K-builder: corporate agentic software engineering platform for Kunumi

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1. Strategic context of K-builder

Artificial intelligence is changing not only how software is developed, but how companies transform knowledge, capital, and market opportunities into scalable products.

Kunumi is strategically positioned at the intersection of advanced scientific research, artificial intelligence, and the scale of the Bradesco ecosystem. The next stage of its growth requires an infrastructure capable of converting this position into a continuous portfolio of high-value products.

K-builder is proposed as that infrastructure: a proprietary platform that uses specialized AI agents to transform business opportunities, scientific hypotheses, and product ideas into secure, scalable, and measurable software solutions.

- **Strategic multiplier:** expands the impact of Kunumi's researchers, architects, engineers, and product leaders;
- **Research-to-market infrastructure:** reduces the distance between scientific discovery, experimentation, product development, and commercial application;
- **Product scale:** enables more initiatives to be developed simultaneously without proportional growth in operational complexity;
- **Institutional intelligence:** captures decisions, methods, architectures, code, experiments, and lessons learned as reusable organizational assets;
- **Long-term ambition:** establish Kunumi as the leading science-driven AI product company in Latin America.

2. Market problems and current gaps in software and AI product development

Software development remains one of the main constraints on corporate innovation, even in organizations with access to capital, data, cloud infrastructure, and technical talent.

- **Long time-to-market:** opportunities lose value while requirements, architecture, implementation, testing, security, and deployment are coordinated;
- **Fragmentation between science, business, and engineering:** research findings and business needs frequently fail to become production-ready products;
- **Dependence on scarce experts:** senior architects, researchers, and technical leaders become bottlenecks for multiple initiatives;

- **High experimentation cost:** many promising ideas are not tested because prototypes require excessive time and engineering effort;
- **Knowledge loss:** architectural decisions, experiments, failures, components, and technical lessons are rarely reused systematically;
- **Inconsistent quality:** different teams apply different standards for architecture, testing, documentation, observability, security, and governance;
- **Limited impact measurement:** faster code generation does not necessarily result in better products, lower lifecycle costs, or measurable business value.

The central gap is not the absence of code-generation tools. It is the absence of an integrated corporate system capable of coordinating product, architecture, engineering, quality, governance, and scientific validation.

3. General objective

Develop and scientifically validate a corporate agentic software engineering platform capable of transforming business needs, product ideas, scientific hypotheses, and operational challenges into reliable, secure, scalable, and measurable software solutions.

The platform will coordinate specialized AI agents throughout the development lifecycle while preserving human strategic control, corporate governance, technical traceability, and alignment with business outcomes.

4. Specific objectives

- Create a natural-language environment in which users can describe and progressively refine product ideas;
- Develop specialized Product Manager, Software Architect, Tech Lead, Software Engineer, and QA Engineer agents;
- Define responsibilities, tools, decision boundaries, escalation rules, and performance criteria for each agent;
- Convert ambiguous ideas into product requirements, acceptance criteria, architecture, implementation plans, code, tests, and documentation;
- Establish persistent project memory containing decisions, requirements, risks, evidence, and development history;
- Integrate the platform with repositories, CI/CD pipelines, testing tools, security systems, observability platforms, and corporate knowledge bases;
- Build reusable catalogs of components, architectures, prompts, agent skills, evaluation protocols, and governance policies;
- Implement continuous measurement of productivity, quality, cost, autonomy, and business impact;
- Validate the platform in real corporate use cases before large-scale adoption;
- Generate proprietary technology, scientific publications, patents, benchmarks, and engineering frameworks.

5. Expected strategic results

K-builder is expected to generate interconnected business, scientific, engineering, and organizational results.

- **Faster product creation:** reduce the time between opportunity identification, prototype development, validation, and production;
- **Greater innovation capacity:** increase the number of products and experiments that Kunumi can execute simultaneously;
- **Lower development cost:** reduce repetitive work, rework, coordination overhead, and dependence on external development capacity;
- **Higher software quality:** improve architectural consistency, testing coverage, documentation, security, and traceability;
- **Scientific acceleration:** transform research hypotheses into executable and reproducible software experiments;
- **Knowledge accumulation:** preserve corporate intelligence beyond individual projects and professionals;
- **Portfolio scalability:** create a repeatable mechanism for transforming ideas into products across multiple markets;
- **Strategic differentiation:** build proprietary capabilities that are difficult for competitors to reproduce.

These results will be treated as measurable hypotheses and validated through controlled experiments and real-world pilots.

6. Why invest in K-builder now?

A rare market window is being created by the convergence of technological maturity, competitive pressure, and growing demand for AI-enabled products.

- **Agentic systems are becoming operational:** AI systems can increasingly plan, use tools, modify software, execute tests, and coordinate complex workflows;
- **The market is moving beyond coding assistants:** competitive differentiation is shifting toward organizational platforms that manage the complete product lifecycle;
- **Companies need growth and efficiency simultaneously:** organizations must create more digital products while controlling costs, risks, and headcount;
- **Generic capabilities will become commoditized:** long-term value will reside in proprietary knowledge, governance, data, agent skills, benchmarks, and reusable technology;
- **Early learning compounds:** every project completed through K-builder can improve future agents, components, processes, and products;
- **Kunumi has a timing advantage:** its combination of scientific expertise, engineering talent, and access to Bradesco-scale use cases is difficult to replicate.

Investing now means building a proprietary capability while the standards of agentic software engineering are still being defined.

7. Definition of K-builder as a corporate agentic software engineering platform

K-builder is an internal platform that coordinates specialized AI agents to support the complete lifecycle of software and AI product development.

The user describes a business problem, product idea, or scientific hypothesis in natural language. The platform progressively transforms this input into structured and validated artifacts.

- Product vision and strategic objectives;
- User profiles, journeys, and business requirements;
- Functional and nonfunctional specifications;
- Architecture and technical decisions;
- Implementation plans and source code;
- Automated tests and quality evidence;
- Security, governance, and compliance controls;
- Documentation and deployment artifacts;
- Operational and business-performance metrics.

K-builder is not only a code generator. Its unit of work is the evolution of a product under explicit business, scientific, architectural, quality, cost, and risk constraints.

8. High-value corporate applications and new product potential

K-builder can accelerate initiatives directly connected to revenue, efficiency, modernization, risk, customer experience, and scientific differentiation.

- **AI product incubation:** rapidly convert market opportunities and scientific ideas into functional prototypes;
- **Financial solutions:** support products for credit, fraud, risk, personalization, collections, compliance, and customer intelligence;
- **Legacy modernization:** analyze existing systems, generate tests, refactor components, and support controlled migration;
- **Internal productivity:** create specialized assistants, workflow systems, reporting platforms, and decision-support applications;
- **AI infrastructure:** accelerate data pipelines, model-serving platforms, observability systems, evaluation tools, and governance solutions;
- **Scientific platforms:** support experimentation, benchmarking, dataset curation, reproducibility, and research-asset management;
- **Regulatory applications:** automate documentation, evidence collection, policy monitoring, traceability, and risk classification;
- **New digital ventures:** reduce the cost and time required to validate new services, partnerships, and business models.

Although K-builder will be used internally, the products, technologies, and intellectual property created through it may generate significant commercial value.

9. Value proposition for Kunumi, Bradesco, and their ecosystems

K-builder creates value as an organizational capability for repeatedly producing products, not as an isolated development tool.

- **For Kunumi:** converts scientific knowledge into scalable software assets, strengthens product capacity, and multiplies the impact of technical experts;
- **For Bradesco:** accelerates digital and AI initiatives while improving standardization, security, traceability, and cost control;
- **For research teams:** provides infrastructure for transforming hypotheses into reproducible experiments and production-ready components;
- **For business units:** reduces the time and technical complexity required to validate new opportunities;
- **For the broader ecosystem:** creates reusable frameworks, components, and solutions that can support subsidiaries, partners, and future ventures;
- **For investors:** establishes a platform capable of increasing the return generated by multiple product and research initiatives.

10. Operational gains, innovation capacity, and impact metrics

K-builder will be managed through executive indicators connected to productivity, quality, cost, innovation, and economic impact.

- **Speed:** time from idea to specification, prototype, pilot, and production;
- **Productivity:** human effort per delivered feature and number of initiatives executed simultaneously;
- **Quality:** defect density, rework rate, test coverage, architecture compliance, and change-failure rate;
- **Cost:** cost per prototype, validated hypothesis, accepted feature, and production release;
- **Innovation:** number of experiments, products, reusable assets, and research outputs converted into prototypes;
- **Autonomy:** percentage of tasks completed without intervention and number of correction cycles required;
- **Adoption:** number of active teams, projects, users, and business units;
- **Business impact:** revenue potential, avoided cost, operational savings, and economic value of accelerated products;
- **Scientific impact:** hypotheses tested, benchmarks created, publications produced, and patents submitted.

Initial targets should be validated experimentally. Potential research goals include a 30–60% reduction in selected cycle times, a 20–40% reduction in rework, and a significant increase in parallel experimentation capacity.

11. Full-lifecycle automation through specialized agents

K-builder will automate and coordinate the complete development lifecycle through agents with explicit responsibilities.

- **Product Manager Agent:** defines the business problem, users, objectives, priorities, requirements, and acceptance criteria;
- **Software Architect Agent:** establishes architecture, components, integrations, scalability requirements, and technical standards;
- **Tech Lead Agent:** transforms architecture into an executable plan, coordinates dependencies, and manages technical risks;
- **Software Engineer Agent:** implements, integrates, refactors, tests, documents, and corrects software components;
- **QA Engineer Agent:** defines test strategies, validates requirements, identifies edge cases, and assesses release readiness;
- **Human specialists:** retain responsibility for strategic intent, capital allocation, sensitive decisions, risk acceptance, and final approval.

The objective is not to eliminate human expertise. It is to multiply its reach and concentrate it on high-value decisions.

12. Competitive advantage, intellectual property, and barriers to entry

K-builder's defensibility will not depend on a single AI model. Its competitive advantage will be created by cumulative proprietary assets.

- **Multi-agent orchestration:** specialized roles, collaboration protocols, delegation methods, and conflict resolution;
- **Organizational knowledge:** relationships among products, systems, research, policies, repositories, and architectural decisions;
- **Agent skills:** methodologies encoded from senior researchers, architects, engineers, product managers, and QA professionals;
- **Private benchmarks:** real enterprise tasks reflecting regulated, complex, and long-running development environments;
- **Execution data:** evidence about which models, tools, plans, and architectures perform best for each problem;
- **Reusable technology:** components, connectors, templates, reference architectures, and testing frameworks;
- **Governance by design:** security, traceability, approval, and risk controls embedded in agent execution;
- **Domain specialization:** accumulated knowledge in banking, risk, customer intelligence, and enterprise operations.

Every completed project should increase the value and defensibility of the platform.

13. Exploratory innovation with disruptive potential

K-builder creates research opportunities that extend beyond immediate productivity improvements.

- **Adaptive agent teams:** dynamically create and specialize agents according to project complexity and risk;

- **Agent-generated engineering organizations:** form temporary structures containing product, architecture, engineering, security, and research agents;
- **Self-improving processes:** identify recurring failures and improve workflows, tools, prompts, policies, and agent skills;
- **Hypothesis-to-software pipelines:** convert scientific hypotheses directly into prototypes, experiments, and evaluation procedures;
- **Autonomous maintenance:** identify outdated dependencies, vulnerabilities, architectural drift, and declining test quality;
- **Competing solution simulation:** generate and evaluate alternative architectures before implementation begins;
- **Continuous product discovery:** use operational and business feedback to recommend new experiments and product improvements.

These capabilities can transform K-builder into a new operating model for scientific and technological production.

14. Long-term strategic advantage and Kunumi's positioning in Latin America

K-builder can become the proprietary infrastructure through which Kunumi creates and scales AI products.

- **Portfolio scale:** execute multiple initiatives without reproducing complete teams and processes;
- **Scientific scale:** convert research outputs into reusable product capabilities;
- **Knowledge continuity:** preserve corporate intelligence beyond individual employees and projects;
- **Technological adaptability:** adopt new models and tools without losing institutional knowledge;
- **Faster market response:** react rapidly to technological, regulatory, and customer changes;
- **Regional differentiation:** create a platform validated in Latin American markets, cultures, and regulatory environments;
- **International potential:** adapt reusable methods and architectures to additional markets;
- **Strategic positioning:** establish Kunumi as a science-driven AI product company with industrial delivery capacity.

15. Scientific foundation of multi-agent systems for software engineering

Software development is a collaborative process involving specialized roles, shared artifacts, iterative decisions, verification, and negotiation among competing objectives.

Multi-agent systems provide a scientific foundation for modeling and improving this environment.

- **Role specialization:** agents optimize for different objectives and responsibilities;
- **Task decomposition:** complex goals are transformed into coordinated work units;

- **Shared memory:** requirements, decisions, risks, and evidence remain available throughout the project;
- **Planning under uncertainty:** agents operate despite incomplete information and changing priorities;
- **Tool use:** agents interact with repositories, terminals, databases, tests, and corporate systems;
- **Verification:** outputs are evaluated through tests, policies, peer agents, and human review;
- **Organizational learning:** execution histories become reusable knowledge and operating procedures.

The research challenge is to determine how specialization, communication, memory, autonomy, and verification affect quality, productivity, and scalability.

16. State of the art in coding agents and autonomous engineering

The market is evolving from code-completion systems toward agents capable of planning changes, navigating repositories, using development tools, running tests, and generating review-ready software.

However, current solutions remain primarily centered on individual developers, repositories, and isolated engineering tasks.

Relevant gaps include:

- Limited product and business context;
- Weak coordination among specialized professional roles;
- Limited long-term organizational memory;
- Insufficient enterprise governance and access control;
- Difficulty operating across multiple products and repositories;
- Limited scientific validation of productivity and quality;
- Weak connection between research assets and product development;
- Dependence on generic external platforms and workflows.

K-builder will focus on the enterprise orchestration, governance, specialization, evaluation, and organizational-learning layer that generic coding assistants do not fully address.

17. Converting Kunumi's scientific knowledge into reusable technology assets

K-builder will establish a systematic mechanism for transforming scientific knowledge into reusable corporate capabilities.

Potential assets include:

- Algorithms and model components;
- Agent skills and specialized workflows;
- Scientific software libraries;

- Evaluation methods and benchmark suites;
- Data-processing pipelines;
- Reference architectures;
- Synthetic-data generators;
- Domain ontologies;
- Validation protocols;
- Prompt and context strategies;
- Governance policies;
- Technical documentation and training material.

Each asset should contain its intended application, scientific assumptions, evidence, limitations, implementation requirements, governance constraints, version history, and intellectual-property classification.

This creates a continuous bridge between research investment and commercial scale.

18. Scientific and technological differentiators

- **Product-oriented multi-agent architecture:** agents collaborate around product and business outcomes;
- **Explicit role specialization:** each agent has defined responsibilities, tools, memory, and evaluation criteria;
- **Scientific validation:** platform improvements are evaluated as research hypotheses;
- **Model independence:** different models can be selected according to performance, cost, risk, and security;
- **Institutional memory:** decisions, experiments, failures, and standards persist across projects;
- **Governance embedded in execution:** access, approval, security, and traceability are part of the workflow;
- **Business-impact orientation:** success is measured through cycle time, quality, cost, adoption, and economic value;
- **Continuous benchmarking:** agents, models, orchestration strategies, and tools are evaluated systematically;
- **Portfolio intelligence:** learning from one initiative improves future projects;
- **Research-to-product conversion:** scientific outputs become reusable software capabilities.

19. Research hypotheses

- Specialized agent teams will reduce development time and human effort in suitable engineering tasks;
- Separation between architecture, implementation, and quality agents will reduce defects and rework;
- A Product Manager Agent will improve alignment between software delivery and business requirements;
- An explicit Software Architect Agent will reduce architectural drift;

- Structured communication protocols will outperform unrestricted multi-agent interaction;
- Risk-based autonomy will increase productivity without compromising control;
- Reusable components and agent skills will reduce cost in subsequent projects;
- Expert users will obtain greater value because they provide stronger objectives, constraints, and validation;
- Dynamic model selection will outperform dependence on a single model;
- A portfolio-level platform will generate greater cumulative value than isolated coding assistants;
- Integration of research assets into development workflows will increase the conversion of scientific work into products;
- Governance, sandboxing, and human approval will reduce risk while preserving productivity gains.

20. Conceptual architecture and agent orchestration

K-builder will be designed as a modular corporate platform composed of integrated layers.

- **Interaction layer:** natural-language environment for describing ideas, reviewing plans, and approving decisions;
- **Product-intelligence layer:** maintains objectives, users, requirements, priorities, and success metrics;
- **Multi-agent orchestration layer:** creates agents, delegates tasks, controls dependencies, and resolves conflicts;
- **Memory layer:** stores decisions, code context, research evidence, test results, risks, and lessons learned;
- **Model gateway:** controls access to different AI models according to cost, performance, security, and task type;
- **Tool layer:** connects agents to repositories, sandboxes, terminals, databases, APIs, CI/CD, and testing systems;
- **Quality layer:** validates outputs through automated tests, static analysis, security checks, and independent review;
- **Governance layer:** defines permissions, approvals, execution boundaries, auditability, and risk policies;
- **Experimentation layer:** compares models, agent structures, memory strategies, and validation methods;
- **Portfolio analytics layer:** provides executive visibility into investment, progress, value, cost, quality, and risk.

21. Research methodology, experimental validation, and scale roadmap

The project will follow an evidence-driven, incremental methodology aligned with the approved reference structure, progressing from conceptualization and prototyping to field validation, scalability, and governance.

- **Strategic definition:** select priority use cases, establish baselines, define governance, and design the initial architecture;

- **Controlled prototype:** implement the core platform, five specialist agents, project memory, basic integrations, and approval mechanisms;
- **Corporate pilots:** compare K-builder with conventional development in greenfield, legacy, AI-product, and research-to-prototype use cases;
- **Enterprise hardening:** improve security, reliability, observability, scalability, cost optimization, and corporate integration;
- **Portfolio deployment:** support multiple concurrent products, teams, repositories, and business units;
- **Continuous evolution:** incorporate new models, expand agent roles, improve benchmarks, and generate new scientific hypotheses.

Each stage will have explicit hypotheses, metrics, risk limits, and advance, redesign, pause, or rollback criteria.

22. Governance, security, ethical considerations, and risks

Governance will be embedded in K-builder from the beginning rather than added after deployment.

- **Human accountability:** strategic and high-risk decisions remain assigned to identified professionals;
- **Least-privilege access:** agents receive only the permissions required for each task;
- **Approval controls:** sensitive actions require explicit human authorization;
- **Traceability:** relevant actions, models, prompts, tools, and decisions are recorded and versioned;
- **Secure execution:** agents operate in isolated environments with controlled access to networks, repositories, secrets, and infrastructure;
- **Software assurance:** generated code undergoes testing, vulnerability scanning, dependency analysis, and policy validation;
- **Intellectual-property protection:** proprietary data, code, research, and methods are classified and protected;
- **Ethical use:** limitations remain visible, autonomy does not obscure responsibility, and high-impact systems preserve meaningful human control;
- **Technical risks:** incorrect code, context loss, inconsistent decisions, integration complexity, cost, latency, and vendor dependence;
- **Scientific risks:** unrealistic benchmarks, weak generalization, experimental bias, and overestimated productivity;
- **Organizational risks:** resistance to adoption, unclear ownership, unrealistic expectations, and fragmented implementation;
- **Market risks:** rapid competitor evolution, commoditization, and external platform dependence.

Risk mitigation will rely on progressive autonomy, validation, monitoring, sandboxing, model redundancy, change management, and controlled deployment.

23. Patents, publications, frameworks, and proprietary technologies

K-builder can generate a structured intellectual-property portfolio aligned with scientific authority and commercial defensibility.

- **Potential patents:** multi-agent orchestration, dynamic engineering teams, risk-based autonomy, organizational memory, and agent-performance optimization;
- **Scientific publications:** human-agent collaboration, role specialization, long-horizon memory, productivity, governance, and enterprise benchmarks;
- **Proprietary frameworks:** orchestration protocols, product-memory systems, evaluation suites, risk models, and scientific-asset registries;
- **Private datasets:** enterprise development tasks, execution traces, failure patterns, and quality evaluations;
- **Reusable technologies:** components, connectors, reference architectures, testing methods, and governance controls;
- **Strategic research partnerships:** collaboration with universities and research institutions without compromising critical intellectual property.

Patentability, confidentiality, and commercial relevance must be evaluated before public disclosure.

24. Strategic risks of delaying the project

Delaying K-builder creates risks that may exceed the cost of a controlled initial investment.

- **Loss of market timing:** external platforms may define the dominant architectures and standards before Kunumi establishes its own;
- **Vendor dependence:** critical engineering workflows may become dependent on external pricing, security, models, and product roadmaps;
- **Loss of cumulative learning:** delayed execution means fewer benchmarks, reusable assets, agent skills, and validated methods;
- **Higher future integration cost:** fragmented adoption of coding tools across teams may create governance and consolidation problems;
- **Reduced scientific leadership:** patents, research agendas, frameworks, and evaluation standards may be established by competitors;
- **Slower product expansion:** innovation capacity will remain constrained by the availability of complete human teams;
- **Competitive acceleration:** organizations that start earlier will accumulate proprietary knowledge that cannot be acquired immediately;
- **Opportunity-cost exposure:** promising scientific and business opportunities may not be tested within the period in which they have maximum value.

The strategic choice is not simply whether to invest in software automation. It is whether Kunumi will build a proprietary and cumulative capability while agentic software engineering is still being defined, or become a future adopter of platforms and standards created by others.

K-builder provides the infrastructure through which Kunumi can repeatedly transform scientific excellence into scalable products, intellectual property, economic value, and long-term market leadership.