probabilistic judgment, calibration, and bias detection. Generative AI changes drafting, synthesis, ideation, and coding activities, often increasing the need for prompting, verification, epistemic vigilance, and domain-specific evaluation. Agentic AI systems add another layer: humans must specify goals, supervise autonomous action, detect misalignment, and maintain accountability under uncertainty [8–10].

The relevant HR question is therefore not “which jobs will AI replace?” but “which activity components will be delegated, augmented, monitored, or reconfigured, and which facet configurations become more or less critical as a result?”, as shown in **Table 4**.

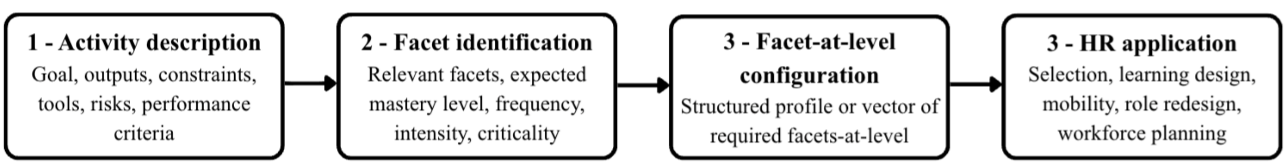

Figure 2. ATHENA four-step activity-to-facet mapping process.

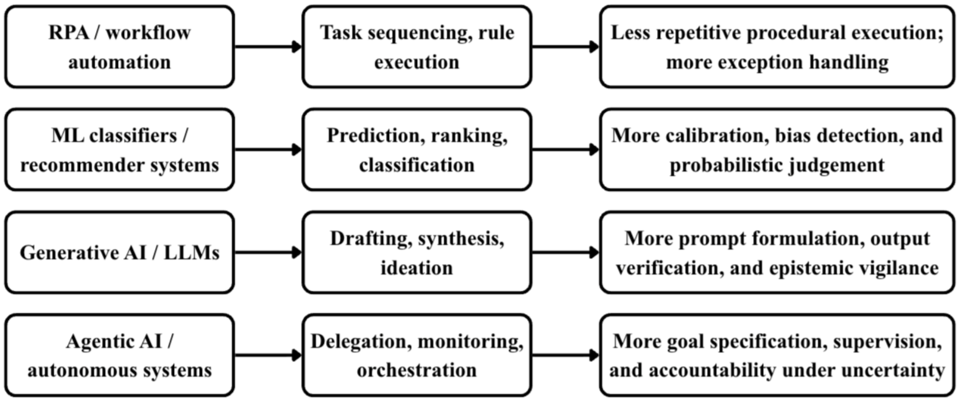

Figure 3. AI modalities and typical facet-demand shifts.

Table 4. AI modalities and illustrative facet-demand shifts.

AI Modality	Activity Transformation	Facet Demand Likely to Decrease	Facet Demand Likely to Increase
Robotic Process Automation (RPA)/ workflow automation	Automates rule-based sequences and repetitive transactions	Routine procedural execution; repetitive attention	Exception handling; process monitoring; systems thinking; responsibility allocation
Machine Learning (ML) classifiers/recommender systems	Ranks, predicts, classifies, or recommends based on data patterns	Manual classification; some factual retrieval	Probabilistic judgment; bias detection; calibration; domain knowledge; uncertainty management
Generative AI/Large Language Models (LLMs)	Drafts text, code, summaries, concepts, and synthetic outputs	First-pass production; routine synthesis	Prompt formulation; epistemic vigilance; output verification; conceptual synthesis; source evaluation
Agentic AI systems	Executes multi-step goals with partial autonomy	Direct task execution and scheduling	Goal specification; supervision; intervention timing; accountability; ethical judgment

5. Detailed Example: An AI-Augmented Analyst Role

Consider an analyst role before and after the implementation of generative AI for research synthesis and report drafting. Before implementation, much of the analyst's time may be devoted to information search, manual synthesis, slide drafting, and iterative writing. After implementation, some drafting and first-pass synthesis activities may be accelerated. However, the role does not become less demanding in a simple sense. The locus of demand shifts. The analyst must formulate better prompts, evaluate source reliability, identify hallucinations or unsupported claims, decide when to trust or reject AI outputs, integrate outputs into business context, and communicate uncertainty to stakeholders.

In ATHENA terms, the activity configuration changes. Certain procedural and production facets may become less central for routine outputs, while judgment calibration, domain knowledge, sustained attention, uncertainty management, metacognitive monitoring, and ethical accountability become more critical. This is exactly the kind of change that broad competency labels struggle to capture. The job title remains "analyst", but the facet configuration has shifted. **Table 5** summarizes all of the above.

Table 5. Worked example of activity-to-facet shift in an AI-augmented analyst role.

Activity Component	Before Generative AI	After Generative AI	Illustrative Facet Shift
Research synthesis	Manual search, reading, and note-taking dominate the workflow.	AI accelerates first-pass synthesis but may introduce unsupported claims.	Lower routine synthesis load; higher factual knowledge, source evaluation, uncertainty management, and cognitive self-regulation.

Table 5. *Cont.*

Activity Component	Before Generative AI	After Generative AI	Illustrative Facet Shift
Report drafting	Analyst writes most sections from scratch.	AI drafts initial sections; analyst edits, verifies, contextualizes, and aligns with stakeholder needs.	Lower production fluency demand; higher conceptual synthesis, domain contextualization, and communication judgment.
Data interpretation	Analyst interprets data and manually links it to recommendations.	AI proposes interpretations that may be plausible but wrong or incomplete.	Higher deductive reasoning, error detection, calibration, and systems thinking.
Stakeholder communication	Analyst explains findings and caveats based on own analysis.	Analyst must explain what was AI-assisted, what was verified, and where uncertainty remains.	Higher perspective-taking, ethical accountability, emotional regulation, and contextualization.

6. Implications for HR Practices

For talent identification, ATHENA suggests that organizations should not evaluate candidates only against broad competencies attached to a job title. Under high task volatility, selection should emphasize the facet configurations that support adaptation across plausible future activities. This does not imply replacing validated assessment methods with an unvalidated facet battery. It implies using facet analysis to improve construct specification and to justify why particular assessments are relevant to the work[11, 12, 26–28].

For learning and development, the framework shifts attention from generic skill training to limiting facets. A limiting facet is a resource whose insufficient mastery constrains performance across several activities in a configuration. For AI-mediated work, examples may include verification discipline, sustained attention under accelerated tool-mediated workflows, uncertainty management, and metacognitive self-monitoring. Bastida et al emphasize that AI integration transforms not only operational HR processes but also the developmental conditions under which employees adapt, learn, and regulate work under increasing technological complexity[37]. Training design can then target qualitative shifts in facet mobilization rather than merely updating procedures[38].

For internal mobility, ATHENA introduces configurational proximity. Two roles may be close if their facet-at-level vectors are similar, even when their job titles differ. Conversely, two roles with similar titles may require different configurations after AI integration. Mobility pathways can therefore be identified by comparing configurations and by diagnosing the specific facet gaps that require development[39, 40].

For HR architectures, ATHENA supports interoperability without enforcing a single universal vocabulary. Organizations may keep their local competency labels for communication while using facets as a deeper substrate for comparison, analytics, and learning design. This "unification from below" is compatible with skills taxonomies and skills-based organization models but adds a psychological and developmental layer[29–32, 35, 41].

From a strategic HRM perspective, ATHENA may also support more dynamic forms of workforce allocation and developmental investment under conditions of technological and organizational volatility.

Finally, ATHENA has governance implications. A granular model of human capability can support better learning and mobility, but it can also enable excessive monitoring or reductionist classification. Responsible use requires clear use cases, transparency, human validation, proportionality, and strict limits on high-stakes individual decisions until validity evidence is available[42].

7. Theoretical Propositions and Operationalization

To make the theory testable, each proposition is translated into observable constructs, candidate indicators, and empirical designs, and reported in **Table 6**. The propositions are not claims of established validity. They define what future studies should test.

Table 6. Operationalized propositions and suggested research designs.

Proposition	Operationalized Construct	Candidate Indicators	Suggested Design
P1. Under higher task volatility, facet-based representations provide greater decision stability than job-title competency labels.	Decision stability across framework updates	Temporal similarity of required criteria; Jaccard/cosine similarity of facet vectors; percentage of retained development priorities; number of revised selection criteria	Longitudinal comparison of competency dictionaries and facet maps across 6–12 months in AI-exposed roles
P2. Tool mediation increases within-title heterogeneity in facet configurations.	Within-title configuration dispersion	Average pairwise distance among employees with the same title; variance in required mastery levels; tool-use intensity index	Multilevel study comparing teams with low, medium, and high AI integration
P3. Facet configurations add predictive value over competency checklists for performance and adaptation outcomes.	Incremental criterion-related validity	ΔR^2, AUC, RMSE improvement; supervisor ratings; error-detection accuracy; adaptation speed	Hierarchical regression or cross-validated predictive modeling with baseline competency scores and facet vectors
P4. Training targeting limiting facets produces more transferable gains than training around fixed task procedures.	Learning transfer and maintenance	Near/far transfer tasks; delayed post-test; performance under changed tool conditions; self-regulation behavior	Randomized or quasi-experimental comparison of facet-targeted vs. procedural training
P5. Configurational proximity reveals viable mobility pathways missed by title- or skill-label adjacency models.	Hidden mobility detection	Similarity between facet vectors; transition success; ramp-up time; retention; post-move performance	Retrospective and prospective validation of internal mobility recommendations

8. Boundary Conditions, Limitations, and Governance

ATHENA is most useful when work is volatile, tool-mediated, cognitively complex, or strategically important. It may offer limited added value for roles with stable, repetitive activities and low tool mediation. It also depends on mapping quality. If analysts select facets inconsistently, the framework will produce noise. Governance, training, and inter-rater reliability checks are therefore necessary.

The framework is not measurement-ready as a whole. Some facets correspond to constructs with established assessment traditions, whereas others require new operational definitions. Validity claims must be tied to specific interpretations and uses [11]. A facet used for learning design does not require the same evidence as a facet used for selection or certification.

The configurational assumption creates analytical complexity. Competence is not the sum of sixty scores. Future research should therefore use methods capable of modeling patterns, interactions, thresholds, and compensatory structures, including configurational comparative methods, latent profile analysis, network models, and predictive models with transparent validation [43].

ATHENA should therefore not be interpreted as a finalized latent-variable model or psychometric taxonomy, but as a theory-building configurational framework intended to support future empirical refinement.

Ethically, ATHENA should not be used as a surveillance architecture. Its purpose is to clarify developmental and organizational reasoning, not to reduce persons to facet profiles. Individual-level deployment in high-stakes contexts should be restricted until reliability, validity, fairness, and governance safeguards are demonstrated.

9. Research Agenda and Next Steps

A staged research agenda is required. The first step is content validation: expert panels should evaluate whether the current 60 facets adequately cover the resources required in selected families of activities. The second step is mapping reliability: independent raters should map the same activities to facets and mastery levels, allowing estimation of agreement and sources of ambiguity. The third step is criterion-related validation: facet configurations should be tested against performance, adaptation speed, error detection, learning transfer, and supervisor ratings. The fourth step is intervention research: facet-targeted learning designs should be compared with conventional task-based training. The fifth step is interoperability research: ATHENA configurations should be aligned with O*NET, ESCO, and organizational competency dictionaries to assess whether they improve mobility and learning recommendations.

In practical terms, the first empirical studies should be modest rather than universal. A strong initial design would focus on one role family exposed to generative AI, such as analysts, consultants, customer support agents, instructional designers, or software developers. The study would compare pre- and post-AI activity maps, facet configurations, and performance outcomes. Such a design would test the central claim of ATHENA without requiring immediate validation of all sixty facets.

10. Conclusions

This article has addressed a growing mismatch in HRM. Work is increasingly transformed at the level of activities and human–tool interaction, while many HR systems remain anchored to competency labels and job titles. ATHENA offers a way to bridge this gap by introducing facets-at-level as an intermediate analytical layer between tasks and competencies.

The framework's value lies in its granularity and its configurational logic. It allows organizations and researchers to ask a more precise question: which human resources must be mobilized, at which level, in which configuration, for which activity, under which technological and organizational constraints? This question is better suited to AI-mediated work than static lists of competencies or purely descriptive task inventories.

The article has clarified ATHENA's methodological status, presented its list of facets, specified mastery levels, differentiated it from adjacent frameworks, described AI-specific mechanisms, offered a worked example, and translated theoretical claims into operationalizable propositions. These additions also define the next scientific challenge. ATHENA should now be tested through content validation, mapping reliability studies, longitudinal research on task volatility, intervention studies on facet-targeted learning, and mobility analytics based on configurational proximity.

ATHENA should therefore be understood neither as a finished instrument nor as a universal answer to talent management. It is a research scaffold and strategic HR infrastructure. Its promise will depend on disciplined empirical validation, responsible governance, and careful integration with existing systems. In an era where job titles may remain stable while the substance of work changes rapidly, HRM needs architectures that can evolve with work itself. A facet-based approach offers one rigorous path toward that objective.

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During the preparation of this work, the authors used ChatGPT 5.2 to improve the language, readability, and overall grammatical coherence of the text. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

Appendix A. Facets Definitions

Appendix A presents the operational definitions of the 60 facets currently integrated into the ATHENA framework. These definitions are intended to clarify the conceptual scope of each facet, support analytical consistency, and facilitate future empirical operationalization across contexts of competence assessment and development.

Table A1. The operational definitions of the 60 facets currently integrated into the ATHENA framework.

Dimension	Sub-Dimension		Facet		Full Definition
Cognition	1A	Reasoning	1A1	Inductive reasoning	Capacity to derive general conclusions from specific observations while considering contextual variations. In the context of competence, this facet supports the generalization of patterns and principles from experience to new situations.
			1A2	Deductive reasoning	Capacity to draw specific conclusions from general premises using logical reasoning while adapting to contextual constraints. In the context of competence, this facet supports the accurate application of rules, models, or theories to concrete situations.
			1A3	Abstract reasoning	Capacity to manipulate non-concrete ideas and concepts, identify patterns, and solve problems conceptually across changing environments. In the context of competence, this facet supports innovation and the understanding of complex systems or situations.
	1B	Memory	1B1	Short-term memory	Capacity to temporarily retain a limited amount of information for immediate use. In the context of competence, this facet supports the active handling of task-relevant information despite distractions or environmental constraints.
			1B2	Long-term memory	Capacity to store and retrieve information over extended periods while organizing it according to experience and context. In the context of competence, this facet supports the use of prior knowledge and experiences to guide present actions and decisions.
			1B3	Working memory	Capacity to maintain and manipulate information necessary for complex cognitive tasks under varying levels of cognitive load. In the context of competence, this facet supports problem solving, reasoning, and real-time decision-making.
	1C	Attention	1C1	Sustained attention	Capacity to maintain cognitive focus on a task or stimulus over prolonged periods despite distractions or changing conditions. In the context of competence, this facet supports consistent performance during demanding or repetitive activities.
			1C2	Selective attention	Capacity to focus on relevant stimuli while filtering out irrelevant information in complex environments. In the context of competence, this facet supports prioritization and efficient information processing.
			1C3	Divided attention	Capacity to distribute attentional resources across multiple tasks or information sources simultaneously. In the context of competence, this facet supports multitasking and the management of parallel demands.
			1C4	Attentional Flexibility	Capacity to shift attention efficiently between tasks, stimuli, or priorities in dynamic situations. In the context of competence, this facet supports rapid adaptation to changing demands.
	1D	Creativity et Innovation	1D1	Divergent thinking;	Capacity to generate multiple original ideas or solutions from a single starting point. In the context of competence, this facet supports creativity and the exploration of alternative approaches to complex problems.

Table A1. *Cont.*

Dimension	Sub-Dimension		Facet		Full Definition
Cognition	1D	Creativity et Innovation	1D2	Cognitive flexibility	Capacity to modify thinking and adapt strategies in response to new information or changing situations. In the context of competence, this facet supports adaptation and alternative problem-solving approaches.
			1D3	Conceptual synthesis	Capacity to combine ideas, information, or concepts from different domains to create new insights or solutions. In the context of competence, this facet supports innovation and interdisciplinary integration.
Conation	2A	Motivation	2A1	Intrinsic motivation	Capacity to engage in an activity for the inherent satisfaction it provides. In the context of competence, this facet supports sustained engagement and continuous improvement.
			2A2	Extrinsic motivation	Capacity to engage in an activity to achieve external outcomes such as rewards, recognition, or goals. In the context of competence, this facet supports effort mobilization in response to external incentives.
			2A3	Self-efficacy	Belief in one's capacity to successfully perform actions required to achieve desired outcomes. In the context of competence, this facet supports confidence, persistence, and engagement with challenging tasks.
	2B	Volition	2B1	Self-regulation	Capacity to monitor and adjust one's thoughts, emotions, and behaviors to achieve goals. In the context of competence, this facet supports adaptive performance and behavioral control across contexts.
			2B2	Perseverance	Capacity to sustain effort and commitment despite obstacles, setbacks, or adversity. In the context of competence, this facet supports long-term progression and resilience in challenging situations.
			2B3	Time management	Capacity to plan, prioritize, and allocate time effectively according to goals and constraints. In the context of competence, this facet supports efficient organization and performance optimization.
	2C	Proactivity	2C1	Initiative	Capacity to act proactively and autonomously by identifying and seizing opportunities. In the context of competence, this facet supports innovation, anticipation, and self-directed action.
			2C2	Decision-making	Capacity to select a course of action by evaluating alternatives, risks, and consequences. In the context of competence, this facet supports effective choices in complex or uncertain situations.
			2C3	Problem solving	Capacity to identify, define, and resolve problems using systematic and adaptive approaches. In the context of competence, this facet supports overcoming obstacles and generating effective solutions.
	2D	Adaptability	2D1	Behavioral flexibility	Capacity to adapt behaviors in response to changing environmental demands or expectations. In the context of competence, this facet supports adjustment to new situations and evolving requirements.
			2D2	Uncertainty management	Capacity to function effectively in ambiguous or unpredictable situations. In the context of competence, this facet supports performance and decision-making despite incomplete or changing information.
			2D3	Lifelong learning	Capacity to continuously seek and integrate new knowledge and experiences. In the context of competence, this facet supports ongoing adaptation and professional development.

Table A1. *Cont.*

Dimension	**Sub-Dimension**		**Facet**		**Full Definition**
Knowledge	3A	Declarative knowledge	3A1	Factual knowledge	Capacity to retain and recall objective and verifiable information. In the context of competence, this facet provides a reliable informational foundation for action and decision-making.
			3A2	Concepts	Capacity to understand and manipulate mental representations of categories, ideas, or phenomena. In the context of competence, this facet supports knowledge organization and conceptual reasoning.
			3A3	Principles	Capacity to understand and apply general rules, laws, or frameworks across situations. In the context of competence, this facet supports transfer and adaptation of knowledge to new contexts.
	3B	Procedural knowledge	3B1	Technical expertise	Capacity to perform specialized tasks efficiently and accurately using appropriate tools, methods, or procedures. In the context of competence, this facet supports operational execution and domain-specific performance.
			3B2	Heuristics	Capacity to use simplified cognitive strategies to make rapid judgments or decisions under complexity or uncertainty. In the context of competence, this facet supports efficient action in ambiguous situations.
	3C	Metacognitive knowledge	3C1	Learning strategies	Capacity to identify and apply effective methods for improving learning and skill acquisition. In the context of competence, this facet supports efficient knowledge acquisition and retention.
			3C2	Cognitive self-regulation	Capacity to plan, monitor, and evaluate one's cognitive processes and learning strategies. In the context of competence, this facet supports continuous adjustment and optimization of performance.
			3C3	Self-awareness	Capacity to recognize and evaluate one's own cognitive processes, strengths, and limitations. In the context of competence, this facet supports adaptive strategy selection and self-improvement.
	3D	Contextual knowledge	3D1	Knowledge transfer	Capacity to apply previously acquired knowledge or skills to new situations or domains. In the context of competence, this facet supports adaptation and effective reuse of prior learning.
			3D2	Systems thinking	Capacity to understand the interdependencies and dynamics within complex systems. In the context of competence, this facet supports long-term reasoning and awareness of indirect consequences.
			3D3	Cultural intelligence	Capacity to understand, adapt to, and function effectively across diverse cultural contexts. In the context of competence, this facet supports effective interaction and collaboration in multicultural environments.
			3D4	Awareness of trends	Capacity to identify and anticipate emerging changes and developments within a domain or environment. In the context of competence, this facet supports proactive adaptation and strategic anticipation.
Emotion	4A	Emotional competence	4A1	Emotional perception	Capacity to accurately identify and interpret emotions in oneself and others. In the context of competence, this facet supports interpersonal understanding and adaptive social behavior.
			4A2	Emotional regulation	Capacity to manage and adjust emotional states according to situational demands and goals. In the context of competence, this facet supports emotional stability and effective functioning under pressure.

Table A1. *Cont.*

Dimension	Sub-Dimension		Facet		Full Definition
Emotion	4A	Emotional competence	4A3	Adaptive use of emotions	Capacity to use emotions constructively to guide thought, decision-making, and behavior. In the context of competence, this facet supports motivation, judgment, and adaptive action.
	4B	Resilience	4B1	Stress adaptation	Capacity to cope effectively with stressful or adverse situations using adaptive strategies. In the context of competence, this facet supports sustained performance under pressure.
			4B2	Optimism	Capacity to maintain a positive yet realistic outlook toward future outcomes and challenges. In the context of competence, this facet supports persistence and long-term engagement.
			4B3	Post-traumatic growth	Capacity to derive learning, meaning, or personal development from difficult experiences. In the context of competence, this facet supports resilience and transformation following adversity.
	4C	Empathy and social emotion	4C1	Emotional recognition	Capacity to identify and interpret others' emotions through verbal and nonverbal signals. In the context of competence, this facet supports communication and interpersonal effectiveness.
			4C2	Perspective-taking	Capacity to understand situations from another person's psychological viewpoint. In the context of competence, this facet supports empathy, collaboration, and conflict resolution.
			4C3	Compassion	Capacity to respond constructively to others' suffering or difficulties with concern and supportive intent. In the context of competence, this facet supports prosocial behavior and supportive relationships.
			4C4	Social intelligence	Capacity to understand and navigate complex social situations effectively. In the context of competence, this facet supports collaboration, influence, and adaptive interpersonal behavior.
Sensori-Motion	5A	Perception	5A1	Visual acuity	Capacity to perceive fine visual details accurately under varying conditions. In the context of competence, this facet supports precise observation and interpretation of visual information.
			5A2	Auditory acuity	Capacity to detect, discriminate, and interpret sounds accurately across different environments. In the context of competence, this facet supports communication and responsiveness to auditory signals.
			5A3	Propriocep-tion	Capacity to perceive body position, movement, and force without visual reference. In the context of competence, this facet supports body awareness and motor control.
	5B	Coordination	5B1	Hand-eye coordination	Capacity to synchronize hand movements with visual input. In the context of competence, this facet supports precise manipulation and tool use.
			5B2	Balance	Capacity to maintain postural stability and control body equilibrium during movement or disturbance. In the context of competence, this facet supports physical stability and safe task execution.
			5B3	Fine dexterity	Capacity to perform precise and controlled movements with the hands and fingers. In the context of competence, this facet supports accurate manipulation of objects and tools.
	5C	Motor performance	5C1	Speed	Capacity to execute movements or action sequences rapidly according to situational demands. In the context of competence, this facet supports efficiency and responsiveness.
			5C2	Precision	Capacity to perform movements or actions accurately and consistently. In the context of competence, this facet supports reliability and high-quality execution.

Table A1. *Cont.*

Dimension	Sub-Dimension		Facet		Full Definition
Sensori-Motion	5C	Motor performance	5C3	Endurance	Capacity to sustain physical or motor performance over extended periods despite fatigue. In the context of competence, this facet supports prolonged effectiveness in demanding activities.
			5C4	Automatization	Capacity to execute complex motor or cognitive sequences with minimal conscious effort. In the context of competence, this facet supports efficiency and cognitive resource optimization during repetitive tasks.
	5D	Sensorimotor integration	5D1	Functional synesthesia	Capacity to integrate information from multiple sensory modalities to guide action. In the context of competence, this facet supports adaptive functioning in multisensory environments.
			5D2	Sensorimotor adaptation	Capacity to adjust motor responses according to sensory feedback and environmental changes. In the context of competence, this facet supports flexible and adaptive motor performance.
			5D3	Sensory compensation	Capacity to rely on alternative sensory information when a sensory modality is limited or disrupted. In the context of competence, this facet supports maintained performance despite sensory constraints.

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