

Jarvis AIOS

AI Operating System for Public Works Delivery

面向公共工程交付的人工智能操作系统

Ontology · Business logic · Deliverables · Process — a framework for government

知识图谱 · 业务逻辑 · 交付成果 · 流程 —— 面向政府的框架

Built to integrate, not replace. One command centre for the works contract, from planning to handover.
为整合而生，而非取代。为工程合约提供单一指挥中心，贯穿从规划到移交的全过程。

Executive summary

Jarvis AIOS is an AI operating system and command centre for public works delivery. It runs the full contract lifecycle — from planning to handover — by capturing government and project requirements into a single ontology, and integrating text, drawings, BIM, time, cost and quality into one contractual BIM model.

Critically, Jarvis AIOS is built to integrate, not replace. It connects the systems a public works department already mandates — the Digital Works Supervision System (DWSS), Digital Project Delivery System (DPDS), Smart Site Safety System (SSSS), BIM common data environment and e-Payment — into one queryable source of truth, without rip-and-replace or lock-in. This lands directly on Hong Kong's Construction 2.0 agenda, under which DWSS is now mandated for capital works contracts above HK\$30 million and the Development Bureau has issued a technical circular on adopting artificial intelligence in capital works projects.

For the government officer, the result is a live command dashboard where every figure, alert and answer is traceable back to its source document — turning separate compliance mandates into a single, defensible supervisory picture.

执行摘要

Jarvis AIOS 是一套面向公共工程交付的人工智能操作系统与指挥中心。它通过将政府与项目要求汇入统一的知识图谱（ontology），并把文本、图纸、BIM、时间、成本与质量要求整合进单一的合约 BIM 模型，从而管理从规划到移交的整个合约生命周期。

关键在于，Jarvis AIOS 为整合而生，而非取代。它把工程部门已强制采用的系统——数码工程监督系统（DWSS）、数码项目交付系统（DPDS）、智慧工地安全系统（SSSS）、BIM 共享数据环境与电子支付——连接为单一、可查询的可信数据来源，无需推倒重来，亦不受单一供应商锁定。这与香港「建造业 2.0」的方向高度契合：DWSS 现已在合约额超过 3,000 万港元的基本工程合约中强制实施，发展局亦已就在基本工程项目中采用人工智能发出技术通告。

对政府人员而言，指挥中心最终呈现的是一个实时指挥仪表盘，其中每一个数字、警示与回答都可追溯至源文件——将各自独立的合规要求整合为单一、可辩护的监督全景。

1. The challenge and the prerequisite for AI

On every public works contract the same familiar problems recur. Three of the most costly share a single root cause — there is now more information than any team can read.

Information overload. A single contract now generates more than any team can physically read: tens of thousands of pages of contract, specification and correspondence; thousands of drawings and BIM objects revised continuously; daily site records, RISC forms, photographs and 360° capture; and dozens of mandated forms across five separate systems. Construction 2.0 and the DWSS, SSSS and DPDS mandates solved the collection of this data — every record now exists digitally. What they did not solve is comprehension: the question is no longer “do we have the records?” but “can anyone read and cross-check them in time?”

Problems surface too late. Because supervision and reporting are still largely manual and after-the-fact, delays and defects are often discovered only when they are already hard to recover. When no one can read the whole contract in time, the early warning signs — a slipping activity, an unclosed NCR, a missed quality hold point — stay buried in the records until they become failures.

Cost overruns and disputes. Industry studies report that over 30% of projects run over budget. Disagreements over progress, variations and claims consume time and public money — and each dispute is, at heart, an argument about records too voluminous to reconcile by hand. Without a single, traceable source of truth, resolving them is slow, contested and costly.

The prerequisite: AI must understand construction language. All three problems point to the same answer — artificial intelligence to read and cross-check what people no longer can — but only a particular kind of AI. The prerequisite for AI to be useful on a works contract is domain comprehension: the system must understand construction language and jargon, not merely process text. Construction runs on its own vocabulary — RISC, IPA and IPC, NCR, BoQ, provisional sums, dayworks, retention, variation orders, hold points, DWSS and SSSS. A general-purpose model treats these as unfamiliar words; it can rephrase them, but it cannot reason about what they mean contractually, and it will get that meaning confidently wrong — which is not acceptable on a public works contract. Jarvis AIOS is built to understand construction first: the JARVIS Ontology encodes the entities and their relationships, and the enterprise knowledge banks — millions of words and rules, a large BIM object library and 360° imagery — ground every answer in the contract's own terms. That is what turns “reading the words” into “understanding the contract,” and it is why every answer Jarvis produces is traceable back to its source.

1. 挑战 —— 以及人工智能发挥作用的前提

在每一份公共工程合约中，同样的老问题反复出现。其中代价最高的三类，都源于同一个根本原因——如今的信息量已超出任何团队所能通读的极限。

信息过载。 如今，单一合约所产生的信息量已远超任何团队所能通读的极限：数以万计的合约、规范与往来文件；持续修订的数千份图纸与 BIM 对象；每日的现场记录、RISC 表单、照片与 360° 影像；以及分散于五个独立系统中的数十种强制表单。「建筑业 2.0」及 DWSS、SSSS 与 DPDS 等强制要求已解决了数据的采集问题——每一份记录如今都以数字形式存在。然而，它们尚未解决理解的问题：问题已不再是「我们是否拥有这些记录？」，而是「是否有人能及时通读并交叉核对这些记录？」

问题暴露过晚。 由于监督与报告在很大程度上仍依赖人工、且属事后进行，延误与缺陷往往要到已难以挽回时才被发现。当无人能及时通读整份合约，早期的预警信号——滞后的工序、未闭合的不符合项（NCR）、被遗漏的质量停检点——便一直埋在记录之中，直至演变为失败。

成本超支与争议。 行业研究显示，超过 30% 的项目出现预算超支。围绕进度、变更与索赔的分歧，耗费大量时间与公帑——而每一起争议，究其本质，都是围绕着一堆庞杂到无法人工核对的记录所展开的争论。若缺乏单一、可溯源的可信数据来源，此类争议的解决往往缓慢、充满争执且代价高昂。

前提：人工智能必须理解建造业语言。 上述三类问题都指向同一个答案——以人工智能读取并交叉核对人力已无法应对的信息——但唯有特定类型的人工智能方能胜任。人工智能要在工程合约中真正发挥作用，其前提是具备领域理解能力：系统必须理解建造业的专业语言与术语，而不仅仅是处理文字。建造业有其自成体系的词汇——RISC、IPA 与 IPC、NCR、工程量清单（BoQ）、暂定金额、计日工、保留金、变更指令、停检点、DWSS 与 SSSS。通用大模型会将这些视为陌生词汇；它能改写这些词句，却无法就其在合约层面的含义进行推理，且往往会「言之凿凿」地理解错误——这在公共工程合约中是不可接受的。Jarvis AIOS 以「首先理解建造」为构建原则：JARVIS 知识图谱对各类实体及其关系进行编码，企业知识库——数百万字词与规则、庞大的 BIM 对象库及 360° 影像——使每一个回答都扎根于合约自身的术语之中。正是这一点，将「读出文字」转化为「理解合约」，也正因此，Jarvis 给出的每一个回答都可追溯至其源文件。

2. What Jarvis AIOS is

Jarvis AIOS is an integration layer and command centre that unifies mandated systems, design tools, site-capture hardware, GIS and business documents into one project database. The database is built automatically through JARVIS RAG combined with the JARVIS Ontology, with zero manual data entry — Jarvis reads the project and constructs the structured, queryable record itself.

Four named subsystems carry the workload:

- **Contractual BIM model.** The spine that fuses government and project requirements — text, drawings, BIM, time, cost and quality — into one linked model.
- **Eagle Eye 360.** Captures site progress, safety and quality conditions from the field via 360° cameras, drones, IoT sensors and CCTV.
- **Jarvis Pay.** Captures and validates the payment condition of the works — interim payment applications and certificates.
- **Jarvis AI Check.** Assists officers in checking every class of document: tender, invoice and submittal.

These sit on the JARVIS OS management module, orchestrated across a growing set of specialised agents and backed by enterprise knowledge banks (millions of words and rules, 360° imagery and a large BIM object library). Foundation models are swappable — DeepSeek, Qwen, GPT-4o and Gemini — so the platform is not tied to any single vendor.

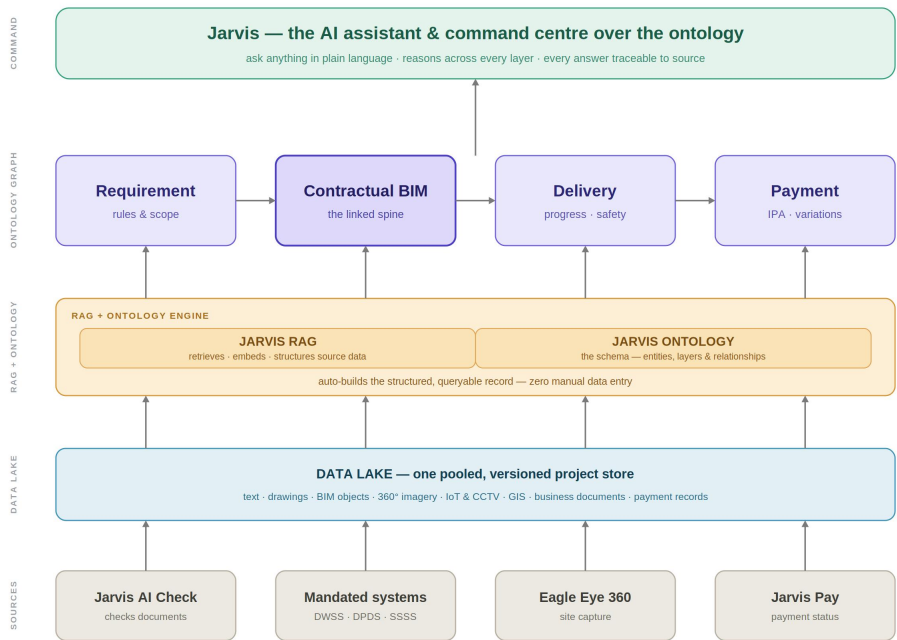
2. Jarvis AIOS 是什么

Jarvis AIOS 是一个整合层与指挥中心，将强制系统、设计工具、现场采集硬件、GIS 与业务文件统一到单一的项目数据库。该数据库由 JARVIS RAG 结合 JARVIS 知识图谱自动构建，无需人工录入——Jarvis 读取项目资料并自行建立结构化、可查询的记录。

四个具名子系统承担核心工作：

- **合约 BIM 模型：**作为主干，将政府与项目要求——文本、图纸、BIM、时间、成本与质量——融合为一个相互关联的模型。
- **Eagle Eye 360 (鹰眼 360)：**通过 360° 相机、无人机、物联网传感器与闭路电视，采集现场的进度、安全与质量状况。
- **Jarvis Pay：**采集并核验工程的付款状况——中期付款申请（IPA）与付款证书（IPC）。
- **Jarvis AI Check：**协助人员核查各类文件：标书、发票与呈交文件。

上述子系统运行于 JARVIS OS 管理模块之上，由一组不断扩充的专业智能体协同调度，并以企业知识库为支撑（数百万字词与规则、360° 影像及庞大的 BIM 对象库）。底层基础模型可自由更换——DeepSeek、Qwen、GPT-4o 与 Gemini——因此平台不受制于任何单一供应商。



3. Ontology

The ontology is what makes “ask anything, every answer traceable” possible. It is a graph linking requirement to contract to delivery to payment, with the contractual BIM model as the connective spine and Jarvis as the reasoning layer over the whole graph.

3. 知识图谱 (Ontology)

知识图谱是实现「有问必答、答必溯源」的关键。它是一张将要求—合约—交付—付款相互连接的图谱，以合约 BIM 模型为贯通主干，并由 Jarvis 作为覆盖整张图谱的推理层。

Layer 层级	Core entities 核心实体	Fed by / built by 数据来源 · 构建者
Requirement 要求层	Government, contract and project requirements (ordinance, spec, employer's requirements, BEP) 政府、合约与项目要求（法例、规范、雇主要求、BEP）	API Ingestion + Jarvis AI Check 数据摄取 + Jarvis AI Check
Contractual BIM model 合约 BIM 模型	Scope element linked to programme activity, cost item (BoQ) and quality criterion — the spine 范围元素关联进度活动、成本项（BoQ）与质量标准——贯通主干	BIM / CDE, design tools BIM / CDE、设计工具
Delivery 交付层	Progress record, RISC/inspection, site diary, defect/NCR, safety/SSSS event, labour & plant 进度记录、RISC/检查、工地日志、缺陷/NCR、安全/SSSS 事件、劳工与机械	Eagle Eye 360, DWSS Eagle Eye 360、DWSS
Payment 付款层	Measured work, IPA/IPC, variation order, retention, claim/dispute 已计量工程、IPA/IPC、变更指令、保留金、索赔/争议	Jarvis Pay, e-Payment Jarvis Pay、电子支付
Document 文件层	Tender, submittal/material approval, invoice, method statement 标书、呈交/材料审批、发票、施工方法说明	Jarvis AI Check Jarvis AI Check
Governance 治理层	Officer/role (RBAC), approval, alert, audit-trail entry, source reference 人员/角色（RBAC）、审批、警示、审计追踪记录、源文件引用	JARVIS OS JARVIS OS

Key relationships. A requirement is satisfied by a delivery record or document; a contractual BIM object is measured by an interim payment application and verified by a RISC or defect record; and every answer Jarvis produces cites a source reference. That final relationship — answer to source — is what gives officers defensible, audit-ready traceability.

关键关系。 一项要求由某条交付记录或文件予以满足；某个合约 BIM 对象由中期付款申请予以计量，并由 RISC 或缺陷记录予以核实；而 Jarvis 给出的每一个回答都引用相应的源文件。正是「回答—源文件」这一关系，赋予政府人员可辩护、可随时审计的追溯能力。

4. Business logic

The agents enforce a large rule base across the same layers. The core rule families are:

- **Requirement compliance.** Every submittal, tender and method statement is matched against the ordinance, specification and BIM execution plan it must satisfy; gaps are flagged.
- **Contractual BIM linkage.** No scope element exists without a linked programme activity, cost item and quality criterion; orphans are flagged.
- **Progress and earned value.** Planned vs. actual S-curve, physical progress against cost-vs-budget, with ahead/behind flags.
- **Quality gates.** RISC and inspection-and-test-plan hold points must pass before the next activity; non-conformances auto-open rectification tracking.
- **Safety.** A real-time safety index; lost-time-injury and critical-event thresholds trigger escalation, aligned to SSSS.
- **Payment validation.** IPAs are measured against verified work; retention and variation adjustments applied; Security of Payment timing enforced and measurement disputes flagged.
- **Variation logic.** Variation-order impact on time and cost is modelled, with decision-due countdowns raised to the responsible officer.
- **Document checking.** Jarvis AI Check extracts, matches against contract terms, and flags inconsistencies for the officer's sign-off — never silent auto-approval.
- **Escalation and access.** Role-based routing by threshold, with a complete timestamped audit trail on every action.

4. 业务逻辑

智能体在上述各层之上执行庞大的规则库。核心规则族包括：

- **要求合规。**每份呈交文件、标书与施工方法说明，都会与其须满足的法例、规范及 BIM 执行计划进行比对；差异之处将被标记。
- **合约 BIM 关联。**任何范围元素都必须关联进度活动、成本项与质量标准；孤立项将被标记。
- **进度与产值。**计划与实际的 S 曲线对比、实物进度与成本对预算的对比，并标示超前/滞后。
- **质量关卡。**RISC 与检验及测试计划（ITP）的停检点须通过后方可进入下一工序；不符合项将自动开启整改跟踪。
- **安全。**实时安全指数；工伤损时与重大事件阈值将触发上报，并与 SSSS 对接。
- **付款核验。**中期付款申请须对照已核实工程进行计量；套用保留金与变更调整；执行付款保障（SOP）时限，并标记计量争议。
- **变更逻辑。**对变更指令在时间与成本上的影响进行建模，并向负责人员发出决策倒计时提示。
- **文件核查。**Jarvis AI Check 提取内容、对照合约条款并标记不一致之处，供人员签核——绝不静默自动审批。
- **上报与权限。**按阈值进行基于角色的分派，并对每项操作保留带时间戳的完整审计追踪。

5. Deliverables

What the government officer receives from the command centre:

- Command dashboard — one live operational picture synthesised across all modules and intake channels.
- Morning brief — a Jarvis-generated daily summary with the decisions due that day.
- Priority alerts — auto-raised critical defects, variation decisions, payment disputes and programme slippage.
- Checking reports — Jarvis AI Check output on tenders, invoices and submittals, with source-linked flags.
- Payment certification support — validation packs for the certifying officer on each interim payment.
- Variation decision support — time and cost impact with a countdown to the decision deadline.
- Compliance and safety scorecards — quality pass rate, safety index and live DWSS/SSSS status.
- Audit trail and traceability — every figure and answer linked back to its source document.
- Portfolio view — the same picture rolled up across multiple contracts for a bureau or department.

5. 交付成果

政府人员可从指挥中心获得的成果：

- 指挥仪表盘——汇总所有模块与接入渠道的单一实时运营全景。
- 晨间简报——由 Jarvis 生成的每日摘要，列明当日须作的决策。
- 优先警示——自动提出的重大缺陷、变更决策、付款争议与进度滞后。
- 核查报告——Jarvis AI Check 对标书、发票与呈交文件的核查结果，附源文件链接标记。
- 付款证明支持——为核证人员就每期中期付款提供核验资料包。
- 变更决策支持——时间与成本影响分析，并附决策截止倒计时。
- 合规与安全记分卡——质量合格率、安全指数及 DWSS/SSSS 实时状态。
- 审计追踪与可溯源——每个数字与回答均链接回其源文件。
- 组合视图——将上述全景汇总至跨多份合约的局或部门层级。

6. Process — planning to handover

1. **Planning / capture** — Jarvis ingests government and project requirements and builds the ontology and contractual BIM model automatically.
2. **Tender** — Jarvis AI Check screens tender documents against requirements before award.
3. **Mobilisation** — The mandated systems — DWSS, SSSS, DPDS, BIM/CDE, e-Payment — connect into the command centre.
4. **Construction / supervision** — Eagle Eye 360 and DWSS feed progress, quality and safety; RISC and inspection gates are enforced; defects and NCRs are tracked.
5. **Measurement and payment** — Jarvis Pay validates IPAs against verified work; variations are assessed; disputes are flagged.
6. **Oversight** — Officers query the command centre; alerts and briefs drive decisions; every action is logged.
7. **Handover** — The ontology becomes the as-built digital record and audit trail for the asset's lifecycle.

6. 流程 —— 从规划到移交

1. **规划 / 采集** —— Jarvis 摄取政府与项目要求，自动构建知识图谱与合约 BIM 模型。
2. **招标** —— 在发布中标前，Jarvis AI Check 对照要求筛查标书文件。
3. **动员进场** —— 强制系统——DWSS、SSSS、DPDS、BIM/CDE、电子支付——接入指挥中心。
4. **施工 / 监督** —— Eagle Eye 360 与 DWSS 输入进度、质量与安全数据；执行 RISC 与检查关卡；跟踪缺陷与不符合项。
5. **计量与付款** —— Jarvis Pay 对照已核实工程核验中期付款申请；评估变更；标记争议。
6. **监督管理** —— 人员查询指挥中心；以警示与简报驱动决策；每项操作均被记录。
7. **移交** —— 知识图谱成为该资产全生命周期的竣工数字记录与审计追踪。

7. Why it matters, where it applies, when to use

Why it matters to government

Jarvis AIOS operationalises the Construction 2.0 vision: it turns the separate DWSS, SSSS and DPDS mandates into a single supervisory picture, gives officers defensible and source-traceable oversight, accelerates variation and payment decisions, and answers the Development Bureau's own push toward adopting AI in capital works. It reduces fraud and administrative burden while improving transparency and the evidence base for policy.

Where it applies

Capital works and public infrastructure contracts — reclamation, tunnels, drainage and seawalls among them — and scalable from a single works contract up to an entire department's portfolio.

When to use it

Continuously, as the contract command centre, and at each decision point in particular: tender screening, RISC and quality gates, safety events, variation-order decisions, and interim payment certification.

7. 为何重要、适用范围与使用时机

为何对政府重要

Jarvis AIOS 将「建筑业 2.0」愿景落地：它把各自独立的 DWSS、SSSS 与 DPDS 要求整合为单一监督全景，为政府人员提供可辩护、可溯源的监督，加快变更与付款决策，并呼应发展局在基本工程中采用人工智能的推动方向。它在减少舞弊与行政负担的同时，提升透明度并夯实政策的证据基础。

适用范围

适用于基本工程与公共基础设施合约——包括填海、隧道、渠务与海堤等——并可从单一工程合约扩展至整个部门的项目组合。

使用时机

作为合约指挥中心持续使用；并特别用于各决策节点：标书筛查、RISC 与质量关卡、安全事件、变更指令决策，以及中期付款核证。

Jarvis AIOS doesn't replace your systems — it connects them into one source of truth, and stays open to whatever you adopt next. No rip-and-replace, no lock-in.

Jarvis AIOS 不取代你现有的系统——而是将它们连接为单一可信数据来源，并对你日后采用的任何系统保持开放。无需推倒重来，绝不锁定。

Prepared by isBIM Jarvis AI; Miss Ruby Hong (ruby@isbim.com.hk)

isBIM Limited · 19/F Nathan Commercial Building, 430 Nathan Road, Kln, Hong Kong · www.isbim.com.hk