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Towards a modular SD approach for modelling military workforce planning problems

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Context

- My story: training systems VS technical M&S skills
- Commencement of the PhD
- Research project status

Abstract

- use of M&S for decision making in the military w/f context
- our project
- 1st case study

Presentation Outline

Section 01: Introduction

- Background,
- SD Methodology – issues
- BB approach potential

Section 02: BBs and associated concepts and definitions

Section 03: Research methodology

Section 04: Project Phases

Section 05: Reflection and future research direction

Introduction

- Increased complexity of the decision making in the military w/f planning and management context
- Why SD?
- SD fundamental concepts

Introduction (continues)

Modelling issues and how BB approach could potentially address them

Modelling issues	Capabilities offered by a modular (BB) SD approach
The modelling process is **time consuming** as models are built from scratch	reusable and proven-to-work model building blocks or components to speed up the process, reduce the burden of model testing, and improves confidence in the model output
The modelling process starts with a **priori structure**. This limits experimentation to changing model parameters	Ability to assemble modelling building blocks to generate and run specific model instances.
Models are **difficult to understand** especially by non-technical managers	Ability to use domain-specific modelling components, that separate the end user from the inner model details
Models grow in **complexity** (i.e. both details and dynamic), which exert cognitive load on the modeller and end user	Ability to use function-centered components may reduce the risk of adding unnecessary elements since each building block should add something to the overall model representation

Introduction (continues)

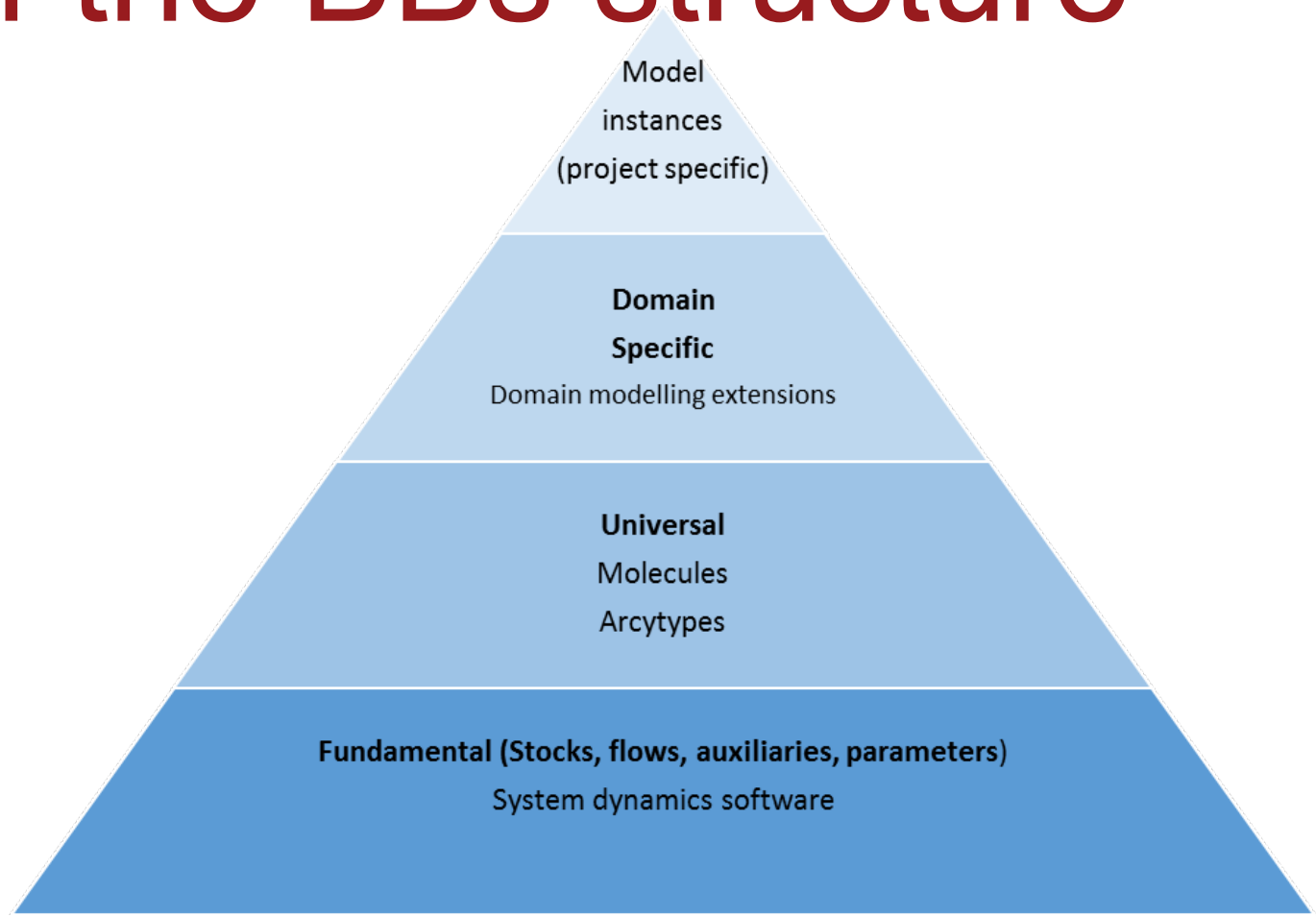
BB approach potential

- expedite the modelling process by providing reusable and tested ‘plug-in’ components;
- bridge the chasm between modelers and system engineers by providing high level domain objects; and
- improve learning by providing users with a flexibility to build and experiment with models, without being overwhelmed with the model’s technical details.

BBs and associated concepts

- Structure
- Design patterns
- Building blocks
- Software components

4 levels of the BBs structure



Research methodology

- phased approach
- multiple case studies

Project Phases:

1. Problem framing and scoping (previous publications by the authors)

Patterns in SD w/f planning models (Table 2) – derived from our Literature Review conducted to gain an insight into:

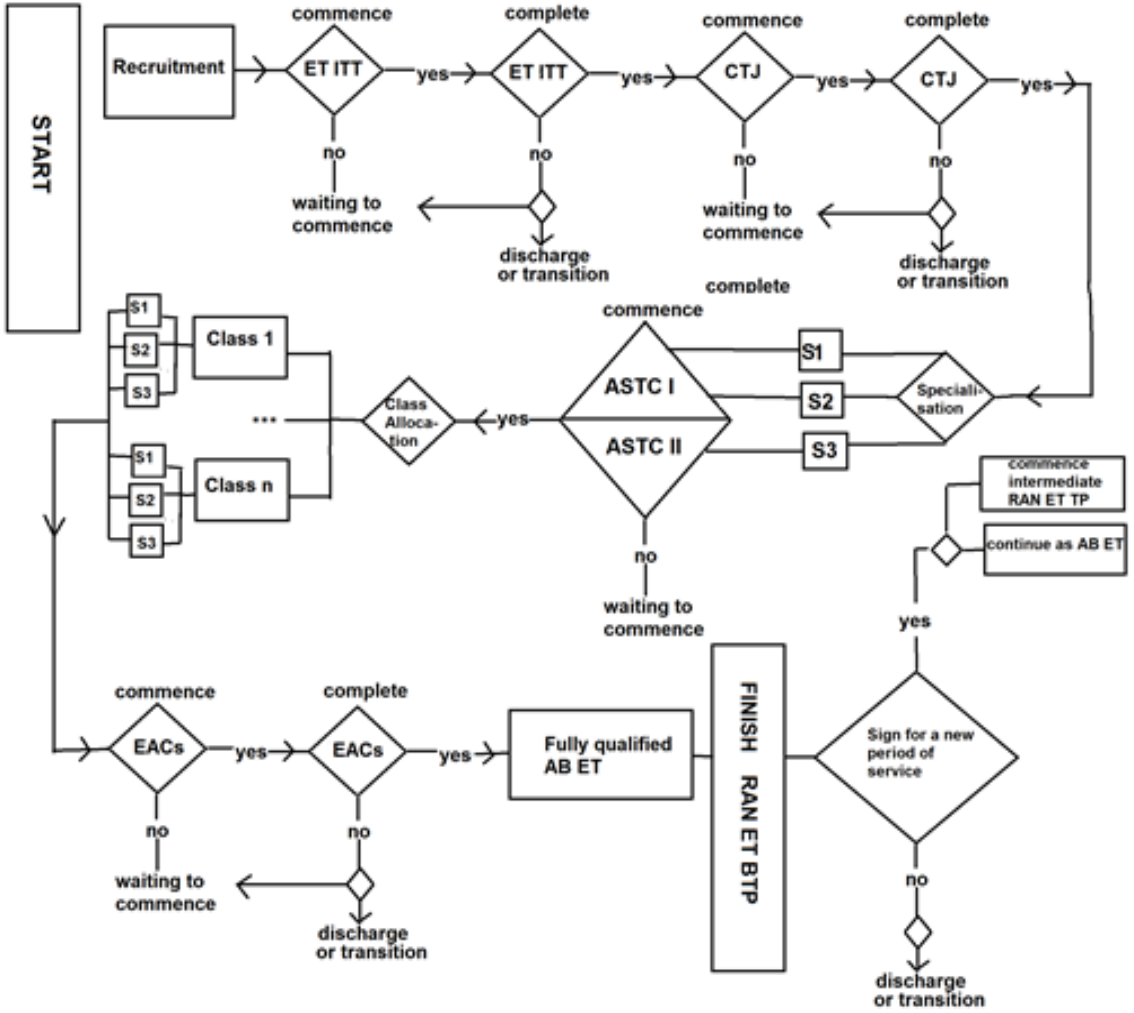
- the patterns' identification,
- types of problems,
- and questions of analysis relevant to the domain

(The model's physical and information constructs are designed to enable experiments' conduct for a particular model purpose)

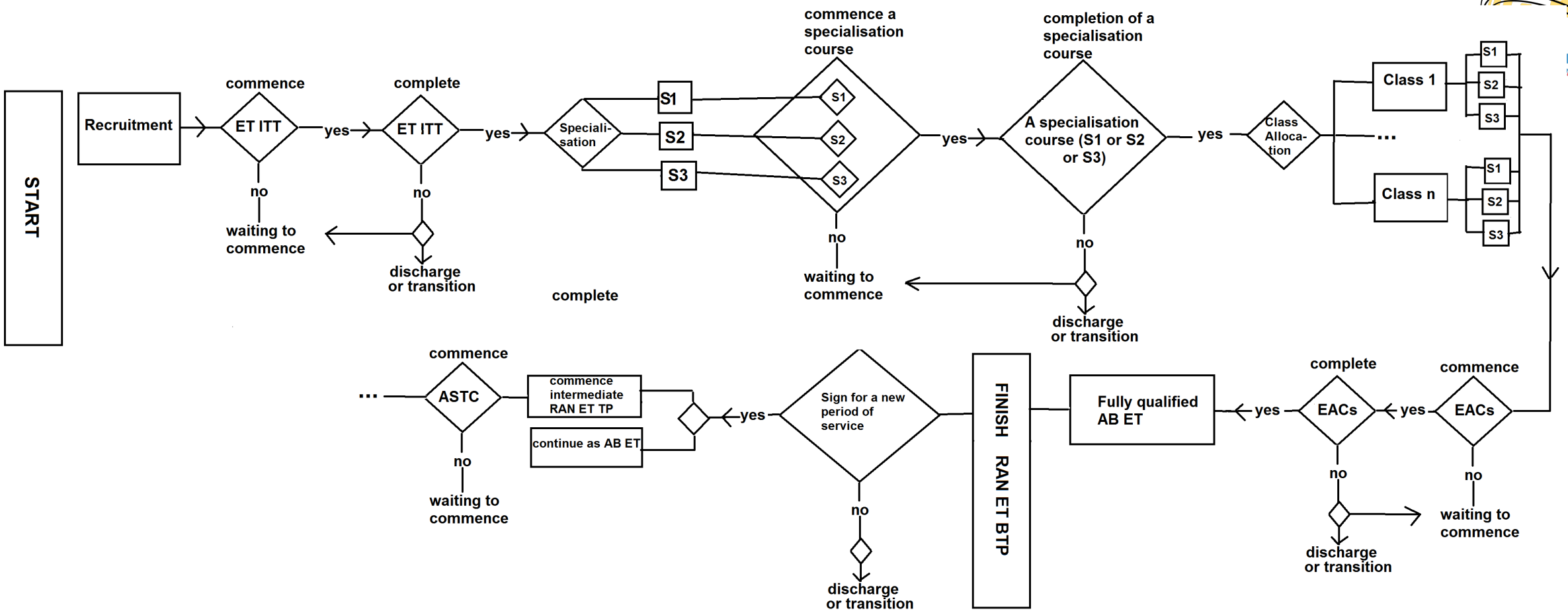
Project Phases

2. Model conceptualisation

- Business Process Model Notation (BPMN) based
- The three RAN ET BTP variations as identified by Jnitova (2016) are as follows: Pre-2015, Current (2015) and Post-2016



Pre-2015 ET BTP Pipeline Variation



Post-2016 ET BTP Pipeline Variation

Project phases

3. Model formulation

Step 1: Identify key variables and rates

Variables	Rates
a. Numbers of Recruits b. Instructor numbers/ hours c. Training components: types, number per year, duration, number of students per component; d. Position types (trainee/ junior ET Sailor positions); e. Policy inputs into RAN ET BTP step changes; f. Ranks, and g. Levels of confidence and satisfaction of the RAN ET BTP graduates	a. Failure rate b. Recruitment rate c. Separation rate d. Retention rate; and e. Waiting periods between the courses – pipeline delays rate.

Project phases

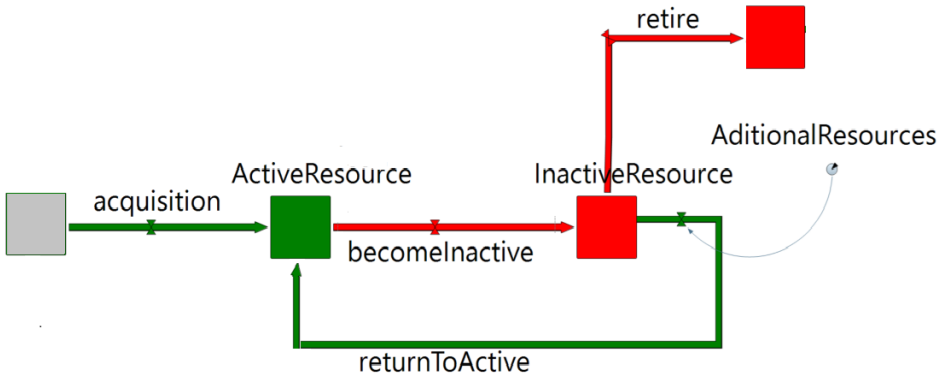
3. Model formulation (continues)

Step 2: Capturing and prioritising business rules

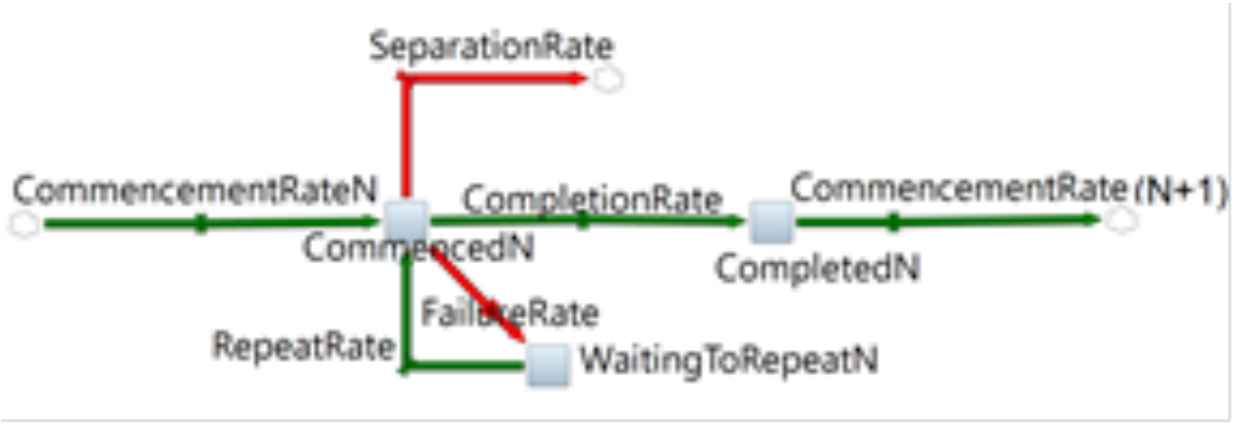
Step 3: Draw an SD conceptual model

Proposed preliminary BB set

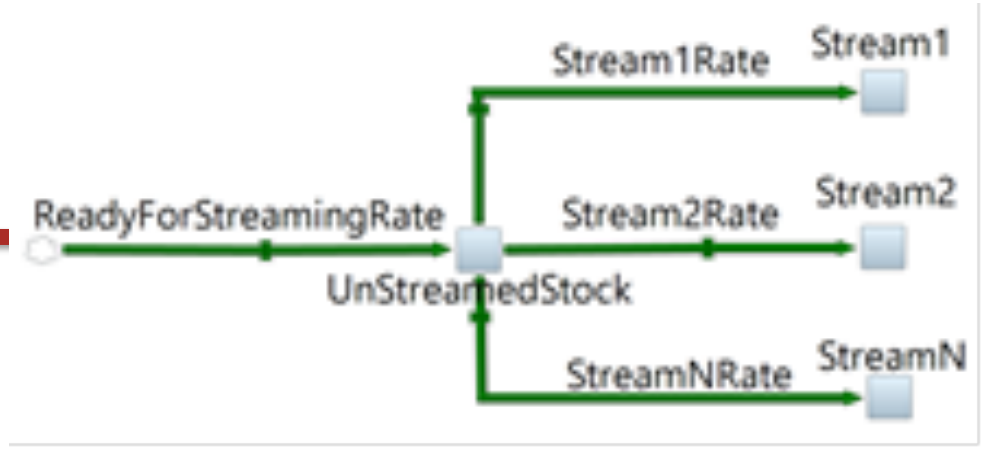
Resource BB



Training Component BB



Streaming BB



BB Purpose/ Input/ Output

BB	Purpose	Input	Output
Resource Availability	to simulate resource (instructors, facilities, equipment) availability in response to changes in the acquisition, retirement, maintenance and failure processes	acquisition rates, retirement rates, failure rates and maintenance rates	resource availability/ unavailability
Training	to simulate training duration and successful completion rate in response to course actual duration, delays, sequencing and failure process	course duration, trainee numbers, failure rates, separation rates, sequencing and delays	Course/training pipeline duration per student, and a number of successful students
Streaming	to simulate the pipeline split into the parallel streams	number of students ready to be streamed, streaming rates	pipeline's parallel streams containing a desired/ not desired number of trainees

Reflection and future research directions

???Questions???

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