

WHAT IS

NIMBLE™

by End to End Enterprise Solutions



Nimble™ is a highly adaptable, multifaceted solution designed to offer a reusable application development environment. Equipped with Digital Twin technology and Semantic Reasoning, Nimble™ represents a significant technological leap, for example, facilitating the rapid implementation and deployment of intelligent, autonomous operations. Its high adaptability allows for the seamless integration of diverse use cases. We are able to employ the 'concept of dropping the use case on top of the engine', to answer to emerging operational or technical challenges.

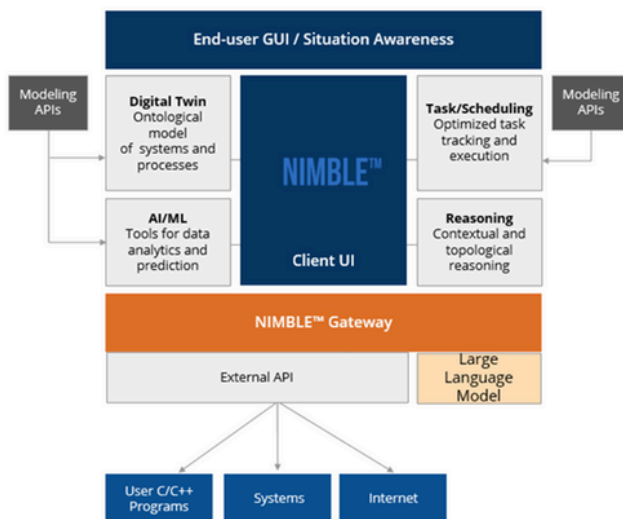
Nimble as a Problem Solver/ Mitigation Master...

Through careful analysis and tailored technical design centered around AI/ML and Digital Twin Technology, we activate the integration of tools from disciplines such as Prognostic Health Management (PHM) and Model-Based Systems Engineering. These tools can function independently or be combined to create solutions. Nimble™, crafted by the E3S team of MasterMinds is designed to address a wide range of challenges across the AI market by providing intuitive intelligent architecture that demonstrates the application and impact of AI integration.



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At E3S we not only focus on building data-driven AI models (for example, Artificial Neural Networks or even Large Language Models) but rather entire AI-powered Orchestration Systems that can diligently monitor or autonomously control all mission-critical operations.



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THE CORE & MECHANISMS

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NASA Platform for Autonomous Systems (NPAS) & Autonomous Satellite Technology for Resilient Applications (ASTRA)



E3S is responsible for the design, development, testing and validation of an onboard, flight tested and verified, small satellite autonomous control system. It features a reusable autonomous operations and AI/ML analytic framework and toolkit that E3S has developed over the course of 20 years.

To do this we leveraged Digital Twins for Semantic Reasoning- created an operational Digital Twin comprised of semantic software models of systems, workflows, assets, and missions that are updated by AI/ML driven state inference and provide a mechanism for the software logic to make symbolical references to the states of the systems, workflows, assets, and missions. Scope includes but is not limited to:

- ASTRA COP Display Integration
- API and Standards-based Interfacing
- AI Workflow Orchestration – The real power of ASTRA
- NPAS Autonomous Fuel Transfer System (NAFTS)
- NASA Crew Health and Performance

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Nimble™'s Core Mechanisms Enhance the Development Process & Performance

- **Reusable Application Development Environment:** A robust and flexible framework that fosters code reusability, reducing development time and effort significantly.
- **Digital Twin Technology:** Smarter decision-making and better performance are enabled by a dynamic and interactive relationship between virtual models and real-world entities- users are able to simulate and optimize complex systems,
- **Semantic Reasoning:** Nimble™'s semantic reasoning capabilities empowers applications to derive context, meaning, and insights from data, allowing the system to adapt and optimize in real-time, based on changing circumstances.
- **Rapid Development& Deployment:** Nimble™ aims to revolutionize the software development lifecycle by streamlining the process from inception to deployment for seamless integration, testing, and deployment of intelligent software solutions, ensuring faster time-to-market.
- **Thinking Autonomy:** Nimble™ It is designed to transition from conventional brute-force autonomy methods to a more sophisticated "Thinking Autonomy" approach. This includes the development of comprehensive SysML-like live-models that support model-based real-time analysis and operations.
- **Autonomous Operations:** E3S not only focuses on developing algorithms for specific autonomous reactions but also emphasizes the strategic implementation of autonomy. This strategy is informed by a blend of policy requirements, operational procedures, concepts of operations, and specific mission goals. In this framework, autonomous systems developed by E3S are optimized to utilize available resources effectively to achieve mission objectives from private sector, including the manufacturing industry, to the Department of Defense (DOD).
- **MBSE:** Nimble™ extends the model-based systems engineering (MBSE) approach to include live models that facilitate real-time, thinking autonomous operations, which can be rapidly deployed, reused, and evolved according to mission needs



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HOW IT WORKS

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Nimble™- Technical Functionality

1. Allow Low-code\No-code development capabilities for model creation.

a) Digital Twin Models

b) AI\ML Models

2. Reusable Model Library

3. Easy Pointed Solutions Designer for UI\UX Designer

4. Support for modularity: known industry technologies - Omniverse, Autodesk or MATLABs



Differentiators

- We construct Artificial Intelligence (AI) systems that encompass machine learning, adaptive reasoning, natural language processing, model-based engineering, autonomous system control, digital-twin simulation, big data analytics process management and control, system health prognostics, intuitive human-computer interaction, internet of things and other 21st century technologies.
- Our “Nimble™ Reasoning Graph” is a core engine that differentiates use. With this capability we enable reasoning capabilities in a reusable fashion.

Our Solutions • Connect the Dots

- Autonomy strategies that leverage operational concepts and system attributes, including redundancy and persistence strategies such as repeating commands
- Integrated System Health Management (ISHM) for ongoing health assessment, anomaly detection, diagnostics, prognostics, and overall situational awareness
- Extensive object libraries and system infrastructure for applications in electrical, mechanical, computing, and communications that enhance the creation of knowledge models
- Tools for developing and executing detailed mission operations, including plans, schedules, and sequences
- Sophisticated user interfaces that provide comprehensive awareness for users, developers, and administrators.

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OUR VALUE

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Nimble™ - Analysis You Can Count On!

- A collective repository for information that can be segmented and shared according to security levels, urgency, and authorizations.
- Precision decision making based on high quality analysis gained from real-time insights gathered from shared intelligence.

Agility!

- Access one common operating picture with a configurable portal; windows can drill down to see notes and real time actions, data and analysis done by the AI software.
- Use of Digital Twin to model a domain- this 'twin' also goes beyond being a mere information repository, to combine actions that it can execute independently and give outputs.
- Independent AI output, the AI inside of the digital framework makes correlations and comes to conclusions based on patterns of communicated by the same data. It acts like a third eye with a perspective, based on logic, to shape the conclusions it outputs. This can, in turn, enhance the human decision-making ability and shape actions.
- Versatile due to its data agnostic characteristics. It can handle several threads from satellite imagery to transport information and weather, using any data, a human can use to conclude.

Nimble™ - The Change Agent in Crisis Management

- Nimble predicts! Emerging shocks, continued stressors and other internal factors such as sudden defense gaps, incapacities within the organization or the social ecology being protected are all considered as we customize the Nimble architecture for an organization.
- Nimble can contract or expand the areas from which it pulls data and the connections it allows partners and players to make during decision making. It does this by examining and rationalizing the changes and factors which can harm a system or the extent to which the 'community'/'environment' can be affected by the impact of a hazard or exposed to the possibility of being attacked or harmed, either physically or system wide.
- NIMBLE™ leverages real-time information from multiple sources to:
 - Supply continuous real-time views that highlight the current and future posture of any system
 - Enable the ability to detect, respond and contain an incident appropriately and quickly.
 - Give flexible communication parameters that can contract or widen all with the same efficiency and transparency enabling information sharing and better cognitive reasoning.
 - It can answer several questions simultaneously by analyzing problems that have respective variables then fit solutions to these multi-dimensional hazards and vulnerabilities.



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