

# STANREC 4800 - AMSP-04 NATO Education and Training Network Federation Agreement and FOM Design

## Evolution of NATO Standards for Federated Simulation

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MSG-163

## Agenda

- **Background and Context**
- **AMSP-04 Ed A (Current version)**
- **Ongoing, Future Work and Expectations on AMSP-04 Ed B**
- **How to find more info and how to get involved**

# Background

STANAG 4603 Ed 1  
HLA IEEE 1516-2000

NATO M&S Master Plan 2.0 (NMSMP)

STANAG 4603 Ed 2  
HLA IEEE 1516-2010 "HLA Evolved"  
NATO HLA Certification

2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018

CeAG

MSG-ET-35

MSG-068

MSG-106

MSG-134

MSG-163

NETN FAFD v1.0

- AMSP-04 NETN FAFD - Draft

- STANREC 4800
- AMSP-04 NETN FAFD
- HLA Certification IOC

## NATO M&S Master Plan (NMSMP)

- **The most recent updated version (2.0) of the NMSMP was formally endorsed by the NATO Science and Technology Board in Sep 2012.**
  - NMSMP Version 1.0 was approved by the North Atlantic Council (NAC) and signed in 1998 by the NATO Secretary General.
- **STRATEGIC PLAN (objectives)**
  - Establish Common Technical Framework
  - Provide Coordination & Common Services
  - Develop Models & Simulations
  - Employ Simulations
  - Incorporate Technological Advances
- **IMPLEMENTATION PLAN**
  - Identifies Master Plan Objective and Sub-objective tasks and stakeholders
  - E.g. Development of STANAG 4603 and NETN FAFD

## STANAG 4603 Ed 2

- Participating nations agree that, when procuring or developing applicable new modeling and simulation systems, they will, based on their national requirements, ensure that the systems are compliant with the latest IEEE 1516 HLA series of standards.
- Participating nations agree to utilize the HLA Compliance Certification Process established by the NATO Modeling and Simulation Group (NMSG).
- Ratified by 19 of 28 nations; 1 not participating, 8 no response
- Promulgated 2015
- STANAG 4603 => Cancel STANAG 4482 DIS

## A Brief History of AMSP-04

- **MSG-068 NATO Education and Training Network (2007-2011)**
  - Defined the concept of a Federation Architecture and FOM Design specification
  - Focus on support to CAX based on national and NATO programs
  - JMRM (NATO JWC), KOSI (DEU), ALLIANCE (FRA), P2SN (SWE)
  - Delivered NETN FAFD v1.0 used in e.g. Viking 11 CAX
- **MSG-106 Enhanced Computer Assisted Exercise (CAX) Architecture, Design and Methodology (2011-2015)**
  - Introduced Modular FOMs and contributed to the SISO RPR-FOM v2.0 Modularization
  - Added MRM, TMR, CBRN, SIMC2 and Advanced Logistics FOM Modules
  - Delivered NETN FAFD v2.0 used in e.g. Viking 14 CAX
- **MSG-134 NATO Distributed Simulation Architecture & Design, Compliance Testing and Certification (2014-2017)**
  - NETN FAFD maintenance and support
  - Support to MS3 for AMSP-04 publication
  - Delivered STANREC 4800 AMSP-04 Ed A NETN FAFD used in e.g. Viking 18 CAX

## Names and Abbreviations

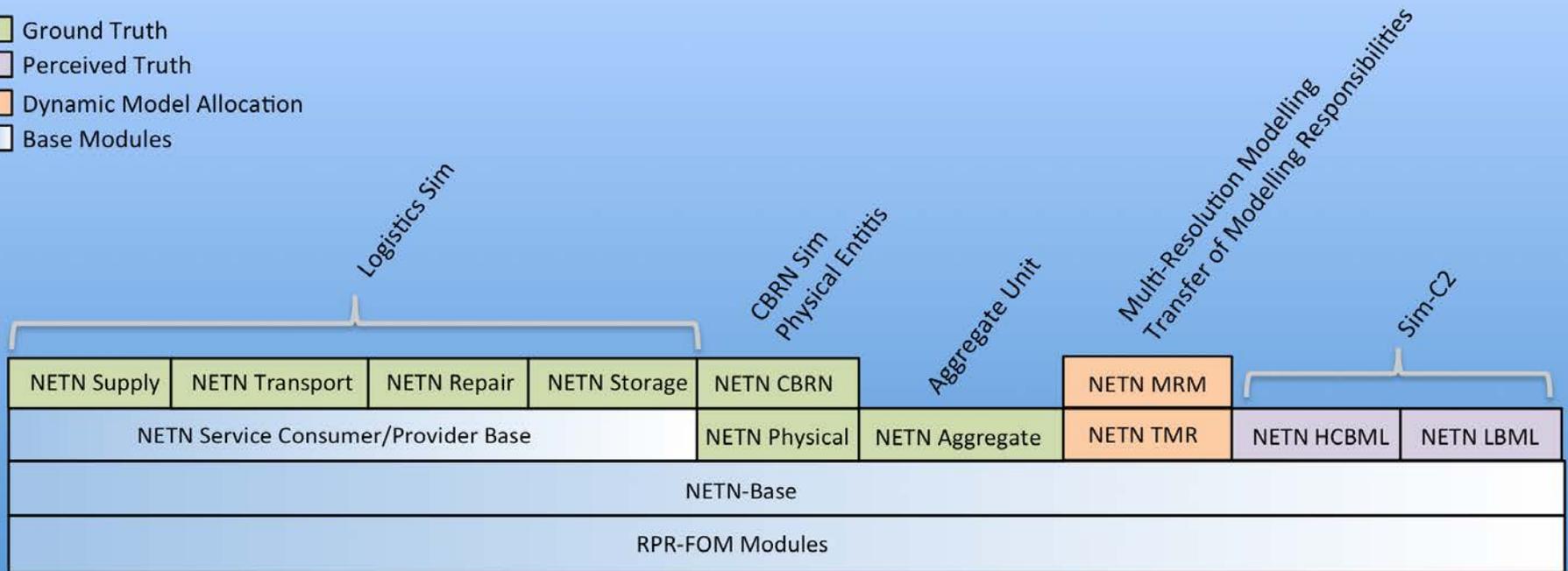
- **STANREC 4800**
  - Is a NATO Standard recommendation to use AMSP-04 NATO Education and Training Federation Architecture and FOM Design
- **AMSP-04 Ed A**
  - Is an Allied Modelling and Simulation Publication (AMSP)
  - Full name is AMSP-04 Ed A NATO Education and Training Network Federation Architecture and FOM Design
  - Is a reference document for Federation Agreements to support NATO Federated System design based on STANAG 4603
- **NETN FAFD**
  - Short Abbreviation of NATO Education and Training Network Federation Architecture and FOM Design
  - A reference to AMSP-04
- **NETN FOM**
  - Is part of NETN FAFD and specifies a set of STANAG 4603 (HLA) FOM Modules
  - Extends and complements SISO RPR-FOM v2.0

## So What is NETN FAFD?

- **AMSP-04 Ed A NATO Education and Training Network Federation Architecture and FOM Design (NETN FAFD)**
- **NETN FAFD is a Reference Federation Agreement Document**
- **NETN FAFD includes a modular Federation Object Model (FOM)**
- **NETN FAFD FOM Modules extends and complements RPR-FOM v2.0**
- **NETN FAFD was initially developed by MSG-068 and MSG-106**
- **NETN FAFD custodian is NMSG MS3 (M&S Standards Subgroup)**
- **NETN FAFD was maintained by MSG-134**
- **NETN FAFD was published by NSO in March 2018 as AMSP-04**
- **NETN FAFD is covered by STANREC 4800**
- **NETN FAFD is currently maintained and further developed by MSG-163**
- **NETN FAFD is supported by several COTS simulation systems**
- **NETN FAFD has been used in major CAX, e.g. Viking 11, 14 & 18**

# Current Modular NETN FOM

- Ground Truth
- Perceived Truth
- Dynamic Model Allocation
- Base Modules

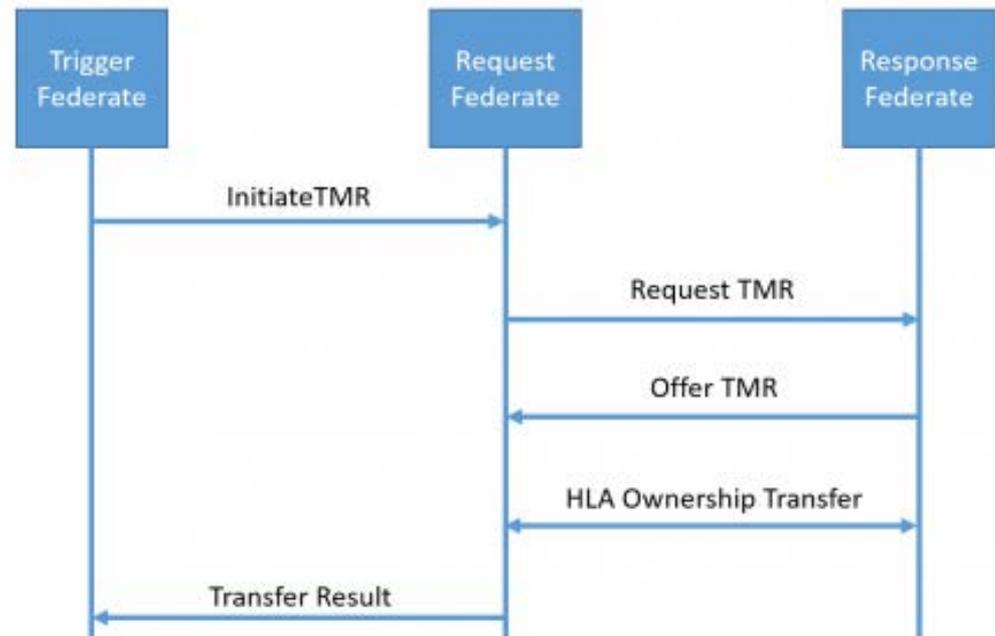


## Current Modules of NETN FAFD

- **Military Scenario Definition Language (MSDL) with extensions for representation of ORBAT, unit relations, holdings and initial modelling responsibilities**
- **RPR-FOM extensions for Physical Entities and Aggregate Units including MSDL based Unique Identifiers**
- **Module for representation of CBRN simulated events and attributes**
- **Module for Unit Tasking and Reporting in distributed simulation (Low-Level BML)**
- **Module for Simulation-C2 interaction support based on C-BML**
- **Module for Negotiated Transfer of Modelling Responsibilities (TMR) between different federated systems**
- **Module for Managing Aggregation and Disaggregation interplay between federated systems**
- **Logistics Module replacing RPR logistics with negotiated (Re)Supply, Transport, Repair, Storage**

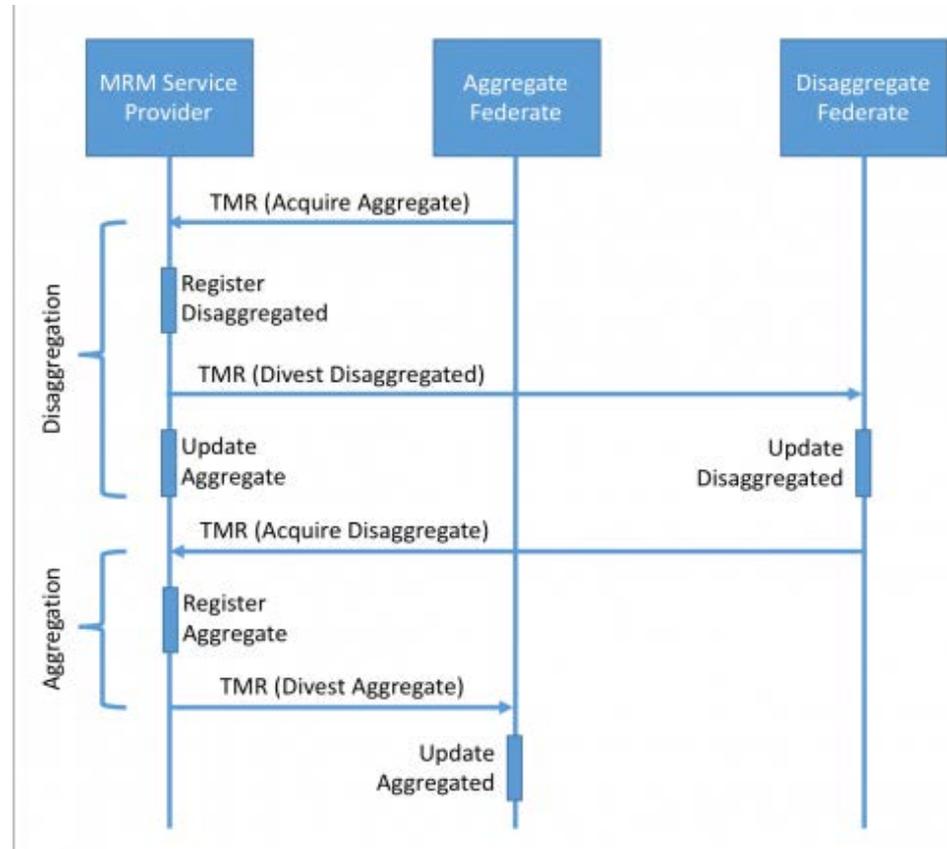
## Transfer of Modelling Responsibilities (TMR)

- Dynamically select the most appropriate federate to model certain aspects of a simulated entity
- For example:
  - change from Live or Recorded entities to Constructive or Virtual simulations.
  - Dynamic load balancing,
  - fault handling and hand-over,
  - delegating modelling of e.g. damage assessment and movement, etc.



## Multi-Resolution Modelling (MRM)

- Provides a way to manage aggregation and disaggregation of simulated units and physical entities.
- MRM also use TMR for transferring modelling responsibilities between federates that simulate the entity at different levels of resolution.



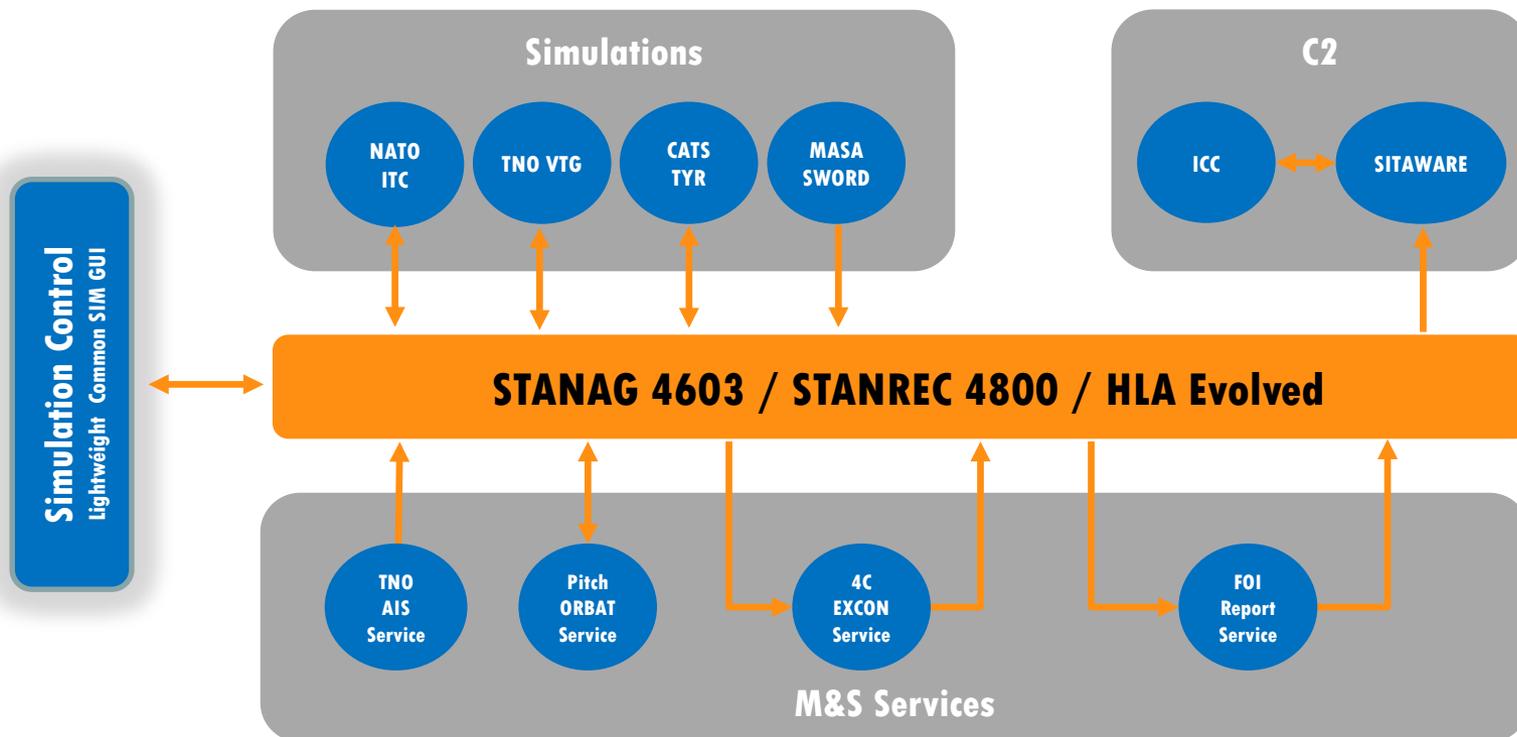
## CBRN

- Used to model CBRN dispersion calculations and the dissemination of information about the dispersion effects on entities and the environment.
- **Source Release:** A *CBRN Release* interaction is published in the federation to trigger the CBRN Federate to start simulation of the release.
- **Detectors:** *CBRN Detector* objects and *CBRN Detector Alarm* interactions. Sensor concentration readings are published using a *CBRN Sensor* object and *CBRN Sensor Update* interactions.
- **CBRN Effects:** The *CBRN Human* object class extended with *TriageLevel* and level of Individual Protective Equipment (IPE)
- **Protective Measures:** This part include both modelling of CBRN treatments and the modelling the level of individual (IPE) and collective CBRN protection equipment.
- **Hazard Area:** Representation of a contamination area used by simulation to model CBRN effects.

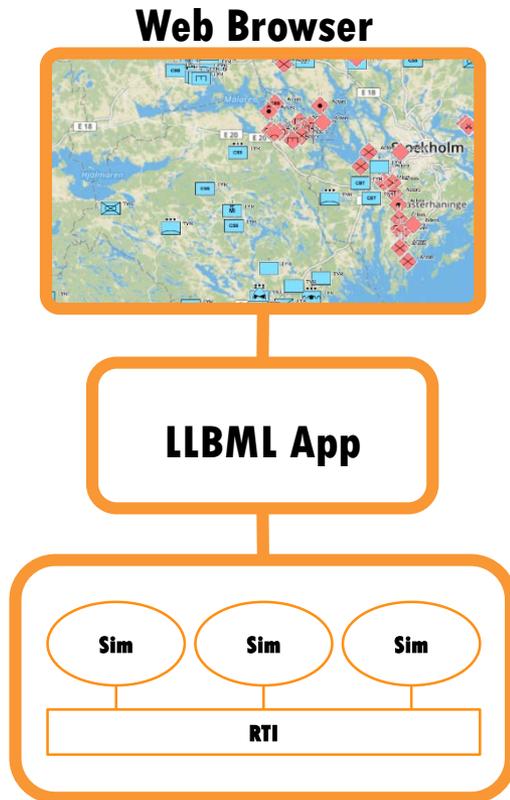
## Unit Tasking and Reporting

- The Low-Level Battle Management Language (LLBML) is a part of the NETN SimC2 component and represent lower-level tasks suitable for providing simulation instructions to federates modelling individual units or platforms.
- LLBML provides a simulator independent way of command and control over simulated entities both from a simulator operator perspective and when modelling command and control interaction between federates in a distributed simulation.
- LLBML contains common low level tasks and commands that can easily be interpreted and executed by simulations that model the behavior of entities. It also defines a set of reports used by simulations to provide status updates of the tasks being executed.

# Viking 18 Gaming Architecture



## Lightweight Common Simulation GUI used in Viking 18



- View Simulation Scenario in thin Web-Browser Clients
- Control Multiple Simulations from a single User Interface using NETN FOM
- Use Standard ORBAT Formats (MSDL)
- Dynamic Task Organization and Force Relations
- NATO STANAG 4603 and NATO STANREC 4800 compliant

**NATO STANREC 4800 Federation**

## MSG-163 & AMSP-04 Ed B

- **New Modules**

- Updated Initialization Module with an added MSDL FOM Module
- METOC Module for representation of Weather in collaboration with MSG-156
- Modules for Crisis Management and Disaster Response in collaboration with MSG-147
- Automatic Identification System (AIS) Module for Surface Vessel Tracking

- **Structural Changes**

- Merging of NETN Logistics FOM Modules
- Split of SimC2 Module and harmonization with MSG-145
- Preparation for HLA 4

- **Module Updates**

- Extended set of orders and reports in LLBML
- Other improvements

# NATO Simulation Interoperability Test and Certification Service

Verify individual simulation components' compliance with NATO interoperability standards for M&S and provide certificates of compliance to simulation components that successfully complete the certification process



**Certify compliance not only with STANAG 4603 (HLA) but also STANREC 4800 (NETN FAFD)**

**NATO Interoperability Test and Certification Service IOC  
Certification Entity is NATO M&S COE (<https://www.mscoe.org/>)**

## Getting Involved

- **Download and start using AMSP-04**
  - Publically available for download at:
    - <https://nso.nato.int>
    - Download FOM Modules from: <https://www.sto.nato.int/pages/natostandards.aspx>
- **Engage in MSG-163**
  - Contact your National NMSG POC
- **Liason with MSG-163**
  - E.g. today MSG-156, MSG-147 provide input
- **Provide feedback on AMSP-04 to MSG-163**
  - Mail to: [msg@csso.nato.int](mailto:msg@csso.nato.int)

<https://netn.mscoe.org>

Efficient and effective use of NATO and national Modelling & Simulation (M&S) capabilities, to support training, requires standards for connecting and integrating M&S components across the training system enterprise.

Compliance with these standards can be tested and certified by NATO.

NATO M&S Strategic Plan Version 2.0

	NORTH ATLANTIC COUNCIL CONSEIL DE L'ATLANTIQUE NORD
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14 September 2012 **DOCUMENT**  
AC/323/NMSG(2012)-015

**NATO MODELLING AND SIMULATION  
MASTER PLAN**

**NATO MODELLING AND SIMULATION  
STRATEGIC PLAN**

VERSION 2.0

-1-

**STANDARDIZATION AGREEMENT** **ACCORD DE NORMALISATION**

**STANAG 4603**

MODELLING AND SIMULATION ARCHITECTURE STANDARDS FOR TECHNICAL PROPERTIES: HLA LEVEL ARCHITECTURE (HLA) / NORMES SUR L'ARCHITECTURE DES MODELES ET SIMULATIONS POUR LEUR INTEROPERABILITE: PROPRIETES TECHNIQUES: ARCHITECTURE DE NIVEAU (HLA)

EDITION / ÉDITION 1  
NSO/323/02 (2015) NMSG/4603  
February / février 2015



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**STANDARDIZATION RECOMMENDATION** **RECOMMANDATION DE NORMALISATION**

**STANREC 4800**

NATO EDUCATION AND TRAINING NETWORK FEDERATION ARCHITECTURE AND FEDERATION OBJECT MODEL DESIGN / RÉSEAU DE FORMATION ET D'ENTRAÎNEMENT OTAN - ARCHITECTURE DE LA FÉDÉRATION ET CONCEPTION DU MODÈLE OBJET DE LA FÉDÉRATION

EDITION / ÉDITION 1  
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QUESTIONS?