PLAYING WITH IDEAS

Interactive Dynamic Environment
and Agent System (IDEAS)

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EXECUTIVE SUMMARY

Imagine a world where you could test any idea, explore any future, and replay any decision, not in a complex spreadsheet or a manually coded program, but by interacting with reality itself.

Imagine a surgeon rehearsing a life-saving operation on a dynamic model of their actual patient, or a city planner visualizing the real-time impact of a new transport system before a single stone is laid. This is the world IDEAS makes possible.

IDEAS (Interactive Dynamic Environment and Agent System) is a revolutionary platform that transforms real-world video footage into interactive, playable simulations. By watching, learning, and reproducing the world around us, IDEAS allows users to ask "what if?" and see the results unfold in a visually realistic and dynamically accurate environment.

This is Programming by Reproduction: a paradigm shift that democratizes simulation and makes complex systems understandable to everyone. Our core innovation is based on a foundational patent specification written 20 years ago — a vision of the future that was waiting for technology to catch up.

Today, the convergence of: advanced AI, computer vision, and immense computing power has finally unlocked this potential, giving IDEAS an unparalleled and defensible head start.

We are entering a market at a perfect inflection point. The global simulation and digital twin market is projected to be worth over $230 billion by 2030. driven by a massive demand for data-driven decision-making across every major industry.

IDEAS is uniquely positioned to capture a significant share of this market by targeting high-value verticals including healthcare, sports, urban mobility, and environmental science. Our founding team comprises world-renowned experts in simulation, AI, and design, supported by a network of industry leaders ready to deploy our technology.

We project achieving a €250 million valuation by 2030 based on a conservative investment model, with the potential for multi-billion-euro growth through strategic partnerships and larger investment. This document outlines our vision, our technology, our market, and our plan to build IDEAS into the universal simulation layer for the real world.

1.   Introduction to IDEAS

IDEAS (Interactive Dynamic Environment and Agent System) is a platform that learns from videos and transforms them into interactive simulations or games. It converts visual content into agent-based models that allow users to test 'what if' scenarios across domains — from ecosystems and urban systems to human teams and biological processes.

By bridging Machine Learning, Simulation Modeling, and Interactive Design, IDEAS transforms real-world footage into playable, explorable systems. It represents the evolution of multimodal system dynamics — integrating numbers, words, and pictures into living, dynamic models.

2.   System Foundations

IDEAS builds upon decades of research in multimodal modeling, from cellular automata and agent-based modeling to real-time, AI-powered simulations. Its core technological foundations include:

Computer Vision & Scene Decomposition

IDEAS uses computer vision to separate videos into their constituent parts - distinguishing static background elements from dynamic agents (moving objects). This decomposition layer is the foundation for understanding what's happening in any scene.

Machine Learning for Behavior Modeling

The system employs ML algorithms (including reinforcement learning) to infer:
- Transition rules (how things move and change).
- Interaction rules (how agents respond to each other and their environment).
- Behavioral patterns extracted directly from observed video data

Causal Modeling

Rather than just finding correlations, IDEAS builds causal diagrams - graphs showing dependencies between variables (background conditions, agent behaviors, outcomes). This allows the system to understand why things happen, not just that they happen.

Dynamic Simulation Engine

The system integrates the ML components into a unified dynamical model that can:
- Predict alternate outcomes when conditions change.
- Run "what-if" scenarios.
- Support real-time interactive experimentation.

Multimodal Integration

IDEAS orchestrates three representational layers simultaneously:
- Numerical (probabilities, metrics, quantitative data).
- Linguistic (natural language, semantic understanding).
- Pictorial (visual flows, spatial patterns, images). IDEAS uses realistic video images in the input, interaction and output phases.

Programming Paradigm

The approach is called "programming by reproduction" - the system learns models directly from data/video rather than requiring manual coding. This enables converting "any video into a what-if simulation" where users can experiment with reality itself.

Fig.1 depicts IDEAS' process flow including the different stages that allow for turning a video into a playable simulation with identically realistic dynamic image output.
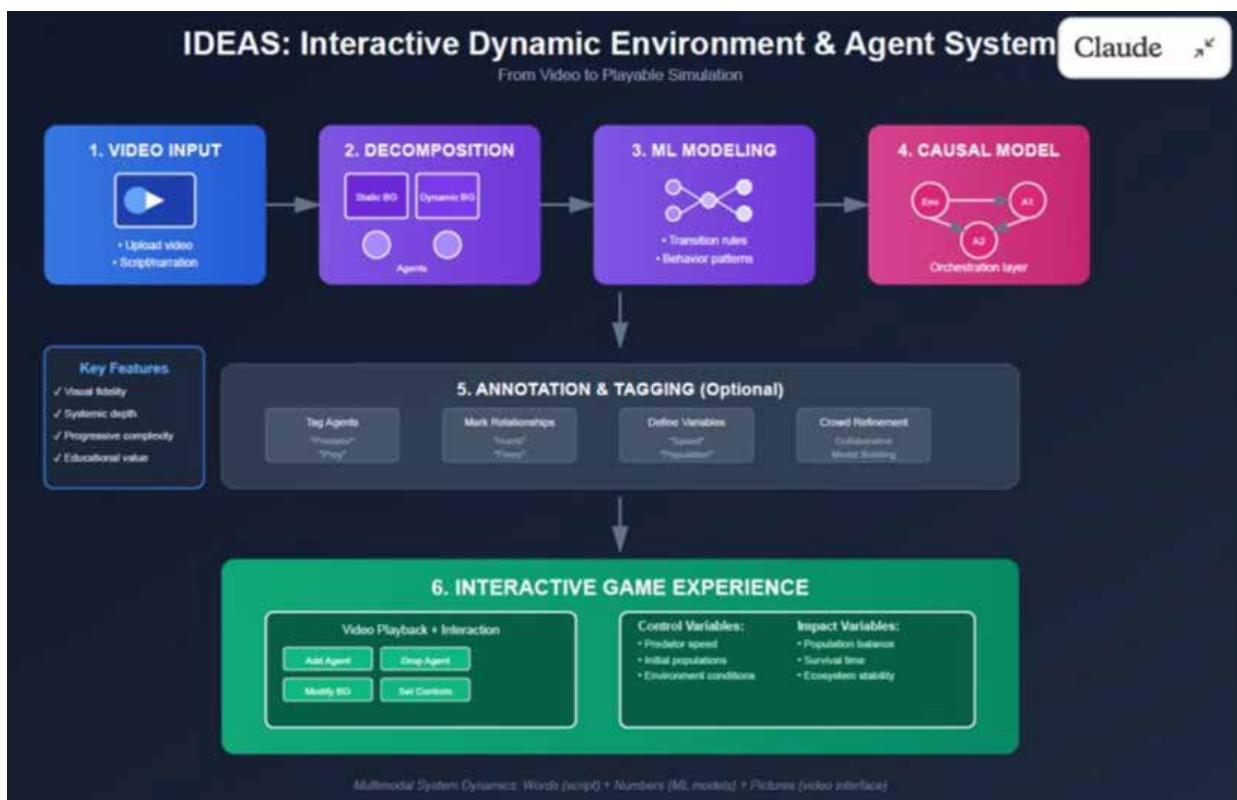

Fig.1. IDEAS process flow

3.   Use Cases by Vertical Market

3.1 Ecology & Biology – In-Silico Nature

IDEAS decouples background environments from dynamic agents, learning predator-prey or cellular dynamics. This enables simulations for biodiversity, ecosystem balance, or drug testing.

Applications include ecosystem simulation, cellular modeling, and biodiversity education. Fig. 2 depicts an IDEAS application to predator-prey modelling.
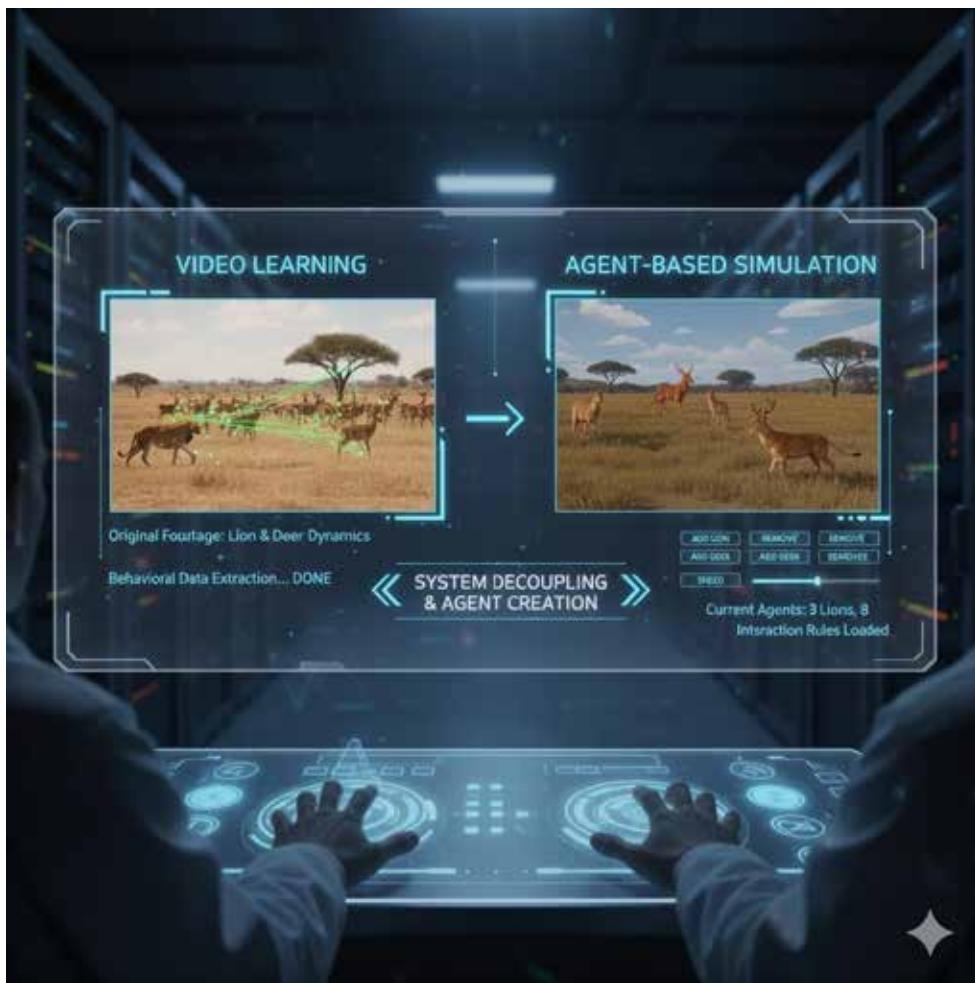

Fig.2 IDEAS application to ecological modelling: what if we could add/drop predators and preys at will in a video turned into a video game

3.2 Urban Planning & Mobility

IDEAS analyzes live traffic videos, learning vehicle movement patterns and testing interventions — for instance, replacing 70% of large cars with TUGA micro-vehicles.

Applications include urban mobility design, crowd dynamics, and policy support (see Fig.3 for an illustrative case).

Fig.3 IDEAS applications to mobility: what if we could replace our oversized cars with TUGA micro-vehicles

3.3 Sports Analysis & Tactical Planning

IDEAS can learn from sports footage, turning games into simulations where coaches and players can test tactics or relive key moments interactively.

Applications include tactical simulation, skill transfer, and immersive coaching (see Fig. 4).
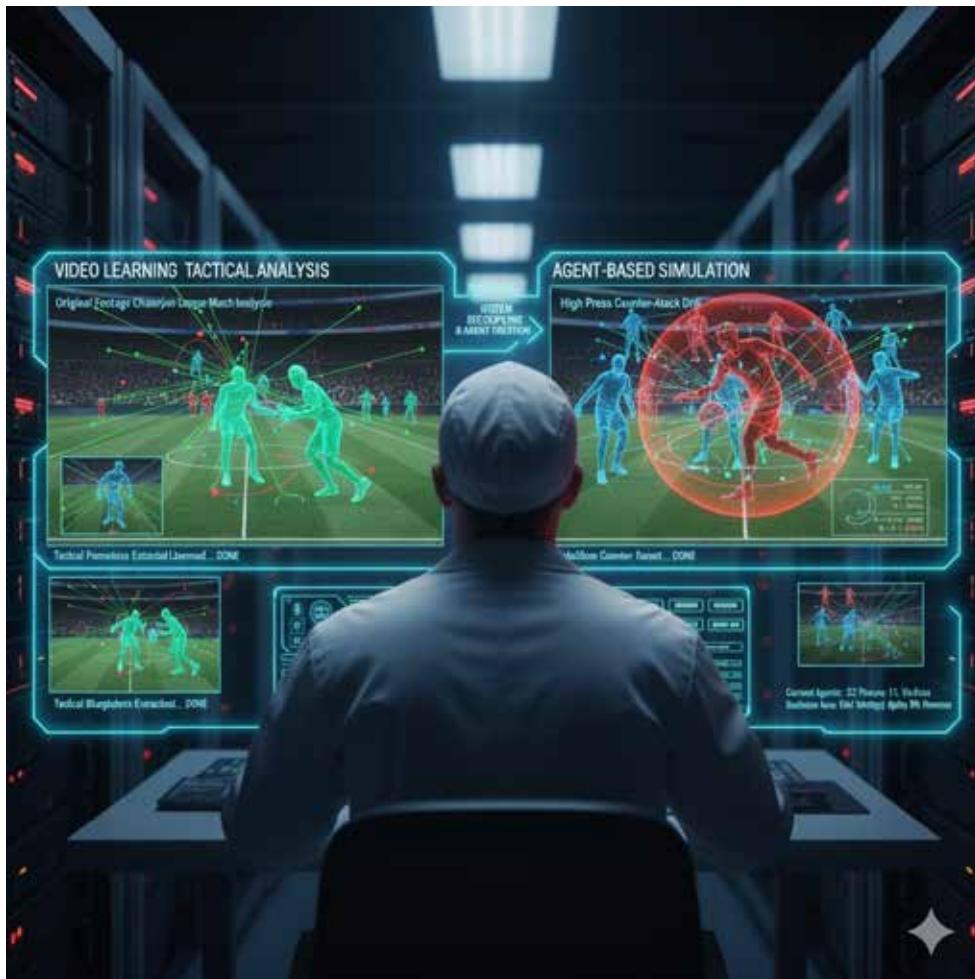
Fig.4. IDEAS application to football tactical planning

3.4 Healthcare & Surgery

IDEAS analyzes surgical footage, tracking instruments, tissue responses, and team coordination to create agent-based simulations for training, planning, and robotic assistance.

Modules include surgical training, pre-operative planning, complication prediction, and robotic enhancement (see Fig. 5).
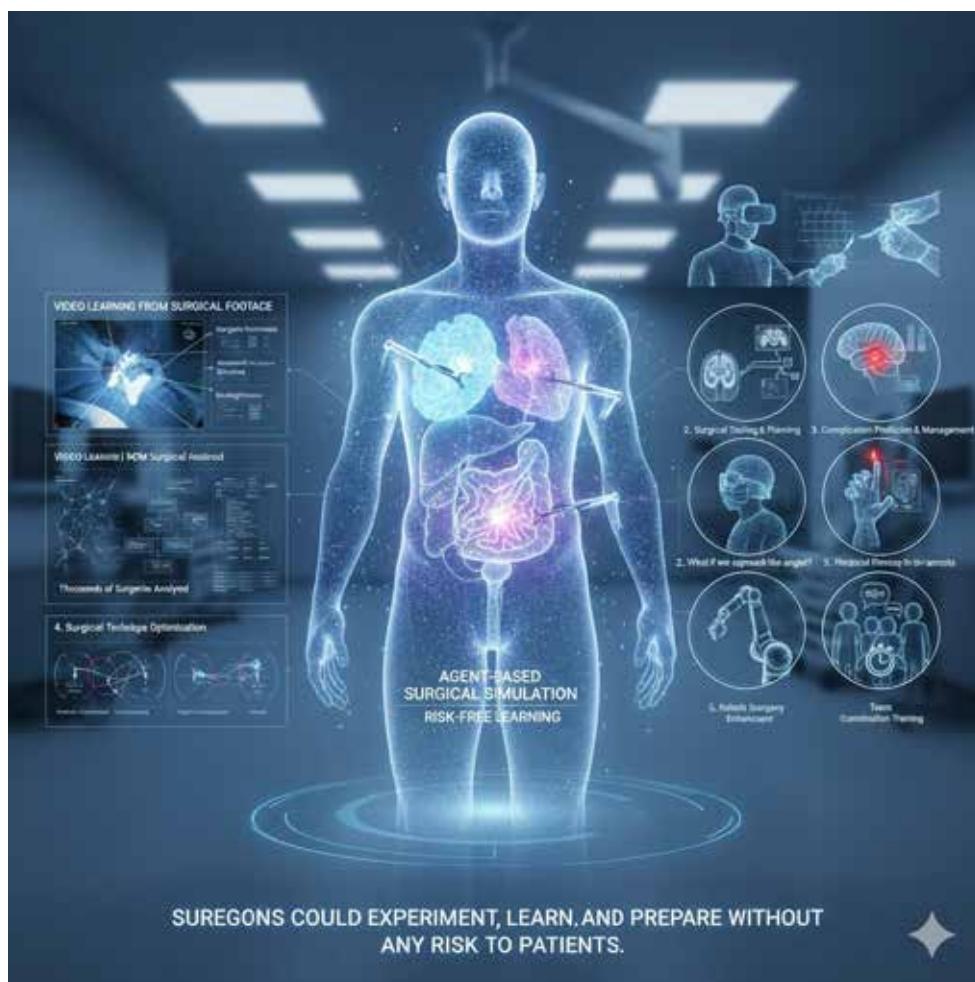

Fig. 5 IDEAS application to surgical training

3.5 Garden and Landscape Design

IDEAS learns from thousands of garden videos to model plant growth, spatial layouts, and environmental factors, enabling users to visualize gardens evolving across seasons and years.

Applications include design, biodiversity optimization, and climate resilience (see Fig. 6).
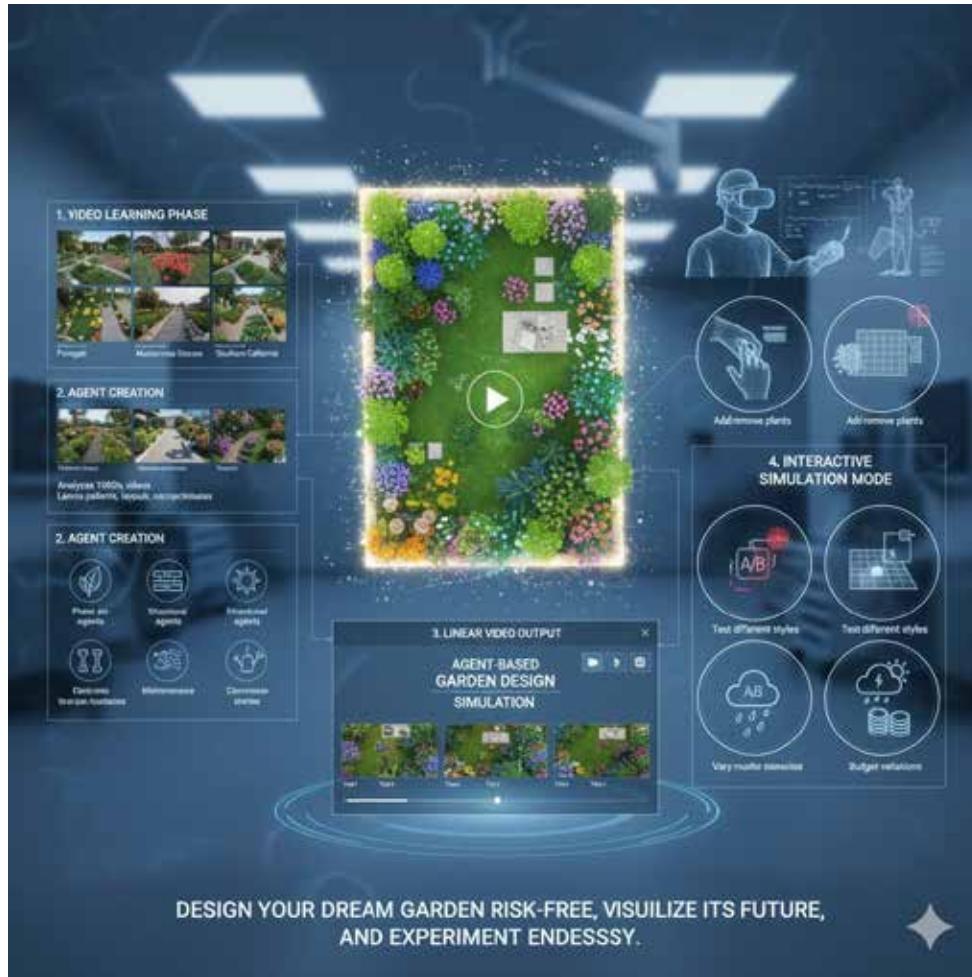
Fig. 6 Design your dream garden with the help of IDEAS

3.6 Decision Theatres

IDEAS can power immersive decision theaters combining real data, learned behaviors, and simulations for professionals.

Examples include traffic management, sports coaching (as shown in Fig 7), and hospital coordination.

Fig.7 Football tactical planning using a Decision Theater

4.   Team

António Câmara, **Edmundo Nobre** and **Haydn Rigby** will lead the IDEAS team with the help of Y Dream development team headed by **Nuno Cardoso**.

Y Dream's R&D team will be advised by **Tony Fernandes**, an internally known designer of products for Lotus, Netscape and Apple, among others. It will be also helped by the scientific support from **Joaquim Jorge** from IST, IEEE Computer Society's President.

Use cases will be developed by teams headed by **Duarte Araujo** (FMH) for sports applications, **Ana Pinheiro Privette** (U. Illinois) for nature applications, **César Barbosa** (TUGA Innovations) in mobility, and **Alexandre Rainha de Campos** (Hospital Santa Maria) in medical surgery.

5.   IDEAS as a Business Unit

IDEAS is a new venture born from decades of research in **Multimodal System Dynamics** and **YDreams**' innovation in spatial computing. Its mission is to make the world playable — allowing any user to simulate and explore reality. IDEAS' platform suite includes:

- IDEAS Studio – desktop/web interface for video-to-simulation conversion
- IDEAS Cloud – scalable AI-Simulation engine (SaaS)
- IDEAS Store – simulation marketplace
- IDEAS API – integration with enterprise systems

IDEAS will first target B2B verticals (Healthcare, Sports, Mobility, Nature) before expanding to B2C creative and educational markets.

Financial Projections (2026–2030):
2026: €0.3M revenue | €1.2M cost | €1.5M investment | €5M valuation
2030: €20M revenue | €10M cost | €0 investment | €250M valuation
2030–2035: Expansion through AR/VR consumer experiences, IDEAS Companion App, and integration into the Mirror Verse. IDEAS will become by itself a multi-billion Euros company.

These are minimum investment-based projections. IDEAS could grow much faster with larger investment. With 75 million Euros investment over the next five years, IDEAS may be worth more than one billion Euros by 2030, and between 5 and 10 billion Euros by 2035.

6.   Vision Beyond 2030

Beyond 2030, IDEAS will serve as the universal simulation layer of Y Dream's Mirror Verse — connecting humans, machines and Nature. By democratizing simulation creation, IDEAS enables everyone to explore and reimagine reality itself.