# M02 Lab Assignment: Scoping the Problem

## Deliverables and Format

* Problem statement as understood, EEAs, constraints (including analysis scope), system context, and description of general analysis approach (MS Word or PDF file)
  + A system context graphic should be inserted into the writeup, and can be neatly drawn in any tool or by hand.
* Model of system context in native tool, if available (e.g., Excel, Visio, CORE file)

# Deliverables

## Problem Statement

In recent years there has been a dramatic increase in the volume of data gathered by the U.S. Navy in support of its operational efforts. While multiple channels are available to the Navy, Network Operations (NetOps) is a common methodology for moving the information as well as responding to system and network issues. NetOps is the U.S. Navy's operational construct designed to operate and defend the Global Information Grid (GIG) (NGEN NetOps CONOPSv1.0, DON, 7 Apr 2008). Specifically , NetOps provides the framework for contextual information leading to situational awareness and comprehension to make operational and mission decisions within the context of network operations and defense.

Existing technology solutions lack the ability to effectively provide data cohesion, fusion, common processing and interfacing within a diverse and growing operational datascape. Naval Watch Officers, specifically, need to receive data in a timely manner to develop and deliver factual and actionable information to decision-makers on events revolving around system outages network degradations, or shifts in priorities. Determining and defining network events and their technical severity and mission implications so as to prioritize and react in a timely manner is critical to meeting the Navy’s operational needs.

## EEAs

* Can the systems engineering and analysis verify that the graph DB approach will provide a measurable improvement in effectiveness and success for the PACCOM decision makers’ process vs. a document DB approach?
* If so, what confidence level can be associated with the magnitude of improvement in the various measures?
* Is the current SIPRnet hardware/network infrastructure capable of providing the threshold improvement level goals, regardless of data model and solution approach?
* If not, what required performance improvements in hardware, redundancy, throughput, and/or bandwidth are needed to support project goals?
* If the required improvements from a hardware and network architecture standpoint are implemented, can the graph DB approach be then verified as necessary to meet operational efficiency goals vs. maintaining the current process, services, apps, UIs, and APIs?
* What average percent reduction in time is possible using the Ruby on Rails web app/Neo4j graph DB approach through the Acquire → Assess → Report operational activities performed by the watch officers vs. the current process?
* What average time reduction is available to reestablish the COP/shared SA status for all surface platforms in the Pacific AOR with the proposed approach vs. the current process?
* Can the analysis justify the selection of the current preferred solution approach of Neo4j graph DB implementation vs. another solution (Lucene, GIS, Rest API)?
* Is there any reduction in data/information quality (accuracy) observed with the graph DB traversal solution approach vs. an SQL join approach [null hypothesis might assume no difference, but data and analysis might even show an improvement]?
* Would proposed filtering strategies potentially screen relevant data from arriving to watch officers and decision makers?
* Would any existing data source web apps still need to be directly and quickly accessible by watch officers in support of preparation of their briefs due to either the volume, or criticality of the data those apps contain and/or due to an inability to reliably extract/parse/convert or interpret the data through the fused graph DB solution?

## Constraints

* Adhere to DoD, USN, and USSTRATCOM policies
* Requirements conflicts among prospective customers (COMPACFLT, PACOM, 7THFLT, STRATCOM, etc)
* Potential database limitations of Neo4j and Ruby on Rails and compatibility concerns with utilizing multiple tools
* Lack of understanding of existing information correlations (i.e. which data, applications, and services are fed to and from which communication systems)
* Potential budget limitations deterring the ability to satisfy project objectives

## System Context

* See attached PDF, will be added to final file before it is submitted.

## General Approach

The cornerstone of our general approach has been to gather information through study of the problem and interview. The stakeholders have supplied us with review material summarizing their problem space and proposed high level architecture which has given us the basis to focus our interview questions to best effect. Our recent interview session with the stakeholders provided us with the added insight necessary to drill down into the problem space and begin our analysis in earnest.

As we move through the systems engineering process, analysis will be a continual and integral part of the engineering process, providing a continual feedback loop against which we can measure our progress and course of action. Although analysis will be ongoing, the majority of the early analysis that will allow us to move forward should be complete within two weeks.

Given sufficient information to gain early traction, we will refocus our analysis efforts on modeling the system. Given that we do not have access to the actual system under development, we will rely on the critical information gained through interview and study. The modeling effort, if carefully carried out, will give us much needed access to a surrogate for the system under development and will lend insight into the feasibility of different proposed courses of action. This real time feedback will make it possible for us to provide the stakeholders with a reliable engineering plan.