Annex B – RELATIONSHIP BETWEEN C-BML AND MIP

In this section, the relationship between C-BML and the MIP is discussed. First, an overview of the MIP is (Section B.1), followed by a summary of the key MIP-specific capabilities (Section B.2). Then an overview of C-BML is provided (Section B.3) as well as key C-BML capabilities (Section B.4). On that basis, the similarities (Section B.5) and differences (Section B.6) between the C-BML and MIP approaches are considered. A conclusion of this comparison is given in Section B.7.

B.1 THE MULTI-LATERAL INTEROPERABILITY PROGRAMME (MIP)

The Multi-lateral Interoperability Programme (MIP) is intended to define an interoperability protocol for Command and Control (C2) systems between a large number of Nations, comprised mostly of NATO countries. The most important product to come from MIP is the Joint Consultation Command and Control Information Exchange Data Model (JC3IEDM).

The JC3IEDM has been adopted by NATO as STANAG 5525 and most NATO member countries are dedicating considerable resources to ensure that their C2 systems are compatible with the JC3IEDM. The JC3IEDM has its roots in ground-based C2 requirements and has gradually expanded it into other Joint functional areas. The MIP has also produced the Data Exchange Mechanism (DEM) which is an automatic data-push mechanism.

B.2 MIP-SPECIFIC CAPABILITIES

Compatibility with a Broad Spectrum of C2 Systems – The driving force for MIP is the ability to interface C2 systems from different Nations. Some of the C2 systems may have specific mandatory requirements that in turn become a mandatory requirement for MIP. These requirements may include the need for accurate timing, for example.

Need for Complete Expressions – C2 systems often offer the ability to convey information in plain language (e.g. Commander's intent, assessment, etc.) and this information has significant value in terms of interpretation and decision-making. The MIP protocol must not impede the ability to amplify information in a language intended to be interpreted by humans. The JC3IEDM Plan-Order structure is such an example effectively reproducing the five-paragraph OPORD, however the human-readable portion is likely difficult or nearly impossible to accurately interpret by a computer-based system.

Field Usability – C2 systems are designed to operate in the harshest environments and under conditions that are not always favourable for good communications. The MIP protocol may also be limited in bandwidth by field grade communication systems. The MIP protocol has the additional requirement that it must remain usable even when subject to such unreliable and unfavourable conditions.

B.3 COALITION BATTLE MANAGEMENT LANGUAGE (C-BML)

C-BML has its source in the modelling and simulation domain and although the concept is far from new, the term BML has only been in existence for about nine years. In the context of joint, combined and coalition operations, C-BML is being developed to define standardized representations, consistent with C2 and simulation system requirements and based on an operations-centric common reference model (e.g. JC3IEDM). It defines a digitized form of C2 information such as orders, plans, reports, and requests such that they can

easily be represented to military personnel through C2IS and simulation interfaces and processed by simulated or robotic forces.

B.4 C-BML-SPECIFIC CAPABILITIES

Compatibility to Simulation Systems – A driving force for C-BML has been the need to provide a seamless interface between simulation systems and C2 systems. As such, the compatibility to both C2 and simulation systems is crucial. C-BML expressions must be made in a language that can express all relevant actions performed by both C2 and constructive simulations. These expressions have a one to one relationship with simulated behaviour and new behaviour may be developed, as required.

Ability to Work Faster than Real Time – In the case of course of action analysis it is usually preferable to run the simulation at rates that exceed real-time. The C-BML language infrastructure must not only support high data rates, it must also be designed such that the language is effectively independent from the real-time. This may not be desirable in real-time C2 to C2 interfaces.

Unambiguous Expressions – The use of unambiguous expressions is a mandatory criterion for C-BML when interfacing a C2 system with a simulation. In the case of the simulation, the messages are being interpreted by a computer that is not capable of comprehension of free text information.

Semantic Interoperability – Exchanging computer-parseable, unambiguous expressions is a pre-requisite for *semantic interoperability* or the ability of a C-BML-consumer to properly interpret the C-BML expressions in the way it was intended to be interpreted when constructed and sent by the C-BML-producer. Ensuring correct interpretation and exchange of *meaning* requires a shared knowledge often represented in the form of ontology. The SISO C-BML Product Development Group has defined the development of C-BML ontology as part of their product development plan.

B.5 SIMILARITIES BETWEEN MIP AND C-BML

Both MIP and C-BML share common characteristics as follows:

Scope and Compatibility – Both MIP and BML are intended to provide a means to ensure C2 information compatibility between systems.

Doctrinal Relevance – Both C-BML and MIP support the current military doctrine.

Need for Acceptance – Just as for any standards, MIP and C-BML need wide spread acceptance in order to have any value.

B.6 DISTINCTION BETWEEN MIP AND C-BML

Scope – MIP is intended to provide interoperability among C2 systems of different Nations. C-BML is intended to provide focused Joint C2 (Plans, Orders, Reports, and Requests) interoperability among C2 systems and simulated forces, as well as automated/robotic systems. From a linguistic point of view, the information exchange in the MIP is assertive (descriptive) whereas in C-BML only the report exchange is assertive, but order (and request) exchange in BML is directive (i.e. intended to initiate an action).

Structure – MIP is focused on JC3IEDM to JC3IEDM interoperability. C-BML could use any Data Model that contains the required information and could provide for interoperability between data models. C-BML is

layered on top of a data model (e.g. JC3IEDM) as an application that provides the structure and content of the language.

Unambiguity – There must be no ambiguity in information exchange related to the exchange of BML expressions. MIP allows for exchanges containing free text that could include ambiguous statements.

Communications – Currently, MIP uses the DEM for communications to transport JC3IEDM information between systems. Most current C-BML implementations use a standard form of a Web Service. However, neither the JC3IEDM nor the C-BML applications are forced to use any particular information exchange mechanism.

B.7 CONCLUSION

It is clear that both MIP and C-BML both are required. It is evident that there must be synergy and close collaboration between the two programs that will lead to a coherent set of standards. Ongoing efforts have identified this need for collaboration and plans are in place to ensure that there is bilateral representation both at MIP and in MSG-085 to enable this integration/convergence.