

Automated generation of information injects

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Abstract — Information Injects can provide a valuable depth to exercises but can be time-consuming to create and can struggle to reflect the events of a dynamic operation. In two projects – Automated Social Media Synthetic Wrap (ASMSW) and AI for Information Injects (AI4II) - Daden have developed software to provide automated generation of such injects, the first for a turn-based wargame, and the second for a real-time 3D virtual simulation. Automating the inject generation process can allow existing staff to focus on the more nuanced messaging, and have their message hidden within a realistic amount of “noise”, allow exercises with minimal staff support to incorporate a social media synthetic wrap, and enable G2/G9 and influence staff to be better exercised and to give all participants a heightened awareness of the humanitarian and ethical consequences of their actions.

1 Introduction

Many exercises use information injects in order to let players know what is happening within the scenario environment, and to provide information on which they need to act, plan, or take account of in their activities.

However, these injects take time and effort to produce and can be hard to adapt if player actions start to diverge from the script – even more so when the players are using a real-time virtual simulation systems. The effort required also tends to mean that the injects are focussed on the “golden thread” of the scenario, with little time to produce the “noise” which would so often accompany any real-life information environment. As a result, G2/G9/Influence cells are often not exercised as well as they could be, particularly in the areas of Open Source Information (OSINF).

Our work has been aimed at answering the question as to whether it is possible to generate the same or similar OSINF content required by an exercise but without high levels, or even any, human intervention?

2 A Semi-Automated Approach

As part of the UK’s Land Warfare Centre’s Ex Urban Lion series of command post wargames in 2020/2021 Daden were asked to develop a system to generate social media injects in order to give staffs a better appreciation for the unfolding situation within the urban fight.

Automated Social Media Synthetic Wrap (ASMSW) is a turn based system. Each turn the operator enters 4 parameters to describe the levels of fighting activity of Blue and Red (e.g. from patrolling to artillery bombardment) and their attitude (from friendly to aggressive) and 10 parameters to reflect the levels of physical damage and civilian deaths and the state of vital utilities (energy, water, etc) and services (food, hospitals, etc).

An agent-based model is used to represent key members/archetypes of the civilian population with initial

values for the sentiment and mood which are then automatically adjusted each turn.

The core of the message generation system is a template and synonym approach. A library of ~800 message templates is indexed by the environment parameters and a gent sentiment/mood. Each template makes heavy use of synonym (e.g. ~afv = tank or APC or armoured vehicle) and variable tags (e.g. % location%) which are populated as messages are generated. This enabled the 800 templates to potentially generate over 3 million different messages. The main ASMSW Turn Screen is shown in Figure 1.

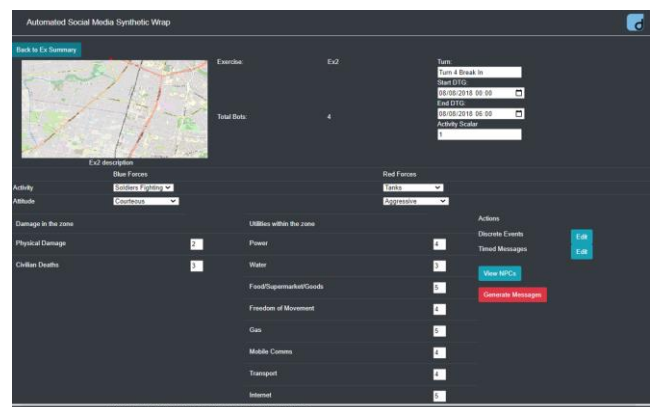


Fig 1. ASMSW Turn Screen.

ASMSW takes a 3 layered approach to inject generation:

- A base-layer of fully automated messages reflecting the turn parameters and a gent states
- A mid-layer of sets of message templates ready to be cued at particular times for more specific exercise events (e.g. rocket bombardment);
- A top-layer of custom one-off ad-hoc messages from specific agents, but which just appear amongst all the other messages being generated.

The ASMSW system has been used at almost a dozen exercises at Brigade and Battalion level during 2020/21 as part of Ex Urban Lion. Staff were surveyed after each exercise to get qualitative feedback as to the usefulness of

the system and its product. Comments included “provided a presence/reminder of the [civilian] population.”, “adds a real sense of realism / depth / immersion that can be hard to get, especially on short exercises.”, “gives a wider sense of ‘live’ activity to back up OSINF summary and target RFIs.” and “really good, real-time effect”.

3 A Fully Automated Approach

As part of UK’s Defence Science and Technology Laboratory’s (Dstl) Serapis Mastering Architectures and Artificial Intelligence for Training and Education Efficiency (MAAITEE) programme Daden were awarded a contract in June 2021 to develop a proof-of-concept of a system to fully automate the generation of information injects from a real-time tactical simulation system – Artificial Intelligence for Information Injects (AI4II). Daden led the 6-month project and system design, with software development undertaken by Vindico Limited. The system was required to generate military intelligence reports, social media posts and news media posts.

We used the Defence Virtual Simulation (DVS) system as the target, but it was loosely coupled, and all intelligence was kept within the AI4II system. As a result, AI4II could readily be used with other simulation engines.

AI4II uses a small script embedded in each DVS sensor/trigger to detect activity. Social media and military units have a 1:1 mapping of sensor to agent, whereas a news agent may take feeds from a number of sensors. As with ASMSW each agent has a chattiness and retweet value and messages are generated from templates, synonyms and variables. ASMSW can also generate secondary messages based on aggregate activity within an area, and allows the operator to combine multiple messages into a single news story.

A key aim was to try and make messages as life-like as possible, so each agent has a “recognition skill” which is used to turn detected entity ID into a name of decreasing accuracy, e.g. from “BMP1” to “BMP”, to “APC” to “tank” and/or to confuse one vehicle type (e.g. a T80) with another (e.g. a T90). Combined with the retweeting this can create a suitably confusing picture for any analyst.

A key requirement of the project was to produce imagery for the messages. We would have liked to use an “in-game” camera under scripted control to capture this live, but this feature is not currently available in DVS. The end solution was to maintain in AI4II a library of entity and environment images and then merge them as required. Whilst not ideal this was sufficient for the proof-of-concept and also ensured that AI4II imagery matched the imagery seen by other DVS users. The combined message display screen is shown in Figure 2. A typical 5-10 min simulation generated 50+ messages across all streams.

Since this is only an initial proof-of-concept task there has been no formal evaluation yet, but it is hoped that we’ll get the chance to deploy AI4II alongside a DVS exercise in due course in order to get user feedback – although the current deliverable has been well received by the sponsor.

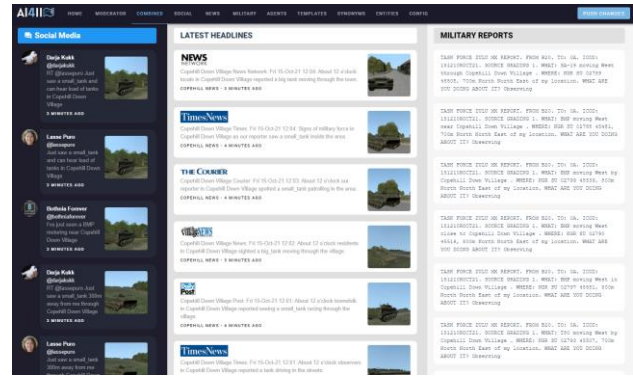


Fig. 2. AI4II Message Display Screen

4 Lessons Learned, Future Work

Problems were experienced around limitations in DVS, in particular the way that sensors are “blocked” by each entity triggering them, and trying to get a sensor to follow a moving agent. There are a number of ways in which we would like to enhance the AI4II system, including:

- Supporting mobile sensors;
- A better approach to image generation;
- Detecting changing entity states, e.g.: stop/start, firing;
- Detecting closest approach before messaging;
- Detecting (and doing detection from) UAVs.

Since ASMSW and AI4II share the same technical approach we would ideally look to combine both systems. This would add a further “live” layer to ASMSW’s existing 3-layer model, and enable AI4II to take advantage of ASMSW’s sentiment tracking and agent based model.

5 Conclusions

We believe that ASMSW and AI4II show how the generation of information injects can be partially or fully automated. Such approaches can reduce the time taken to author injects for simulation-led exercises – or enable staff to focus their time on more “golden-thread” type injects and better hide those within the automated injects. The automation of information injects without the need for additional or specialist staff could also increase the use of synthetic information wraps within unit, sub-unit and even Fight Club style exercises. It should also increase an awareness of the human, social and ethical consequences of actions, and the sense of media oversight, as well as better exercising G2, G9 and influence staff on simulation and wargame-led exercises.

Author Biography

David Burden is a former Royal Signals officer with experience in CEMA, COIN and airmobile operations. David founded Daden Limited in 2004 and has delivered over a dozen research projects for MOD within the fields of artificial intelligence and simulation. In 2019 co-authored the book *Virtual Humans: Today and Tomorrow*. David is currently studying for a PhD in wargaming urban conflict.