Mining Systemigram Content to Create a SysML Model

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Abstract

Dr. Brian Sauser and I have been discussing whether or not there is sufficient information a Systemigram to serve as source material for a SysML model. He provided a DHS Small Vessel Security Strategy systemigram provided by Dr. Brian Sauser.

Introduction

Systemigrams are meant to tell a story which can be understood, and agreed to by the customer. A SysML model can be used at any number of steps in the systems engineering process. Sometimes, system architects will use the systems modeling language to capture the operational requirements of a new system. Much the same way as a systemigram does. However, a systemigram is much less formal, and therefore we believe, much better suited for discussions with the customer. So, the question arises, can one use the knowledge gained in systemigram to create a SysML model.

Purpose of this exercise

The purpose of this exercise is to take an existing systemigram, and begin creating a SysML model. It will not be a complete SysML model, and only enough will be done to convince us that this is worth pursuing. Our goal is to propose the approach to the Army Soldier Center for further research on the approach if this is successful.

Discussion

Figure 1 was provide by Dr. Brian Sauser to Dr. Robert Cloutier on June 7, 2011. For the details of the development of this systemigram, see B. Sauser, J. Ramirez-Marquez, and Q. Li, "Systemigram Modeling of the Small Vessel Security Strategy for Developing Enterprise Resilience," Marine Technology Society Journal, vol. 45, pp. 88-102, 2011.

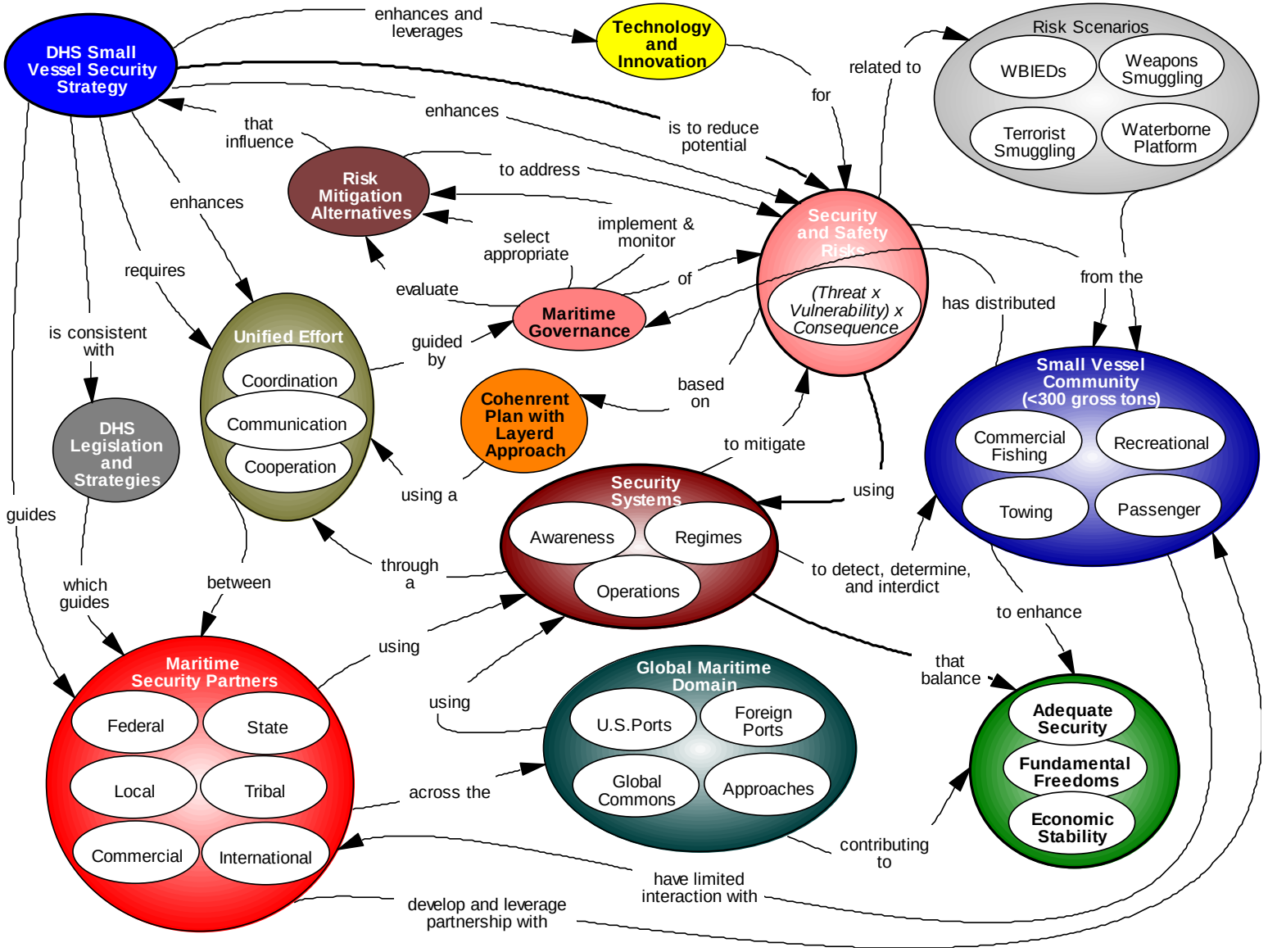


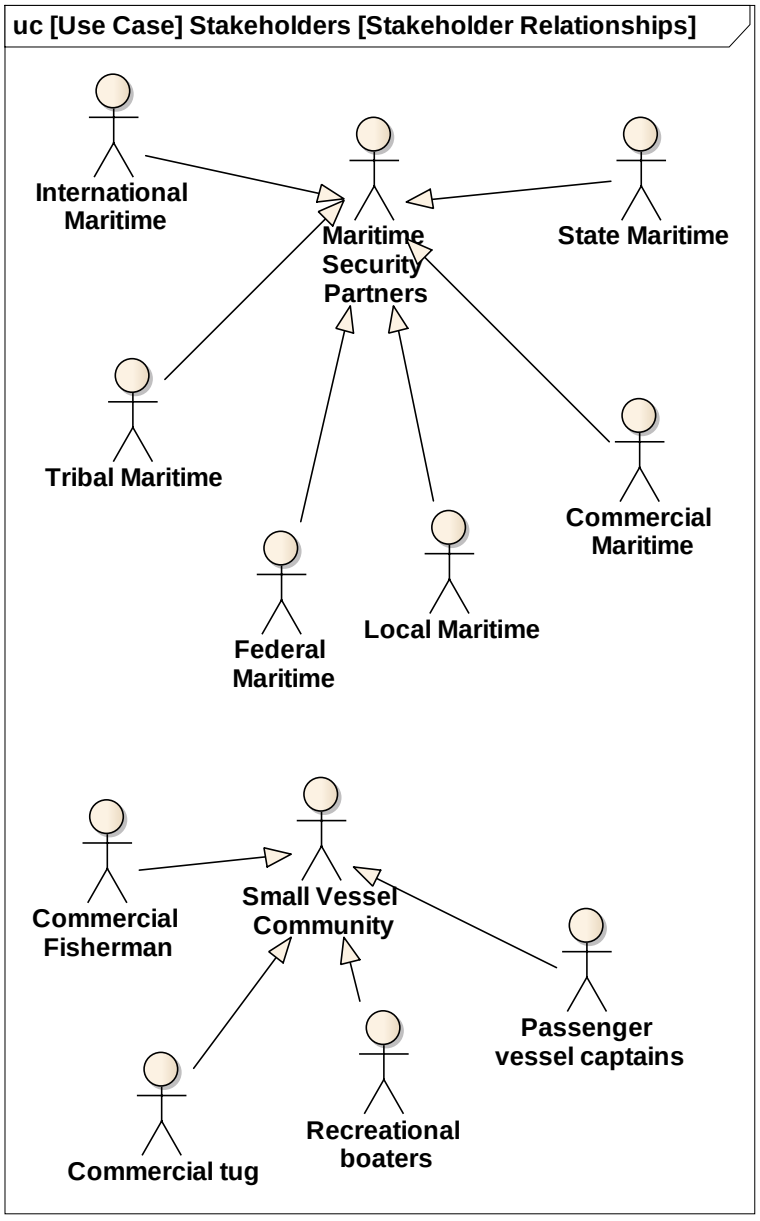
Figure 1. DHS Small Vessel Security Strategy

Approach

In regards to Systemigrams being translated to SysML, the following interpretations may be helpful.

Node=Nouns=People, places, or things. Things can be objects or artifacts. Objects can be technologies, systems, subsystems, etc. Artifacts are anything that is produced as a result of an activity.

1. Set up empty model, named it DHS_Small_Vessel_Security
2. Added Stakeholder folder
   2.1. Created stakeholder relationships diagram
      2.1.1.Mined for stakeholders, looking at nodes



2.1.2. Noticed some stakeholders also are objects – e.g. Commercial fishing vessels in the small vessel community

2.2. Created Domain Objects folder under main model

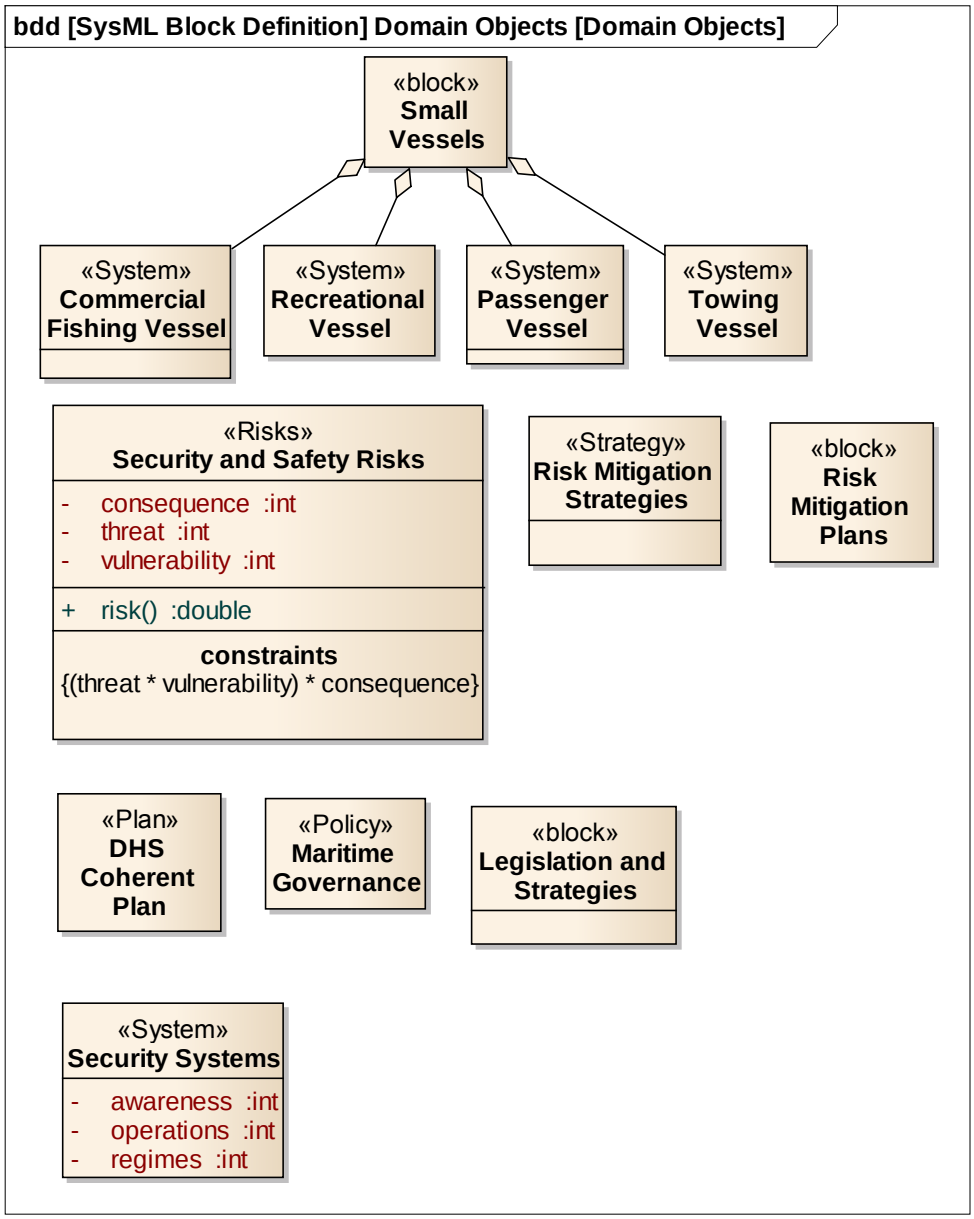
2.2.1. Created blocks for object identified in nodes – e.g. each vessel as identified by stakeholders

2.2.2. Generalized all vessels as small vessels

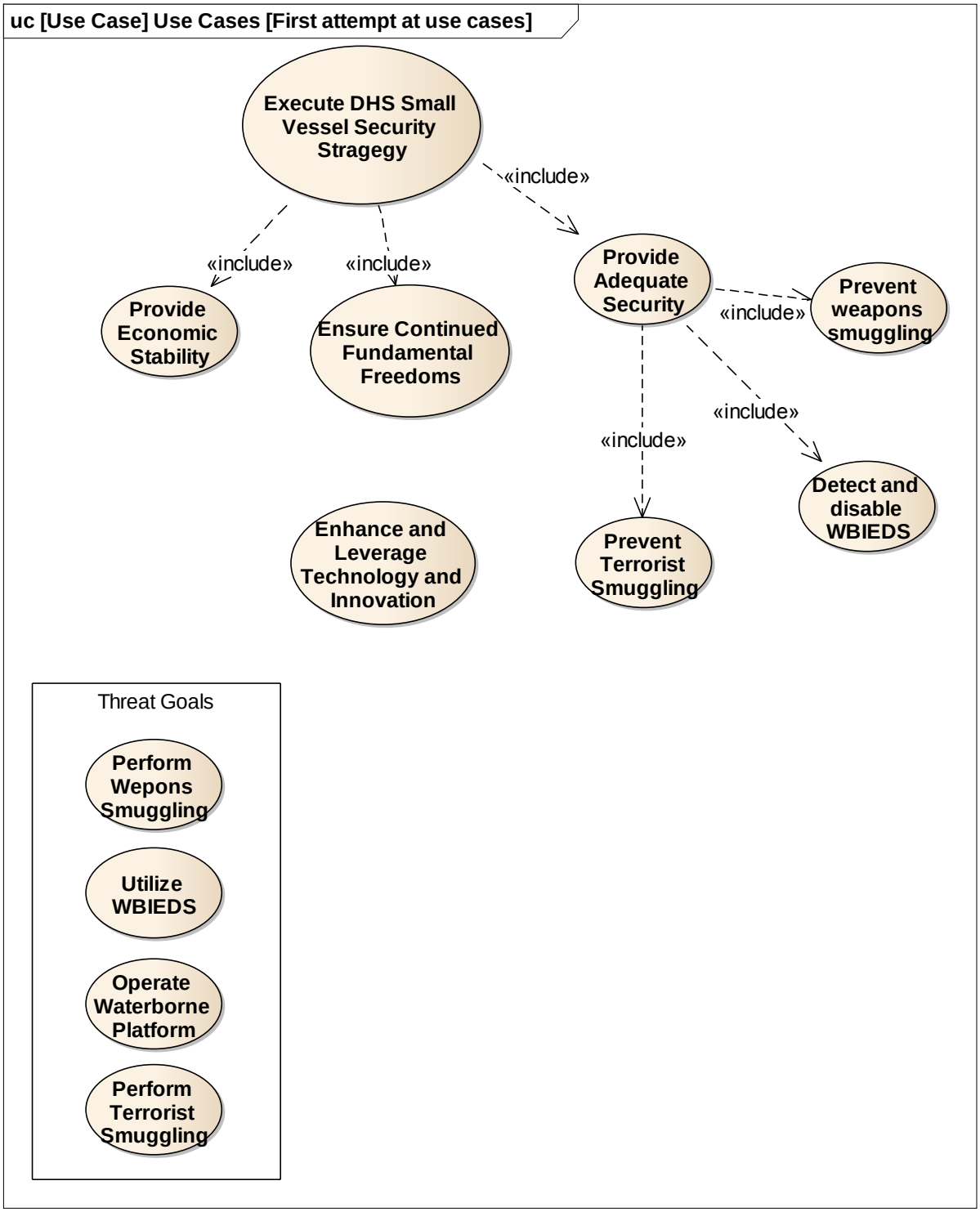
2.2.3. Looked for other "things"

2.2.3.1. Policies

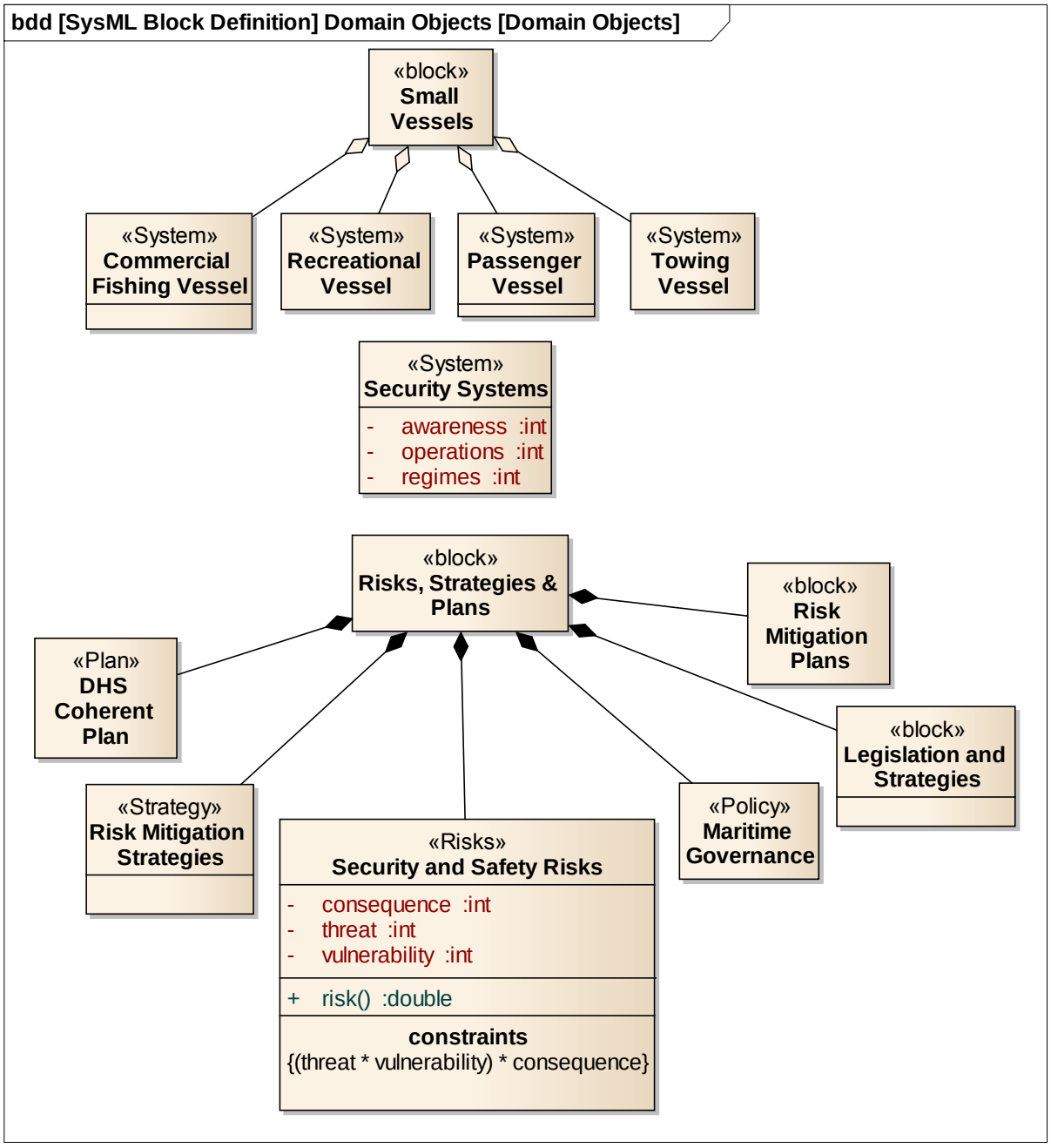
2.2.3.2. Systems



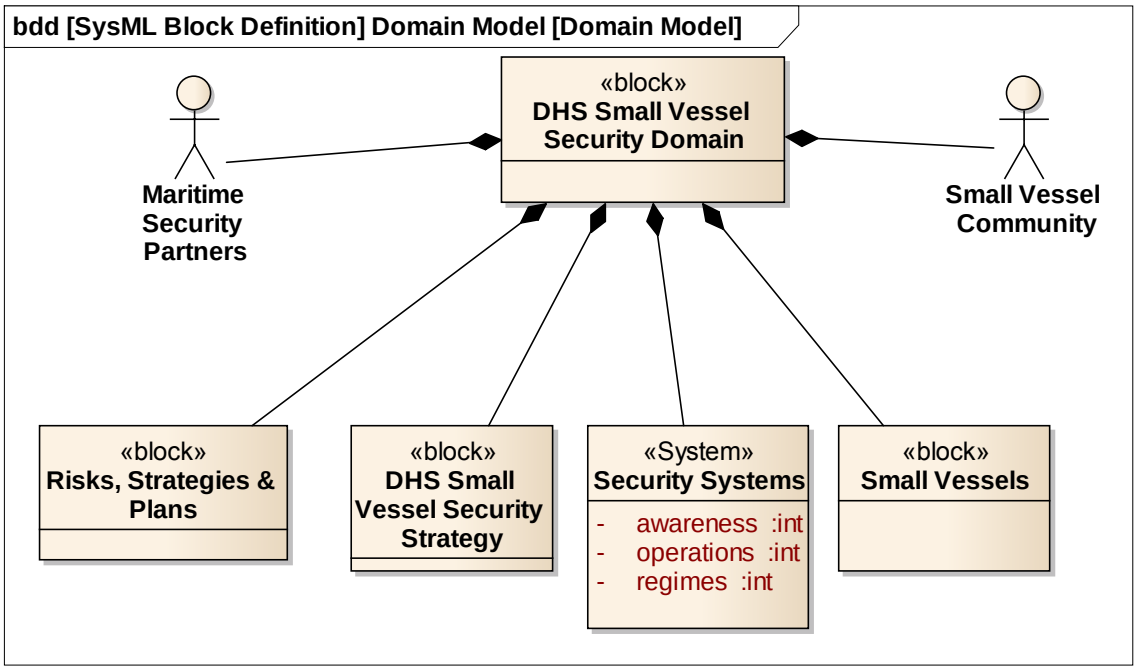
2.3. Created a use cases folder and diagram to capture use cases and scenarios



2.3.1.So I begin thinking about the domain. While creating the domain diagram, I refactor the domain objects diagram



2.3.2.I finish up my domain diagram for now



2.3.3.Now where to go? May consider other use cases, activity diagrams…

Brian. Now we need to talk… I want to walk you through what I did – though it is pretty self-evident. We need to discuss some of the entities, and what to do about the links… and some of the interrelationships… will you be on campus tomorrow?

Log:

Work began

Worked proposed and accepted by Systems Engineering Research Center as RT33

Briefed to NYCT in February 2012