

**G2OPS**<sup>®</sup>  
*Smarter Intelligence.*<sup>®</sup>



# Gold Standard Methodology<sup>™</sup> Ecosystem

Methodology, Models,  
Products, Analysis, and Total  
Quality Management



## Executive Summary

Model-Based Systems Engineering (MBSE) is a giant leap forward in Systems Engineering's approach to development. But, since its inception, MBSE has been plagued with inconsistencies and a lack of industry-wide accepted standards that transcend individual business practices and niche concerns.

The result is MBSE stands as the definitive systems engineering approach, without complete standardization. Legitimate engineering concerns and a lack of consensus prevent a coherent solution from being found. The ramifications of this are conflicting processes, various methods of systems design, analysis, and change that yield inconsistent and unrepeatable results. Worse yet, because of these failings, delivered products and services fall short of providing for the unique needs and expectations of the customer.

This industry problem is solved by the G2 Ops Inc. Gold Standard Methodology<sup>™</sup> (GSM) and its supporting ecosystem. The GSM Ecosystem stands as the culmination of engineering experience, efficiency-driven innovation, quality-minded processes, and the desire to provide automated, accelerated, and advanced engineering development while standardizing and revolutionizing the process.



# G2 Ops – Gold Standard Methodology™ Ecosystem

## 1 Introduction

The International Council on Systems Engineering (INCOSE) defines Model-Based Systems Engineering (MBSE) as “the formalized application of modeling to support systems requirements, design, analysis, verification, validation, and sustainment activities beginning in the conceptual design phase. MBSE has transformed engineering practices and has now become the standard way to design, redesign, improve, and innovate systems, their components, and interactions between systems and continuing throughout development and later life cycle phases.”<sup>1</sup>

While adoption of MBSE is more widespread than ever, standardization and ‘best of breed’ practices have yet to be formalized. The Object Management Group (OMG) and the INCOSE have endeavored to standardize certain aspects of MBSE, most notably using the Systems Modeling Language (SysML) which enables “modeling from the enterprise to system to software design. Other OMG standards, such as the Requirements Interchange Format™ (ReqIF™), provide a standard format for exchanging requirements information between different requirements tools.”<sup>2</sup>

However, a myriad of companies employing MBSE have developed their own standard operating procedures that yield a wide variety of results, reliability, and reproducibility, giving rise to criticisms. With this in mind, G2 Ops, Inc. (G2 Ops) system engineers and architects synthesized tens of thousands of hours of engineering experience and knowledge, coupled with pragmatic approaches, formalizing the most efficient and effective processes in the execution of MBSE. The result is G2 Ops’ Gold Standard Methodology™ (GSM) and its Ecosystem (GSME).

The GSM serves as a single source of truth for all stakeholders significantly reducing ambiguity, guesswork, and supposition, providing practical, knowledge-based, and actionable information for precise decision making throughout the system lifecycle. The key to GSM and its ecosystem is the efficiency and synergy of engineering automation created by combining three elements: schema consisting of data and relationships, applications leveraging data/relationships producing engineering analysis, and processes to use the new analytics to perform traditional engineering functions together cheaper, better, and faster. This results in a comprehensive collection of matured Engineering automation use cases for every step in the process.

What is more, our customers, specifically government agencies and military branches, have come to depend on our Gold Standard Methodology™, and consider it the foremost reliable and trusted process for maintaining, analyzing, and improving their systems.

## 2 Methodology

The Gold Standard Methodology™ (GSM) is structured to be the G2 Ops proprietary standard for developing models with defined schema, repeatable processes, and engineering analysis applications, for system development efforts. The GSM and its ecosystem marry ‘best of breed’ MBSE-enhanced engineering practices, and evolving automation techniques with efficient and repeatable modeling developmental activities, streamlining the engineering lifecycle in a way

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<sup>1</sup> <https://www.omg.org/hot-topics/syse.htm>

<sup>2</sup> <https://www.omg.org/intro/MBSE.pdf>



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that prioritizes efficiency, accuracy, and completeness, while ensuring a quality process and modeling foundation.

The GSM employs engineering development processes segregated into discrete modules or stages, each corresponding to a systems engineering sub-process. For each stage, specific use cases are identified that address specific needs. For example, in the System-level Requirements stage, use cases may include “extract requirements from the Statement of Work” or “generate a Requirements Traceability Matrix (RTM)”. Great care is practiced such that the inputs and the outputs of these use cases are standardized to clearly identify engineering data needs, improve SE process integration, and maximize reusability. The customer receives the final product resulting from the linked use cases such as in pipelines or stepwise outputs generated by each use case.

The GSM establishes and evolves an MBSE enabled engineering development process designed to be project agnostic while being adaptable to handle the specifics of any project. The software, tools, applications, and MBSE-enhanced engineering process provided to the customer allows them to make specific, targeted improvements in their system that best fit their operational needs. This establishes cooperative communication between G2 Ops and amongst customer stakeholder decision makers. The continuous improvement cycle reinforces quality controls and effectiveness of all improvements made to any unique system as well as the methodology, the baseline models, software automation, and processes. This environment is described as the Gold Standard Methodology™ Ecosystem (GSME).

***G2 Ops Gold Standard Methodology™ Ecosystem is based on a three-layered construct that develops unique solutions to customers’ complex business problems.***

## Model-Based Systems Engineering (MBSE)

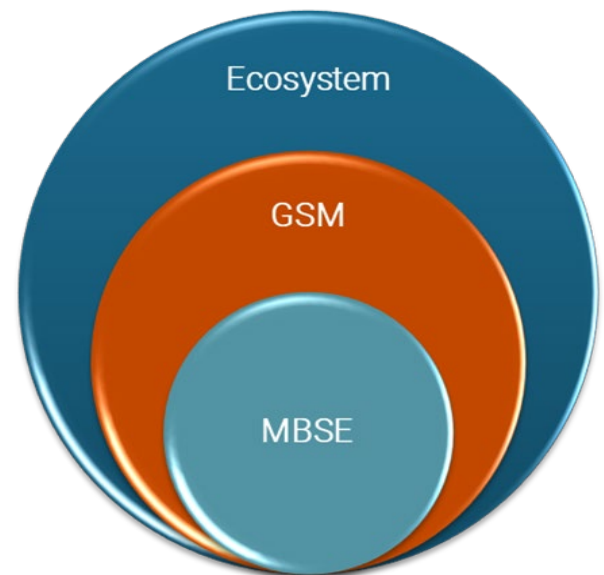
- G2 Ops accelerates our customers into Digital Engineering across the development lifecycle

## Gold Standard Methodology™ (GSM)

- G2 Ops integrates MBSE models together to benefit the greater enterprise customer needs
- Proactively drives common model schema to rapidly mature Systems Engineering (SE) automation tools
- GSM enables compatibility with G2 Ops analytic tools and capabilities

## GSM Ecosystem (GSME)

- The GSM Ecosystem fosters development and continual improvement of software applications that can be reused for subsequent projects, benefiting from lessons learned on previous efforts
- Baseline schema created from ‘best of breed’ practices form the core of any single project, but can be utilized across multiple models and projects reducing development time and effort





# G2 Ops – Gold Standard Methodology™ Ecosystem

MBSE forms the basic systems engineering design platform, and the Gold Standard Methodology™ codifies best practices, automation, analysis, and quality control, umbrellaed by the surrounding development ecosystem that reinforces and vets the practices that yield superior results.

## 3 Modeling

The Gold Standard Methodology™ provides a baseline model from which all future iterations are effectively based. This model is called the GSM metamodel. Any system that exists in the real world can be represented as a systems model with defined characteristics for the systems structure, behavior, and performance. Thus, for any project, the SE team starts with a GSM metamodel. This metamodel begins life compliant to the GSM Ecosystem's standards in methodology and structural guidelines in constructing the project model. It standardizes and defines the hierarchy of elements, such as platform, system, subsystems, and components. It also predefines relationships between requirements and other model elements such as parent/child requirements, architecture satisfaction, test case verification, use case refinement, and association to reference artifacts. These established elements form the basis of the modeling schema.

Built upon the metamodel is the 'starter' model or template. This model is the foundation from which the SE team works to digitally capture the real-world system. While it is customized for each specific project, it provides capabilities common for these projects. For example, a common library of reusable hardware, parts, and software elements from various vendors exists for integration.

For consistency and to eliminate confusion, the metamodel follows a configuration management-aligned style guide that recommends best practices ranging from package structure and naming conventions to consistency in depicting Internal Block Diagrams (IBDs) and activity diagrams to formatting like font size, color, and other levels of detail.

While models start out as GSM-compliant, the flexibility granted to engineers provides opportunities for customization and deviation. Thus, at any time, these models can then be evaluated for compliance. If deviations are necessary, the administrators of the GSM decide whether or not to make the deviations a standard part of the metamodel and/or the starter model or simply allow the project to register that deviation.

## 4 Capabilities and Products

Although each customer's system and requirements may be different, root foundational shells of these elements exist to ingest appropriate data to align developmental and revision activities coherently.

To fully incorporate the benefits of modeling, multiple products must be developed to work in unison with the model and the methodology. Besides the model itself, these products take the form of automated processes streamlined to reduce human-driven data entry, tools to analyze and interpret data, as well as reporting tools designed to provide comprehensive views. All these processes and tools live within the GSME to provide continuous analysis and improvement.



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Furthermore, unique and bespoke software applications can be developed to answer customer-focused concerns when the need arises.

The methodology, modeling, and products yielded to G2 Ops systems engineers are directly responsible for arguably the most important aspect of the GSME: analysis and improvement. Every product created, whether it is an automated process, an analytical report, or process improvement critique, lends itself to improving a system. This is because they take vital elements into account when coupling a proposed change or revision to a system. The analytical tools that result from the GSM allow for detailed ‘what if’ scenarios to be played out, analyzed, and critiqued in the virtual environment before any real-world physical or process changes are ever made.

## 5 Total Quality Management

Within the GSME, interwoven throughout the methodology standards, the modeling, products, and analysis components, there is an underlying focus on quality. This quality takes the form of organization-wide efforts to perform MBSE and GSM processes and practices at a superior level that facilitates continuous improvement and demands products and services provided to the customer are value-added and speak to the unique concerns they have. Total Quality Management (TQM) speaks to the human element, relying on four key components:

**Customer Focus.** A customer must be educated on how the model represents their system, but also on how to use the tools developed to analyze and improve it as well. This overall approach to customer service integrates the customer to ensure their needs and expectations are met.

**Employee Commitment & Engagement.** SEs, architects, and other personnel operating within the GSME are fully immersed and take ownership of the process. This allows them to not only have greater work satisfaction but makes them integral to the success of the project.

**Integrated & Systematic Approach.** The GSM provides for training and experiential opportunities that expand personnel skill while allowing for analysis and critique of the ecosystem itself. This allows personnel to identify problems and potential solutions to the ecosystem or part of it.

**Informed Communication and Decision Making.** The GSM is designed to elicit informed communication by promoting continual analysis. Needed changes to the ecosystem are promoted by the continual improvement process. These changes, once verified, are then incorporated into the canonized ecosystem, becoming a standard part of the GSME.

## 6 Conclusion

The everchanging world of Systems Engineering radically shifted with the introduction of Model-Based Systems Engineering (MBSE). Since its inception, MBSE continues to revolutionize the way systems engineering design, implementation, and revision occurs. But for all its successes, basic standardizations and conformity allude the process. While MBSE improves engineering, it still suffers from growing pains.

G2 Ops solves this problem by developing the Gold Standard Methodology™ (GSM) Ecosystem. The GSME combines the benefits and disciplines of MBSE, OMG and INCOSE standards, and ‘best



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of breed' practices with model development, products and applications, and evolving automation techniques with efficient and repeatable modeling developmental activities, streamlining the engineering lifecycle all the while focusing on quality, efficiency, and the bespoke needs of the customer.

What is more, the GSME automation reduces the human touch time needed to compile and ingest data and significantly reduces labor hours to complete tasks. Now project personnel can focus on process and systems improvement instead of manual data entry and alignment. Further, the analysis and improvement capabilities enabled by the GSM structures allows for superior systems understanding of how systems exist in the real world, and how 'what if' changes affect systems efficiencies and productivity.

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### About G2 Ops, Inc

G2 Ops brings decades of experience integrating Systems, Cybersecurity, and Software engineering techniques to provide solutions to a growing list of Government and private customers. G2 Ops combines cutting edge tools with innovative engineering practices, data analytics, and risk algorithms that enhance visibility into complex distributed infrastructures, optimizing resiliency in system design and operations. G2 Ops is a woman-owned small business led by an executive staff known for providing cutting-edge solutions to solve our nation's most complex engineering challenges. G2 Ops has been named to the INC 5000 List of fastest growing companies each of the last 3 years (2018-2020) and has locations in Arlington, VA, San Diego, CA, and Virginia Beach, VA.