Weapons Training Simulator

Simulation is proving very effective as the worlds armies seek to improve their shooting skills.

Armies aim to improve life on the range

1.   **Preface.** Over the past decade the world's armies increasingly have turned to simulation devices to help improve soldier's proficiency with small arms. This trend has been driven by a number of requirements. Armies are keen to reduce the cost of training, particularly the use of expensive-to-run outdoor ranges that require large safety staff. Environmental concerns have also forced armies to limit the amount of noise generated during training.

2.   Modern simulation technology also has opened up new opportunities for specialist training, allowing specific missions to be rehearsed against representations of the real terrain and with realistic targets moving across the area of interest. The portability of modern small arms trainers means they can be deployed during peace-keeping operations to allow them to maintain proficiency in situations where live range firing may not be possible.

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Small Arms & Weapons Training Simulator

1.   **Name**. Small Arms and Weapons Training Simulators [SAWTS]

2.   **Introduction**. Small Arms and Weapons Training Simulators [SAWTS] are used to train defense personnel in operational handling of small arms and weapons, helping cut the cost of ammunition, and allowing the training to be conducted in a relatively small area, with identification of all the trainee's shots

3.   **Specifications.**
    (a)   Multiple lane small arms trainer.
    (b)   Provide high fidelity mock up of multi threat realistic scenarios (which may be varied), simulating realistic threat actions
    (c)   Real weapons are deactivated and fully censored to provide realistic handling.

4.   **Country of Origin.** MACMET India Ltd.Usage data not available

5.   **Relevance.** System uses computers for CGI and Instructor station. The simulation solution provided by MACMET provides high fidelity mock up of multi threat realistic scenarios (which may be varied), simulating realistic threat actions that must be countered appropriately..

Action Speed Tactical Trainers

1. **Name**. ASTT (Action Speed Tactical Trainer),

2. **Introduction**. Macmet Simulation Systems is developing a distributed training system and environment, which is useful for naval and other armed forces A specific product spin off using these technologies is the ASTT (Action Speed Tactical Trainer), which operates on a standard Windows-NT network. Using a combination of multi-functional workstations and multi-workstations grouped to form cubicles or virtual ships, the system allows large games to be run for training and tactics development.

3. **Specifications.**
    (a)   Windows NT network
         (i)   Distributed Simulation of Constructive and Virtual Entities
         (ii)   Subsurface
         (iii)   Surface
         (iv)   Air
         (v)   Space
    (b)   Digital Networked Audio Communication System
    (c)   Controller Consoles with all Control Functions including Backtrack, Trial Jump, Jump-in-Time
    (d)   Task force and fleet level CIC Cubicles
    (e)   Virtual Radar and Sonar Simulations
    (f)   Extensive Simulated Sensor, EW and Weapon Systems
    (g)   Thirty days and above game duration
    (h)   Comprehensive De-brief support with full Record-Replay
    (j)   Sneak View of Students' perception for Instructor
    (k)   Student Performance evaluation
    (l)   Multiple Gaming Levels

    (m)   ASTT Cubicle Features
    (n)   All cubicles are sound proof and air-conditioned. Safety considerations include automatic fire protection and emergency power shut off. Each student cubicle is equipped with four to six Tactical Consoles, Tactical Communication Post, Plotting Table,

LED Display, Intercom, Public address system, Network printer, LCD Projector, Air Plot Screen, Fleet Disposition Board, and EMCON/EEP State Boards.

4.   **Country of Origin.** MACMET India Ltd. Usage data not available

5.   **Relevance.** System uses computers for CGI and Instructor station and may be using virtual reality eqpt and may have some kind of war gaming capability.

Electronic Warfare

1. **Name**. Electronic Warfare Training Simulators [SAWTS]

2. **Introduction**. Macmet Simulation Systems has expertise to provide a virtual reality trainer in electronic warfare for intelligence collection operators. The system can simulate signals at various frequencies and power levels and audio in various languages and dialects to provide a realistic operational environment. The operator would have to sift through all this visual/audio information to identify and intercept enemy signals. All trainee interaction can be stored and evaluated later by the instructor

3. **Specifications.**
   The basic configuration of the system is as follows:

   (a) Individual training stations, used in stand alone or in coordinated operations
   (b) A Scenario Library
   (c) An Instructor Station providing scenario information

4. **Country of Origin.** MACMET India Ltd. Usage data not available

5. **Relevance.** System uses computers and virtual reality probably HMD for immersive environments. These technologies are planned to be incorporated in future RADAR and EW sml.
.

Ship TCR/MCR Simulators

1.   **Name**. Ship TCR/MCR Simulators

2.   **Introduction**. Ship MCR Simulators are used to train the ship technical personnel in the operation of Ship Machinery Room equipment. This training shall be with respect to both normal procedures as well as exigency procedures. A typical Ship MCR Simulator will have Ship MCR Room with all controls & instruments, Host Computer to run the ship equipment models, Instructor Station to control the training session & I/O system to interface the Computer systems with the Ship MCR room.

3.   **Specifications.**
   (a)   Crew training stations, used in stand alone or in coordinated operations
   (b)   A Scenario Library
   (c)   An Instructor Station providing scenario information

4.   **Country of Origin.** MACMET India Ltd. Usage data not available

5.   **Relevance.** System uses computers and mockups for immersive environments
.

Flight Simulators

1.   **Name**. Flight Simulators

2.   **Introduction**. Macmet Simulation Systems has the ability to design, develop, install, integrate, test and commission Full Mission Flight Simulators as well as Part Task Trainers for various applications. The company completed a major upgrade on a full mission flight simulator of a combat aircraft. To make it cost effective, sub-systems with adequate residual life and performance capability, namely the cockpit and motion system, were retained, and the rest of the simulator sub-systems were fully replaced with COTS (commercial off the shelf) hardware. Software upgrade included full replacement of LoS, Visual and Radar. New software was added for additional weapons and EW environment.

3.   **Specifications.**
        (a)   Mission flt sml as well as maint sml with partly/fully immersive environments.
        (b)   Uses COTS computers
        (c)   A Scenario Library
        (d)   An Instructor Station providing scenario information

4.   **Country of Origin.** MACMET India Ltd. Usage data not available

5.   **Relevance.** System uses computers and mockups for immersive environments.

Armoured Vehicle Driving Simulators

1. **Name.** Armoured Vehicle Driving Simulators

2. **Introduction**. Macmet Simulation Systems has expertise to supply Armoured Vehicle Driving Simulators (AVDS) for tanks and armoured vehicles. The simulator will permit instruction and practice in all aspects of the driver's tasks, including mastering the dynamic behavior of the vehicle on different types of terrain and in all kinds of weather conditions. Training can also be provided in operations and procedures to individual turret members or the whole team.

3. **Specifications.**
    (a) **Driver's Cabin.** This is a replica of the Tank driver's cabin of an actual vehicle and is complete with tank controls & instruments.
    (b) **Visual System**. Computer Generated Imagery is used to present a realistic, 3-dimensional view of the land terrain environment. Scenes with different lighting conditions, weather conditions and terrain conditions can be depicted. Various terrain scenarios can be simulated.
    (c) **Aural System.** The aural system is used to simulate the various internal and external sounds heard by the vehicle. The vehicle internal sounds comprise of the engine sounds when the vehicle is at rest or is moving at different speeds. The external sounds simulated include sounds due to other armoured vehicles and weapons.
    (d) **Instructor Station.** The instructor has a key role to play in a simulation environment. Therefore, an extremely user-friendly man-machine interface is developed to carry out various functions and operations through specially developed menus. The instructor is able to control the exercise and introduce emergencies and malfunctions. The mistakes committed by the trainee are recorded and a performance evaluation report is generated at the end of the exercise.
    (e) **Motion Platform**. A motion platform is optional and can be included to meet the requirements of the customer. Depending on the application, either a motion platform with 3-degrees of freedom or a seat shaker can be used to induce better realism to the training exercise.

4.   **Country of Origin.** MACMET India Ltd. Usage data not available

5.   **Relevance.** System uses computers , mockups and motion platform for immersive environments.

FATS

1. **Name**. **Firearms Training Systems, Inc.** (OTC: BB: **FATS**),

2. **Introduction**. **Firearms Training Systems, Inc.** (OTC: BB: **FATS**), headquartered near Atlanta Georgia, is a leading worldwide producer of interactive simulation systems designed to provide training in the handling of interactive simulation systems. **FATS** has focused its sales efforts for small arms simulators primarily in the US and international military and law enforcement market. Larger gunnery simulation systems are developed and manufactured by its Montreal Canada based subsidiary, FATS-Canada. This subsidiary of **FATS** contracts to develop and deliver several unique products. An air defense missile trainer; an appended armored vehicle crew trainer; a stand alone armored vehicle crew trainer and, an embedded light armored vehicle crew trainer. **FATS,** through its smaller subsidiaries, located in the UK, the Netherlands, Singapore, and Australia, also provide sales and service in addition to limited manufacturing support.

3. **Developed in response to customer demand,** the *Laptop Forward Observer* provides three dimensional terrain databases and high-fidelity realism for artillery, mortar, naval gunfire and forward air control training. The product is being well accepted by all branches of the military and provides a vehicle to accelerate the growth of Firearms Training Systems, Inc.

CEO Mohling states, "One of the most exciting developments in our product line is **FATS'** new Laptop Forward Observer. This **FATS** product can be carried onto the battlefield by a soldier."

3.   FATS Product offerings :

FATS Simulator Product Offerings By Target Market

	Military	Law Enforcement	Int. Law Enforcement And Military
1	Small Arms Trainer	Small Arms Trainer	Small Arms Trainer
2	Indirect Fire Trainer	Live Fire Trainer	Indirect Fire Trainer
3	Judgmental Trainer	Judgmental Trainer	Live Fire Trainer
4	Forward Observer Trainer	Authoring Station	Judgmental Trainer
5	Live Fire Trainer		Authoring Station
6	Heavy Weapons Simulation		Heavy Weapons Simulation
7	Combined Arms Trainer		Combined Arms Trainer
8	Network Trainers		Network Trainers
9			Motion Integrated Trainer

Another significant product achievement of fiscal 2003 was the award of $1.6 million subcontract for development and installation of software for the Embedded Training System of the Interim Armored Vehicle. Soldiers using this equipment can, by flipping a switch, move back and forth between live capability and virtual training capability so that, during quiet periods on the battlefield, they can hone their skills.

3.   <u>**Specifications.**</u> **FATS weapon designers** replace the firing elements with pneumatics, electronics, lasers, and sensors without altering a weapons mechanical function, center of gravity, balance or weight. **FATS,** provides this realistic weaponry by retrofitting real, live fire weapons with simulation technology to deliver the true form, fit and feel of a live fire weapon. These weapons provide diagnostic information not available with live fire weapons, such as trigger pressure, barrel movement, weapon cant, and butt pressure, thereby supporting instructors with a rich set of performance data. Since these simulated weapons do not fire live rounds they provide a significantly longer life cycle, for example, an actual M 16 has a field life of about 5,000 rounds before rebuild. A **FATS** simulated M 16 is designed to fire 50,000 rounds before requiring service.

4.   **FATS Training Software** provides interactive engagements to meet specific training objectives using real world imagery. **FATS** scenario library includes terrain scenes derived from the National Imagery and Mapping Agency (NIMA),

data sets; realistic targets (both friendly and threatening); realistic human images; and various times of day, weather and lighting conditions. As a result, **FATS** has developed thousands of customized scenario programs as the following table indicates.

4. **Country of Origin.** **FATS currently has contracts for training programs with:** • the Swedish Army; ◆ Malaysian Ministry of Defense; ◆ U.S. Marine Corp.; ◆ IBCOL Technical Services; ◆ GM Defense-Delco Systems; ◆ U.S. Navy CNET; • Canadian Department of Defense; ◆ United Kingdom Ministry of Defense; ◆ Australian Defense Forces; ◆ U.S. Air Force Space Command; ◆ Chilean Army; ◆ Royal Netherlands Land Army; ◆ D.E.A.; ◆ Singapore Police & Ministry of Defense; ◆ U.S. Army; • Italian Police; ◆ United Kingdom Ministry of Defense; ◆ SAAB Bofors Sweden; ◆ Italian Caribinieri; ◆ Air National Guard.

5. **Relevance.** System uses computers and mockups for immersive environments.

MÄK Technologies to Provide VR-Link as HLA Solution for FATS' USMC Contract
FATS to Use VR-Link Networking Toolkit for Indoor Simulated Marksmanship Trainer-Enhanced Program

1.   I/ITSEC, ORLANDO, Fla., November 28, 2000 - MÄK Technologies, the world's leading supplier of distributed simulation software, is providing Firearm Training Systems, Inc. (FATS), producer of interactive simulation systems designed to provide training in the employment of small and supporting arms, with VR-Link to meet the HLA requirement of their U.S. Marine Corps contract win. The U.S. Marine Corps Systems Command awarded FATS a contract with an approximate initial value of $7,550,000 for the Indoor Simulated Marksmanship Trainer-Enhanced program. FATS has agreed to purchase over 600 VR-Link licenses from MÄK over the course of the ISMT-E contract.

2.   Expanding the virtual battlefield is an ongoing goal at FATS. Expansion means networking simulators. In 1999, FATS selected MÄK's VR-Link HLA Libraries to support the successful networking of small and supporting arms simulators for the Australian and Canadian Armies. FATS integrated VR-Link into its core product as the HLA networking solution.

3.   "Success in Australia and Canada provided FATS with the confidence to offer the use of VR-Link in support of the recently awarded Marine Corps Indoor Simulated Marksmanship Trainer - Enhanced (ISMT-E) contract," said Jeff Marlin, FATS vice president of business development. "With MÄK's support, FATS will upgrade the current ISMT inventory to meet HLA compliance. In practical terms, this means that small and supporting arms commanders will be able to conduct combined arms exercises previously unavailable at the tactical level for ground combat. The FATS system is the first small and supporting arms trainer to have successfully completed HLA Compliance Testing. FATS customers, supported by MÄK Technologies, now have a proven HLA solution."

4.   VR-Link, MÄK's commercial off the shelf networking toolkit, allows users to easily network simulators using either HLA or DIS. With VR-Link, simulations can be fully HLA compliant while maintaining DIS compatibility. VR-Link's FOM-Agile infrastructure allows a user to build a simulation once, and have it be used among several different federations. The toolkit's FOM Mapper Builder automatically generates FOM mapping code that can be used with any VR-Link-based application.

5.   "MÄK is pleased that FATS, as the leader in small and supporting arms simulation, has chosen VR-Link as their standard to meet their customers' HLA requirements," said Marc Schlackman, director of sales for MÄK Technologies.

compatibility. VR-Link's FOM-Agile infrastructure allows a user to build a simulation once, and have it be used among several different federations. The toolkit's FOM Mapper Builder automatically generates FOM mapping code that can be used with any VR-Link-based application.

US Army's Engagement Skills Trainer 2000 (EST 2000)

1.   **Name**. US Army's Engagement Skills Trainer 2000 (EST 2000)

2.   **Introduction**. On 6 March 2000 the ECC International Corp. was awarded a $7.5m low-rate initial production (LRIP) contract under the US Army's Engagement Skills Trainer 2000 (EST 2000) programme. The contract calls for ECC to deliver small arms training systems to the US Army, Army Reserves and National Guard beginning in November 2000.

3.   **Specifications.**

    (a)   Uses multitude of wpns
    (b)   An extremely accurate weapons training system, the EST 2000 can provide training on 11 different weapons including rifles, pistols, machine guns, shotguns, anti-tank weaponry and grenade launchers
    (c)   Real weapons are deactivated and used to provide realistic handling.

4.   **Country of Origin.** USA. ECC leads a team of companies that contribute to the production of EST 2000 including Shorts Missile Systems (SMS) of Belfast, Northern Ireland, Omega Training Group of Columbus, Georgia and Firearms Training Systems (FATS) of Suwanee, Georgia.

5.   **Relevance.** System uses very advanced HLA and GIS based model with a multitude of functions. It is networked and fully distributed.

Shorts Missile Systems S1 multi-arms trainer (MAT), CST 100D-P, CST 200D-P

1.   **Name**. US Army's Shorts Missile Systems S1 multi-arms trainer (MAT)

2.   **Introduction**. The Shorts Missile Systems S1 multi-arms trainer (MAT) has been specifically developed to meet the particular needs of military forces and law enforcement agencies. A highly accurate hit-detection system ensures personnel are trained in marksmanship skills and the availability of realistic scenarios enables students to be taught engagement skills. Scenarios can be generated and modified by the customer thus enabling the accurate replication of particular threats. Weapon simulation is realistic and includes instrumentation that enables the teaching and monitoring of the correct operation of weapons.

3.   Available systems range from the low-cost and highly portable CST 100D-P to the multi-screen, multi-shooter weapons team engagement trainer (WTET). The CST 200D-P, an all-digital compact skills trainer, offers the ability to provide interactive digital video-based training in all aspects of the use of force continuum (chemical spray, baton, and firearms). In conjunction with the US Naval Air Warfare Centre Training Systems Division (NAWCTSD), FATS has developed a weapons team engagement trainer (WTET) that offers realistic training for special weapons and tactical teams. The trainer incorporates a number of features including infra-red location sensors, continuous aim point tracking for enhanced scenario interaction, shootback capability, and the ability to use scenarios in a challenging multi-room training experience.

4.   **Specifications.**

   (a)   Uses multitude of wpns from revolvers to 40mm cannons.
   (b)   Scenario based and can be customized to improve engagement skills
   (c)   An extremely accurate weapons training system. Weapon simulation
   (d)   is realistic and includes instrumentation that enables the teaching and monitoring of the correct operation of weapons
   (c)   Real weapons are deactivated and used to provide realistic handling.

5.   **Country of Origin.** USA. Used by the US and Israel

6.   **Relevance.** System uses very advanced HLA based simulation model with a multitude of functions. It is networked and fully distributed.

ST-2000 MilTrainer, ST-2000 Pistolman ST-2000 Sniper sml, MFT 6000 , 406 light weapons firing instructional simulator and BT 61 multi-purpose gunnery trainer

1.   **Name**. ST-2000 MilTrainer, ST-2000 Pistolman , ST-2000 Sniper sml, MFT 6000 , 406 light weapons firing instructional simulator and BT 61 multi-purpose gunnery trainer

2.   **Introduction**. Noptel Oy is a pioneer and leader in the development and manufacture of opto-electronic marksmanship training and analysis systems for defence forces, police and security personnel, as well as for sports marksmen. Its products range from simple devices for individual training to more complex computer-based devices, such as the ST-2000 MilTrainer, ST-2000 Pistolman and ST-2000 Sniper, that makes it possible to observe the training of one or more shooters simultaneously, indoors or out of doors. Multiple shooters can be connected to a single PC. Saab Training Systems takes the concept on still further with its BT 61 multi-purpose gunnery trainer that is useable with machine guns and other crew-served weapons such as the 40mm AGL.

3.   British company GQ offers the MFT 6000 firearms trainer; this is a modular four-lane indoor range for live or dry fire against targets that are generated on video imagery..

4.   France's GDI Simulation are marketing their DX 406 light weapons firing instructional simulator. This uses laser attachments to weapons that allow exercises involving up to 10 lanes of participants. The German armed forces are also active in this field, having recently contracted Thomson Training & Simulation to provide 143 AGSHP small arms training systems
.

3.   **Specifications.**
        (a)   Multilane.
        (b)   Uses COTS computers

(c)   A Scenario Library
(d)   An Instructor Station providing scenario information
(e)   multi-purpose gunnery trainer that is useable with machine guns and other crew-served weapons such as the 40mm AGL
(f)   Targets are generated on video imagery.

4.   **Country of Origin.**   ECC International Corp(Constrium Britain, france , Finland). Used in the armed forces of collaborating nations.

5.   **Relevance.** System uses computers and immersive environments

VizTek's military simulators

Urban War fighting Sim

Weapon Training Sims

Military   Simulators

.

Scenario authoring

Virtual Aim (small arms training Simulator)

1.   **Name**. VizTek's military simulators

2.   **Introduction**. VizTek's military simulators are made to order. Using the same high quality visualization and image generation systems, we provide turnkey solutions enabling professional training for soldiers and police, whether for direct target shooting using rifles and handguns or for sophisticated weapon systems such as surface to air missiles.

3.   **Specifications.**
   (a)   Open architecture PC environment with the ease of integration into back and forth from CAD data to our VR Immersive solutions.
   (b)   Physics based real-time rendering engines coupled with advanced artificial intelligence tools enable the most spectacular "intelligent" interaction between the real and the virtual.
   (c)   A Virtual Wall based
   (d)   **Battlefield Scenario** (Command Post) and War gaming integrated as:-

(i)   Training of subordinate war fighting commanders
(ii)   Developing doctrine and tactics
(iii)   Formulating and assessing operational plans
(iv)   Conducting virtual mission rehearsal
(v)   Defining operational requirements
(vi)   Study "what if" scenarios
(vii)   Battle damage assessment (BDA)
(viii) Test a war plan to see how well it's likely to work
(ix)   Calculate the timetable and outcomes of future operations
(x)   Determine the best mix of forces
(x1)   Determine the best use of weapons in meeting planning and operational goals
(xii)   Initiate deliberate as well as crisis action planning
(xiii) Can manage battle space entities (BSE) such as aircraft, ships, satellites or tanks with each BSE interacting within an area of operation
(xiv)   Test system effectiveness and run trade-off analyses
(xv)   Develop and assess warfare concepts and doctrines
(xvi)   Can simulate a whole-theater (area of 500 x 500 km).
(xvii) Open source and modular architecture

4.   **Country of Origin.** USA. Used by DOD approved clients.

5.   **Relevance.** System uses computers for immersive environments and has integrated war gaming capability. Based on open architecture.

Maintenance Simulators

1.   **Name**. Maintenance Simulator

2.   **Introduction**. This maintenance simulator provides training of Maintenance technician by exposing to simulated systems prior to hands-on training on actual systems.

   (a)   Reducing the training time for technician due to simulator training syllabus complementing maintenance syllabus.
   (b)   Acquiring improved skill due to close supervision and learning by easy replay of maintenance tasks.
   (c)   Planning of additional maintenance tasks in respect of a snag on the system without its actual occurrence.
   (d)   Aiding to understanding of functioning of system under normal / faulty conditions through wide range of exercises.
   (e)   Practicing fault diagnosis / analysis / rectification procedures.
   (f)   Training made possible irrespective of availability of the actual equipment.
   (g)   Evaluating trainers under standardized conditions.
   (h)   Studying on possibilities of likely failures, their effects & maint procedures.
   (j)   Saving in cost of training by reducing actual usage of equipment (i.e) aircraft, helicopter, ammunition, Tanks or any such system. and low operating cost of simulator.

   (k)   Impart knowledge of system and instruments.
   (l)   Train on functional checks and use appropriate maintenance tools / means.
   (m)   Group system components through either circuit or system and identify their interactions.

3.   **Specifications.**

   (a)   Hardboard display with highly realistic simulation of Various sub-systems
   (b)   Actual components for the operator to get the feel of the actual system.
   (c)   High quality Visual Cues for proper identification of LRU's
   (d)   Maintenance training in normal and emergency/Fault procedures

   (f)   Sensors sub-system maintenance training including radar and navigation

communication
(g) COTS based Hardware (PCs, Networking and LAN switches etc.)
(h) Simple maintenance and Upgrade
(j) Flexible Modular and Expandable
(k) Instructor station for generation of training session
(l) Central database of lessons and training exercises
(m) Evaluator /Instructor module: real time monitoring of students progress; evaluates students achievements to determine grades, progress, and compute final grade
(n) Sophisticated tutorial Instructor station incorporating
  (i) Windows-oriented user graphic interface
  (ii) Instructor capability to inject any level of fault at any juncture
(o) Man machine interface based on Visual basic
(p) User Friendly procedure editing with security for future procedure upgrades
(q) Blow up's of different subsystem components and LRU's with high quality visual cues
(r) Self learning mode for beginners for unattended training for the Normal procedure
(s) Both standalone and Networked environment operation possible

4. **Country of Origin.** MELSS India Ltd. Usage data not available

5. **Relevance.** System uses very advanced sml model with a multitude of functions. It is networked and fully distributed.

Battle Effects Simulator

1.   **Name**. Lockheed Martin Battle Effects Simulator

2.   **Introduction**. Lockheed Martin Battle Effects Simulator Can be Configured as a Weapon Firing or a Hit Effects Simulator.

3.   **Specifications.**

    (a)   Propane Charged Firing System - No Pyrotechnics.
    (b)   Oil Based Smoke Effect.
    (c)   35 Shots Minimum per Charge.
    (d)   Excellent Thermal Signature.
    (e)   Safe Handling and Operation.
    (f)   Significant Cost Savings over Pyrotechnic Devices.
    (g)   Versatile Audio-visual Effects Simulator.
    (h)   Can be Configured as a Weapon Firing or a Hit Effects Simulator.
    (j)   Firing and Hit Effects Derivatives can be Vehicle or Ground Mounted.

4.   **Country of Origin.** Lockheed Martin ,UK. Used by British forces.

5.   **Relevance.** System uses very simple and innovative approach.

Lockheed Martin MILES

1. **Name**. Lockheed Martin MILES

2. **Introduction**. Lockheed Martin MILES shoot back device for realistic training

3. **Specifications.**

    (a)   Universal Mount Adaptable to Support MILES, MILES II, MILES 2000 and the 3rd Generation MILES devices.
    (b)   Portable and Designed to withstand Loose Transport over Rough Terrain.
    (c)   Ease of Installation, Operation and Repair.
    (d)   Designed for Continuous Operation 24 Hours a Day, 7 Days a Week, 240 Days a Year with a Minimum of 90% Availability.
    (e)   Cable and Controls are Designed for Hand Installation - No Special Tools Required.
    (f)   Weight is less than 6lbs.
    (g)   Height is adjustable.

4. **Country of Origin.** Lockheed Martin ,UK. Used by British forces.

5. **Relevance.** System uses very innovative approach.

Lockheed Martin Muzzle Flash Simulator

1.   **Name**. Lockheed Martin Muzzle Flash Simulator

2.   **Introduction**. Lockheed Martin Muzzle Flash Simulator for realistic training

3.   **Specifications.**

   (a)   Built into the SIT enclosure lid.
   (b)   Operates in either Single Shot or Burst Mode.
   (c)   Burst rate of 600 Rounds per Minute.
   (d)   The Burst Mode will Generate a Random Number of Flashes up to 16 Durable, Rugged, Watertight and Rustproof Device Designed for Outdoor use in Extreme Environments.
   (e)   Designed for Continuous Operation 24 Hours a Day, 7 Days a Week, 240 Days a Year with a Minimum of 90% Availability.
   (f)   Cable and Controls are Designed for Hand Installation - No Special Tools Required

4.   **Country of Origin.** Lockheed Martin ,UK. Used by British forces.

5.   **Relevance.** System uses very innovative approach.

Lockheed Martin Sound Effects Simulator

1. **Name**. Lockheed Martin sound effects sml

2. **Introduction**. Lockheed Martin sound effects sml for realistic training

3. **Specifications.**

   (a) Records and plays back up to 12 sounds, total time 120 seconds.
   (b) Sounds are triggered remotely via the Range Control Station or the Hand Held Controller (HHC).
   (c) Operated in conjunction with the Next Generation Stationary and Moving Target Lifters.
   (d) Five 10 Watt Speaker Outputs, audio line input and output and microphone input.
   (e) User friendly keyboard and display.
   (f) All solid-state design, no tape or moving parts.
   (g) 16-bit 44.1KHz Compact Disk quality audio.
   (h) Battery operation with low-power sleep and standby modes.
   (j) Public address capability, microphone included.
   (k) Water-tight enclosure with storage area for microphone and accessories.
   (l) Lightweight Design, Rugged enclosure.
   (m) Operates in severe climate conditions of -40ºF to 140ºF.

4. **Country of Origin.** Lockheed Martin ,UK. Used by British forces.

5. **Relevance.** System uses very innovative approach.

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Training and Training Technology Battle Lab

1.   **Name.** Training and Training Technology Battle Lab

2.   **Introduction and Specifications.**and Training Technology Battle LAB (T3BL) is aggressively pursuing training into the 21st Century with an addition to the current facility that will provide and integrate the most current training devices and strategies in the Army.

3.   Phase I of the construction was the Synthetic Theater of War (STOW) hub and was completed in 1999. A STOW hub delivers the virtual and constructive capabilities to link multiple locations that have the capabilities to connect unique and varied simulators and simulations. Phase II construction was fully funded in the 1999 budget and construction will begin in the fall of 2000. It will encompass six night fighting lanes, a Close Combat Tactical Trainer bay to accommodate an Abrams and Bradley Company suite and a Fire Support Combined Arms Tactical Trainer (FSCATT) bay, and eight multimedia classrooms.

4.   L Training Branch conducted testing and evaluation on numerous Training Aids, Devices, Simulators and Simulations (TADSS) during 1999. The goal continues to be the integration of the live, virtual and constructive training domains to maximize training opportunities for all Reserve Component units.

5.   1998, a Battle Focused Training Exercise (BFTX) was conducted with 2-113th Infantry from July 25 to August 8 at Fort Dix to validate the Battle Focused Training Strategy (BFTS). This strategy was conceived and developed by T3BL and was the basis for this training exercise. In 1997, this training was conducted as an experiment to validate the principal strategy. Platoons conducted scenario-based maneuver training (lanes training), company commanders and battalion staff rehearsed the Battalion's Selected Course of Action in the constructive environment and the final operation was executed both constructive and live. The entire BFTX capitalized on operating in live, virtual and constructive training environments. T3BL Battle Staff Training Branch assisted the unit in battalion staff training on the Janus Constructive Simulation. As a result, the BFTS was further validated as an effective training method.

6.   lab developed a Weapons of Mass Destruction (WMD) emergency response scenario utilizing Spectrum and Janus constructive simulations. Each simulation database was manipulated from its military application to that of a civilian emergency response. Spectrum provides the situational events and Janus the ability to execute response actions. These two simulators are used to train emergency responders and Emergency Operation Centers. A joint simulation exercise demonstration was presented on November 14, during the FEMA Region 2, WMD Conference held at the T3BL. Efforts to coordinate and schedule exercises with these simulations for local, county, and state emergency response personnel continue.

7.   1999, expanding upon the successful Battle Focused Training Strategy, the T3BL developed the Field Artillery Enhanced Training Experiment (FAETE) that

fully integrates the live, virtual and constructive training environments. FAETE revolved around a constructive battle being fought on the JANUS simulation by the 50th Brigade, 42nd Infantry Division, with the Brigade Tactical Operation Center (TOC), along with two maneuver Task Force TOC's live in the field. The 3- 112th Field Artillery provided direct support artillery to the brigade from live and virtual firing positions. FAETE was planned as an experiment to train Field Artillery units at the level organized by optimizing the capabilities of live, virtual and constructive training environments. The key element of FAETE was the use of a constructive simulation, FIRESIM XXI, which was developed at the Depth and Simultaneous Attack Battle Lab at Fort Sill, OK. During FAETE, FIRESIM XXI was the integral component in creating a STOW environment, which linked the live fire support Command, Control and Communications systems of the FA Battalion with a Distributive Interactive Simulation compliant version of JANUS. The experiment was conducted from July 10-24 at Fort Dix, and was a resounding success. This experiment yielded a training strategy that will enhance training for all Field Artillery units by providing an environment to conduct multiechelon training under the "train as you fight" principle.

8.   T3BL's Civil Support OPS Group conducted a Weapons Of Mass Destruction exercise for the Burlington County Emergency Operations Coordinator and his staff on August 28. This exercise was designed to replace a "Table Top" exercise using computer simulation as the training driver, which supported the EOC Staff and supporting organizations in the county. It was stressed to the county that this was their exercise and the computer was another tool. The planning for the exercise began 4 months earlier and included a Familiarization Exercise conducted on July 24. The exercise was executed in three phases: Alert and Response, Incident Mitigation, and Recovery. County and Township participants included representatives from the police, SWAT, fire, EMS, HAZMAT team, and Health.

Field Artillery Team

9.   1998, the Field Artillery Team provided the expertise for the Fire Support Combined Arms Tactical Trainer(FSCATT) user test conducted at Fort Sill, OK. The team was also developing the Field Artillery Enhanced Training Experiment (FAETE) and a STOW which was to integrate live, virtual and constructive training in July 1999.

10   In 1999 the Field Artillery Team provided Subject Matter Expert (SME) support to Raytheon in Orlando, FL, assisting in the development of the FSCATT. The Battle Lab received two of the half million dollar devices in February. They also have worked closely with Fidelity Technologies enhancing the Guard Unit Armory Device Full Interactive Simulation Trainer (GUARDFIST) II and IIA, which trains forward observers on how to call for fire. The FA Team also utilized the technology of the Digital Systems Test and Training Simulator (DSTATS), and linked DSTATS with GUARDFIST II/IIA. As a result of their expertise, NGB-ART requested a training strategy for ARNG utilization of the DSTATS.

Armor Team

11   In 1998, the Armor Team provided instructor support to Region A Total Army School System (TASS) for the accreditation of the Armor Crewman Reclassification Course. They also performed as Subject Matter Experts advising Region A TASS on the Abrams Full Crew Interactive Simulation Trainer (A-FIST) and developed its initial inclusion into the Program Of Instruction for the Armor Transition Reclassification Course. A-FIST's inclusion into the instruction program was approved by the Fort Knox Armor School.

12   In 1999, the Armor Team continued work on the Abrams Full Crew Interactive Simulator Trainer (AFIST), an M1 tank full crew simulator. As the Guard SME on the AFIST, the Armor Team has been working with NGB on recommendations to network the AFIST device to conduct platoon level training. Their current mission will be ensuring that various armor simulations are PC compatible.

Infantry Team

13   In 1998, the Infantry Team continued efforts to refine small arms TADSS and integrate them into weapons training strategies. One device in this arena is an electronic laser-sensored replica of the Army's Alternate Course (Alt. "C") rifle qualification target. This past summer the Alt. "C" device was subjected to initial user and preliminary beta testing at the T3BL as part of an ongoing joint effort between the National Guard and Army Reserve. The device, manufactured in New Jersey by Robotec, could well become a standard means of rifle qualification throughout the active and reserve components of both the Army and Air Force. The Infantry team also conducted two Heavy Anti-armor Weapons (HAW) Leaders Courses at Fort Dix for the Egyptian Army. The courses focused on the tactical employment of the TOW HAW and were developed and customized in-house by T3BL training developers.

14   In 1999, the Infantry Team continued testing and evaluation on the Engagement Skills Trainer (EST); a laser operated small arms and crew served weapons firing simulator. They also worked with BEAMHIT America on their laser operated small arms simulators the BeamHit 2000, BeamHit Blazer and the BeamHit 25 meter Alternate Course C (Small Arms Qualification). In addition, the Infantry Team wrote a capabilities study, as directed by NGB, for the BeamHit 2000 simulated infantry trainer.

Regional Training Site – Maintenance (RTS-M)

15   The Regional Training Site – Maintenance (RTS-M) at Fort Dix has a key role in the overall TASS to provide wheel and track vehicle maintenance training to Army forces located in the Northeast region. Training is provided on primary Army systems such as the High Mobility Multi Purpose-wheeled Vehicle, Palletized Loading System, Bradley Fighting Vehicle, Abrams M1 series of Main Battle Tanks, recovery operations, logistical training, and Non-Commissioned Officers Educational System (NCOES).

16   During 1998, the RTS-M trained 400 soldiers in maintenance and leadership skills. The NJ RTS-M was one of the top rated RTS-M's in the entire nation. Following 1997's success as the first RTS-M to provide Distributive Learning (DL), the RTS-M is currently developing DL programs that will have a direct impact on readiness. In September 1998, the RTS-M began broadcasting readiness ordnance courses to twelve states. The RTS-M, with funding from both the NJARNG and the National Guard Bureau, has created a state-of-the-art mechanist and welding facility. The RTS-M is one of only three Army facilities in the entire nation capable of training and qualifying national guard, reserve, and active duty soldiers in the Military Occupation Specialties (MOS). Following an evaluation by the Combined Arms Support Command from Fort Lee, the RTS-M was accredited and certified to provide MOS-Q and NCOES instruction to soldiers under the TASS.

17   The successes of the RTS-M during 1999 included training over 350 soldiers in maintenance and leadership skills, the first RTS-M to provide distributive training (Distance Learning) to several sites at once, assisted the Combined Arms Support Command at Fort Lee to develop, test and validate emerging Total Army School System Courses. The RTS-M has been assigned the Army wide mission under Total Army School System (TASS), to train Welders (44B) and Mechanists (44E MOSQ and NCOES) in all 7 Regions of TASS.

18   In 1999, virtual, Live and Constructive (VLC) Training Environments for Maintenance, a concept for training future maintenance technicians, was evaluated at the T3BL. This evaluation was conducted under an Army Concept Evaluation Program sponsored by the Army Training and Doctrine Command in Washington, DC. The study did prove, with the help of many New Jersey National Guard soldiers, that integrating the VLC domains can provide quality training at a reduced cost.

19   The Battle Lab and RTS-M, in concert with NGB and Security Assistance Training Field Activity, has further extended its responsibilities, by training International Military Students on operations, maintenance, and employment of the M60A3 Tank and M109A5 Howitzer. Two groups of Greek students were trained during 1999.

20   The T3BL has played an integral part in the development of Distributed Training Technology's during 1999. T3BL advises and assists in developing and implementing DoD learning technology policies and standards to ensure interoperability and effectiveness of advanced learning products and processes. The T3BL serves as a focal point for developing, coordinating, and applying distributed training technologies. The Lab promotes collaboration between federal, state, and local government activities, as well as with industry and academia, on all aspects of learning technology.

21.   **Country of Origin.** USA. Usage data as above

22.   **Relevance.** System uses very advanced concepts for theatre levell training.

Combined Arms Tactical Trainer(CATT)

1.   **Name**. The Combined Arms Tactical Trainer (CATT)

2.   **Introduction and Specificatios.** The Combined Arms Tactical Trainer (CATT) facility is a networked suite of simulators designed to replicate the interiors of armoured vehicles, for example, Challenger main battle tanks, Warrior armoured fighting vehicles and Scimitar light tanks. The facility is used to train a variety of army personnel from the footsoldier, going into battle as an individual, through to the brigade commander, who could be responsible for hundreds of lives.

3   CATT is the largest and most sophisticated virtual training facility in the world and because of this has gained a listing in the, "Guinness Book of Records". The simulators are housed in a building the size of two football pitches in Warminster which, in turn, is able to be linked in real-time to a sister facility in Germany. The CATT system enables crews to view a realistic computer-generated world through armoured vehicle periscopes and then fight a battle against a 'virtual foe', also generated by computer. Commanders plan and view the exercise from Battlegroup Headquarters simulators. To make the exercise as effective as possible the system has been made extremely realistic. For example, engines overheat if left idle for too long, repairs are needed if vehicles are damaged and supplies have to be brought up if the battlegroup is to keep fighting. Mobile Infantry commanders can disembark from an armoured vehicle simulator and then climb into a linked 'infantry' simulator to continue the battle 'on foot', exactly as they would do in a live situation.

4   The 'players' in their simulators can fight against other 'players' in simulators or computer-generated forces. They can exercise within a site or between the UK and German sites. Following the exercise the whole 'battle' can be played back for post-exercise analysis. CATT provides more effective training, as current simulators lack the complexities of a modern battlefield and only involve small parts of a battlegroup rather than a whole formation.

5   The benefits of the CATT system are numerous and include:

(a)   Using the latest technology to keep front-line troops trained to the required high levels of operational effectiveness, reducing pressure on training land, the defence budget and the environment.

    (b)   Being complementary to both army skills training and field training

(c)   Providing a realistic level of manoeuvre and procedural training in an unconstrained virtual battlefield

(d)   Allowing all arms of service (ie. infantry and cavalry etc) to train in the same environment

(e)   Allowing better and more effective preparation for future training in the field

(f)   Allowing unprecedented exercise control

6.   **General characteristics / technical performance** The main simulator hall measures approximately 120m x 45m and accommodates 70 combat vehicle simulators,16 generic vehicle simulators, 12 dismounted infantry simulators, plus room for expansion. In addition, CATT can link to simulators on other sites. The technology incorporated into CATT represents the latest developments in areas such as high fidelity graphics, computer generated forces and high-speed networking

7.   **Country of Origin.** The total cost of the programme to date is £238 million. Two training facilities have been constructed; one in the UK (Warminster) and one in Germany (Sennelager). The UK building was completed mid 2002 and the German building in October 2000. The Warminster facility has been in service since May 2002 with Sennelager following a few months later in September 2002.

8.   Lockheed Martin Simulation, Training and Support (LMSTS) is the prime contractor and wholly responsible for the UK system, including the building. This extends to equipment supply, installation and integration for the German system, but the building is the responsibility of the German Construction Agency. Major sub-contractors involved were AMS, SAIC, CAE-Invertron, and for the UK building, Amey.

9.   **International Collaboration.** The CATT system is based on a UK development of the US Army's Close Combat Tactical Trainer. A Memorandum Of Understanding (MOU) between the Defence Procurement Agency and US Department of Defense (DoD) underpinned the CATT development and has enabled technology transfer arrangements advantageous to both MOD and DoD to be put in place. The MOU continues to allow for future bilateral exchange of CATT-like developments between the UK and US programmes.

10.   **Relevance.** System uses very advanced approach.

UNITECH's Scenario-Based Simulations and Exercises

1.   **Name**. UNITECH®'s scenario-based simulators

2.   **Introduction .** UNITECH®'s scenario-based simulators provide users with real-life situations delivered via high-fidelity virtual interactions in a synthetic free-play environment. These "virtual environments" help users maximize the effectiveness of their critical decision-making skills by engaging "real-world" problems and responses. Through computer-delivered exercises, we deliver customized and scalable reality-based scenarios to meet your planning, training, and diagnostic program objectives.

3   For example, the FAA is applying our scenario-based simulation expertise to the HOST Proficiency Tool. We developed a Web-based solution that enables National Airspace System Operators at FAA field facilities to experience and increase their proficiency with various outage scenarios.

4   UNITECH® also integrates new and upgrades existing simulator and training devices. This includes incorporating improved or new databases for more robust and accurate representations of actual conditions as well as implementing significant hardware upgrades.

5   For example, we build stand-alone training systems like the Small Arms Marksmanship Simulation Suite (SAMT) for the U.S. Navy, appended training systems like the Light Armored Vehicle Full crew Interactive Trainer (LAV-FIST) for the U.S. Marine Corps, and embedded training solutions including the Tank Weapons Gunnery Simulation System (TWGSS) After Action Review System, also for the Marines. UNITECH® also provides modernization of existing trainers and simulators. The Precision Gunnery Training System (PGTS) for the Marines and the F-14 flight simulator visual system upgrade for the Navy are examples of successful modernization efforts.

6.   **Specifications.**

   (a)   synthetic free play environments.
   (b)   Scenario based.
   (c)   Networked.
   (d)   Based on real world problems and responses
   (e)   System provides:-
        (i)   Instructional Systems Design, Analysis and Evaluation
        (ii)   Advanced Distributed Learning
        (iii)   Performance Support Tools
        (iv)   Scenario-Based Simulations and Exercises
        (v)   Emergency Response Training
        (vi)   Learning/Training Environments
        (vii)   Learning Technology Integration

7.   **Country of Origin.** USA. Scenario-Based Simulators and Trainers have been supplied to the Department of Defense, the FAA, and key government contracting partners.

8.   **Relevance.** Systems use very innovative approach.

Area Weapons Effect Simulator (AWES)

1.   **Name.** Area Weapons Effect Simulator (AWES).Force on Force Simulation

2.   **Introduction**. Under a 1998 contract with the United Kingdom Ministry of Defence, prime contractor Cubic launched AWES in the U.K. last December, and is scheduled to complete the Canadian portion of AWES by August 2003. Cubic's defense segment has already installed electronic equipment in exercise control, logistics support and communications facilities for the AWES system at the British Army Training Unit Suffield (BATUS) site in Alberta, Canada. The company also delivered 100 percent of the required individual and vehicle combat training systems equipment to Canada, completed all required integration and formal testing, and is in the initial stages of overall AWES system trials there.

3.   AWES is the exercise control, position tracking and area weapons indirect-fire effects portion of the British Army's Enhanced Tactical Engagement Simulation (TES) system, a training system with features not found in any other combat training system in existence today. The other two elements of Enhanced TES are Cubic's Multiple Integrated Laser Engagement System (MILES) laser-based combat training system, Cubic's Direct Fire Weapons Effect Simulation (DFWES) system for dismounted players, and Saab's DFWES system placed on armored and other military vehicles taking part in exercises.

4.   **Specifications.**Here's how the system works: At both TES sites, at the Salisbury Plain Training Area in the U.K. and BATUS in Canada, British Army soldiers participating in live force-on-force training exercises are equipped with helmet arrays and vests studded with laser detectors, and weapons mounted with laser transmitters. The soldiers' laser transmitters fire laser pulses at targets upon detection of the detonation of blank rounds during simulated battles. This action is completely transparent to the firer. These direct-fire laser bullets are used to simulate the direct-fire casualty effects of each soldier's target engagements on the battlefield.

5   The AWES system tracks each participant's and vehicle's position location with GPS technology while recording their weapons engagements, including "hits," "misses," "kills" and shooter-to-target pairing for after-action reviews.

6   What sets AWES apart from all other systems in use today is its integration of a wider array of weapons effects into combat training exercises that stretch beyond small arms and vehicle weapons direct-fire effects. These new simulated weapons effects include artillery, mortar fire, smoke, nuclear, biological and chemical attacks, mines and air-delivered munitions. Natural and manmade obstacles can also be presented as real constraints on maneuver, allowing greater realism.

7   "The Enhanced Tactical Engagement Simulation (TES) is the first ground combat training system to fully integrate such a wide array of threats," said Phil Heltman, vice president and general manager of Air, Land and Joint Combat Training Systems for Cubic Defense Applications (CDA). "Enhanced TES training will be invaluable to British soldiers training in both the U.K. and Canada to meet the challenges of 21st century warfare, and Cubic is proud to be part of that training." The Cubic Defense Applications group, one of Cubic's two major segments, provides realistic combat training systems for military forces as well simulation training, force transformation assistance, educational services, operations & maintenance, and manufacturing services. The group also supplies products and systems for C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance & Reconnaissance) applications, search and rescue avionics and radio communications for military and civil markets. The corporation's other major segment, Cubic Transportation Systems, designs and manufactures automatic fare collection systems for public mass transit authorities

8.   **Country of Origin.** Cubic-Developed Area Weapons Effect Simulator (AWES) Operational in United Kingdom, Nearing Completion in Canada.

9.   **Relevance.** System uses very advanced approach.

HIDESS

1.   **Name**. HIDESS **The Ultimate in Electronic Warfare Simulation**

2.   **Introduction**. Cubic's high-performance Electronic Warfare (EW) Simulators provide an accurate and cost-effective means to test electronic airborne systems against real-world radar threats. Used for operator training and receiver testing, our family of High Density Simulation System (HIDESS) products generate radar threats identical to those that U.S. forces and allies would face in actual combat.

3.   Cubic's EW simulators produce multiple radar signals -- including surface-to-air missiles, air-to-air and air-to-ground threats -- in real-time, dynamic scenarios. The signals are injected into an aircraft's actual radar warning receivers and flight software to test the aircraft's ability to effectively handle various radar threats. The simulators are also used to train operators to recognize multiple signals, including hostile, neutral and friendly radar signals, in a constantly changing threat environment.

4.   The simulators preserve the actual characteristics of both the radar signal and operational environment to provide the highest level of fidelity and realism possible. The systems' unique design provides a clear replication of the signals with minimal   RF   noise   output.

5   The use of individual time clocks for each signal preserves the asynchronous nature of the threat environment - in real time. Signals are generated using the same basic frequency timing clock as the radar that is being emulated, providing unprecedented realism.Cubic's EW simulators are modular in design with easy to use, reprogrammable software that can be readily customized to meet future needs. The products can emulate standard radar, pulse Doppler (including ICW) or continuous waveform signals

6.   **Specifications.** The Cubic EW product line is available in three configurations:

a) <u>The Standard HIDESS</u> (Model 8207) for the complete EW facility
b) <u>The TESTER</u> (Model L8802), a desktop system for laboratory use
c) <u>The Attaché</u> (Model P8801), intended primarily for portable use

Together, the products address the full range of customer needs, and may be modified or used in combination to meet individual customer needs.

7.   **<u>Realistic threat environments</u>** The fidelity of the EW environment produced by HIDESS ensures that the aircraft's equipment is tested under the same conditions that pilots will encounter in combat. The key characteristics of both the simulated radar signal and total environment are preserved.

8.   **<u>Signal syncronization</u>** HIDESS features unique separate clock generators for each produced signal, which allow replication of the "real world" EW environment. This is made possible with the use of individual timing generators for each radar system. Even if two radar systems are considered "identical," the manufacturing differences of the two systems will cause a slightly different timing pattern.

9.   To preserve this asynchronism as seen in the real world, the system must generate the signals on separate clocks. Where multiple beams of a threat have the same timing reference, the HIDESS architecture allows multiple signal sources to be synchronized to the same clock. Complex signals such as pulse Doppler radar signals, including any ICW components and scan synchronization, are easily generated by the system.

10   **<u>minimal rf noise output</u>** A unique RF module design ensures a very low-level of RF noise output. This provides additional usable dynamic range for testing sensitive, high dynamic range receiver systems

11.   **<u>Advanced software</u>**   At the heart of the HIDESS product line is the advanced software package, Escape2000. The Escape2000 signal generation and simulation control software operates on a Pentium-based personal computer system utilizing Windows XP operating system. Escape2000 allows the user to create a signal database that can be used in many different tests or scenarios.

12   All user entries - including beam descriptions, pulse patterns, scan patterns, scan definitions and frequency agility patterns - are stored in a commercial database. These definitions are then available to the user to build the scenarios and test sequences that are required. With advanced ProClock circuitry, even the Doppler effect on the pulse intervals and pulse widths can be replicated

13.   **<u>Country of Origin</u>**. UK. Cubic-Developed HIDESS is Operational in United Kingdom.

14.   **<u>Relevance.</u>** System uses very advanced approach.

Web Update (FATS)

1   FATS inc. has produced small-arms training systems since 1984. Started by former Formula One world champion Jody Scheckter, the company has grown from his garage to one of the largest small-arms training companies in the world with subsidiaries in Canada, the UK, Australia, Singapore and the Netherlands. FATS first customer was the US Postal Service. Those original systems, designated FATS 1s, were basic 'shoot/no shoot' trainers utilising video-based scenes and stand-alone wireless weapons with no recoil. Many of those original systems are still in use and although crude by today's standards, they have been important to the training of thousands of US Postal Inspectors.

2   Today FATS has fielded more than 5,000 training systems worldwide. Those systems span over five generations of FATS products and are used in training from Opelika, Alabama to the United States Marine Corps and can be found on every continent.

3   In its approach to meeting the training needs of many different customers, FATS has employed some of the best weapons training experts available. Over the years its team of training developers has been involved in every aspect of the business from marketing to the installation and training of its systems. By ensuring that engineers and management never lose sight of the customer's training needs, FATS has been able to create some of the most unique and comprehensive training systems available. Its ability to 'speak and understand the language of training' is one of its strongest qualities and has often been the deciding factor for customers. The core platform for FATS is the small arms trainer (SAT) 300D (D for digital). The title small arms trainer could be considered a misnomer as a 300D system is fully capable of linking all elements of the ground combat team into a single combined arms package. Available training features of the system include basic and advanced marksmanship, judgmental situational training, less than lethal training, artillery, mortar and naval gun fire support training, closed loop mortar crew training, terminal attack control of close air support training, detailed fire planning, as well as distributed mission training between systems and constructive and live simulations.

4   Modular in design, the system can also be physically configured to meet deployable training needs and or purpose-built static training sites. While one customer may have a need to build a facility to train 50 soldiers at a time, another may require a portable system that can easily be transported from training site to training site via a station wagon while training only one to four individuals at a time.

5   FATS produces more types and quantities of simulated weapons than any other manufacturer with over 250 different types of simulated weapons hand crafted in its weapons shop. Weapons as large as 120mm mortars to hand guns as small as the Markarov 9mm pistol, are all designed and manufactured there. Taking an actual live weapon, its team of engineers and designers modify the weapons for use on the simulator.

6   Each weapon has recoil provided by CO2 and accepts the loading of simulated ammunition. Each weapon has the ability to monitor such functions as trigger squeeze, cant angle, safety position, butt pressure, barrel position and simulated ammunition status, all in the restrictive confines of the original weapon frame.

7   Exotics such as the Australian Styer Aug, are de-milled and remanufactured alongside the RPG 7, the MK-19 automatic-grenade launcher, and even the Singaporean designed SAR-21. FATS' knowledge of how to create high quality fully functioning simulated weapons correct in every aspect of form, fit and function that stand up to the rigours of daily weapons training sets it apart. FATS currently holds numerous patents on its weapon designs and produces annually approximately 4,500 simulated weapons.

8   As the role of today's combat soldiers and law enforcement professionals grow, so does the need for training. FATS continues to look for new ways to apply technology to meet those new training requirements while continuing to improve and maintain existing products. Customer support has moved to the forefront of its business model as it seeks to provide accurate and timely support to thousands of systems fielded around the world. A good example is the extensive work FATS has done with Close Air Support and Forward Air Controller Training.

9   It will continue to replicate and produce simulated weapons making use of new wireless and micro valve technologies. Distributed training and integration with other simulation systems as well as creating squad-level virtual reality mission rehearsal systems are all strong players in the role of FATS in the simulation industry.

Web Update (FATS)
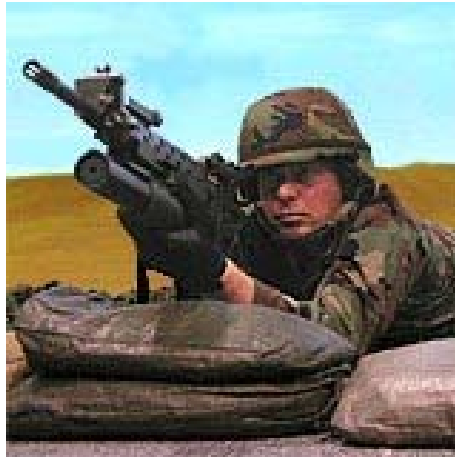
1.   U.S. Air Force School Boosts Training Program with New FATS System. Air Ground Operations School Equips Airmen with Integrated I-FACT.

2.   **SUWANEE, Ga. - October 30, 2003 -** The United States Air Force (USAF) Air Ground Operations School has upgraded its airmen training regimens by implementing the new Indirect Fire-Forward Air Control Trainer (I-FACT) simulation system from Firearms Training Systems, Inc. (OTC: FATS).

3.   The I-FACT, which FATS developed with partner SDS International, is the first commercially available system designed to train ground controllers in the tactics, techniques and procedures necessary to conduct successful joint close air support operations. A software-based training solution, it supports laptop-based operation through classroom and domed screen events, as well as deployed training.

4.   At the USAF Air Ground Operations School at Nellis Air Force Base in Nevada, the I-FACT system will be used in the Joint Firepower course, Tactical Air Control Personnel course, and Air Liaison Officer course.

5.   **Features and benefits of I-FACT include:**

   (a)   Incorporates both Virtual and Pilot-In-the-Loop Close Air Support training.
   (b)   Supports Joint Forward Air Control training objectives.
   (c)   Fully supports Joint Close Air Support, Joint Forward Observer and Universal Observer Training.
   (d)   Expandable to include FATS simulated weapon training.
   (e)   Expandable to include networking to actual aircraft flight simulators.
   (f)   Can be a part of a HLA/DIS distributed training network via LAN or WAN.
   (g)   Can be included in constructive and/or live simulation training events.
   (h)   Provides centralized control of all training areas: selecting and starting training, monitoring student status, performance during training.
   (j)   Replays and displays the training for after action reviews.

6.   FATS, Inc. CEO Ron Mohling said, "When the finest air force in the world depends on our simulation systems to train its airmen, there's no doubt the product is first-rate. Everyone at FATS is proud of the superior product that has resulted from our partnership with SDS International."

7.   FATS exhibited the I-FACT at the Field Artillery & Joint Fires Conference in Ft. Sill, Okla., Oct. 20-24. It will also be demonstrated at the Interservice/Industry Training, Simulation & Education Conference in Orlando, Fla., Dec. 1-4.

8.   Firearms Training Systems, Inc. (OTC: FATS) designs and sells software and hardware simulation training systems that improve the skills of the world's military, law enforcement and security forces. FATS's training systems provide judgmental, tactical and combined arms experiences, utilizing company-produced weapons and simulators. The company serves U.S. and international customers from headquarters in Suwanee, Georgia, with branch offices in Australia, Canada, Singapore, Netherlands and United Kingdom. FATS, an ISO 9000 certified company, celebrates its 20th anniversary in 2004.

Noptel Oy The Optical Shooter

ST-2000 series products

1. **Name**. ST-2000 products

    (a) **ST-2000 Sport - for indoor training**

Noptel ST-2000 Sport is advanced, environment-friendly and safe shooting training device. You can practice shooting and analyse your technique precisely whenever and where-ever you want. At a shooting range or at your home, alone or with your trainer or fellow marksmen.
The optical unit is attached outside the gun barrel and connected to a PC´s serial interface with a cable. The whole shooting process may be observed on the computer screen real time.

    (b) **ST-2000 Marksman - for short and mid-range practising**

Noptel ST-2000 Marksman device is designed to be used in ranges from 3 m to 150 m. Marksman is meant to be used mainly indoors, but can also be used outdoors under moderate conditions. Several (1-16) shooters can be connected to ST-2000 Marksman -device. With the help of a PC the instructor can observe the training of a single shooter or the whole group throughout the whole training period.

(c)   **ST-2000 MilTrainer - for indoor and outdoor use.**

Noptel ST-2000 MilTrainer is a new generation shooting training device, which makes it possible to observe the training of one or more shooters simultaneously, indoors or out of doors. Up to 16 shooters can be connected to a single PC.

(d).   **<u>ST-2000 Sniper - for long range shooting</u>**

Noptel ST-2000 Sniper is designed to be used for long range shooting training and analysis in genuine environment. The operating principle is the same as that of Noptel ST-2000 Sport and several shooters can be connected to one computer.

(e)   **ST-2000 Pistolman - built inside of a handgun**

ST-2000 Pistolman is built inside of a service pistol (9 mm) and it operates exactly like Noptel ST-2000 Sport. H&K, Sig Sauer, Beretta, Makarov or similar can be used as the gun. Several users can be connected to the same PC simultaneously.

2.   **Introduction**. ST-2000 MilTrainer is a marksmanship training and analysis device designed to be used outdoors. The real shooting distance is from 10 to 300 meters. 1-16 shooters can be connected simultaneously to one PC. The instructor can easily monitor the training of a one single shooter or the whole group. Concurrent use of blanks and live fire is also possible

3   Noptel Oy is the worldwide pioneer in the manufacture of optoelectronic shooter training and analysis systems and has supplied systems to 50 countries in every continent of the world. A great deal of experiment and scientific evidence has been gathered to prove the efficiency of Noptel training systems compared to the conventional methods. In the picture above is Juha Hirvi with a Noptel ST-2000 Sport fitted onto the barrel of his personal gun. Juha Hirvi is silver medal winner of Sydney 2000 Olympic Games. The first military customer was naturally the Finnish Defence Forces. The co-operation started in the middle of 1980's and continues from year to year.

3   The ST-2000 series products consist of three basic parts:-

(a)   An optical unit attached to the gun

(b)   An RS box for a computer interface and a reflective target.

4   The Noptel ST-15 Defender, the Noptel ST-21 Fighter and the Noptel ST-11 make it possible for the trainee to practice basic shooting skills at real distances indoors or outdoors under all imaginable weather conditions.

5   **Training Efficiency**

(a) improved training results (better understanding of shooting techniques) - > self-confidence in combat
(b) savings in time (quick understanding of problems, no real ranges required)
(c) savings in money (ammunition, organisation)
(d) simulated training indoors allow all-weather training
(e) increased training motivation (modern hi-tech products)

6.   **Specifications.**

(a)   Uses multitude of wpns
(b)   An extremely accurate weapons training system.
(c)   Real weapons are used
(d)   Compressed air used for recoil
(e)   **Length:** 110 mm ,**Width:** 79 mm, **Height:** 33 mm
(f)   **Weight:**device: 230 g, with the clamp: 395 g
(g)   **Operating   temperature:**
        Optical   unit: -20°C-+50°C
        RS-box: 0°C-+50°C

7.   **Country of Origin.** Finland. Used by the Finnish Defence Forces and about 50 other countries.

8.   **Relevance.** The study of this system provides useful information on advanced infantry wpn sml of the future.

Noptel ST-2000 Sport
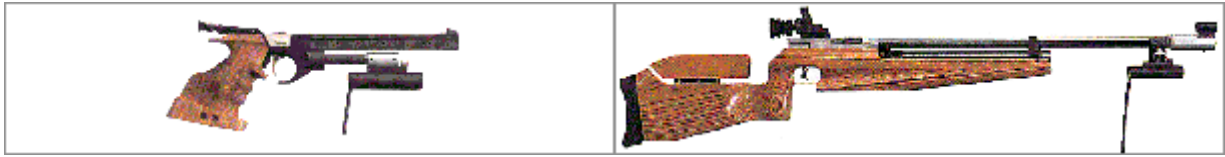
1.   **Name**. Noptel ST-2000 Sport

2.   **Introduction** Noptel ST-2000 Sport is a proggressive, environmentally acceptable, safe training system for shooters which allows high precision analysis of technique anywhere and at any time: at the shooting range, at home, alone or with one's coach or training companion. The system will help you to improve your own skills as a shooter by practicing just those things that make the most difference. You can <u>analyze</u> your own performance and discover the reasons for your mistakes.

3   Noptel ST-2000 Sport will give you an answer to the perpetual question: Why did the shot go where it did?

4   **Fits onto your own gun** The transmitter/receiver is a small unit (=Optical unit) which is fitted onto the shooter's own personal gun and linked by a cable to a computer. This allows the whole shooting process to be viewed in real time on the monitor. ST-2000 Sport - Optical Unit fitted onto the barrel of the gun.

5   **Noptel ST-2000 Sport** provides clear, unprejudiced information on the effects of the shooter's hold, aim and trigger control on the resulting shot. The range of information provided by the device adds efficiency to training sessions and makes it easy to arrange exciting competitions almost wherever you want. The system is simple to extend for use by several shooters simultaneously, and colour displays can be arranged for the public by means of monitor and video screens.

6   **Noptel ST-2000 Sport** is easy to use. The gun can be zeroed quickly and accurately with the help of the computer, and the shooter is free to concentrate entirely on the shot, as the computer performs the measurement and storage operations automatically. The program is informative and user friendly in every way.

7   The target used with **Noptel ST-2000 Sport** is conventional in appearance but is fitted with a reflector. No electric current or wiring is needed, and it can be placed wherever you want. A number of shooters can aim at the same target simultaneously. ST-2000 Sport - Targets

8   The software provides a detailed, comprehensive analysis of the shooters' performance and allows him to follow his own development by comparing his scores with previous ones or with those of his competitors.

9   **Noptel ST-2000 Sport** is quick to assemble and requires very few cables and no separate power supply is needed.

10   The system consists of the following devices:

      (a)   Optical unit, product number: A-101 (transmitter and receiver)
      (b)   RS Box, product number: A-102 (control unit)
      (c)   Computer
      (d)   Target

11   **Noptel ST-2000 Sport** is plugged into the serial port of the computer. With optional PCMCIA/RS adapters (PC Card) a further <u>1-2 shooters</u> may be connected to a portable computer. For <u>more users</u> the system requires the installation of a bus card and the necessary connectors in the computer.

12   **<u>Advantages for the shooter</u>**

      (a)   Full evaluation of performance
      (b)   Monitoring of the aiming trajectory
      (c)   Hold, aim, and trigger control statistics
      (d)   Easy to use
      (e)   Simple construction
      (f)   Excellent software with clear graphics
      (g)   Accurate and reliable
      (h)   Small and light
      (i)   Easy to move from place to place
      (j)   Free choice of shooting distance
      (k)   Also moving targets
      (l)   Adaptable for monitoring several shooters at once
      (m)   Safe and environmentally acceptable

13.   **<u>Specifications.</u>**

    (a)   Shooting distance
      (i)   3-100 metres

    (b)   Guns
      (i)   Practically all air guns and firearms

    (c)   Optical unit
      (i)   Includes both transmitter and receiver, weight 85 g
      (ii)   Length 100 mm, width 40 mm, height 22 mm
      (iii)   Attachment, typical weight 30 g - 50 g (depends on gun)
      (iv)   Cable, weight 40 g/m

    (d)   Environment
      (i)   Ambient temperature 0 ...+50 °C

    (e)   Power supply
      (i)   Input via serial port and battery in RS Box

          (ii)   No separate power supply required

(f)   **Computer**
       (i)   Minimum: 486 PC, MS-DOS 6.X, 4 MB RAM, Noptel NOS 3.0
       (ii)   software (MS-DOS version).
   (iii)   Recommendation: Pentium PC with Windows95 or Windows98, <u>Noptel NOS 4.0 software.</u>
       (iv)   1 free serial port per optical unit

14.   **<u>Country of Origin.</u>** Finland. Used in Sydney 2000 Olympic Games

15.   **<u>Relevance.</u>** The study of this system provides useful information on advanced infantry wpn sml of the future

Web Update: NOPTEL - SHOOTER TRAINING SYSTEMS

1.   Noptel specialise in the design and manufacture of innovative optoelectronic products based on distance and position measurement. Our products are divided into two main categories: shooter training systems and measurement systems for industry and defence forces. Since 1982 Noptel have supplied products and systems to more than 50 countries. Today, the number of delivered shooter trainers exceeds 5,000.
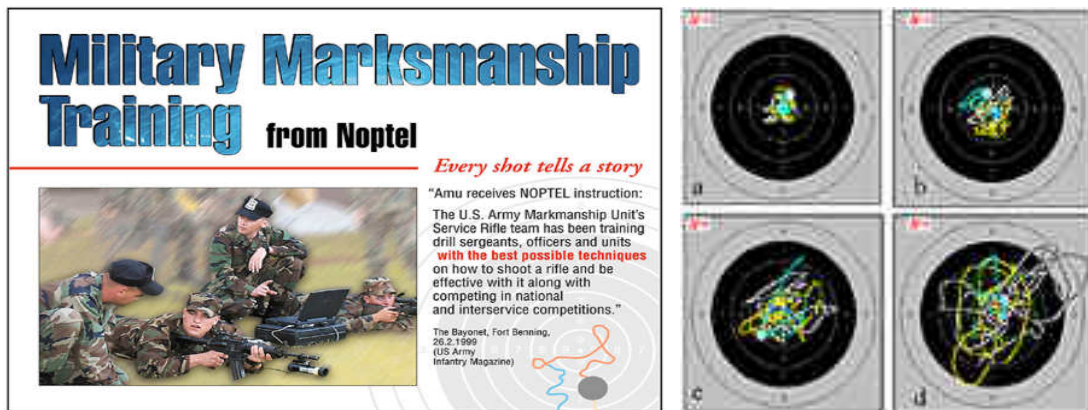
'The US Army Marksmanship Unit's Service Rifle team has been training drill sergeants, officers and units with the best possible techniques on how to shoot a rifle and be effective with it along with competing in national and interservice competitions.'

2   Noptel was the first company to introduce an advanced optical shooter training and analysis system for everyday use, to be used both by sport shooters and professionals alike. Today, Noptel is the leading supplier of marksmanship training systems for outdoor use in the world.

3   The system is based on simple and reliable gun units that can be mounted easily and quickly to almost any gun under or above the barrel. The user can use his own service rifle for training as no modifications are needed.

4   The systems are meant for training:

(a) Marksmanship shooting
(b) Pop-up target shooting
(c) Small scale combat
(d) Anti-terrorist actions

5   And for every possible use:

(a) Pistols / Rifles / Anti-tank weapons
(b) Indoor / Outdoor
(c) Short range / Long range
(d) Standing targets / Moving targets
(e) Dry training / Blanks / Pneumatic operation

6   **Marksmanship** training When using Noptel's ST-2000 series analysing and training products you can forget all the guesswork normally related to shooting skill evaluation. We have raised skill analysis from the level of mere opinion to one of qualitative knowledge**.**

7   The Noptel ST-2000 products accurately measure the gun orientation path on the target surface both before and after the shot as well as recording the shot itself. This path indicates how the shot was generated.A skill analysis may be carried out using graphical presentation, numerical statistics or both.

8   **Field training** The trainer is a standalone unit without cables and works with a standard battery. Mounted on the barrel it can be used for shooting the targets (standing, pop-up and combatant) from any distance and the shooter gets the hit indication by a LED or beeper. The target recognises the hit or near-miss from the separate hit-signal. System is easy to set-up and very suitable for small scale combat and action training.

9   **Noptel miltrainer series:**

(a)   ST-2000 Marksman is an indoor marksmanship training and analysis device for pistols and rifles. The real shooting distance is from 3 to 150m. Dozens of shooting disciplines can be simulated at each real shooting distance used.

(b)   ST-2000 Pistolman is a marksmanship training and analysis device built inside a service pistol (9mm). The real shooting distance is from 3 to 25m. The device can be built into a Beretta, CZ, FN, Glock, H&K, Makarov, Sig Sauer, Walther or similar pistol.

(c)   ST-2000 MilTrainer is an outdoor marksmanship training and analysis device for rifles. The real shooting distance is from 10 to 300m. Several trainees can shoot at a single target simultaneously. Concurrent use of blanks or live fire is also possible. Also a pneumatic system is available to many rifles.

(d)   ST-2000 Sniper is the long range model of the MilTrainer Series. The real shooting distance is from 10 to 600m.

(e)   ST-2000 BigBore is intended to be used for anti-tank shooting training and analysis, for example, up to 500m. The large measurement area (30m @ 500m) makes it possible to shoot with a real lead at moving targets.

(f)   All MilTrainer Series products use the NOS software, which provides versatile features for training and analysis.

10.   **Noptel field training series** ST-15 Defender is a simple training device built inside a service pistol (a Beretta, CZ, FN, Glock, H&K, Makarov, Sig Sauer, Walther or similar). A reflector is used as the target, and its size and form can be freely chosen. The device acts as a hit indicator. A hit is indicated to the shooter either through a sound or a light signal.

11   ST-21 Fighter is a versatile but simple and robust outdoor rifle training device. Concurrent use of blanks is also possible. The Fighter makes it possible to train both the basic marksmanship skills against normal targets and pop-up targets and tactical skills everywhere without large organisational overhead.

Eli-ALFONS

1. **Name.** ALFONS infantry weapons training simulator

2. **Introduction**. Infantry Weapons Training Simulator ALFONS was developed to satisfy the need for cost effective training method for infantry troops. It can be used for wide span of tasks from developing basic marksmanship skills to advanced combat scenarios for small platoons. Up to 12 men ("Alfons 2") can practice simultaneously in a one room. ALFONS uses modified real weapons, equipped with laser modules and sensors. Realistic recoil is provided by unique, internal CO_2 reservoir, eliminating the need for tubes of pressurized air. The modifications do not affect the weapons handling parameters and if removed the weapons can be used for live firing again. Presently the "tubeless" recoil imitation is available for the M14, M16, AKM, Galil ARM and Galil SAR rifles, machine gun MG3 and Glock pistol. The handheld anti-tank weapons include M69 and B300 grenade launchers. New weapons can be adapted on request**.**

3. **Specifications.** The simulator consists of visual system for displaying scenarios and detecting hits, instructor operation station, main and graphics computers, weapons equipped with lasers and sensors and powerful audio system for generating battlefield noise and sound effects.

The visual system uses graphics computer, LCD projector, projection screen and means to detect hits. The software runs combat scenarios and provides realistic target presentation. Several scenarios are provided and additional scenarios can be generated and integrated with the system. Powerful (800 W total power) audio system generates battlefield noise and explosions adding realism to training environment.

The instructor operating station enables to run scenarios and monitor weapon status and shot results of every individual shooter. The combat exercise is recorded and can be replayed and

analyzed. Individual results are stored in the database..

4.   **Country of Origin.** Eli Military Simulation ESTONIA. ELI is the leader of the Baltic countries in developing and producing simulators and training systems for police and defence forces. ELI is located in Tallinn, EstoniaInteractive simulator ALFONS is made to learn to use anti-tank weapons with co-operation infantry small arms. Radio controlled target systems for infantry and sub-caliber anti-tank weapons. ELI Military Simulations created all the mechanical parts of the Estonian Pavilion at the World Exposition EXPO2002

Eli-SIM-4M

1.   **Name**. SIM-4M anti-tank simulator

2.   **Introduction.** The simulator SIM4 is aimed to develop basic skills of operating   light   anti-tank   weapons.
This low-cost device enables to practice aiming and shooting at standing and moving targets.

3   The simulator consists of projector and camera module, computer based instructor operating station and three firing lanes for weapons.

4   SIM4M uses modified real weapons equipped with laser modules and sensors for training. These modifications do not affect the weapons handling parameters and if removed, the weapons can be used for live firing again. Presently the M69, B300, Carl Gustaf and PF89 grenade launchers and 106mm recoilless weapon are available. Precise ballistic data of used weapons are built into the program. Additional weapons can be adapted on request.

5   The speed of the target can be simulated in the 0..50 km/h and the wind speed in the 0..15 m/s range, environmental temperature can be changed in the -5 to 25 C range The instructor operating station enables to monitor weapon status and shot results of every individual shooter during the exercise. The course of exercise is recorded and can be replayed and analysed with trainees. Individual results are stored in the database.

6   The program also enables to learn ballistics and practice aiming without using the weapons. The student can move image of the weapons sight against computer generated image of the armored vehicle, taking into account given target speed and environmental conditions. The result of the "shot" is displayed on the screen. The influence of the speed, wind and temperature to the result is also displayed.

7   The light anti-tank weapons simulator SIM4M device is widely used by Estonian Defense Forces and has proved to be efficient training device with excellent price-performance ratio.

8.   **<u>Specifications.</u>**

(a)   Uses multitude of real wpns
(b)   An extremely accurate weapons training system, Presently the M69, B300, Carl Gustaf and PF89 grenade launchers and 106mm recoilless weapon are available
(c)   SIM4M requires only small room for practice - 7 x 4 m is sufficient. Shooting is performed at 5m distance from the screen. The distances to the target are simulated with different sizes of silhouettes ; 200, 300 and 500 meters   are   available.
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9.   **<u>Country of Origin.</u>** Eli Military Simulation ESTONIA. ELI is the leader of the Baltic countries in developing and producing simulators and training systems for police and defence forces. ELI is located in Tallinn. ELI Military Simulations created all the mechanical parts of the Estonian Pavilion at the World Exposition EXPO2002

10.   **Relevance.** System provides relevant inputs for devp

<u>Eli-M-GOLF</u>

1.   **Name.** M-GOLF mortar simulator

2.   **Introduction**. The mortar simulator M-Golf is intended for field training a mortar team to sight aim and fire in conditions close to real firing. The appearance and the operation of the simulator are identical to that of the real mortar. It uses pressurized CO2 gas for propulsion of special non-explosive rounds. The range is brought down to 1:10 scale enabling to use small training field. Due to innovative construction, the M-Golf has superior accuracy and it is easy and very cost-effective to use and maintain. The actual size of the barrel opening is smaller than that of the real weapon to prevent accidents with live ammunition.

3   Different round types by changing the operating pressure are simulated. Microprocessor-based control unit controls the charging of the reservoir and its pressure. Sighting and aiming are calibrated to simulate an actual weapon. The ballistic tables and wind corrections are used for sighting and aiming as in the case of the real firing. With the 81mm mortar simulator with minimum charge at least 1000 shots and with max charge at least 200 shots can be made out of 1 CO2 gas reservoir. With the 120mm mortar simulator with minimum charge at least 850 shots and with max charge at least 170 shots can be made out of 1 CO2 gas reservoir.

3.   **Specifications.**

   (a)   It uses pressurized CO2 gas for propulsion of special non-explosive rounds.
   (b)   Different round types by changing the operating pressure are simulated
   (c)   Sighting and aiming are calibrated to simulate an actual weapon.
   (d)   Ballistic tables and wind corrections are used for sighting and aiming.
   (e)   Special multi-usable simulation rounds with hardened forepart are used for shooting.
   (f)   In the shell there is specially constructed reservoir for CO2 gas and a container with environmen-tally friendly agent to mark the hit on the ground and to simulate an hit.
   (g)   Use of special purpose microcontrollers for control and evaluation

4.   **Country of Origin.** The mortar simulator M-Golf is used by the Estonian Defence Forces since 1998. ELI is the leader of the Baltic countries in developing and producing simulators and training systems for police and defence forces. ELI is located in Tallinn. ELI Military Simulations created all the mechanical parts of the Estonian Pavilion at the World Exposition EXPO2002

5.   **Relevance.** System uses very innovative approach.

Eli-ANTITANK3
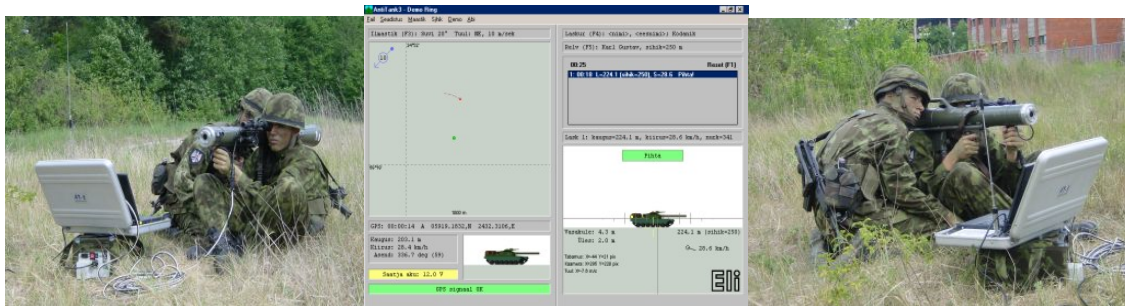
1.   **Name.** ANTITANK3 outdoor simulator

2.   **Introduction**. Portable outdoor infantry anti-tank simulator Antitank3 is designed for cost-effective overall and comprehensive training of infantry anti-tank rocket launchers in natural environment.

3   **Training objectives.** Familiarization of handling anti-tank weapons in real environment. Training of correct execution of every operational task, including Target acquisition and firing training against stationary and moving targets Proper use of sight Evaluation of target speed and distance. Wind effect evaluation

4   **Design and function.** Antitank3 consists of weapon's adapter, target system and operator unit. Operator unit calculates the flight path of the simulated missile and determines hit or miss. The result is immediately displayed on the screen of notebook computer. All events are stored for after-action review.

5.   **Specifications.**

- (a)   Operating range 400 m
- (b)   Lateral accuracy 0,5 mrad
- (c)   Distance accuracy standard GPS accuracy
- (d)   Operating temperature -10…40 oC
- (e)   Antitank3 consists of weapon's adapter, target system and operator unit
- (f)   Uses COTS computers.
- (g)   All events are stored for after-action review
- (e)   Uses actual trajectory data.

6.   **Country of Origin.** The antitank weapons training simulator Antitank3 is used by the Estonian Defense Forces. ELI is the leader of the Baltic countries in developing and producing simulators and training systems for police and defence forces. ELI is located in Tallinn. ELI Military Simulations created all the mechanical parts of the Estonian Pavilion at the World Exposition EXPO2002

5.   **Relevance.** System uses very innovative approach.

Eli-Simulation Mines

1.   **Name.** Simulation Mines

 2.   **Introduction**. Simulation Mines are designed for safe and cost-effective realistic training of infantry and engineering troops to install and detect landmines in natural environment. They also prove to be very useful to bring realistic element to the infantry manoeuvres.

3   **Training objectives**:

    (a)   Installing   mines   and   minefields
    (b)   Landmine   detection
    (c)   Minefield clearing

4.   **Specifications.** Simulation mines are similar in shape and appearance to the real landmines. When triggered, small pyrotechnic charge propels out a cloud of chalk to mark and simulate explosion

Key features

    (a)   Zero safety zone.
    (b)   Realistic handling and appearance.
    (c)   Brings training close to reality.
    (d)   Configurable to various landmine types.
    (e)   Cost-effective solution.
    (f)   Easy maintenance.
    (g)   Environmentally friendly.

5.   **Country of Origin.** The mine simulator is used by the Estonian Defense Forces

6.   **Relevance.** System uses very innovative approach.

Eli-Recoil simulation

1.   **Name.** Recoil simulator

2.   **Introduction.** Unique "tubeless" recoil system from ELI Military Simulations provides automatic recoil for automatic and semi-automatic handguns and gives to the user the realistic feel of live firing. The recoil system can be used with wide variety of simulators as well as for basic weaponry training.

3.   **Specifications.** Instead of traditional tubes of pressurised air the system incorporates liquid CO_2 reservoirs, located in the weapons magazine. It gives to the user freedom of movement, thus significantly widening the area of its use compared to conventional systems.

4   Another advantage of the system is that it can be installed on real unmodified weapons. The modifications do not affect the weapons handling parameters. If needed, the weapons can be converted back for live firing just in few minutes.

5   The magazines can be refilled in seconds and reloading of the weapons is carried out in exactly the same way as in real life. The shot count is at least equal to the magazine cartridge capacity but in most cases exceeds it by factor of two or three. Presently the "tubeless" recoil imitation is available for the M14, M16, AKM, Galil ARM/SAR, UZi automatic rifles and for the machine gun MG3. Recoil imitation is also available for Glock, Makarov and CZ pistol models

5.   **Country of Origin.** The infantry weapons recoil imitation is used by Estonian Defense Forces since 1997. . ELI is the leader of the Baltic countries in developing and producing simulators and training systems for police and defence forces. ELI is located in Tallinn. ELI Military Simulations created all the mechanical parts of the Estonian Pavilion at the World Exposition EXPO2002

6.   **Relevance.** System uses very innovative approach.

Eli-SIM10

1.   **Name**. SIM10

 2.   **Introduction**. SIM10 consists of three target unit blocks. Each block has two built in targets and can be connected with up to 3 weapons. The target senses short laser burst emitted by weapons and determines the hit co-ordinates. Acquired data is sent by serial interface cable to the instructor operating station. The sizes of the targets are simulating standard 500 mm round target at distances 50 and 100 m. The simulators shooting distance is 10 m.

3   SIM10 uses modified real weapons, equipped with laser modules and sensors. Realistic recoil is provided by internal CO_2 reservoir, eliminating the need for tubes of pressurised air. The modifications do not affect the weapons handling parameters and if removed the weapons can be used for live firing again. Presently the "tubeless" recoil imitation is available for the M14, M16, AKM, Galil ARM and Galil SAR rifles and Glock pistol. Additional weapons can be adapted on request.

4   The instructor operating station enables to control the exercise parameters and monitor shot results of every individual shooter during the exercise. The LCD video projector is used to copy the stations display contents to the large screen, enabling every trainee to monitor his own performance. The marksmanship training and analysis uses special IR laser adapter. It enables to acquire information about the shooters hold, aim and trigger control and their effect on the shot result. The device continuously measures and records the position of the aiming spot on an optical target. After triggering this trajectory is displayed on the screen. It is also possible display plots in XY mode and distance from centre mode. All the results are stored in the database, which makes possible to perform afterwards analyses.

5.   **Specifications.**

    (a)   Uses modified real wpns fitted with laser and sensorsd
    (b)   Realistic recoil by CO2 reservoir
    (c)   Uses COTS Computers and LCD video Projectors

6.   **Country of Origin.** The SIM10 simulator is used by the Estonian Defense Forces. .   ELI is the leader of the Baltic countries in developing and producing simulators and training systems for police and defence forces. ELI is located in Tallinn. ELI Military Simulations created all the mechanical parts of the Estonian Pavilion at the World Exposition EXPO2002

7.   **Relevance.** System uses very innovative approach.

Eli-HARDY

1.   **Name.** HARDY radio controlled mobile target set

2**.   Introduction.** Radio controlled mobile target set "Hardy" is a full featured system for the outdoor shooting range for small firearms and anti-tank sub-calibre weapons. Small size and light weight makes the installation of targets quick and easy. Each target mechanism is provided with armox shield that eliminates the need to build ballistically secured emplacement for them. They feature simple and reliable construction with minimum maintenance required.

3   Target holders have hit detectors that cause the target to fall when hit. During operations the hit count are transmitted back to the control unit on request. The microprocessor-based target units have several built in programs that can be actuated by the control unit.

4   Three sizes of easily interchangeable infantry pop-up targets are available. Targets are equipped with low level illumination for night shooting.

5   Hand-held radio control unit controls the targets. The microprocessor-based unit has several built-in programs and is capable of controlling up to 32 individual targets at a 2 km range. The 2x20 alphanumeric display shows the program and target status and the number of hits on each target. The controller can be externally programmed from PC, enabling to create custom scenarios beforehand or in site.

5.   **Specifications.**

   (a)   Hand-held radio control unit controls the targets.
   (b)   The microprocessor-based unit has several built-in programs and is capable of controlling up to 32 individual targets at a 2 km range.
   (c)   A 2x20 alphanumeric display shows the program and target status and the number of hits on each target. The controller can be externally programmed from PC, enabling to create custom scenarios beforehand or in site

6.   **Country of Origin.** Target set "Hardy" is used by Estonian Defence Forces and has proved to be efficient training device. ELI is the leader of the Baltic countries in developing and producing simulators and training systems for police and defence forces. ELI is located in Tallinn. ELI Military Simulations created all the mechanical parts of the Estonian Pavilion at the World Exposition EXPO2002

7.   **Relevance.** System uses very innovative approach

SIMUGUN

1.   **Name.** SIMUGUN Tank Gunnery Trainer

2.   **Introduction**. SIMUGUN is easily adapted to all main battle tanks and integrated with modern fire control systems and fits in a single vehicle It trains the gunner and commander as a team in various gunnery techniques

3.   **Specifications.**

   (a)   Enhances and maintains skills and readiness while minimizing the need for training ranges and ammunition.
   (b)   The entire system, which fits in a single vehicle, includes a color video monitor, black and white video monitor, computer, printer, video disk player and a control unit.
   (c)   Fast and easy to install and operate.
   (d)   The gunner, sitting in his tank, and using his own sight, executes all the operations involved in firing the gun. He sees and feels exactly what he would, had he actually fired a shell and scored a hit or miss.
   (e)   Training is fully controlled, and provides the instructor with the trainee's performance evaluation.
   (f)   The system enables the training of the gunner and commander as a team in various gunnery

5.   **Country of Origin.** HQ in the USA. The simulator is used by the US ,Polish, Israel, Australian and many more countries Defense Forces

6.   **Relevance.** System uses very innovative approach.

C⁴ISR

1.   **Name.** C^{4}ISR: Command, Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance

 2.   **Introduction**. Supporting the air combat arena, RAFAEL's command and control systems provide critical backup in the form of effective air-to-air communication control, tactical missiles fire control, and airborne command and control. Advanced technological infrastructure based on architecture software packages like geotactics, data fusion, and data distribution, enhance management of the air battlefield.

3.   **Specifications.** RAFAEL's C^{4}I Applications include:

   (a)   Map handling and display (GIS)
   (b)   Tactical and operational overlays
   (c)   Database creation and maintenance
   (d)   World processing and e-mail
   (e)   Mission planning, debriefing and special applications
   (f)   Communications module for distribution
   (g)   Command and control systems

4.   **Country of Origin.** HQ in the USA. The simulator is used by the US ,Polish, Israel, Australian and many more countries Defense Forces

5.   **Relevance.** System uses very innovative approach.

C4ISR Products & Systems

1.   **Name.** C^4ISR: Command, Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance

2.   **Introduction**. Cubic brings decades of experience developing C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance & Reconnaissance) systems for the military and signal intelligence markets. Today, we are integrating commercial, high-speed Digital Signal Processing (DSP) technology with our data links and surveillance radios.

3.   **Specifications.** The low-cost DSP technology enhances performance, flexibility and interoperability. Our world-class C4ISR communication systems include:

    (a)   **Data links:** Cubic provides the Surveillance and Control Data Link - a world-class, jam resistant broadcast data link - for the Joint Surveillance Target Attack Radar System, or <u>Joint STARS</u>. We have customized this link for the UK's new Airborne Stand-Off Radar system, or <u>ASTOR</u>, scheduled to enter service in 2005. Our advanced communications data link - the digital Tactical Common Data Link (<u>TCDL</u>) - transfers radar data, video and other sensor information from UAVs to analysts at Army ground stations or Navy ships. A variation of the TCDL has been selected for the U.S. military's weapon system testing and training program.

    (b)   **Signal intelligence/surveillance receivers:** Cubic has developed a wide variety of equipment for the Signal Intelligence community. This equipment is used to detect and analyze a multitude of signals, perform signal direction finding, distribute antenna inputs to multiple receivers, and

perform high precision wideband signal processing and multi-mode digital signal processing.

(c) **Direction finding:** Cubic is a leader in DF technology. Cubic has developed field proven DF receiver/processors designed for mobile vehicle, airborne, fixed station or shipboard installation. A typical system comprises a Wide Band DF Receiver/Processor and a dual array direction finder antenna. Depending on the antenna selection, Cubic DF Systems are capable of providing signal monitoring and DF capabilities in a wide frequency range (with no gaps). Antennas can be used individually or can be linked together to provide reception for HF, VHF and UHF signals, as required.

(d) **Frequency management:** Cubic has created software that enables a user to easily interact with the DF signal management process by using a graphical user interface. The software, when integrated with a DF system, allows monitoring and DF operations in all reception modes with very high sensitivity, selectivity, and accuracy. As a result the operator is able to easily track and locate radio sources over a wide geographic area. Our frequency management software enables control of all receiver functions these include; frequency, receive mode, bandwidth, AGC/MGC, squelch, BFO, channel memory store and recall, and scan/sweep operations including channel/frequency lockout. Besides controlling the receiver(s), these programs can collect signal amplitude information during a special "Spectrum Sweep" operation and create a real-time panoramic display of signal activity.

4. **Country of Origin**. UK.. Cubic-Developed C4ISR is Operational in United Kingdom.
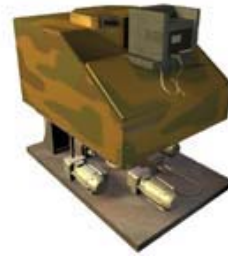
5. **Relevance.** System uses very advanced approach.

LOGOS GUNNERY , CREW AND DRIVING COMBINED SIMULATORS

1.   **Name**. **LOGOS** GUNNERY AND DRIVING SIMULATORS for Russian armored vechicles

 2.   **Introduction**. The simulators are designed to train and master gunnery skills with armored vechicle guns using all types of ammunition including guided missiles in all kinds of visibility and weather conditions, eliminating the need of spending materiel and fuel resources. The simulators provide individual training commanders and gunners as well as collective training in a common tactical engagement The simulators also provide driving training for drivers armored vechicles in different terrain types, weather conditions, seasons, and at different times of day, eliminating the need for spending materiel and fuel resources and operating in a classroom environment.

3.   **Specifications.** The simulator uses a fully electrical motion system. It can be mounted on 3DOF (3 degrees of freedom) or 6DOF motion platform. **The trainee cab** is a framed structure with panelling that imitates the simulated vehicle compartment. Standard driving and firing controls, instruments, vision sights, and signalling devices are installed inside the cab.

4.   **Country of Origin.** Russia. The simulator is used by the US, Russian and many Baltic countries Defense Forces

5.   **Relevance.** System uses very advanced approach.

ABS-2010
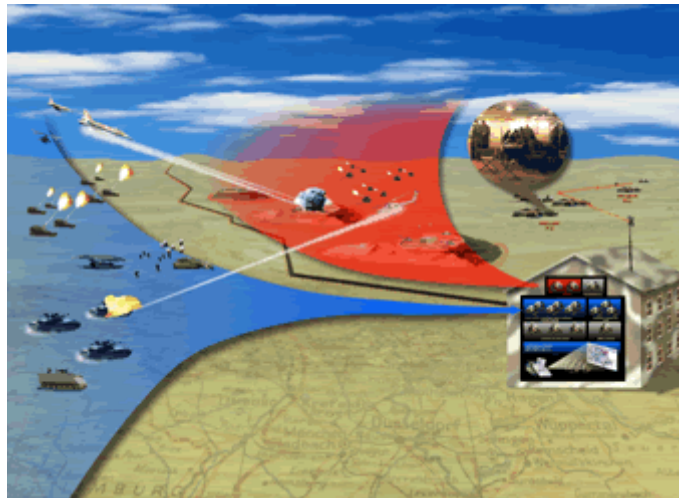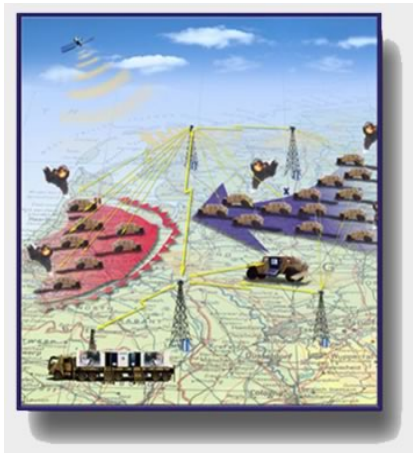
1.   **Name.** ABS-2010 Army Battle Simulation System

2.   **Introduction**. Development of simulation training technology provides modern ground forces with the ability to cope with the tactical, operational and strategic demands of the battlefield by improving decision-making and commanding abilities of commanders and their staff. RAFAEL carries out fixed-base and mobile simulation exercises for the Israel Defence Forces, using the ABS-2010 system. The TIES-2010 Army Battle Simulation system supports field training with live forces, while SECS-2010 is a Computerized Skelton Exercise Controlling System.

3.   **Specifications.** ABS-2010 incorporates the following:-

   (a)   Training commanders and staff from the battalion level up to corps level
   (b)   Training in combined arms combat command, based on full representation of the battlefield conditions
   (c)   Creates the challenge of fighting against a thinking enemy
   (d)   ABS-2010 performs efficiently, intensively and cost effectively in comparison to traditional methods
   (e)   Available in fixed-base or mobile configurations

4.   **Country of Origin.** USA.The simulator is used by the Israel Defense Forces

5.   **Relevance.** System is the ultimate in simulation as it combines all facets into a single system.

CAE Land Training Systems

1.   **Name.** CAE Land Training sml

2.   **Introduction**. CAE designs and manufactures a range of simulators to meet all direct fire training needs. Our solutions provide progressive training for basic gunnery, crew and turret skills with fully interactive training at the troop/detachment/platoon level in a realistic simulated operational environment.

3   Light Tank to Main Battle Tank - Individual to Full Multiple Crew Training SystemsCAE's family of direct fire trainers cover the full range of training devices, from stand-alone desktop gunnery trainers through to fully instrumented tank simulators that can be operated individually or in platoon/squadron networks. These training systems provide a scalable and flexible solution to our customers' training needs.

4   CAE's simulated sighting systems include day/night sights with normal and magnified views, thermal imaging and image intensification. Graticules and other imagery including laser range finder data are incorporated in the simulations.

5   The basic gunnery level have targets that move simply on fixed tracks, whereas training at a crew and platoon or squadron level, a sophisticated semi-automated forces system like CAE's STRIVE™ can be introduced to provide a high level of tactical training.

3.   **Specifications.**

   (a)   **Software Features**

      (i)   A range of sighting systems including optical, II and TI
      (ii)   Full 3D terrain scene and target models, with drive through capability
      (iii)   Accurate ballistic simulation
      (iv)   Library terrain areas of 20Km x 20Km available
      (v)   Summer and winter scenes
      (vi)   Interactive tactical map
      (vii)   Scaleable computer generated forces
      (viii)   Variable weather conditions

        (ix)   Dawn/dusk transitions
        (x)   Variable visibility
        (xi)   Unlimited number of exercises can be set up
        (xii)   Record and replay facility
        (xiii)   Student assessment facility
        (xiv)   Student record management

(b)   System Features

        (i)   Scalable range of devices to satisfy all training needs
        (ii)   HLA or DIS compliant, providing interoperability with other training devices
        (iii)   Maps produced from the visual database to ensure 100 percent compatibility
        (iv)   Mobile systems available

4.   **Country of Origin.** UK . CAE (NYSE: CGT; TSX: CAE), headquartered in Canada, was founded in 1947 and has become a leading provider of integrated training services and advanced simulation and controls technologies to **civil aviation**, **military** and **marine** customers in more than 15 nations worldwide.

5.   **Relevance.** System uses advanced sml concepts.

MBT Arjun Gunnery Training Simulator
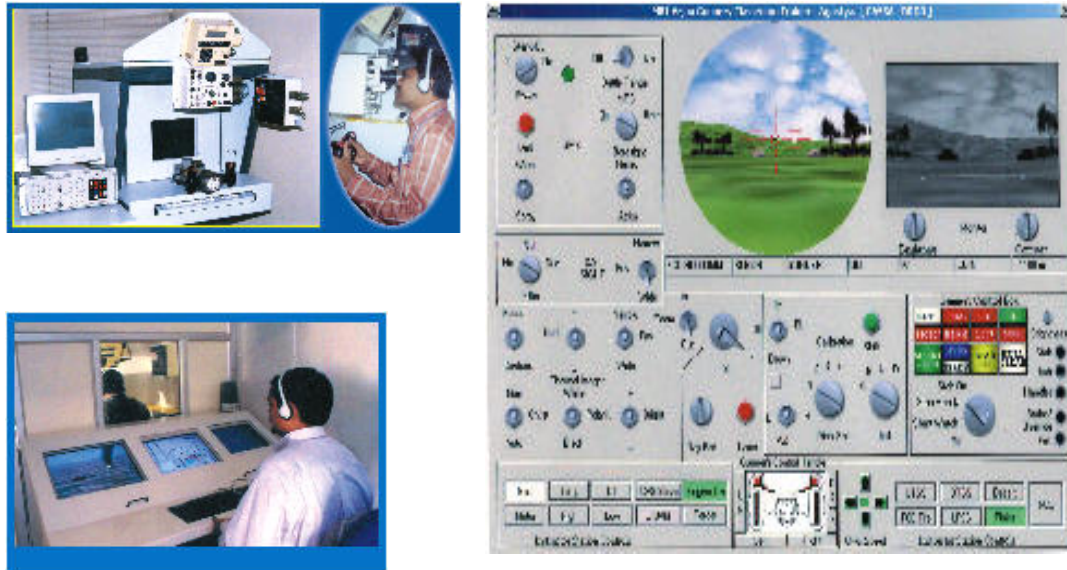
1. **Name.** MBT Arjun sml

2. **Introduction**. Combat Vehicles Research & Development Establishment (CVRDE), Avadi, has initiated the development of simulators for MBT Arjun gunners under the project Gunnery Arjun Part Task Training Simulator (GAPTTS). Mass production of MBT Arjun is in progress and the users need training to use this state-of-the-art battle tank effectively and efficiently. The simulators will impart cost-effective, exhaustive and extensive training.

3. **Specifications.** In this novel training methodology, training will be in steps of increasing content and complexity instead of having a single simulator which traditionally many other leading tanks in the world have. It will provide training in three stages:

    (a) **Classroom Gunnery Training Simulator** (**CGTS-Agastya**)-A software-based version with soft panels for gunnery controls is aimed at teaching the functionalities of the various controls and switches present in the gunner station to a group of gunners in a classroom. It also includes bilingual (Hindi/English) online help for the gunners to independently learn the tank gunnery operations with the help of a simple mouse click.

    (b) **Desktop Gunnery Training Simulator (DGTS-Agastya)-** This aims at imparting hands-on experience to the gunners with replicated gunner station hardware. The procedural operation on the Integrated Fire Control System (IFCS) is taught. CVRDE in association with CASSA, Bangalore, has developed these two versions of training simulators

(c)   **Gunnery Training Simulator (GTS)-** A full-fledged high fidelity simulator provides with advanced procedural, laying, tracking and firing skills to the gunner. This containerised, air-conditioned simulator systems has separate compartments for the instructor and gunner. The gunner has all the vital gunners' equipment positioned in the exact place as in the tank. This simulator has gunner seat vibration unit to simulate the realistic disturbances felt by the gunner during the operation. Specially developed piping optics integrated with gunner's day and thermal eyepieces provides the same field of view of the battlefield environment as in the actual tank. The instructor with his dedicated console

4.   **Country of Origin.** India. Usage data not available.

5.   **Relevance.** System uses new sml concepts

BT 46 Tactial trainer

Saab's laser-based tactical engagement system, the BT 46, is a precision-based training device that is sought after by the world's most advanced armed forces

1.   **Name.** BT 46 TES

2.   **Introduction**. Armies around the world are convinced that laser-based tactical engagement systems (TES) are an essential ingredient to prepare their armoured forces for combat. Saab Training Systems is a leader in this market with its BT 46 laser simulator. Britain, Germany, Sweden and the United States have used the BT 46 for several years and have made repeat purchases. The BT 46 laser simulator can be used for simulating all types of direct firing weapons, from shoulder-fired anti-armour guns to main battle tanks. The system uses the principle of two-way simulation and requires the target to be equipped with reflectors. The laser pulses emitted from the firing system are reflected back from the target. This indicates the precise range to the target to be determined and is used in the ballistic calculation that assesses whether a hit has been achieved.

3   The simulation is performed in real-time with a very high degree of precision and realism. BT 46 has the ability to simulate accurately the trajectory (or the missile flight characteristics) in real-time. The Saab BT 46 is the latest generation in a line of high-fidelity weapons-effects simulators. The most important features are that there is no negative training, it is unconditionally eye-safe, has Class 1 laser safety, provides high fidelity simulation, low life-cycle costs, is transparent during use, allows for the use of normal operational procedures and is a generic design.

4   Built-in gyroscopes enhance the system's performance and make it possible to exercise the full range of gunnery techniques for all types of targets. Immediate feedback from each firing is provided through a realistic tracer and burst-on-target simulation in the gunner's and commander's sights as well as sound cues over the intercom system and a flashing light on the target. The target computer combines information about its vulnerability with data received from the firing system to determine accurate hits and what damage has been caused. The BT-46 system comprises several components, including a laser transceiver positioned on a vehicles gun barrel, retro-detector units on the vehicle hull and turret, GPS devices, sound simulators and smoke generators.

5.   **Specifications.** BT 46 simulator applications are developed from a set of generic components, making it fairly easy to develop new applications. The potential to simulate future weapons is almost unlimited. The BT 46 universal pod unit allows for full integration of helicopter assets into two-way tactical and gunnery training programmes

6.   **Country of Origin.** Sweden .The simulator is used by the US, GERMAN and ISRAELI Defense Forces

7.   **Relevance.** System is the ultimate Tactical sml.

MILES

1.   **Name.** MILES

2.   **Introduction**. The Multiple Integrated Laser Engagement System (MILES) is a training system that provides a realistic tactical battlefield simulation using laser beams. Each individual soldier and vehicle participating in the training exercise has a its own MILES to fire and sense hits.

3   The MILES can be fitted on various weapons platforms, including armored vehicles such as MBT, and APC, as well as on infantry weapons such as ATGM, LMG, assault rifles, etc

4   The MILES was developed by the U.S. Army in the late 1970's. It entered service in the IDF in the late 1980's, but due to poor maintenance and lack of proper awareness to its potential it was barely used for almost a decade. In the late 1990's, when the IDF realized that the MILES can dramatically increase training effectiveness, thus combat readiness, it began massive usage in the MILES. Today the MILES as well another simulation mean - the paintball guns - are very common during force on force simulations in all infantry oriented units, including both regular and SF ones. Currently the IDF placed an order for the new generation of the MILES - the MILES 2000 - that features many improvement and can be fitted even on airborne platforms such as attack helicopters. The MILES 2000 ,which is made by the American Cubic company, should arrive to Israel in 2002-3.

5.   **Specifications.** Each MILES systems is composed of three main parts:-

(a)   **Laser Transmitter** that is attached to the weapon (usually on the barrel), and accurately replicate the specific weapon range, by sending a simulated eye safe laser round. The MILES laser transmitter is sound activated, so it requires the sound of a blank cartridge in order discharge the laser round. In order to firing the blanks, each small arm is fitted with a blank firing attachments mounted on the barrel (seen in the article's photos as the red device fitted on the barrel). This MILES blank firing system enables great realism by allowing the soldiers to use their weapons as they would in an actual combat.

(b)   **Laser Detectors** attached to soldiers and vehicles taking part in the exercise. When a laser beam fired from a laser transmitter impacts on a detector, the laser detector records a hit. Note that the MILES laser detectors are sensitive to the exact origin and type of fire. So for example, the laser beam from a soldier's CAR15 won't be register as a hit in a detector mounted on an APC. The laser detectors are fitted on two harness, one for the helmet and one for wearing over a load bearing vest.

(c)   **External Rechargeable Power Source** that activate the laser detectors. Note that the laser transmitter has its own power source as an internal part of the transmitter. The detectors' power source is usually located on the back of the soldier's vest or on the helmet.

4.   **Country of Origin.** USA. The MILES was developed by the U.S. Army in the late 1970's. It entered service in the IDF in the late 1980's. It is used by Israel and other US allies.

5.   **Relevance.** System is a Force on Force type of sml and can be fitted on almost all wpn sys. It is a generic sml which can be programmed for all kinds of wpn systems.

LOGOS-TKNTSAZ-172(T-72 MAIN BATTLE TANK ADVANCES GUNNERY SIMULATOR)

Overall

Gunner

Commander
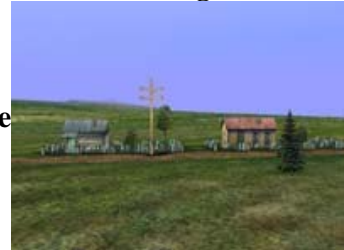

View

External   camera   view

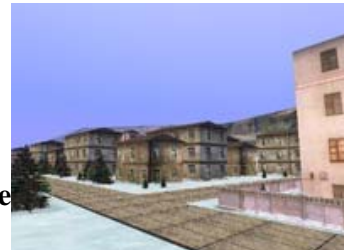**Gunner   Sight   Field   view**

Workplace

Visualization   screenshot

Workplace

Visualization   screenshot

1. **Name.** TKNTSAZ-172

 2. **Introduction**. The simulator is designed to train and master gunnery skills with the guns of T-72 main battle tank using all types of ammunition including guided missiles in all kinds of visibility and weather conditions, eliminating the need of spending materiel and fuel resources. The simulator provides individual training for T-72 commanders and gunners as well as collective training in a common tactical engagement. The simulator is based on functioning training tank stand

extended by computer equipment. The simulator incorporates all functions of the computer gunnery simulator and the functioning training tank stand.

3   The simulator supports the following **types of exercises**:

       (a)   Arming weapons (preparing the armament unit and the fire control system for

       (b)   action at day or night);

       (c)   Initial training (learning basic gunnery practices);

       (d)   Preparatory exercises (consolidating and mastering gunnery skills);

       (e)   Examinations (gunnery tests).

4   The simulator prepares the commander and the gunner to perform **the following tasks**:

       (a)   Loading and unloading the conveyor in manual and semiautomatic modes;

       (b)   Gun loading from the conveyor in automatic, semiautomatic and manual modes with manual conveying of the gun's mock-up to the angle of loading;

       (c)   Loading the gun with stowed ammunition;

       (d)   Prepare the armament and the fire control system for firing;

       (e)   Carry out target reconnaissance, acquisition, and identification;

       (f)   Determine the range using the laser rangefinder;

       (g)   Track the target using the stabilized armament control console;

       (h)   Fire the gun/launcher and the coaxial PKT machine-gun (ballistic projectiles);

       (i)   Fire ATGM projectiles;

       (j)   Operate in emergency modes (with inoperative rangefinder, ballistic computer and/or stabilizer);

       (k)   Adjust the armament and sights of the combat vehicle.

5   The simulator imitates own vehicle movement as well as target movements, making it possible to carry out **the following exercises**:

       (a)   Conducting direct fire;

           (i)   Arming weapons and firing when stationary or from a short halt;

           (ii)   Arming weapons and firing on the move.

6   Additionally, the simulator includes special pantograph exercises to enable the gunner to practice the motoric skills of using the stabilized armament control console and manual aiming dives.

7   Connecting a driver station to the simulator makes it possible to **conduct combat training for complete T-72 crews**.

8   The flexible design of the simulator makes it possible to connect several crew simulators into a single simulation complex, enabling multiple crew training within a unit of combat vehicles (up to the platoon level).

9   The commander and the gunner are able to monitor firing results in the form of smoke obscuration, bursts and detonations, depending on the weapon and ammunition type used, the target's armor protection, hit location, and target range. The instructor is provided with complete operational information about the trainee's results including hit locations and the amount of damage inflicted.

10   The standard configuration designed to provide simultaneous training for T-72 commanders and gunners includes:

    (a)   An instructor console;
    (b)   Turret module simulating T-72 combat compartment;
    (c)   A hardware and software complex.

11   The design of turret module:

    (a)   Ensures that the appearance and location of the simulated controls and sights are identical to the corresponding elements in the actual vehicle;
    (b)   Provides vehicle motion feedback in the form of vibrations and changes in the visual environment displayed in the trainees' fields of view;
    (c)   Simulates 3D sounds of combat and working mechanisms in the trainee headset, provides intercom capabilities, and enables radio communication with the instructor and the other trainees.

12   The purpose and operation of all component parts of the commander and gunner stations match those of the actual vehicle. In the field of view of each sight there is a computer monitor displaying the visual environment and sight scales.

13   Using the exercise control capabilities of the simulator, **the instructor is able to**:

    (a)   Edit existing exercises and create new exercises;
    (b)   Obtain comprehensive objective information on trainee performance during exercise progress;
    (c)   Monitor the simulated vehicle's controls state and main subsystems operational status;
    (d)   Take over control of the fire control system of any trainee to demonstrate correct laying and firing techniques;
    (e)   Carry out after-action reviews by replaying an exercise after it is over;
    (f)   Print out exercise performance reports.

14   The simulator can be mounted **in a standard classroom or in mobile training room** (possibly together with driving simulator).

15.   **Specifications.**

(a)   The simulator is a sophisticated software and hardware complex incorporating a wide range of advanced technological solutions.

(b)   The audio subsystem supports radio and telephone communication, allows the generation of advanced three-dimensional stereophonic noise effects, including sounds of engine, projectile bursts etc.

(c)   The synthetic environment includes fully three-dimensional views of the specified terrain with objects located on it (roads, obstacles, engineering structures, trees, buildings).The synthetic environment is generated on the basis of predefined sets of model objects referred to as a scene.

(d)   The superior image quality allows the modelling of easily recognizable fragments of actual terrain based on customer-provided materials. The simulator is supplied with scenes imitating different types of terrain. Each of the scenes is available in various weather and visibility conditions.

(e)   To simulate T-72 movement, the simulator takes into account the dynamic characteristics of the tank engine and suspension, location of sprockets and support rollers, as well as terrain features and ground-track adhesion.

(f)   DIS or HLA compatible versions of the simulator are available upon request

4.   **Country of Origin.** USA. It is used by Israel and other US allies.
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 5.   **Relevance.** System is the ultimate in simulation as it combines all facets into a single system.

Tactical Simulator for Hand Grenades

1. **Name.** COSIM HG

2. **Introduction** The infantry plays a major role in the modern combined arms scenario. Indeed, certain mission objectives can only be achieved by infantry units. Therefore COSIM HG in combination with the <u>CODARTS</u> system integrates the hand grenade into the field of laser simulator training. Absence of this weapon in a combat training center (CTC) would falsify the results of infantry deployment and leave the infantry without an important means of urban terrain combat. Our force on force combat training program is basically composed of three major components: the **COSIM** TES family, the **CODARTS** Combat Training Center (CTC) and the **COSCOUT** urban warfare (MOUT) training center. C.O.E.L. Entwicklungsgesellschaft mbH is based in D-22880 Wedel, Germany (next to Hamburg). The company employs mostly engineers, physicists and skilled technicians.

3 Effective combat training can not tolerate negative training. Therefore handling, effect and range of the original weapon are reproduced by COSIM HG. A target is only affected by the simulator if the same handling of an original hand grenade would have produced this effect as well.

3.   **Specifications.**

(a)   **Design and function** The system consists of three parts namely <u>COSIM </u>TES family, the <u>CODARTS</u> Combat Training Center (CTC) and the <u>COSCOUT</u> urban warfare (MOUT) training center

(i)   COSIM HG resembles the body of the original weapon. The body contains the pyrotechnical simulator, the data link unit and long life batteries. One set of batteries last for five years of normal operation.

(ii)   COSIM HG can be used inside and outside of buildings and covers the whole spectrum of its combat counterpart. Range restrictions and target protection are considered. Since COSIM HG interfaces directly with the soldier's body harness only "activated" soldiers can utilise the simulator. In <u>CODARTS </u>the identification of each COSIM HG is transferred via the soldiers body harness to the exercise control shelter. If soldiers are affected by the simulator the respective attacker can therefore be identified by the control shelter.

4.   <u>**Country of Origin.**</u> **C.O.E.L.** Communication systems Optronic Electronic Laser applications. Germany

5.   <u>**Relevance.**</u> System is the ultimate Force on Force simulation as it combines all facets into a single system.

Tactical Engagement Simulator
for MBT/APC Weapons

1.   **Name**. COSIM CAN

 2.   Introduction The ability to achieve mission goals while avoiding losses demands realistic training. Therefore the COSIM duel simulator family integrates direct fire weapons (12mm and more) into the field of laser simulated training. The universal laser transceiver COSIM CAN is precisely adjusted to the individual weapon's parameters while ease of handling remains one of its basic features.

3   It uses additional sensors to ensure proper consideration of cant angle and weapon movement and replaces the high power targeting lasers of the original weapon systems which have to be shut off during engagement training.

4   The patented C.O.E.L. target discrimination system (TDS) ensures unrestricted usage of laser simulators in combined forces training.

5   Effective combat training can not tolerate negative training. Therefore handling, effect and range of the original weapon systems are exactly reproduced by COSIM CAN. A target is only hit by the simulator if the same handling of the original weapon would have produced a hit as well.

6.   **Specifications. Design and function**

   (a)   All subunits of the engagement simulator are collocated in the COSIM CAN laser transceiver. The laser transceiver is fitted with a weapon specific mounting and adjusted parallel to the weapon's boresight by integrated adjustment means. External adjustment devices are not required. Ballistic behaviour and ammunition types can be programmed to adapt the transceiver to different weapon systems. A powerful interface connects the transceiver to the existing hardware e.g. the fire control system.

   (b)   The new target discrimination system (TDS) allows unrestricted usage of laser simulators without system immanent errors or manipulative result distortion

7.   **Country of Origin.** **C.O.E.L.** Communication systems Optronic Electronic Laser applications. Germany

8.   **Relevance.** System is Part of Force on Force simulation as it combines all facets into a single system.

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Tactical Engagement Simulator for guided Anti-Tank Missile Systems

1.   **Name.** COSIM DRAGON

2**.   Introduction**. The infantry's anti-tank defence is an important factor in a combined arms scenario. Absence of anti-tank weapons in a combat training center (CTC) would allow deployment of tanks and APCs with an unrealistic low risk and therefore falsify the results of CTC training.

3   Effective combat training can not tolerate negative training. Therefore handling, effect and range of the original DRAGON anti-tank weapon are exactly reproduced by COSIM DRAGON.

4.   **Specifications. Design and function**

(a)   The components of COSIM DRAGON resemble the original DRAGON anti-tank weapon. The simulator can be used on any co-operative target within the range of the original weapon. A target is only hit by the simulator if the same handling of the original weapon would have produced a hit as well.

(b)   COSIM DRAGON interfaces directly with the soldier's body harness. Only "activated" soldiers can engage targets. When the trigger of the COSIM DRAGON is pulled the simulation starts launch effects (centre of gravity displacement and pyrotechnical signature). Operator mistakes which would lead to missile loss in real life will cause COSIM DRAGON to terminate the simulation. The signature of the missile in flight is displayed in the simulator's visor (tracer display).

4.   **Country of Origin** C.O.E.L. Communication systems Optronic Electronic Laser applications. Germany

5.   **Relevance.** System is Part of Force on Force simulation as it combines all facets into a single system.

Tactical Simulator
for Infantry

1.   **Name.** COSIM INF

2**.   Introduction**. More and more global peacekeeping operations are carried out by infantry units, they play a major role worldwide. Training for these units can only be provided if laser simulators and passive systems can cope with these enhanced requirements. Increased user needs have led to a totally new approach to infantry simulation equipment. Precise infantry operations require precise simulation assistance. Distance, elevation angle and target hit location can not longer be ignored in modern infantry training.

3   Treatment of casualties puts additional stress upon military leaders, a crucial factor which has to be included into training situations beforehand. COSIM INF distinguishes body hit locations with respect to the attackers performance and allows a detailed vulnerability model which demands realistic leader decisions.

4.   **Specifications. Design and function**

    (a)   COSIM INF combines the body harness and the Small Arms Transceiver (SAT). The original weapon remains unchanged and report generation is achieved by conventional blank ammunition. The body harness integrates the laser receivers/reflectors and the radio link unit. Only targets within combat range can be attacked. COSIM INF uses a focused laser beam in the transceiver which enables the targeting of individual body areas and the consideration of ballistic ammunition effects. The SAT interfaces directly with the body harness to ensure that only 'activated' soldiers can utilize the simulator.

    (b)   The COSIM INF body harness detecting and display functions cover the main body parts and it displays hits of these parts by individual hit markers. Different audio signals indicate the status of affected soldiers.

(c)   COSIM INF is designed to fit into the CODARTS training system. It uses the patented Target Discrimination System (TDS) to avoid negative training experiences

4.   **Country of Origin.** C.O.E.L. Communication systems Optronic Electronic Laser applications. Germany

5.   **Relevance.** System is Part of Force on Force simulation as it combines all facets into a single system.

Tactical Engagement Simulator for xx mm Grenade Launchers
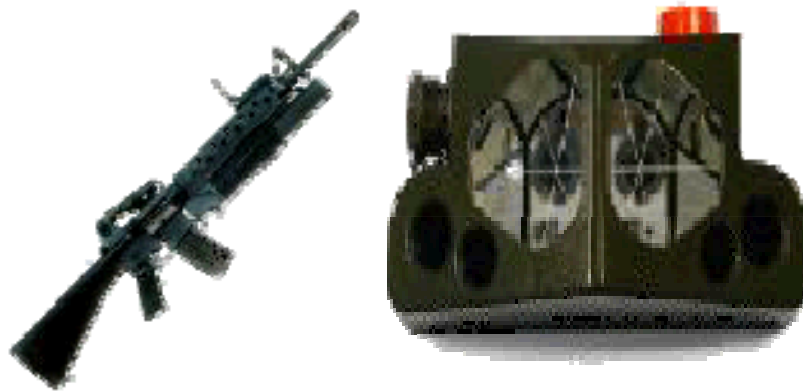
1.   **Name**. COSIM LAUNCHER and TARGET

2**.   Introduction**. Mobile Operations in Urban Terrain (MOUT) are becoming more and more important worldwide due to global peacekeeping actions. Combat in urban terrain is what infantry has to face in their real missions and therefore becomes a major key in combat training. Qualified training requires simulators that can handle the features of modern warfare. The 40 mm Grenade Launcher which is one of the standard MOUT weapons demands simulators that take care of its specific ballistics and handling. It is mainly used in urban environment to shoot grenades into buildings through door and window openings engaging enemy infantry or snipers. In training without a simulated grenade launcher realism and completeness would lack significantly.

3   The 40 mm ammunition with its curved ballistics requires the careful consideration of distance to make sure that it really hits the opening and does not just crash into walls without the desired effect. Correct distance estimation, aiming and the realistic simulation of indoor detonation effect are requirements that can not be solved by standard tactical engagement simulators. Only precision gunnery systems considering the real distance are capable to provide non-negative effective training results.

4.   **Specifications. Design And Function**

(a)   COSIM LAUNCHER resembles the original 40 mm grenade launcher in design, weight and function. It is used in combination with the target transceiver COSIM TARGET. COSIM LAUNCHER is composed of the laser transceiver, the report generation unit and an optional radio data link which communicates with the Infantry Transponder (IT).

(b)   COSIM TARGET is a reflector-receiver unit with an additional laser transmitter. It also includes a report generation unit for impact report generation. All

relevant openings of a building are equipped with COSIM TARGET to ensure accurate location.

(c)   The simulation starts when the trigger of COSIM LAUNCHER is pulled. The weapon transceiver locates the position of the COSIM TARGET reflector-receiver unit that is closest to the flightpath of the simulated grenade. It transmits a distance coded laser signal to that unit. If the opening would have been hit by a real grenade COSIM TARGET activates the report generation unit and sends a kill signal into the adjacent room. COSIM TARGET receives laser pulses of all possible attackers (eg. APC, MBT). It has a built in radio link unit which even allowsÂ to simulate artillery and mortar impacts.

4.   **Country of Origin.** C.O.E.L. Communication systems Optronic Electronic Laser applications. Germany

5.   **Relevance.** System is Part of Force on Force simulation as it combines all facets into a single system.