**COSMOS** — Coordinated Orbital System Management and Operations Suite

**COSMOS Sprint Report**  
Sprint 1 Ending April 01, 2025  
Sprint 2 Ending April 22, 2025 Sprint 3 Ending May 05, 2025

**Context**

**First Day of Sprint 1:** March 25, 2025  
**Last Day of Sprint 1:** April 01, 2025  
**First Day of Sprint 2:** April 8, 2025  
**Last Day of Sprint 2:** April 22, 2025 **First Day of Sprint 3:** April 28, 2025 **Last Day of Sprint 3:** May 07, 2025   
**Working Days in Sprint 1:** 07  
**Working Days in Sprint 2:** 14 **Working Days in Sprint 3:** 09

**Team Members**

| **Name** | **Role in the Sprint** | **Planned Days** | **Worked Days** |
| --- | --- | --- | --- |
| Pasupuleti Jaswanth | Scrum Master | 30 | 26 |
| Krithin Thota | Head Developer | 30 | 28 |
| Dhanush Dayanand | Vision developer | 30 | 28 |
| Vangapandu Baladitya | Security Developer | 30 | 29 |

**Sprint 1, Sprint 2, Sprint 3**

**Product Owner:** Krithin Thotha **Scrum Master:** Pasupuleti Jaswanth   
**Internal Assessor:** Dr. S Santhanalakshmi

**1. User Stories**

**Sprint 1**

| **User Story ID** | **As a** | **I want to** | **So that I can** |
| --- | --- | --- | --- |
| 1 | System Architect | define the architecture for CS LLM, CV LLM, and Central LLM | Better understand working of the systems. |
| 2 | Project Team Member | communication protocols to be defined | Interact with different domains seamlessly |
| 3 | Developer | set up project repositories | Easily access code and update versions |

**Sprint 2**

| **User Story ID** | **As a** | **I want to** | **So that I can** |
| --- | --- | --- | --- |
| 4 | LLM Developer | Convert task updates into structured prompts | Improve communication between LLMs |
| 5 | Security Specialist | Implement quantum encryption | Protected inter-LLM communication is |
| 6 | CV Developer | convert detections into structured prompts | Pass information to LLM for further processing. |
| 7 | Data Architect | Establish data partitioning | Retrieve data and optimize |

**Sprint 3**

| **User Story ID** | **As a** | **I want to** | **So that I can** |
| --- | --- | --- | --- |
| 8 | System Operator | see the predicted path or impact area for detected space debris | visually understand the potential risks. |
| 9 | System Administrator | Deploy a UI | Oversee system activity |
| 10 | Developer | Implement feedback loops | continuously improve system |
| 11 | QA Engineer | Evaluate the CS LLMs | Improve communication delays |
|  |  |  |  |

**2. Product Backlogs**

**Sprint 1 Product Backlog:**

|  |
| --- |
| * Project setup |
| * Define architecture for CS LLM , CV LLM , Central LLM |
| * setup repositories |
| * define communication protocols |
| * Data collection and preprocessing |
| * Gather dataset for CV LLM (space debris, weather anomalies) |
| * Define data encryption methods for CS LLM ( Quantum Security Framework) |
| * Gather dataset for task management to train LLMs ( Sub and central nodes) |
| * Model selection and baseline testing |
| * Select CV model |
| * Finalise and apply encryption methods for secure task transmission |
| * Research and Documentation |
| * Finalise prompt format for central LLM |
| * Document project scope and workflows |

**Sprint 2 Product Backlog:**

|  |
| --- |
| * Implement CV LLM |
| * Train object detection and prediction model for debris/weather anomalies. |
| * Implement thresholding for severity scoring. |
| * Convert detections into structured prompts for Central LLM. |
| * Implement CS LLM |
| * Implement quantum encryption for secure message relay. |
| * Establish message integrity verification. |
| * Convert task updates into structured prompts for Central LLM. |
| * Central LLM Development |
| * Implement multi-source prompt processing. |
| * Develop task prioritization algorithm based on severity & urgency. |
| * Implement reinforcement learning for task optimization. |
| * Integration of Sub-LLMs |
| * Establish real-time data flow from CS LLM & CV LLM to Central LLM. |
| * Set up APIs for task assignment. |
| **Sprint 3 Product Backlog:**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  | | --- | | * Performance Testing | | * Stress-test CV LLM on high-speed debris detection | | * Evaluate CS LLMs latency under encrypted messaging. | | * Optimize Central LLMs decision-making loop. | | * Final Integration & Refinement | | * Implement feedback loops to refine model accuracy. | | * Optimize task allocation efficiency.  |  | | --- | | * Real-Time task analytics | | * Implement Kafka/Spark Streaming to process CV anomaly detection data in real time. | | * Build batch & streaming pipelines to store and process large volumes of sensor data. | | * Optimize data aggregation, compression & retrieval speed for anomaly records. | | * Define real-time dashboard/UI for data monitoring (React/D3.js for visualization) | | * Integrate real-time event triggers for Central LLM task updates. | | * Implement data pipelines to feed Central LLM with processed insights from CV & CS LLMs. | | * Develop predictive analytics module using historical anomaly trends. | | * Test Big Data streaming performance under extreme loads. | | * Deploy UI for real-time monitoring of detected anomalies & task assignments. | | * Set up logging & monitoring tools for post-deployment analysis. | | | |  | |

**3. Iteration Planning**

**Vision and Roadmap:** Build an integrated task management suite for satellite automation

**Number of User Stories Fit:** 3 User Stories per sprint.

**Iteration Theme / Name:**

* Sprint 1: "Getting Started"
* Sprint 2: "Implementation and integration"
* Sprint 3: “Performance Testing”

**Dates:**

* Sprint 1: March 25–April 01, 2025
* Sprint 2: April 08–April 22, 2025
* Sprint 3: April 28–May 07-, 2025

**Capacity:**

* Sprint 1: 100 hours
* Sprint 2: 95 hours

**Definition of Done (DoD):**

* Feature fully developed, reviewed, tested, and deployed on staging.

**Dependencies and Assumptions:**

* UI library setup before frontend development.

**Commitment:**

* Complete 3 stories per sprint.

**Actions:**

* Daily scrums, code reviews, staging deployments.

**4. Contents and Assessment**  
**Points Earned:** 265

Sprint 1

|  |  |  |
| --- | --- | --- |
| COS-1 | 30 | Finished |
| COS-2 | 10 | Finished |
| COS-3 | 10 | Finished |
| COS-4 | 10 | Finished |
| COS-5 | 40 | Finished |
| COS-6 | 40 | Finished |
| COS-7 | 40 | Finished |
| COS-10 | 15 | Finished |
| COS-11 | 15 | Finished |
| COS-13 | 10 | Finished |
| COS-14 | 10 | Finished |
| COS-37 | 5 | Finished |
| COS-38 | 5 | Finished |
| COS-40 | 5 | Finished |
| COS-41 | 10 | Finished |
| COS-42 | 10 | Finished |

**Sprint 2**

**Points Earned:** 205

|  |  |  |
| --- | --- | --- |
| Jira ID | Points Earned | Result |
| COS-15 | 20 | Finished |
| COS-17 | 20 | Finished |
| COS-18 | 10 | Finished |
| COS-19 | 20 | Finished |
| COS-21 | 20 | Finished |
| COS-22 | 20 | Finished |
| COS-23 | 20 | Finished |
| COS-24 | 10 | Finished |
| COS-25 | 10 | Finished |
| COS-28 | 15 | Finished |
| COS-29 | 15 | Finished |
| COS-49 | 15 | Finished |
| COS-50 | 10 | Finished |

Sprint 3

Points Earned :55

|  |  |  |
| --- | --- | --- |
| Jira ID | Points | Result |
| COS-30 | 10 | Finished |
| COS-31 | 15 | Finished |
| COS-32 | 15 | Finished |
| COS-33 | 15 | Not Finished (Research initiated W4 Mon) |

5. Sprint 1 Implementation (Screenshots Attached)

* Project Setup (COS-1)
* Architecture Definition (CS, CV, Central LLM) (COS-2)
* Repository Setup (COS-3)
* Communication Protocol Definition (COS-4)
* Initial Data Source Identification (COS-6, COS-8)
* Encryption Method Research (COS-7)
* Big Data Framework & Storage Outlines (COS-37, COS-38, COS-40)

6. Sprint 2 Implementation (Screenshots Attached)

* CV LLM - Initial Implementation & Model Training (COS-15, COS-16)
* CS LLM - Core Encryption & Integrity Modules (COS-19, COS-20, COS-21)
* Central LLM - Core Logic & API Stubs (COS-23, COS-29)
* Data Pipelines - Initial Versions (COS-49)
* Predictive Analytics Module - Core Logic (COS-50)
* Integration Points - CS/CV to Central LLM Data Flow Setup (COS-28)

7. Sprint Retrospective

Held on: May 4, 2025

Attendees: Full Team *(Pasupuleti Jaswanth, Krithin Thota, Dhanush Dayanand, Vangapandu Baladitya, and other relevant team members)*

Key Decisions:

* Successful core LLM module development (CV, CS, Central).
* Effective collaborative problem-solving for technical hurdles (e.g., library issues, encryption debugging).
* Initial data pipelines established for Central LLM.
* Proactive API definition and stubbing facilitated parallel work.