



# COSYSMO

**CO**nstructive **SY**stems Engineering Cost **MO**del

## **GSAW**

*Meet the Technological Challenges of  
Spacecraft Ground Systems*

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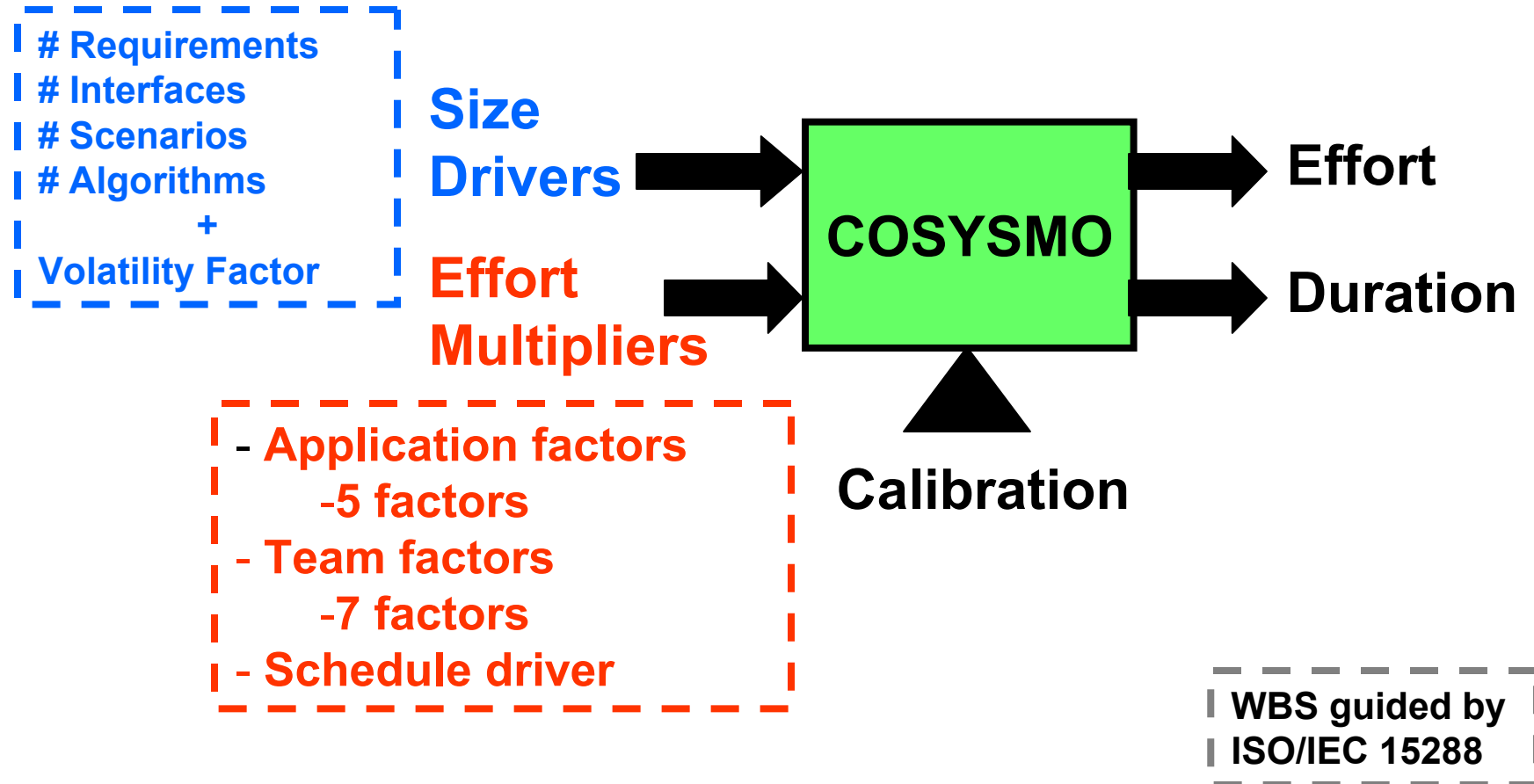
# Outline

- **COSYSMO Overview**
- **COSYSMO and Ground Systems**
- **Drivers**
  - **Size**
  - **Cost**
- **Additional Proposed drivers**
- **Calendar**

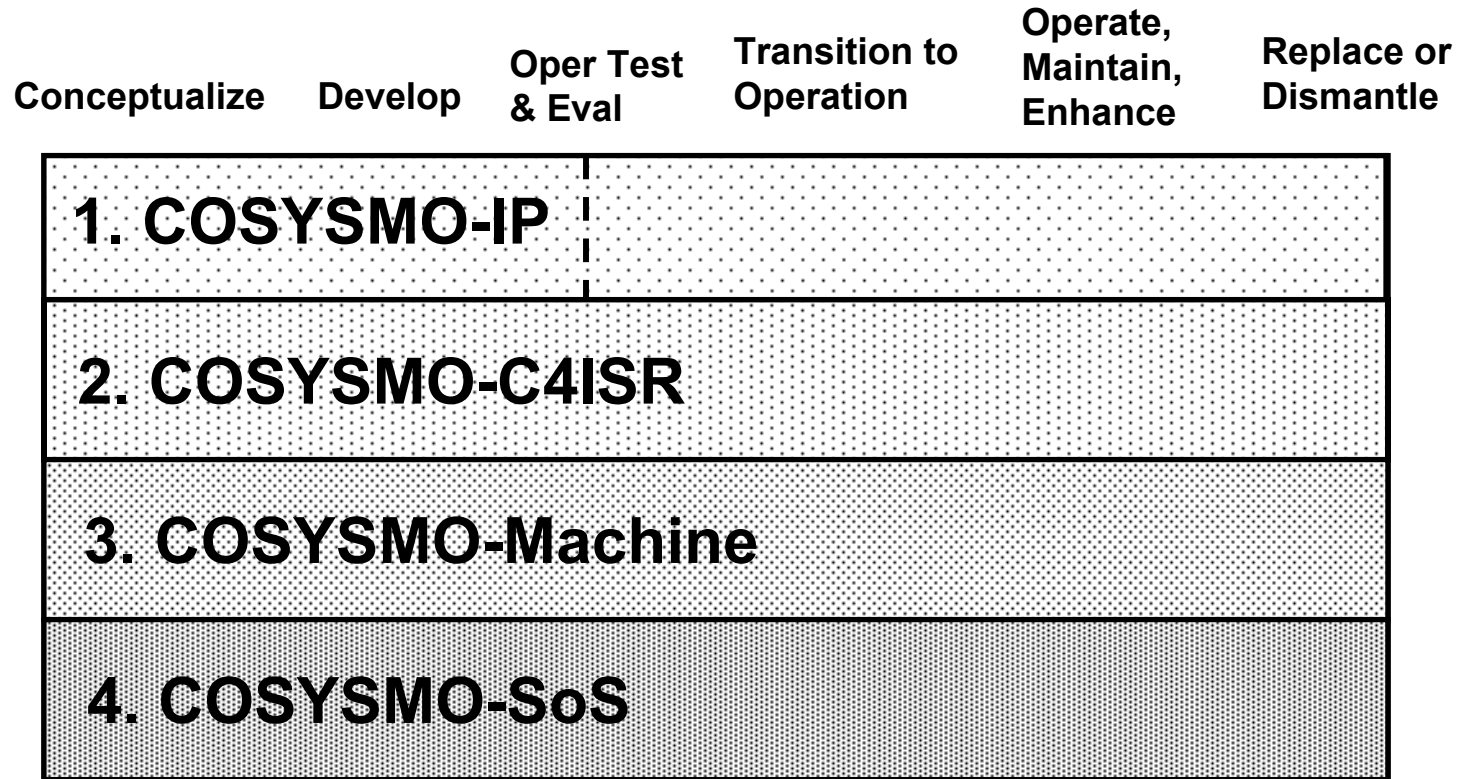
# **COSYSMO: Overview**

- **Parametric model to estimate system engineering costs**
- **Covers full system engineering lifecycle**
- **Focused on use for Investment Analysis, Concept Definition phases estimation and tradeoff analyses**
  - **Input parameters can be determined in early phases**

# COSYSMO Operational Concept



# COSYSMO and Ground Systems



# 4 Size Drivers

- 1. Number of System Requirements**
- 2. Number of Major Interfaces**
- 3. Number of Operational Scenarios**
- 4. Number of Unique Algorithms**

- Each weighted by complexity, volatility, and degree of reuse**

## Number of System Requirements

This driver represents the number of requirements that are typically taken from the system or marketing specification. A requirement is a statement of capability containing a normative verb such as “shall” or “will.” It may be functional, performance, feature, or service-oriented in nature depending on the methodology used for specification. System requirements can typically be quantified by counting the number of applicable “shall’s” or “will’s” in the system or marketing specification.

	Easy	Nominal	Difficult
<b>No. of System Requirements</b>	- Well specified	- Loosely specified	- Poorly specified
	- Traceable to source	- Can be traced to source with some effort	- Hard to trace to source
	- Simple to understand	- Takes some effort to understand	- Hard to understand
	- Little requirements overlap	- Some overlap	- High degree of requirements overlap
	- Familiar	- Generally familiar	- Unfamiliar
	- Good understanding of what’s needed to satisfy and verify requirements	- General understanding of what’s needed to satisfy and verify requirements	- Poor understanding of what’s needed to satisfy and verify requirements

# 12 Cost Drivers

## *Application Factors (5)*

1. Requirements understanding
2. Architecture complexity
3. Level of service requirements
4. Migration complexity
5. Technology Maturity



## Requirements understanding

This cost driver rates the level of understanding of the system requirements by all stakeholders including the systems, software, hardware, customers, team members, users, etc...

Very low	Low	Nominal	High	Very High
Poor, unprecedented system	Minimal, many undefined areas	Reasonable, some undefined areas	Strong, few undefined areas	Full understanding of requirements, familiar system

# 12 Cost Drivers (cont.)

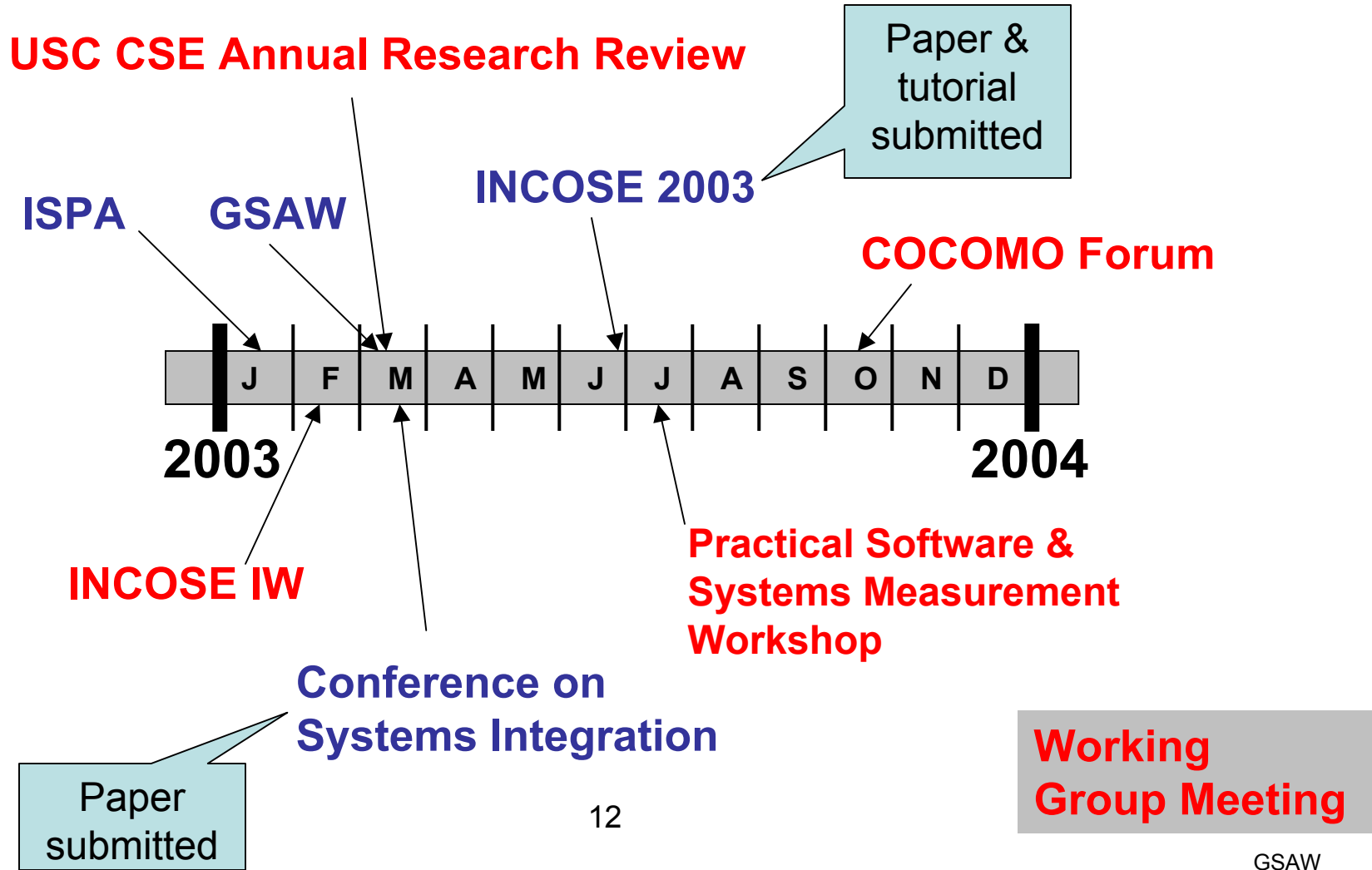
## *Team Factors (7)*

1. **Stakeholder team cohesion**
2. **Personnel capability**
3. **Personnel experience/continuity**
4. **Process maturity**
5. **Multisite coordination**
6. **Formality of deliverables**
7. **Tool support**

# Additional Proposed Drivers

- **# of recursive levels in the design**
- **# and diversity of installations/platforms**
- **# of years in operational life cycle**
- **Degree of Distribution**

# Calendar of Activities: 2003



# Key Members of the COSYSMO Working Group

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