Deputy Assistant Secretary Debriefing for Equipment Repair/Upgrade Simulation Meeting Mission Requirements

10/24/2015

Since Equipment Repair/Upgrade Simulations like the one described in this report were designed for the purpose of training novice dispatchers, they must be given an opportunity to review their contracting strategies for schedule events after simulations so they can be debriefed by the Deputy on what might have gone wrong & where/how there is room for subsequent improvement to be built upon for the next mission requirement scenario. After the simulation, each novice dispatcher should review and itemise their contracting history, and also the contracting chart characterising his or her contracting strategy.

Although this particular Equipment Repair/Upgrade simulation appears to be trivial, establishing successful contracts & realising return on capital is a non-trivial task. Good contracting practise meeting mission requirements involves accurate reading of the equipment condition required to meet mission requirements, careful strategy execution & ability to adapt to unexpected changes in mission requirements. As established in previous reports, a controlled experiment can indeed help us to isolate important factors involved in contracting and identify solid dispatch patterns to employ for realisation of winning strategies.

Contracting Charts for dispatchers are composed of three important time series: 1) Expected contract price quotes to be generated by schedule design; 2) Observed contract price quotes; 3) Position balances of contract quotes.

In some equipment repair/upgrade simulations, many connections are obvious; e.g., the contracting chart for one of the best-performing novice dispatchers apparently follows the trend hinted at by both the schedule event disclosure & price of meeting mission requirements. In some other cases, completely wrong interpretations of schedule events could happen, and in the extreme case, some novice dispatchers might even choose enter into contract positions arbitrarily, disregarding important mission requirements trends.

While experienced dispatchers constitute the fundamental part of meeting mission requirements in this equipment repair/upgrade simulation, most “Operational Noise”, on the other hand, is generated by the speculation of novice dispatchers. In this simulation, we start by constructing a ‘classic novice strategy’ to establish goals of novice dispatchers in meeting mission requirements & proceed from that starting point. However, to prevent novice dispatchers from destroying important trends generated by both suppliers & end-users in mobile operations we will limit price range parameters, controlling how aggressive experienced dispatchers should be in combating “Operational Noise.”

In most of our equipment repair/upgrade simulations, we will simply set contract status increment parameters & after the price is randomly decided, novice dispatchers will choose to

take extreme contract positions with equal probability.

Since novice dispatchers may be constrained by a given position status limit, our initial equipment repair/upgrade simulations will randomly decide how much remaining position status it would devote to the new contract. As speculators, novice dispatchers are required to exit all positions at the expiration of schedule events with automatic programming put in place to gradually exit position status determination when event ‘contract status return on capital’ schedule expiration draws near.

The multi-agent model we present is relatively general and can be used in a wide variety of mission requirement scenarios. As long as dispatchers can generate a list of schedule events that follow equipment repair/upgrade specifications, the Multi-agent model could then generate the desired mission requirements.

The challenge for dispatchers is clear: How do we know whether the generated contracting strategies are what should be expected from the designed mission requirements scenario? This is not a straightforward task since the scenario we plan to execute might not have real-world counterpart in mobile operations. Without benchmarking contract status, establishing credibility of equipment repair/upgrade simulations would not be easy. Of course, if the generated contracting strategies are lined up with mission requirements scenarios & carefully reviewed by dispatchers, we probably could create valid assessments qualitatively.

However, this technique would not be feasible if we plan for large-scale and frequent mission requirements determination overtaking supplier capacity. Therefore, we require a method that is both quantitative & automated. As a solution to the problem, dispatchers have deployed procedures for determining utility of event schedules:

1) Define the schedule event of interest and identify schedule event time series windows. In the case of simple mission requirements, the schedule event of interest & its occurrence is straightforward to define.

2) Measure ‘contract status return on capital’ over the schedule event window. Standard Contract status return on capital could be obtained by simply assuming constant mean return models. In the mission requirements setting, it refers to the mean price of equipment contracts from the beginning of the requirements determination horizon to just before the beginning of the schedule event window.

3) Define a null hypothesis and perform quantitative tests over multiple sample instances. For all events, the null hypothesis can be defined as ‘contract status return on capital’ = 0. As for the alternative hypothesis, it can be defined as ‘contract status return on capital’ > 0 for positive events, ‘contract status return on capital’ < 0 for negative events, & ‘contract status return on capital’ for neutral events-- or no event.

To validate that our multi-agent model indeed creates contracts designed to meet mission requirements in response to recent schedule events, dispatchers created a special mission

requirements scenario with only one schedule event. For establishing successful contracts, we include defined levels of suppliers, end-users for mobile operations & no novice dispatcher to avoid introducing unnecessary noise into processes. To collect enough sample points, the same scenario is executed multiple times in sequential series.

Following the above procedures, we test the null hypothesis with several ‘contract status return on capital’ series. For both positive & negative cases, tests employed by dispatchers imply that strong negative ‘contract status return on capital’ are significant. For no-schedule event cases, our tests indicate that no ‘contract status return on capital’ is detected in the schedule event window.

Compared to the case of validating schedule event occurrence, validating the strength of schedule events is much more difficult. This is because the absolute level of response that should be triggered by schedule events cannot be determined in straightforward manner. Therefore, instead of trying to validate the absolute response strength, we choose to validate the relative response strengths. The objective of this is to ensure that higher impact levels indeed generate larger mission requirement responses when compared to events with lower levels.

To establish this, dispatchers simply performed comparisons between adjacent schedule event strength levels. With this validation, we are at least assured of the consistency in mission requirement responses throughout repair/upgrade simulations.

In this memo, we have presented the efforts of a brigade of dispatchers towards building an agent-based equipment repair/upgrade simulations based on novel models of contracting strategies. Mission Requirement scenarios will progress in subsequent reports though higher-level descriptions of user-defined schedule events.

Our primary goal in creating disparate schedule events is not to create new contract pricing models. Instead, we have focused on how to construct a highly realistic equipment repair/upgrade simulator to better define dispatcher behaviour in issuing contracts. The results of describing underpinnings of operational factors will be used to improve mission requirement scenario instincts of novice dispatchers.

Ultimately, our platform model for equipment repair/upgrade simulation might one day be used in benchmarking real interest of defence bosses in embracing important contracting standards as they begin to make mission requirements decisions on how to build solid event schedules with suppliers, on secure platforms designed to utilise new ability for us to monitor dispatcher activity.