Upholding Fundamentals and Exploring Innovations: The Reconstruction of the "Triple Attributes" of Chinese Psychology and Its Engineering Pathway —A Review of Zhou Xiaolin, Sun Zhaohui, and Hu Jie' s *Transforming Our Psychology*

Authors: Kong Gaiqing, Kong Gaiqing

Date: 2026-02-01T05:45:01+00:00

Abstract

Zhou Xiaolin, Sun Zhaohui, and Hu Jie (2026) argue that Chinese psychology urgently needs to break through the "natural science–social science" "dual-attribute" framework, systematically strengthen its "engineering attribute," and promote a discipline-wide shift from "explaining the world" to "transforming the world," while building an independent engineering system and talent cultivation pipeline in order to respond to national strategies and social needs. This proposition is not only a profound reflection on the current situation of Chinese psychology, but also a discipline-wide, systematic, problem-oriented paradigm reconstruction initiative with Chinese characteristics, put forward against the backdrop of the global psychological community facing a "replicability crisis," an "impact gap (research–practice gap)," and the accelerating emergence of governance demands in digital societies. Its key lies in completing the full trajectory of psychology from "knowledge generation" to "knowledge value creation."

In order to transform this directional proposition into an executable program, this paper defines the engineering of psychology as an engineering-science paradigm: constrained by falsifiability mechanisms, taking deliverable systems as its object, using iterative validation as its method, and adopting risk governance as its bottom line. Building on and affirming the contribution of the original proposal, this paper, from an international comparative perspective, advances a three-layer structure of "mechanism science–translational science–systems engineering" and a "evidence–implementation–governance" closed-loop roadmap: the mechanism layer produces transferable mechanistic indicators and boundary conditions; the translational layer accomplishes the engineering encapsulation and reuse of constructs/measurement/algorithms; the systems layer realizes platform-based deployment, monitoring and operations, audit and compliance, and large-scale implementation. On this basis, we propose peer-review standards for "engineering-type evidence packages," and further put forward corresponding suggestions for an evaluation system, curriculum modules, and project organization.

Full Text

Preamble

Upholding Foundations While Pioneering New Directions: Reconstructing the "Triple Attributes" of Chinese Psychology and Its Pathway to Engineering Transformation—A Commentary on Zhou Xiaolin, Sun Zhaohui, and Hu Jie' s *Reforming Our Psychology*

ORCID: https://orcid.org/0000-0002-3142-3730

Department of Psychology, School of Sports Medicine, Wuhan Sports University

Corresponding Author: gaiqing.kong@gmail.com

Address: No. 461 Luoyu Road, Wuchang, Wuhan, Hubei Province, China, Postal Code: 430079

Zhou Xiaolin, Sun Zhaohui, and Hu Jie (2026) propose that Chinese psychology urgently needs to transcend the traditional "dual-attribute" framework of psychology as both a natural and social science, and to systematically strengthen its engineering attribute. This shift is intended to reorient the discipline from "explaining the world" to "changing the world," and to build indigenous engineering systems and talent-development pipelines that respond to national strategies and societal needs. This proposal is not only a profound reflection on the current situation of Chinese psychology; it also represents a problem-driven and systematic paradigm reconstruction in the context of the global reproducibility crisis, the research–practice gap, and the rapidly growing demands of digital social governance. Its central aim is to complete the full pathway by which psychology moves from knowledge generation to value creation. To translate this broad consensus into an actionable program, we define the engineering of psychology as an engineering-science paradigm: constrained by falsifiable mechanisms, oriented toward deliverable systems, guided by iterative validation, and bounded by risk governance. Building on the original article' s contributions and drawing on international comparisons, we propose a three-layer structure—Mechanism Science, Translational Science, and Systems Engineering—together with a closed-loop roadmap of Evidence–Implementation–Governance.

Specifically, the mechanism layer yields transferable mechanistic indicators and boundary conditions; the translational layer packages and reuses constructs, measurements, and algorithms in engineering-ready forms; and the systems layer

enables platform-level deployment, monitoring and maintenance, auditable compliance, and scalable implementation. On this basis, we articulate peer-review standards for an "engineering evidence package" and offer corresponding recommendations for evaluation criteria, curricular modules, and project organization.

Keywords: engineering-oriented psychology; triple attributes; implementation science; complex interventions; digital governance

---

Abstract

Zhou Xiaolin, Sun Zhaohui, and Hu Jie (2026) argue that Chinese psychology urgently needs to move beyond the traditional "dual-attribute" framing of psychology as both a natural and a social science, and to systematically strengthen its engineering attribute. This shift is intended to reorient the discipline from "explaining the world" to "changing the world," and to build indigenous engineering systems and talent-development pipelines that respond to national strategies and societal needs. This proposal is not only a profound reflection on the current situation of Chinese psychology; it also represents a problem-driven and systematic paradigm reconstruction in the context of the global reproducibility crisis, the research–practice gap, and the rapidly growing demands of digital social governance. Its central aim is to complete the full pathway by which psychology moves from knowledge generation to value creation. To translate this broad consensus into an actionable program, we define the engineering of psychology as an engineering-science paradigm: constrained by falsifiable mechanisms, oriented toward deliverable systems, guided by iterative validation, and bounded by risk governance. Building on the original article's contributions and drawing on international comparisons, we propose a three-layer structure—Mechanism Science, Translational Science, and Systems Engineering—together with a closed-loop roadmap of Evidence–Implementation–Governance.

Specifically, the mechanism layer yields transferable mechanistic indicators and boundary conditions; the translational layer packages and reuses constructs, measurements, and algorithms in engineering-ready forms; and the systems layer
enables platform-level deployment, monitoring and maintenance, auditable compliance, and scalable implementation. On this basis, we articulate peer-review standards for an "engineering evidence package" and offer corresponding recommendations for evaluation criteria, curricular modules, and project organization.

Keywords: engineering-oriented psychology; triple attributes; implementation science; complex interventions; digital governance

---

1. Bringing the Question of Psychology' s Contemporary Function to the Forefront

The most crucial academic contribution of *Reforming Our Psychology* lies in advancing the discussion from "what is psychology" to "what should psychology do and what can it deliver," situating this question within the macro context of national strategy and technological competition. The authors emphasize that Chinese psychology must undergo major transformations in research, talent cultivation, and social services to address critical national needs and public health. The article further points out that the "dual-attribute" understanding and training leave psychologists ill-equipped to meet the quantitative demands of personnel scale, technical specifications, and engineering acceptance in major national projects, resulting in a situation of "abundant theory but scarce solutions and insufficient courage." Consequently, psychology often occupies a sub-project position in these initiatives, struggling to lead decision-making. Based on this diagnosis, the authors propose a core thesis: psychology must break free from the "dual-attribute" framework and strengthen its engineering attribute construction, emphasizing goal orientation, design thinking, usability, and iterative updating, thereby repositioning psychology as having "triple attributes" —social science, natural science, and engineering.

This initiative merits serious discussion not because it is "more radical," but because it touches upon the structural dilemmas of the intelligent era: psychology exerts enormous theoretical influence, yet technology implementation is often dominated by engineering disciplines, creating a pattern of "significant input contribution but limited output capacity." Engineering practice capability is almost entirely absent, resulting in the contradiction of "strong theory, weak tools" and "strong foundation, weak translation." The deep problem is not a "lack of application," but rather "the absence of an engineering chain that runs from mechanistic evidence to system delivery, and then to long-term governance and iteration."

2. A Chinese Response to the Global "Scientific Crisis" and "Impact Gap"

From an international perspective, the initiative by Zhou et al. (2026) does not emerge in isolation but represents a Chinese response to two structural dilemmas long faced by global psychology: first, the "research credibility crisis" centered on reproducibility; and second, the "impact gap" (research–practice gap) stemming from the disconnect between research and practice. More importantly, these two dilemmas reinforce each other in the digital-intelligence era: as psychological knowledge increasingly needs to be embedded in complex socio-technical systems (education, healthcare, platform governance, public services) to generate scalable value, mere "reproducibility" is no longer sufficient to support the discipline' s real-world impact. Psychology must complete the full value chain from mechanistic evidence to deliverable systems, and then to long-term governance and iteration.

2.1 From "Reproducibility Crisis"to "Transferability/Implementability Crisis," and Then to "Sustainable Value" Crisis

The international psychology community has discussed reproducibility for many years. The Open Science Collaboration' s 2015 article in *Science* reporting a large-scale replication of 100 psychology studies found significantly reduced effect sizes and a replication success rate far below the proportion of original significant results (Open Science Collaboration, 2015), triggering widespread debate about research credibility in psychology. Echoing this, recent work by the present authors also demonstrates cases where data analysis cannot support original conclusions (Kong et al., 2026), and situations where classic psychological effects fail to replicate due to inadequate control of key confounding variables (Kong et al., 2024). These discussions have driven improvements in research transparency, open science, and methodological standards in psychology, but framing the discipline' s 困境 solely as a "reproducibility crisis" may still underestimate the deeper challenges psychology faces in functioning effectively in the real world.

In practice, psychology often confronts not merely a "reproducibility crisis," but a crisis of "transferability and implementability" : even when interventions prove effective under laboratory conditions, they frequently fail to enter routine systems, scale up, or sustain effectiveness. This is the so-called research–practice gap or know–do gap. Implementation science has emerged precisely in this context. Reviews in implementation science point out that the field aims to bridge the "know–do" gap, emphasizing how evidence-based interventions are adopted, implemented, and long-term embedded in routine practice within real systems (Westerlund et al., 2019). In other words, as Zhou et al. (2026) propose, psychology's "scientific"requirements cannot stop at "proving an effect exists,"but must upgrade to "stably changing behavior/improving outcomes in real systems." This aligns with the international trend of strengthening "solution-oriented" and "translation–implementation" chains: psychology should not be satisfied with explanation and prediction, but must take responsibility for deployable, maintainable, and governable socio-technical systems.

However, for psychology, "reproducible–transferable–implementable" remains only a necessary condition, not the endpoint. The more fundamental problem is that psychology has long excelled at generating explanatory knowledge but lacks the engineering chain to transform knowledge into deliverable, maintainable, and scalable systems, making it difficult to stably create social value. In other words, psychology also faces a "sustainable value crisis" : whether it can turn mechanistic evidence into solutions that operate stably, are auditable, correctable, and iterable in real systems over the long term. The deep meaning of Zhou' s emphasis on "getting into the game oneself" is precisely the demand that psychology establish a complete closed loop from mechanistic evidence to technical systems, and then to governance and iteration, converting "knowledge generation" into an institutionalized capacity for "value creation."

2.2 "Limited Output Capacity" is a Global Common Problem: Zhou's "Getting into the Game" Has International Foresight

Zhou's article points out that even when psychology provides critical theoretical input for artificial intelligence, human–computer interaction, and value-based decision-making, the real driving force behind engineering breakthroughs and industrial implementation often comes from computer science, biomedical engineering, and electronic information disciplines. This disciplinary structure of "strong theory, weak tools" is not unique to China but represents a shared 困境 for international psychology: psychology contributes enormously to the principles of technological systems but lacks dominance in system construction, deployment, and iteration. The result is that psychology often remains in the position of "explaining variables, providing mechanisms, and supplementing human factors," while struggling to gain voice in requirement definition, system architecture, and acceptance evaluation.

In this sense, Zhou's proposal that "psychology must get into the game itself" represents a repositioning of the discipline's role: psychology should not only provide theoretical input but also possess the capacity to develop assessment and intervention tools, construct algorithms and processes, form deployable platform systems, and establish engineering evidence and governance mechanisms. If Chinese psychology can 率先 form this full-chain capability in high-density real-world scenarios, it may globally 率先 break through the 困境 of "strong input, weak output": not only exporting viewpoints and models but also exporting reusable system paradigms, implementation evidence, and governance frameworks, thereby becoming an important provider rather than a passive recipient in international psychology.

2.3 From "Research Output" to "Value Output": The Engineering Attribute Must Complete a Chain, Not Just a Link

If we restate Zhou's thesis in engineering logic, the objective function of psychology engineering is not "doing more applications," but forming a testable, replicable, and governable value chain: using mechanistic evidence to constrain system design space (mechanism guardrails), using construct and measurement engineering to translate psychological variables into computable indicators (operationalization guardrails), using systems engineering to turn prototypes into deployable platforms that operate stably in the real world (deliverability guardrails), using implementation research to address adoption, compliance, retention, and long-term effects (sustainability guardrails), and using risk governance to ensure privacy protection, fairness bias control, auditability, and accountability (governability guardrails). In this chain, the absence of any segment leads to "knowledge exists but value cannot emerge": either the system cannot be built or cannot be stabilized, or it can be built but is difficult to scale, or after scaling, risks become uncontrollable and accountability becomes impossible.

Therefore, the key increment in Zhou' s initiative lies in elevating psychology' s contemporary mission from "explaining patterns" to "delivering systems and assuming responsibility." This also means that disciplinary competition in psychology is no longer just about theory or methodology, but about the capacity to "form a complete engineering system" : whoever can establish a closed loop between mechanistic evidence, technical translation, system deployment, implementation diffusion, and risk governance will be more likely to achieve dominant positions in national strategic needs and digital social governance, and further feed back to basic theory, forming a cumulative and iterable independent knowledge system.

3. Strategic Breakthrough from "Western Paradigm" to "Independent Knowledge System"

Zhou's positioning of disciplinary history is clear: psychology is a product of the modern Western scientific system, and its theoretical framework, disciplinary structure, and talent training model are deeply influenced by European and American traditions, emphasizing basic scientific status and research methodology training while developing few systematic engineering practice systems. This formulation echoes international critiques of psychology' s sample bias and extrapolation fragility.

3.1 The WEIRD Critique: Psychology's Universality is Not Naturally Given

A landmark critique in international behavioral science is the WEIRD (Western, Educated, Industrialized, Rich, Democratic) sample problem: Henrich, Heine, and Norenzayan point out that psychological research over-relies on WEIRD populations, rendering inferences about "universal laws of human psychology" unrepresentative (Henrich et al., 2010). This means global psychology has long suffered from fragility in "knowledge extrapolation." Zhou' s proposal to establish an independent knowledge system for Chinese psychology, emphasizing Chinese problem orientation, Chinese scene-driven research, and independent technology support, is actually not only about "catching up internationally" but also about responding to international psychology' s own structural defects: enabling psychology to form testable and scalable knowledge systems in the complex governance and technological scenarios of non-Western societies.

3.2 The True Meaning of "Corner Overtaking" : Breaking Path Dependence Through Engineering Ecology

Zhou' s article points out that Western psychology lacks an engineering tradition, and tool development has long depended on other disciplines; China, against the backdrop of the new technological revolution, has the opportunity to corner-overtake by cultivating engineering concepts, entering engineering fields, building digital tools, and participating in intelligent systems to form its own engineering ecology and break free from complete dependence on the Western system. From an international perspective, this strategic breakthrough is not closed-door independence but more like "scene- and system-driven independent innovation": when intelligent governance, public service digitalization, and large-scale mental health needs erupt simultaneously, if psychology can form mature engineering chains and evaluation systems in these high-density scenarios, it may in turn become an important provider for international psychology.

4. Ontological Innovation in the Discipline: The Global Significance of Moving from "Dual Attributes" to "Triple Attributes"

Zhou's article proposes that psychology should possess "triple attributes"—social science, natural science, and engineering—and positions this as the key breakthrough for pushing the discipline from "explaining the world" to "changing the world." This thesis is not only a revision of domestic disciplinary positioning but also carries theoretical significance for international disciplinary construction.

4.1 "Reconstructing Definition" : The Dual-Attribute Framework, Though Common, is Insufficient to Cover Engineering Transformation

Zhou cites the official positioning of "dual attributes"in a 2013 Academic Degrees Committee document, pointing out that this understanding limits the capacity of Chinese and even global psychology to serve national strategic needs. International psychology has also long relied on the "natural science + social science" framework, but Zhou' s contribution lies in elevating the "engineering attribute" to a disciplinary pillar equal to the other two, emphasizing that psychology must not only explain patterns but also create tools, build systems, change the world, and generate verifiable social benefits from knowledge.

4.2 "Engineering Transformation" is More Forward-Looking than "Engineering Psychology Development"

A crucial point in Zhou's article is that engineering psychology is merely a branch and far from representing psychology' s overall engineering capacity; what psychology needs is not "the development of engineering psychology" but "the engineering transformation of psychology" itself—enabling major fields like cognitive, developmental, clinical, social, educational, and measurement psychology to jointly acquire engineering capacity "from mechanism to system." In other words, psychology needs not the expansion of a single interdisciplinary branch but a structural rewrite of the entire discipline—making "system construction capability" a common core competency of psychology and forming sustainable organizational capacity in requirement definition, acceptance evaluation, and risk governance.

5. Reshaping the Discipline in Response to "Data Sovereignty/Digital Sovereignty" and the Intelligent Era: Grounding Psychology' s Leadership in Infrastructure

The previous section discussed "what should be done" from the perspective of disciplinary attributes; this section further addresses "how to possess the infrastructure to get things done in the intelligent era." In the context of international competition, digital sovereignty/data sovereignty is not an abstract slogan but a capacity set concerning who owns data assets, who sets data circulation rules, who controls model training and evaluation standards, and who can audit and hold systems accountable. The World Economic Forum summarizes digital sovereignty/data sovereignty as the capacity to "control one' s own digital destiny," breaking it down into infrastructure, rules, and data layers (Fleming, 2025). OECD (Organisation for Economic Co-operation and Development) reports discuss the coupling between artificial intelligence (AI) and data governance and privacy protection, suggesting that data governance and compliance are becoming part of AI system capabilities (AI, 2024).

Translating this framework to psychology, "psychology' s positioning in data sovereignty" does not mean psychology should compete for administrative "data ownership," but rather that it must gain three types of substantive control rights in engineering practice: (1) Measurement and annotation sovereignty—how psychological constructs are operationalized, how data are collected and annotated, and which biases need to be recorded; (2) Evaluation and acceptance sovereignty—how system success and failure are defined, how evidence levels are set, and how generalization and failure are judged; (3) Governance and audit sovereignty—how privacy protection, bias and fairness, explainability, and accountability are solidified into interfaces and processes at the system level. Only when these rights are institutionally written into project organization and review standards can psychology occupy an irreplaceable disciplinary position at the infrastructure level of "data-model-system," rather than remaining a marginal role that merely "provides theoretical input."

5.1 Enhancing Technical Leadership: From "Able to Analyze Data" to "Able to Define Data and Systems"

Zhou et al. point out that psychology talents generally lack capabilities in big data processing, computational modeling, and system architecture, resulting in low participation in national big data projects. The international rise of computational social science also suggests that after digital footprint data and platformized systems become social research infrastructure, disciplinary competition is not just about statistical skills but about "the capacity to translate theory into runnable systems" (Lazer et al., 2009). Therefore, psychology' s technical leadership should not be narrowed down to "learning to program" but should manifest as: the ability to define constructs, specify collection and governance standards, embed mechanism constraints into system objective functions and acceptance indicators, and assume responsibility for real-world system risks.

5.2 Closed-Loop Optimization Engineering Logic: Making "Evidence-Implementation-Governance" a Lifecycle That Can Be Accepted

Zhou' s article emphasizes "design thinking" and "iterative updating," the key to which is shifting psychology' s research chain from "one-time experiment-paper publication" to "requirement definition-system development-real-world evaluation-iterative upgrading." Methodologically, new frameworks for complex intervention research emphasize cyclical progression through development, feasibility, evaluation, and implementation, suggesting that research should continuously iterate around key uncertainties to maximize impact (Skivington et al., 2021). However, for psychology to truly complete its engineering transformation, it must further engineer this closed loop into "lifecycle management" : the development phase must be reproducible, the deployment phase must be monitorable, the diffusion phase must be implementable, and the operation phase must be governable. Only when "evidence-implementation-governance" is made into an institutionalized process that can be accepted will psychology' s engineering attribute transform from concept to capability.

6. Conceptual Clarification and Methodological Guardrails: Engineering is Not "Application" but an Engineering Science Paradigm

The original article' s discussion of "triple attributes" opens an important directional conversation about disciplinary transformation. However, for the "engineering attribute" to move from advocacy to an actionable reform plan, its strict connotation still requires conceptual clarification and necessary methodological guardrails. Otherwise, "engineering attribute" can easily slide conceptually during dissemination and review, and be questioned as a paradigm confusion that "mistakes application for engineering." First, the engineering attribute is not equivalent to applied research or technology transfer. Applied research emphasizes "using knowledge,"while engineering science emphasizes "making knowledge into systems that run stably." Engineering concerns not only average effectiveness but also system reliability, maintainability, scalability, explainability, and safety and compliance requirements in real environments. Zhou' s advocacy of "from model to tool, from tool to system, from system to industry, and from industry feeding back to theory" points precisely to the full-chain logic of engineering science.

Second, engineering should not be simplified as "learning some programming" or "adding some AI skills." Skills are certainly important, but the key bottleneck in engineering transformation often lies not in whether researchers can code, but in

Figure 1

Figure 1: Figure 1

whether psychological constructs can be strictly operationalized into computable indicators, whether intervention mechanisms can be translated into executable processes, and whether evaluation indicators can form closed-loop evidence that supports iterative optimization. In other words, engineering requires a rigorous translation chain from "construct–indicator–decision–intervention–evaluation–iteration," not a hodgepodge of scattered skills or tool assembly. Finally, engineering does not naturally mean elevated status for psychology. If psychology cannot master requirement definition rights and evaluation sovereignty, even participation in engineering development may continue to remain in the marginal role of "theoretical input provider." Therefore, the key to engineering transformation is not only interdisciplinary collaboration but also forming psychology-led engineering organizational capacity and evaluation systems, enabling psychology to possess substantive leadership in system objectives, mechanism constraints, and evidence standards.

7. From "Triple Attributes" to "Three-Layer Structure" : Making Engineering a Testable and Operational Disciplinary System

To enhance the operability of the "triple attributes" framework, this article proposes further structuring it into a "three-layer disciplinary system" that better aligns with engineering logic, thereby forming the backbone chain of psychology's engineering transformation and providing clear objective functions, deliverables, and evaluation standards for different types of research. The "three layers" do not fragment psychology into isolated blocks but emphasize division of labor, collaboration, and closed-loop iteration from mechanistic evidence to technical translation to system deployment: the mechanism layer answers "why," the translational layer answers "how to become technology," and the systems layer answers "how to scale and governably operate." Under this structure, psychology engineering is no longer a loose collection of "doing some applications" but becomes a testable, deliverable, reusable, and governable disciplinary capability system. To visually summarize the above ideas, this article proposes an overall framework of "triple attributes–three-layer structure–evidence closed loop" (see Figure 1

), and accordingly develops Sections 7-8 on institutionalized recommendations for deliverables, acceptance terms, and evaluation systems.

The first layer is the **Mechanism Science** layer, whose core task is to answer "why." The typical deliverable of the mechanism layer is not a single significant result but should include falsifiable mechanism models, clear boundary conditions, transferable mechanism indicator systems, and reproducible evidence packages

Figure 1

Figure 2: Figure 1

(including at least auditable data processing and analysis logic). Correspondingly, the evaluation focus of the mechanism layer should shift from "whether significant" to "causal identification quality, reproducibility, and explanatory power": whether the research truly distinguishes mechanism explanations from alternative interpretations, whether key confounding variables are identified and controlled, and whether mechanism indicators are operable, measurable, and reusable across different tasks and samples. The most common failure mode of the mechanism layer is substituting statistical significance for mechanism falsification, replacing transferable mechanism indicators with task-specific metrics, or forming "pseudo-mechanisms" due to inadequate confounding variable control, resulting in theories that can be published but cannot support subsequent translation and systematization.

Overall Framework for the Engineering Transformation of Chinese Psychology: Triple Attributes, Three-Layer Structure, and "Evidence–Implementation–Governance" Closed Loop

Note: This figure operationalizes the "triple attributes" thesis of psychology proposed by Zhou Xiaolin, Sun Zhaohui, and Hu Jie (2026), forming a testable, deliverable, and governable engineering roadmap.

The upper "Triple Attributes" indicates that psychology simultaneously possesses social science, natural science, and engineering attributes; the middle "Psychology Engineering" emphasizes organizing knowledge production and value realization through an engineering-science paradigm—constrained by falsifiable mechanisms, oriented toward deliverable systems, guided by iterative validation, and bounded by risk governance. The lower "Three-Layer Structure" decomposes the engineering transformation into Mechanism Science, Translational Science, and Systems Engineering layers: the mechanism layer yields transferable mechanistic indicators and boundary conditions; the translational layer completes the engineering packaging and reuse of constructs/measurements/algorithms; the systems layer achieves platform deployment, monitoring and maintenance, audit compliance, and scalable implementation. The bottom "Evidence–Implementation–Governance" represents the closed-loop path of engineering research: starting with evidence and continuously iterating, using implementation science to bridge the research–practice gap, and using governance and compliance to ensure systems are auditable, accountable, and sustainably operable in real environments. The left side lists the era problems addressed by engineering transformation (reproducibility crisis, research–practice gap, intelligent governance demands), while the right side summarizes key requirements of the engineering-science paradigm (deliverable systems, engineering evidence packages, governance compliance). Terminology note: Engineering Evidence Package refers to the minimum evidence unit usable for peer review and project acceptance, *containing at least system performance, failure modes and boundary conditions, reproducible pipeline, implementation evidence, and governance compliance evidence (see Table 2).*

The second layer is the **Translational Science** layer, whose key task is to answer "how to turn mechanisms into technology." The core work of the translational layer is to translate psychological constructs and mechanism constraints into computable indicators, executable processes, and reusable modules, moving mechanistic knowledge from "explainable" to "deployable." In terms of deliverables, the translational layer should produce a construct engineering manual (construct-to-measure mapping) that clarifies the mapping between constructs, indicators, and decision rules/thresholds; a measurement engineering package containing basic strategies for measurement calibration, quality control, and drift monitoring; algorithm/process prototypes and interface definitions; and further packaging into standardized program packages (documentation, dependency environments, API/flowcharts, etc.), while providing at least small-scale cross-scenario validation (e.g., across different samples, tasks, or institutional environments). The corresponding evaluation focus is on deployability, reusability, cross-context generalization capability, and explainability: it must not only "run"but be "reproducible, transferable, and explainable."Common failure modes of the translational layer include prototypes that rely on implicit experience, lack interfaces and documentation leading to non-reusability; indicators decoupled from constructs causing black-boxing; or effectiveness only in single scenarios, collapsing upon migration, making it difficult to become reliable input for the systems engineering layer.

The third layer is the **Systems Engineering** layer, whose goal is to answer "how to scale and governably operate." The delivery object of the systems engineering layer is not "an algorithm" or "a scale" but a socio-technical system that can operate stably in the real world over the long term, whose core includes architecture, operation, monitoring, maintenance, diffusion, and governance. To avoid the criticism of "talking systems engineering without landing," the systems engineering layer needs to specify the minimum set of system deliverables and describe their operability and governability in engineering acceptance language. First, system architecture and module boundaries: clarifying the division of labor and interfaces between data, model, decision, intervention, and monitoring layers, and providing key data/control flows and system dependencies. Second, version and configuration management: including data and model version control, configuration management, update frequency, rollback strategies, and responsibility boundaries to ensure the system is maintainable, iterable, and traceable. Third, operation monitoring and alerting: establishing performance drift monitoring, anomaly detection, threshold strategies, and disposal processes to ensure the system remains controllable under environmental and data distribution changes. Fourth, security and compliance package: including privacy protection and desensitization strategies, access control and least privilege, ethics review and continuous compliance processes to ensure the system is both "usable" and "compliant." Fifth, audit and accountability interfaces:

including log retention, explanation output, manual review, and accountable traceability to make system results verifiable and reviewable. Sixth, implementation and diffusion package: clarifying deployment conditions, training materials, cost estimation, resource allocation, and promotion strategies to support scalable implementation. Seventh, failure mode and boundary condition checklist: clarifying when and why the system fails and how to correct it, avoiding "silent failure" during diffusion. It should be noted that engineering terms such as "rollback strategy," "drift monitoring," "audit interface," and "version control" used in this article are not intended to reduce psychology to an information engineering problem, but to refer to the institutionalized governance mechanisms that psychological technology systems must have to ensure scientificity, ethics, and controllability when operating in real service scenarios. They correspond to psychology' s long-standing concerns about measurement stability, context dependency, risk control, and responsibility attribution, but are made explicit and operable through the language of engineering science.

Correspondingly, systems engineering layer evaluation should not only ask "whether effective" but "whether reliable, maintainable, scalable, and governable" : whether the system runs stably, possesses monitoring and rollback capabilities, meets security and compliance requirements, provides audit interfaces, reports long-term effects and cost-benefit, and clarifies failure criteria and risk disposal processes. To enhance operability, this article structurally summarizes the key deliverables, acceptance terms, and common failure modes of the "mechanism science–translational science–systems engineering" three-layer structure (see Table 1) to form usable language for peer review and project acceptance. In short, the value of the three-layer structure lies in connecting "explanation–translation–delivery" into a closed loop: it can prevent engineering from sacrificing scientificity (the mechanism and translational layers provide falsifiable and explainable guardrails) and prevent traditional psychology from long remaining at the explanatory level without delivery (the systems layer provides operable and governable acceptance logic), thereby making psychology engineering a testable, operational, and sustainable disciplinary system.

Table 1. Three-Layer Structure of Psychology Engineering Transformation: Key Deliverables and Acceptance Terms

Layer / Target Question	Typical Deliverables	Core Acceptance Criteria	Common Failure Modes
Mechanism Science Layer (Answering "why")	1) Falsifiable mechanism models and boundary conditions; 2) Transferable mechanism indicators (mechanism variables, latent mediation/moderation indicators); 3) Reproducible evidence package (data, code, analysis scripts, optional preregistration/open materials); 4) Key confounding variable list and control scheme	1) Causal identification quality (design and inference rigor); 2) Reproducibility/robustness (sensitivity analysis, alternative model testing); 3) Clear boundary conditions (when it holds/fails); 4) Mechanism indicators are operable, measurable, and reusable	1) Substituting statistical significance for mechanism falsification; 2) Indicators dependent on specific tasks/samples, fragile extrapolation; 3) Uncontrolled confounding variables causing "pseudo-mechanisms"; 4) Non-reproducible evidence (missing data/code)

Layer / Target Question	Typical Deliverables	Core Acceptance Criteria	Common Failure Modes
Translational Science Layer (Answering "how to become technology")	1) Construct engineering manual (construct-to-measure mapping); 2) Measurement engineering package (standardization, calibration, and drift monitoring ideas); 3) Algorithm/process prototype and interface definition; 4) Standardized program package (reusable modules, documentation, API/flowcharts); 5) Small-scale cross-scenario validation	1) Deployability (runnable, connectable, clear dependencies); 2) Reusability (modular, well-documented); 3) Cross-context generalization (at least two scenarios/samples); 4) Explainability (indicator–mechanism–decision link explainable); 5) Reproducible pipeline can be rerun	1) "Can run" but not reusable (lacking interfaces/documentation); 2) Non-explainable indicators (black box, decoupled from constructs); 3) Only effective in single scenario, collapses upon migration; 4) Calibration missing

Layer / Target Question	Typical Deliverables	Core Acceptance Criteria	Common Failure Modes
Systems Engineering Layer (Answering "how to scale and governably operate")	1) Platform system (data-model-decision-intervention-monitoring); 2) Operation and version mechanisms (version control, rollback strategies); 3) Monitoring and alerting (drift monitoring, anomaly detection, threshold strategies); 4) Security and compliance package (privileges, desensitization, ethics and privacy processes); 5) Audit and accountability interfaces (logs, explanation output, manual review); 6) Implementation and diffusion package (deployment conditions, training, cost estimation); 7) Failure mode and boundary condition checklist	1) Reliability/robustness (stable operation, optional stress testing); 2) Security and compliance (privacy protection, access control, least privilege); 3) Auditability (complete logs, traceable, explainable); 4) Maintainability (updatable, rollback-capable, monitorable); 5) Cost-benefit and long-term effects (follow-up/continuous monitoring); 6) Risk disposal process	1) "Can be built" but not "stably run" (missing operation and maintenance); 2) Diffusion failure (deployment conditions/training/costs not evaluated); 3) Uncontrollable risks (privacy, bias, fairness, unclear responsibility); 4) No audit interface leading to non-accountability; 5) Drift 失控 causing effect decay

8. Talent Cultivation, Project Organization, and Evaluation Systems: The Real "Bottleneck" of Engineering Transformation Lies Not in the Curriculum

Zhou' s article proposes structural reform recommendations starting from the talent training system: incorporating big data analysis, computational modeling, behavioral data engineering, system design, human–computer interaction engineering, intelligent psychological assessment, and digital intervention into undergraduate, master' s, and doctoral training systems, and using engineering practice platforms to shift psychology education from "reading papers and doing experiments" to "building systems, making products, and solving problems." These recommendations capture the capability foundation of engineering transformation, but if "high-quality engineering" is to be achieved, the real bottlenecks often lie not in the curriculum itself but in structural constraints at three levels: evaluation systems, project organization, and implementation mechanisms. In other words, if evaluation and organizational rules remain unchanged, no matter how "engineering-oriented" the curriculum becomes, it may only produce "traditional psychology that can code," rather than forming an engineering psychology community capable of delivering systems and assuming governance responsibilities.

First, at the evaluation system level, if the academic community still uses paper quantity and impact factor as core metrics, engineering achievements will face significant incentive distortion: system development and deployment require enormous investment but receive disproportionate returns in traditional publication mechanisms, ultimately suppressing high-quality engineering research. Therefore, it is necessary to establish "engineering evidence package" standards that can enter peer review and project acceptance, and institutionally write them into funding, major project, and journal review clauses. To facilitate the inclusion of engineering achievements in peer review and funding acceptance, this article proposes adopting the "engineering evidence package" as the minimum evidence unit, whose composition and review points are shown in Table 2. The evidence package should contain at least five elements: first, system performance evidence, emphasizing generalization performance across samples and scenarios, and reporting comparisons with baseline schemes (Westerlund et al., 2019); second, failure modes and boundary conditions, clarifying when and why the system fails and how to detect and correct it; third, reproducible pipeline, including data governance explanations, version control, repeatable operation processes, and dependency environments; fourth, implementation evidence, covering adoption, adherence, retention, and maintenance/long-term effects, rather than stopping at "prototype effectiveness" ; fifth, governance and compliance evidence, including privacy protection, bias and fairness evaluation, audit interfaces, and responsibility boundaries. This evaluation structure aligns with Zhou et al.' s emphasis on "closed-loop optimization and effectiveness verification," but further translates "what should be done" into "how to be reviewed" and "how to be accepted." The five modules in Table 2 correspond to key breakpoints in the "evidence-implementation-governance" closed loop and can serve as an operational template for journal and funding review clauses, thereby shifting the evaluation of engineering achievements from "paper-oriented" to evidence-oriented on "deliverable, reproducible, diffusible, and governable."

Table 2. Proposed Composition of Engineering Evidence Package

Evidence Package Module	Content Requirements (Minimum Standards)	Review/Acceptance Focus (Reviewer Checklist)
A. System Performance Evidence	Cross-sample/scene performance; key metrics (accuracy/benefit/risk, etc.) and comparison with baseline	Is generalization reported? Is there a baseline comparison? Are applicable boundaries explained?
B. Failure Modes and Boundary Conditions	When it fails, why it fails, how to detect and correct it (thresholds and disposal processes)	Are failure cases/scenarios provided? Are executable correction strategies available?
C. Reproducible Pipeline (Pipeline)	Data governance explanation, version control, repeatable operation process, and dependency environment	Can others reproduce it? Are version and environment dependencies clearly stated?
D. Implementation Evidence (Implementation)	Adoption, adherence, retention, long-term effects (maintenance)	Does it stop at "prototype effective" ? Are landing indicators and follow-up available?
E. Governance and Compliance Evidence (Governance)	Privacy protection, bias and fairness evaluation, audit interfaces, privilege control and compliance processes	Is it auditable and accountable? Are privilege controls and compliance processes in place?

Second, at the project organization level, Zhou et al. (2026) criticize that psychology often participates as a sub-project in major initiatives, struggling to achieve leadership and decision-making status. To change this structure, psychology must move from "participatory collaboration" to "leading and dominating," and institutionally gain three types of leadership rights in interdisciplinary engineering: requirement definition rights (how problems are formulated, how success is defined, how acceptance indicators are set), mechanism constraint rights (psychological mechanisms and ethical bottom lines that systems must satisfy, which variables cannot be crossed), and evaluation sovereignty (evidence levels, scaling standards, and failure criteria, including when to shut down or rollback). If these leadership rights are absent, the more engineering advances, the more psychology may be absorbed as "human factors input," struggling to precipitate as an independent knowledge system. Correspondingly, it is recommended to map the "mechanism–translation–system" three-layer structure onto phased milestones and role divisions in project management: the mechanism stage centers on "mechanism model + mechanism indicators + boundary conditions + falsifiable predictions" as core milestones; the translation stage centers on "construct/measurement engineering package + reusable modules + cross-scenario validation" as core milestones; the systems stage centers on "platform deployment + monitoring and maintenance + audit compliance + implementation diffusion package + engineering evidence package" as core milestones. Simultaneously, project teams need to clearly define key roles and write them into task statements (e.g., requirement definition lead, mechanism constraint lead, system architecture lead, implementation evaluation lead, governance and compliance lead), institutionalizing "who is responsible for what, how to accept, when to correct," to truly ensure psychology structurally gains leadership capacity.

Finally, at the "last mile" implementation mechanism level, whether engineering systems can enter routine practice and stably generate benefit value depends on the quality and institutionalization of implementation-level research. Implementation science emphasizes adoption barriers, facilitating factors, and sustainability of evidence-based interventions in real systems, representing a key methodological tradition for bridging the research–practice gap (Westerlund et al., 2019). Compared to "developing a system," implementation research is more concerned with why systems are (or are not) adopted, how to improve adherence and retention, how to continuously operate under resource and organizational constraints, and how to diffuse across regions and populations without amplifying inequities. Thus, psychology' s engineering transformation should explicitly incorporate implementation indicators and implementation research designs into training systems and research evaluation, treating "implementation and governance" as components of system delivery rather than treating "prototype creation" as the endpoint. Only when implementation and governance are institutionally incorporated into review and acceptance can psychology' s engineering transformation move from "project-based highlights" to "routine capacity."

In summary, engineering transformation is not simple curriculum upgrading or skill patching but a coordinated reconstruction of evaluation systems, project organization, and implementation mechanisms: using engineering evidence packages to write "deliverable" into peer review, using three leadership rights to write "can lead" into project structure, and using implementation and governance to write "can run long-term" into system lifecycle. Only when these key institutional nodes are transformed can psychology' s engineering attribute truly move from concept to capability and form a sustainable value creation pathway in national strategic needs and digital social governance.

9. Conclusion: From "Follower" to "Leader," the Key Lies in Testable Engineering Chains and Governance Capacity

From an international perspective, *Reforming Our Psychology* not only attempts to solve Chinese psychology' s "lack of fit" but also, against the backdrop of global psychology seeking new paths, proposes an engineering route that may have leading significance: driven by Chinese problems, supported by independent technology, and centered on system construction capability, to push psychology from "explaining the world" to "changing the world." This article agrees with its directional judgment and emphasizes that the real challenge lies not in "whether to engineer" but in "how to engineer without losing scientificity and governability" : using mechanism science to maintain the falsifiable bottom line, using translational science to complete rigorous translation from constructs to technology, using systems engineering to achieve deliverability and scalable replication, and using the "evidence–implementation–governance" lifecycle framework to solve real-world landing and long-term sustainability issues.

If evaluation systems, curricular systems, and project organization can be reformed synchronously, allowing engineering achievements to gain reviewable academic status and granting psychology requirement definition and evaluation sovereignty, then Chinese psychology' s engineering transformation will not only be "enhanced application" but may become a testable new path for global psychology to break through the 困境 of "strong theory, weak translation."

Acknowledgments: We thank the authors of *Reforming Our Psychology* for their valuable feedback and constructive comments on an earlier draft of this article.

References

Zhou, X., Sun, Z., & Hu, J. (2026). Reforming our psychology. *Psychological Science*, 49(1), 2–5. https://doi.org/10.16719/j.cnki.1671-

AI, O. (2024). *Data Governance and Privacy: Synergies and Areas of International Co-Operation*. OECD: Paris, France.

Collaboration, O. S. (2015). Estimating the reproducibility of psychological science. *Science*, 349(6251), aac4716.

Fleming, S. (2025). What is digital sovereignty and how are countries approaching it. *World Economic Forum*. https://www.weforum.org/stories/2025/01/europe-digital-sovereignty

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, 33(2-3), 61-83.

Kong, G., Aberkane, C., Desoche, C., Farnè, A., & Vernet, M. (2024). No evidence in favor of the existence of "intentional" binding. *Journal of Experimental Psychology: Human Perception and Performance*.

Kong, G., Vernet, M., & Farnè, A. (2026). The sense of agency in near and far space: where do we stand? *Neuroscience of Consciousness*, 2026(1). https://doi.org/10.1093/nc/niaf066

Lazer, D., Pentland, A., Adamic, L., Aral, S., Barabási, A.-L., Brewer, D., Christakis, N., Contractor, N., Fowler, J., & Gutmann, M. (2009). Computational social science. *Science*, 323(5915), 721-723.

Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., Boyd, K. A., Craig, N., French, D. P., & McIntosh, E. (2021). A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *BMJ*, 374.

Westerlund, A., Nilsen, P., & Sundberg, L. (2019). Implementation of implementation science knowledge: the research-practice gap paradox. *Worldviews on Evidence-Based Nursing*, 16(5), 332.