



TACOM

Lethality, Survivability, Mobility and
Sustainment for America's Army

The NATO Armaments Ballistic Kernel

The 1st Item of an Emerging Suite of Software Component Items
for Fire Control Systems

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André J. Sowa

Firing Tables and Ballistics

U.S. Army TACOM-ARDEC
ATTN: AMSTA-AR-FSF-T, Building 120
Aberdeen Proving Ground, MD 21005-5001
UNITED STATES

[1] 410-278-4227 [DSN 298] FAX: 278-7208
Email: asowa@pica.army.mil

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International Artillery & Munitions Systems – Session III



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Focus of Presentation

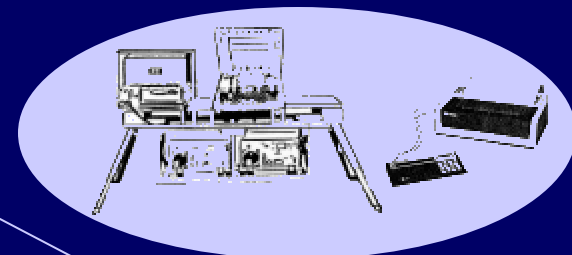
- **NABK – Part of an Emerging Suite of Fire Control Software Component Items**
- **Status of NABK Development and Maintenance Effort**
- **Controls on NABK Information**



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N A B K



NATO

Armaments

Ballistic

Kernel

Currently

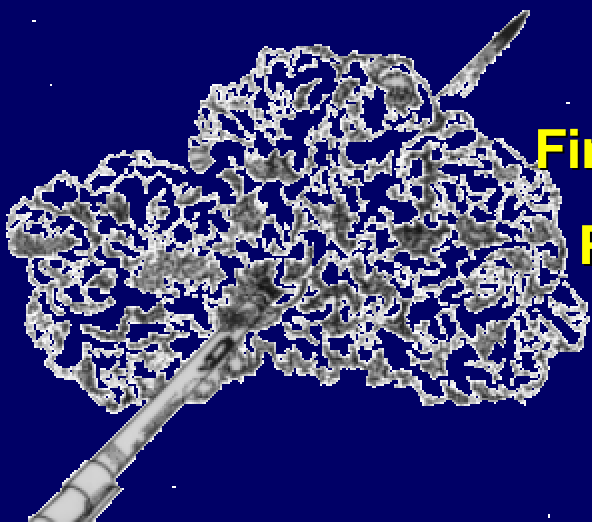
Gun Fired

Spin Stabilized

and

Fin Stabilized

Projectiles

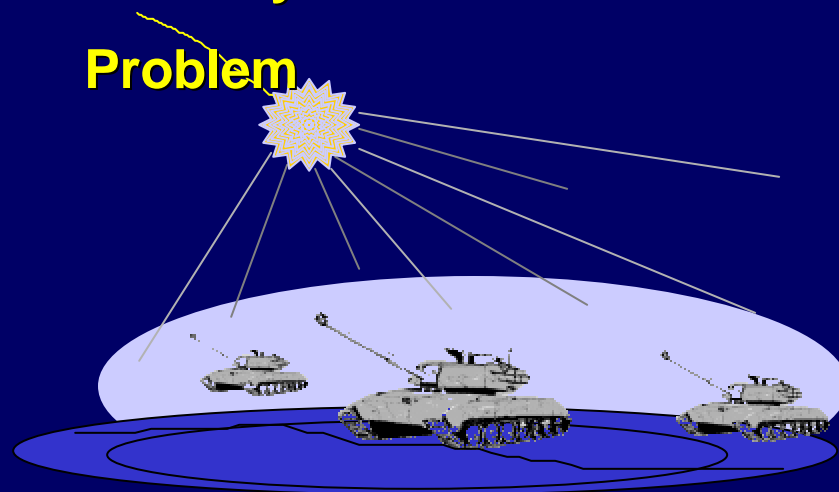


Solves

the

Gunnery

Problem





NABK Developers

- **NATO Army Armaments Group AC/225**
Land Group 4 (Surface-to-Surface Artillery)
Sub-Group 2 on Accuracy, Ballistics & Explosives
- **Current countries involved:**
 - » Belgium, Canada, Denmark, France, Germany, Italy, Netherlands, Norway, Turkey, United Kingdom, United States
 - » Poland (Observer)
 - » Greece, Spain (Pending)
- **Partners for Peace participation through NATO member country sponsorship**



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Suite of Sharable Software Component Items

Communications



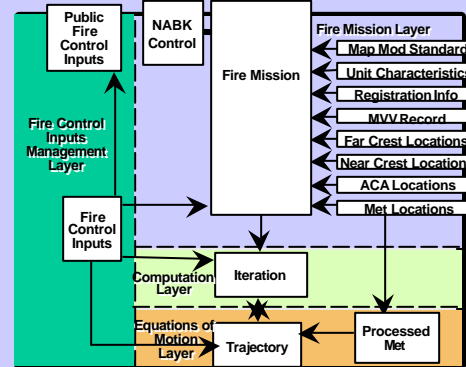
Appreciation Kernel (Targeting)



Soldier-Machine Interface

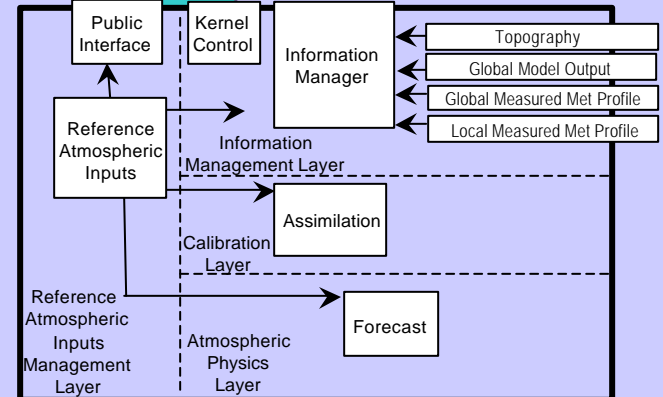


Terrain Elevation Database Manager



NATO Armaments Ballistic Kernel

Met Kernel





Met Kernel Development Effort

Current countries involved:

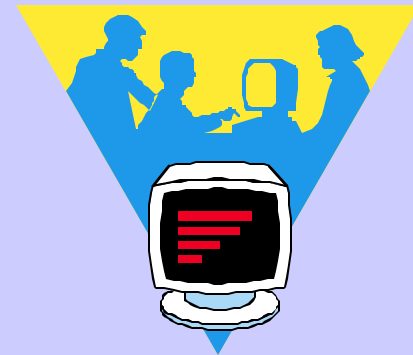
- » Lead Nation: Denmark
- » Denmark, Finland, France, Germany, Netherlands, Norway, Turkey, United Kingdom, United States

3 Areas of Work:

- **MET-GM (STANAG 6022)**
- **Demonstration Met Kernel**
- **Test Trials**
 - » Denmark, Fall 2003
 - » Future Possibilities

Technical Ballistic
Fire Control
Domain Expertise

Atmospheric Sciences
and Meteorology
Domain Expertise



Reusable and Sharable MET Kernel
for Fire Control System Embedding



Rationale for Developing NABK

- To significantly reduce or eliminate duplication of effort
- To avoid significant expenditure of time and money in future development and updates of ballistic fire control software
- To ensure standardization, accuracy, and reliability
- To establish a common method to facilitate the use of NATO ammunition interchangeability
- To develop a single software package that is reusable across multiple weapon systems and multiple countries

Similar Development Rational for the Other Component Items



NABK Development Process

- **Program guidance (STANAG 4537) established**
- **Software development plan established and maintained**
- **Key areas managed:**
 - » Requirements, Technology, Database Development, Software Development, CM, QA, Policy
 - » Peer review integral to each area
- **Program documentation (AOP-37 and source documents) established and maintained**
- **Overall program review held every 6 months; appropriate persons in each key area communicate/meet as required**

Similar Development Process for the Other Component Items



NABK Software Releases

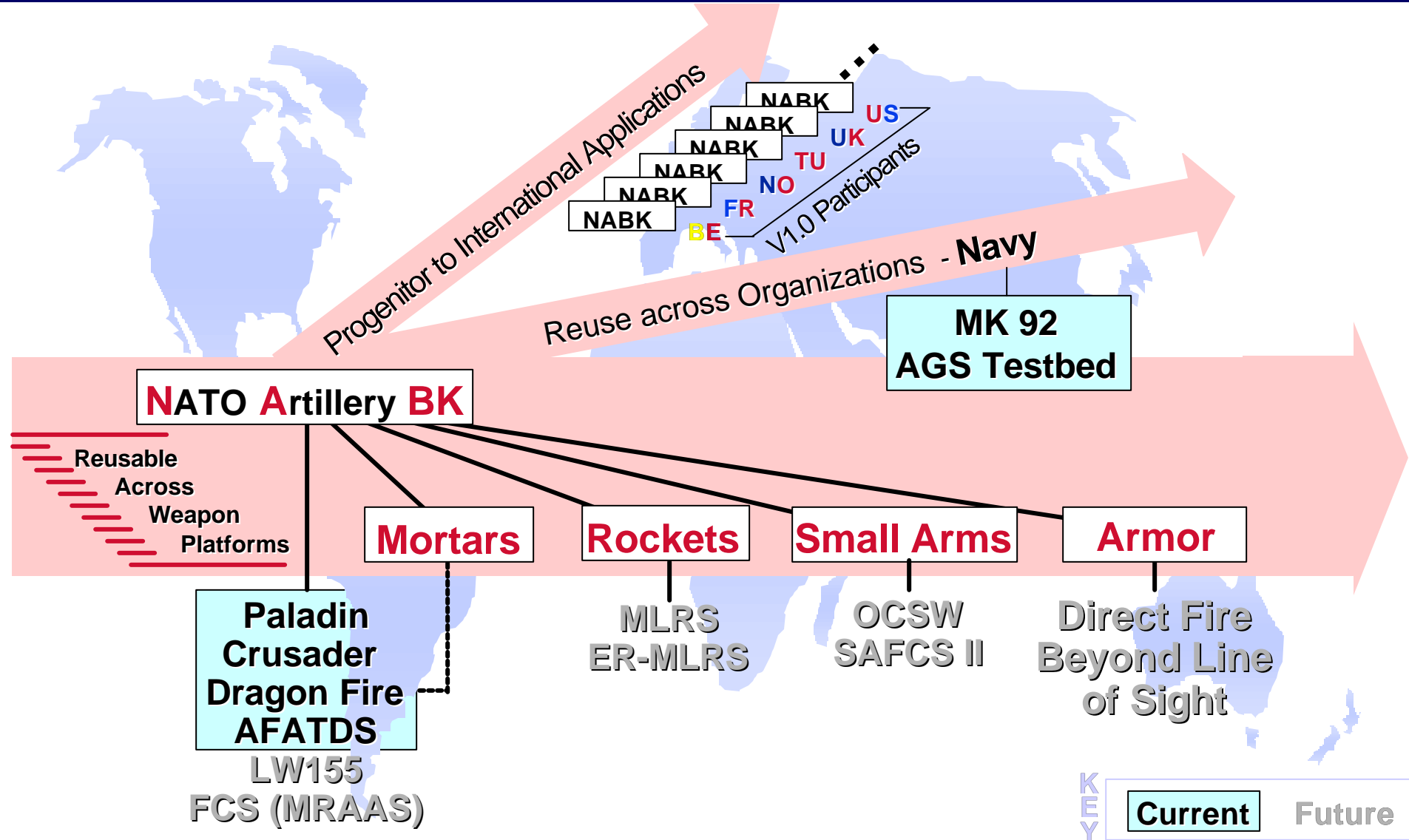
<u>Version</u>	<u>Release Date</u>	<u>Meets U.S. Army Rqmts for:</u>
1.0	Sep 98	Dragon Fire Demonstrator
1.0+	Dec 98	Paladin V11
1.1	Feb 99	
1.5	Jul 99	Crusader, MK 92
1.6	Sep 99	
1.63	Apr 00	AFATDS-99
2.0	Sep 00	
3.0 Beta	Jul 01	
3.02	Dec 01	AFATDS-99+/V7, Paladin V7
4.0 Alpha	Release scheduled for Jul 02	
5.0	Release scheduled for Feb 03	



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U.S. Applications of NABK Software





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National Implementations

- **12 countries currently participating**
- **Implementations:**
 - » **19 currently completed ones in 8 countries**
 - » **32 future ones being worked in 12 countries**
- **3 Ada compilers: Aonix, GNAT, Rational**
- **3 operating system sets: Windows, Unix, Lynx**



Controls on Information

- Program guided by STANAG 4537 and documented in the associated AOP-37 and source documents
- All NATO member nations can implement the NABK into their national weapon systems
- Appropriate contractors must formally agree and adhere to non-disclosure and non-use criteria
- Only participating NATO member nations can sell a product containing the NABK (executable code)
- Partners for Peace participation through NATO member country sponsorship



17th NABK Technical Review

- **Formal Review: 17-19 July 2002 at APG, MD, USA**
Related Meetings/Workshops: 11, 12, 15 & 16 July 2002
- **Levels of Representation:**
 - **National Governments**
 - » **NATO member**
 - » **Partners for Peace**
 - **Contractor Organizations**
 - » **Current contracts requiring NABK**
 - » **Candidates bidding on contracts**
 - » **Observers**
- **Heads of Delegations Control Distribution of NABK Info**



Contractor Attendance at NABK Meetings

If a NATO/PfP nation wishes to send contractor personnel and have them admitted to the meeting(s) and receive appropriate information, please comply with the following instructions:

Appropriate personnel from contractor organizations that require access to NABK information as part of a current contract or as a candidate responding to a contract request can attend provided the national government issuing the contract approves and is in compliance with the guidance in STANAG 4537. The national government representative (Head of Delegation) to the appropriate meeting(s) must notify the meeting points of contact and identify the contractor organizations, names of the personnel expected to attend which meetings, their contact information, and what information the contractor personnel can or cannot receive. In the event a nation will only be represented by contractor personnel, the NAAG AC/225 LG.4/SG.2 delegate from that nation must send notification. The contractor personnel must then submit an official visit request according to the national procedures of the nation of residency through its embassy in Washington DC through the proper chain to the U.S. Army TACOM-ARDEC Security Office as explained above. Bottom line is: if we do not know someone belongs in a meeting, he/she will not be admitted; if we do not know what information he/she can or cannot receive, no electronic or hard copy information will be given to him/her.



Summary

- **NABK effort currently involves 12 countries**
- **About 25 artillery implementations of NABK fielded or actively being worked**
- **NABK is first mature item of a vision of a suite of sharable fire control software component items**
- **NABK is a software product available as a government furnished item (GFI)**
- **Access to the information is controlled**



Appreciation Kernel

- **Lead Nation:** Belgium
- **Answers the questions:**
 - Who fires what?
 - How?
 - How many?
 - Where?
- **Concerns areas of:**
 - Delivery Accuracy
 - Lethality
 - Effectiveness



Terrain Elevation Database Manager

- **Lead Nation: United Kingdom**
- **Manages requests for elevation data (using DTED 0, 1 or 2 resolution)**
- **Designed to provide support to the NABK, Met Kernel, and Appreciation Kernel**
- **Available to provide support to other fire control system software elements**