Peacekeeping Technologies Listed by Type

Dr. Walter Dorn, 16 December 2020

CONTENTS

INTRODUCTION

Drawing from several core UN reference materials on peace operations and the broader literature, this is an extensive—if not comprehensive—list of peacekeeping technologies, divided into about 20 categories. The goal is to provide a reference source for technologies that have a potential role in supporting UN peace operations. Wherever possible, historical examples from specific missions demonstrate the use of each technology in the field, combined with realistic suggestions for current or emergent technology use.

The specific technologies are drawn mostly from six important UN manuals and several outside sources. The abbreviations for references used in the table are (see "References" for full citations):

COE: *Contingent Owned Equipment Manual* (United Nations, 2011; Note: new version in 2020)

KW: *Keeping Watch: Monitoring, Technology & Innovation in UN Peace Operations* (Dorn, 2011)

PP (TIP): *Performance Peacekeeping: Final Report of the Expert Panel on Technology and Innovation in UN Peace Operations* (United Nations, 2014)

TOE: Tables of Organization and Equipment (UN DPKO, 2009)

UNIBAM I: United Nations Infantry Battalion Manual, Volume I (UN DPKO, 2012; Note, new version in 2020)

UNIBAM II: United Nations Infantry Battalion Manual, Volume II (UN DPKO, 2012; Note new version in 2020)

Page numbers cited after the reference. Drafting comments are in [square brackets].

Possible future additional sources: Capabilities report; UNOE database; Standard Cost Manual (LSD); Partnership Symposium; Tech & Innovation WG; US Technology Source Book

ACRONYMS

AG	Armed Groups
COE	Contingent Owned Equipment Manual (version used: United Nations, 2011)
KW	Keeping Watch: Monitoring, Technology & Innovation in UN Peace Operations (Dorn, 2011)
PP	Performance Peacekeeping (United Nations, 2014)
TOE	Tables of Organization and Equipment Edition (UN DPKO, 2009)
UNIBAM I	United Nations Infantry Battalion Manual Volume I (version used: UN DPKO, 2012)
UNIBAM II	United Nations Infantry Battalion Manual Volume II (version used: UN DPKO, 2012)

TOP-LEVEL CATEGORIES

Accommodation
Communications
Energy
Engineering
Environment
Food
Forensics
Information Collection
Information Management, Analysis, & Dissemination
Logistics, Supply Chain, & Inventory
Medical
Miscellaneous
Positioning & Tracking

Protection Technology
Safety and Security
Training
Transportation
Waste Management
Water
Weapons
Weapons, Non-Lethal
Weapons Tracing, Tracking, & Destruction

LIST WITH SUB-CATEGORIES

Accommodation
Construction & Design
    Design
    Energy Efficiency/Power Supply
Shelters
    Purpose/Type (e.g., portable, mobile, static; sleeping, operations, eating, maintenance)
        Tentage

Communications
News and Information
    Internet, Radio, TV, etc.
Infrastructure
    Interoperability/Connectivity
    Data & Voice Communications (Internet access)
    Radio & Telecommunications Systems
    Resilience & Redundancy
Security
    Electronic (e.g., Cybersecurity, Data Privacy, Encryption, Information Security)
    Physical (e.g., asset protection, ruggedized)
    Jamming

Energy
Fuel Supply
Other (e.g., biomass, biogas)
Petroleum Based
Renewables (e.g., solar, wind, hydro)
Power Supply
Power Generation
Usage, Conservation, & Efficiency

Engineering
Advanced Materials & Processes
Combat Engineering
Non-Combat Engineering
Environmental
Heavy Civil Infrastructure

Environment
Impact Reduction (e.g., sustainability, conservation, climate change, etc.)
Impact Assessment
Waste (i.e., Hazardous, Solid, Liquid)

Food
Food Stuffs

Forensics
Investigation & Evidence Collection
Ballistics & Crater Analysis
Biometrics, Bio-sampling and Analysis
DNA Sampling, Storage, Analysis
Financial & Organized Crime
Human Remains Identification
Sexual Assault Kits
Investigation Tools
Crime Scene Kits
Ground-Penetrating Radar

Information Collection
Cameras
    Aerial/airborne
    Fixed (e.g., closed-circuit television (CCTV), digital video networks, web cameras)
    Satellite
    Vehicle Mounted
    Night vision (e.g., image intensifiers)
"Open Source Intelligence"
    Crowdsourcing
    Open Source Collection
    Social Media Monitoring
Platforms
    Aircraft
        Aerostat
        Fixed Wing
        Rotary Wing
        Unmanned
    Digital/Cyber
    Personal (i.e., wearable tech)
    Space-Based (i.e., Satellite)
    Tower/Mast
    Vehicles
Radar
    Air Surveillance
    Artillery-Locating
    Ground-Penetrating
    Ground Surveillance
    Identify Friend from Foe
    Marine
    Weather

Sensors
Acoustic Sensors
    Person or Vehicle Movement

      Small Arms Fire Location

Chemical Sensors

      Explosives Detector

      Working Dogs

Long Range

Metal Detector

      Hand-Held

      Mine/UXO

Motion Detectors

Night Vision

      Thermal Imaging

Pressure Transducer

Radio-Wave

      Radio Scanners/Signal Monitoring

      Signal-Locating

Road Monitor

Seismic Sensors

X-Ray Machine

Information Management, Analysis, & Dissemination

Artificial Intelligence

      Big data analysis, change analysis, etc.

"Command, Control, Intelligence, Surveillance, Recognisance" Integration

      Analysis and Display Software

      Command and Control Systems

      Database

      Dissemination

      Geographic information systems (GIS)

      Image Processing

      Information Management

         Social Media

      Open Source Information

      Situational Awareness Tools

Other

Business Intelligence & Risk Management
"Managing the Remote Back Office"
Mission Support
Mobile applications, devices, & solutions
Supply Chain Resilience
Security
Digital (e.g., resilience & redundancy)
Electronic (e.g., Cybersecurity, Data Privacy, Encryption, Information Security)
Physical (e.g., asset protection, ruggedized)

Logistics, Supply Chain, & Inventory (e.g., demand fulfilment, track & trace, demand planning, sourcing, logistics, storage and transport, delivery, and receipt)

Medical
Crisis Kits
Diagnostics
Other
Surgical Tools
Telemedicine
Trauma

Miscellaneous
Emergent Technologies and Concepts
The Digital Peacekeeper: Civilian
The Digital Peacekeeper: Military
The Digital Peacekeeper: Police
Other

Positioning & Tracking
Boundary Demarcation & Monitoring
Communications
Phone Tracking
Location Tracking
Blue Force (also Red, Green and White)
Global Positioning System (GPS)
Identify Friend from Foe (IFF)

Radio Frequency Identification (RFID)
Transponders & Tags, Vehicle Tracking

Protection Technology
Access Control
Anti-Theft
Security Systems
Infrastructure
Ballistic-Resistant Paint/Coating
Barriers/Fences
Containers
Sandbags
Personal Equipment
Body Armour, Helmet, etc.

Transport
Aircraft Defence
Ground Vehicle Defence
IED Protection

Safety and Security
Infrastructure
Technology
Cameras
Lighting
Motion Detection

Training
On-Mission
eLearning Platforms
Pre-Deployment Training
Classroom and Lesson Based, including eLearning
Field Exercises
"Peacegaming"
Role-Play and Table-Top Exercises
Simulations

Transportation
  Air
    Fixed Wing
    Material & Supply Delivery
    Rotary Wing
    Unmanned
  Ground
    Combat & Combat Support
    Miscellaneous
  Marine

Waste Management
  Hazardous Materials
  Liquid Waste
  Recycling
  Solid Waste

Water
  Sourcing
  Treatment

Weapons
  Aerial Systems
    Fixed Wing (i.e., Fighter Aircraft)
    Rotary Wing (i.e., Attack Helicopters)
    Unmanned
  Heavy Weapons
    Anti-Ship
    Anti-Tank
    Artillery
    Ground to Air Systems
    Howitzer
    Missile
    Naval
    Other

Non-Lethal
Small Arms and Light Weapons
Hand Gun
Machine Gun
Mortar
Other
Rifle
Rocket Launcher
Targeting (i.e., acquisition, tracking)

Weapons, Non-Lethal
Anti-Vehicle
Counter-UAS/UAV
Counter-Vehicle
Combat
Obscurant
Crowd-Control
Area Control/Immobilization
Chemical Irritants
Projectiles (e.g., rubber bullets, water cannon)

Weapons Tracing, Tracking, & Destruction
Chemical, Biological, Radiological and Nuclear
Conventional Weapons
Explosive Remnants of War
Small Arms and Light Weapons

Technology List: Detailed (Tech by Type)

ACCOMMODATION

Construction & Design	
Design (see also, *Environment*)	Advances in soft-wall accommodation: high-quality tentage systems (PP 30) Modular, flat-pack, solar-powered Refugee Housing Unit (IKEA Foundation) (PP 31) Prefabricated buildings (improved insulation for energy saving and noise attenuation) (currently used by The Swedish Defence Research Agency's (FOI) Juba III/UN House Pilot Project) (PP 30) Considerations: Eco-friendly buildings systems and materials (PP 30), local, sustainable, weight, durability, etc. Built with disaster resilience design & materials.
Energy Efficiency/Power Supply (see also: *Energy*; *Environment*)	Energy conservation & efficiency Smart buildings (sensors, lighting, control, etc.)
Shelters	
Purpose/Type	Type, e.g., Tentage, Portable, Mobile, Static, etc. Purpose, e.g., Sleeping, Operations, Eating, Maintenance, etc. Miscellaneous Stores (UNIBAM I 153)[1] 107. Heliborne Operational Stores (05 Sets) As per operational requirement 108. Fire Fighting Equipment (06 Sets) 109. Field Kitchen (07 Sets) TCC Pattern 110. Laundry Equipment (06 Sets) Field Ablution Facility (06 Sets)

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[1] "The battalion as a whole and ICGs independently must be equipped and fully self-sufficient in tentage for operational deployment away from static locations for specified number of days for the operational situation, throughout the period of deployment. Necessary arrangements for portable small tents (pup tents/bivouacs) for small detachments will also be carried out under TCC arrangements" UNIBAM I 153.

Purpose/Type: Tentage	Multi-purpose tentage systems (PP 31)
	114. Tents/Portable Shelters (For complete battalion)[2]
	TCC Battalion
	Modern expeditionary shelter solutions systems (PP 30)

COMMUNICATIONS

Section has considerable conceptual overlap with multiple other areas, e.g.: *Information Collection*; *Information Management, Analysis, & Dissemination*; *Positioning & Tracking.*

News and Information	
Internet, Radio, TV, etc.	Public communications (radio shows, social media)
	"public information"
Infrastructure	
Interoperability/Connectivity	Digital Radio Mondiale
	Radar Frequency and Internet Protocol (e.g., RIOS)
	Individual videoconferencing and text-chatting solution similar to Skype to be used by DFS (Performance Peacekeeping)
	Microsoft Lync (PP 36)
	Point-to-Multipoint (PMP) (PP 36)
	Piloted in MINUSCA to allow upwards of 80 users to connect to a single point
	Tactical long-term evolution (LTE) telecommunications system (PP 36)
	MINUSCA exploring immediate deployment
	Unused gaps in TV whitespace (PP 36)
	Piloted by MONUSCO to provide connectivity and extend network coverage

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[2] 1 UNIBAM I 143.

	Comm@nder Army system (PP 139)
	Comprehensive interoperability package is available such as MIP, NFFI, NVG, link 16, AIS etc. (PP 139)
	Product suite also includes a headquarters application which is seamlessly interlinked with a Battle Management System (BMS), which provides C2 support to company level and below
	IRIS (interoperability product) (PP 138)
	Uses structured data such as USMTF 2000 and NATO ADataP3 formatted messages as its transmission standards
	Medium-orbit low-latency fiber-speed satellite telecommunications networks such as O3b (PP 36)
	Currently being explored
	Other major international organizations have adopted such architecture at graduated levels of capability (PP 35):
	Service Provider: Network contributing mission participants provide a wide area Mission Network Element (MNE) to the federation of networks
	Subnet Extension: Mission participants with their own standard IT and local area networking infrastructure provide a Mission Network Extension (MNX) using services provided by a mission network service provider
	Fully Hosted: Mission participants elect to use infrastructure and software services provided by other mission participants
	Secure mission-dedicated clouds (PP 97)
	Open and scalable solution based on a WEB service-oriented architecture over IP networking and federates components of operational environment from strategic to tactical levels
Data & Voice Communications (Internet access)	Missions need more bandwidth (including via satellite) (PP 97)
	Mobile connectivity fly-away kits (PP 58)
	May be equipped with portable printers, Internet dongles, soft phone video-conferencing capabilities, and access to mission-critical applications such as COSMOS, and to the UN Field System Mobility [VPN) Portal]

Radio & Telecommunications Systems	34. Satellite Phone (12) (UNIBAM I 145)[3]
	01 Reserve
	35. Radio Stations (06) (UNIBAM I 145)
	01 Reserve
	36. Exchange EPABX (06) (UNIBAM I 145)
	Minimum 100 Lines
	37. Cell Phones (120) (UNIBAM I 145)[4,5]
	40. Telephones (40) (UNIBAM I 145)[6]
	41. Monitor (01) (UNIBAM I 145)[7]
	Ground to Air Communication Radio (06) (UNIBAM I 145)
	Aviation Cell & COB to communicate with helicopter pilots
	UN Radio (PP 72)
	UNMIL Radio (PP 73)
	38. VHF Radios (110) (UNIBAM I 145)[8]
	39. HF Radios (40) (UNIBAM I 145)[9]
	Fully functioning tactical radio network backbone (PP 59)
	HF radio should be used as backup to satellite communications (PP 59)
	Tetra radio systems (PP 29) – seeing increasing roll-out on current missions.

[3] 3 UNIBAM I 143.

[4] 4 UNIBAM I 143.

[5] "Cell phones under TCC Arrangements and where communication infrastructure is available in the mission area. (distribution – 48 x Sections, 16 x Platoons, 03 x Support Company, 1 x QRT, 28 Officers, 20 x Special Appointments, 04 x Reserve) (UNIBAM I).

[6] 1 UNIBAM I 143.

[7] 1, 2 UNIBAM I 143.

[8] "VHF Radios Distribution – 48 x Sections, 16 x Platoons, 03 x Support Company, 01 x QRT, 5 x COB Exchanges, 28 x Officers, 20 x Special Appointments, 04 x Reserve" UNIBAM I 145.

[9] "HF Radios Distribution – 16 x Platoons, 03 x Support Company, 01 x QRT, 05 Company Exchanges, 05 x Command Net, 05 x Transport Platoon, 05 x Out Stations/Reserve" UNIBAM I 145.

	Radios (HF/VHF/UHF, TETRA, digital)
Resilience & Redundancy	Backup systems (on and off site, on and off mission)
	Multi-modal systems (HF Radio to backup Satellite and/or fibre)
Security	

Electronic	Considerations:
	    Cybersecurity
	    Data Privacy
	    Encryption
	    Information Security

Physical Security	Considerations:
	    Asset Protection
	    Ruggedized

Jamming	Signals jamming technology

ENERGY

See closely related issues under *Environment*.

Fuel Supply	
Other	Biomass (PP 39)
	Biogas and other energy alternatives can complement gas-fuelled generators (PP 40)
Petroleum Based	Diesel generators (PP 38)
	Other types, e.g., Gas, Diesel, Natural Gas, etc.

Renewables	Wind:
	    Wind Power (PP 39)
	    ICTD has already conducted a pilot for the small-scale use of wind power at the Global Service
	        Centre in Brindisi

	Solar:
	Solar PV-diesel hybrid power systems (PP 39) (limited success)
	Stand-alone solar lighting systems (PP 39) (limited success)
	UNIFIL's full-scale solar arrays (PP 36)

Power Supply	
Power Generation	80. 51-75 KVA (17) (UNIBAM I 150) – *4 x ICGs
	81. 41-50 KVA (02) (UNIBAM I 150) – Level I Hospital
	82. 31-40 KVA (17) (UNIBAM I 150) – Reserve for TOBs Operational Base
	83. 15-20 KVA (15) (UNIBAM I 150) – Towed/portable for mobile operations
	84. 7.5-11 KVA (17) (UNIBAM I 150) – Towed/portable for mobile operations
	85. 2.5-5 KVA (15) (UNIBAM I 150) – Towed/portable for mobile operations
	86. Electrical Accessories for COBs & Reserve (07 Sets) (UNIBAM I 150)
	(Wires, holders, bulbs and other stores, flood lights)
	Back-up energy support (including primary or backup alternative solutions (PP 26)
	Recommendation: No encampment, office compound or staff accommodation should be without
	Many missions have started to use hybrid solar/diesel generation capacity
Usage, Conservation, & Efficiency	Considerations: Conservation, Sustainability, Efficiency, Measuring and Control
	For example; Smart Meter systems (power consumption tracking and use statistics), Smart Building Technology, etc.
	Energy efficiency (renewables), greater water conservation, waste management and recycling, fuel efficiency, and increased use of environmentally-friendly construction materials (PP 90)
	Currently used by PKO and DFS.

ENGINEERING

Advanced Materials & Processes	Building construction methods
	Ground cover (e.g., geotextiles)

(see also, *Accommodation*: *Construction & Design*)	3D Printing
Combat Engineering	

Non-Combat Engineering	

Technical Domains:
     Civil
     Chemical
     Electrical
     Mechanical	

Environmental (see also, *Environment*)	Addition of synchronization panels and automatic switches to generators (PP 36) Energy-saving light fixtures and energy conservation devices (e.g., dimmer switches, photocells, timer switches and programmable energy management devices) (PP 39). Adoption and use of technologies like Light Emitting Diode (LED) (PP 39).
Heavy Civil Infrastructure	Power & Communications (e.g., power transmission and communications backbones), Transport (e.g., roads, rails, runways). Linked with broader UN Country Team efforts (i.e., development and infrastructure priorities)

ENVIRONMENT

Limited coverage, see relevant UN Agencies, Funds, & Programmes.[10]

Impact Reduction	
Conservation, Sustainability, Energy Efficiency, Climate Change, etc.	Innovations and technologies to help reduce the carbon footprint of missions (PP 90): Smart thermostats, low-energy lighting, and low-flow showers and toilets; metres and an accompanying system; generator canopies; modernized air-conditioning units fitted with CFC-free refrigerants, heat pumps and DC inverters.
	Energy efficiency (renewables), greater water conservation, waste management and recycling, fuel efficiency, and increased use of environmentally-friendly construction materials (PP 90)

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[10] See, e.g., UN Department of Operational Support, "Environment" focus area; United Nations Environment Programme, "Greening the Blue Helmets" focus area.

Impact Assessment	
Evaluate	Development of baseline assessments, environmental impact reduction plans and policy, etc.
Test & Monitor	Testing and monitoring for air, soil, and water impacts due to operations, etc.
Waste (see also: *Water*; *Waste Management*)	
Hazardous Waste	Hazardous waste reduction, removal, and handling.
Solid Waste	Solid waste reduction, management, and processing.
Liquid Waste	Potable water supply and use, wastewater management including sewage

FOOD

Food Stuffs	Survival foods (light-weight, easily stored, freeze-dried)

FORENSICS

See also, UN Police[11]

Investigation & Evidence Collection	
(see also: *Communications*: *Security (e.g., cyber security, data privacy, information security, etc.)*	
Ballistics & Crater Analysis	Missions need personnel with specialized skills (forensic investigations, crater analysis data, etc.) (Dorn 2007: 20—21).
Biometrics, Bio-sampling and Analysis	Biometrics technology and data basing capability (e.g., fingerprint scanners) (PP 78)
DNA Sampling, Storage, Analysis	
Financial & Organized Crime	

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[11] See, United Nations Police (Link)

Human Remains Identification	

Sexual Assault Kits	"Swab Programme" in Liberia (UN Police)
	
	    UNMIL and Liberia National Police
	
	    Pilot project to establish a hospital-based procedure for obtaining vaginal swabs in rape cases
	
	Also developed consent forms, written protocols and other documents that are needed to track the chain of custody, as well as the effectiveness of the effort —

Investigation Tools	
Crime Scene Kits	Including specialized illumination, cameras, evidence gathering protocol, etc. and labs On 16 August 2013, UNMIL launched Liberia's first forensics laboratory at the James N. Davis, Jr. Memorial Hospital in Paynesville, Monrovia (UN Police) Opening of the lab will allow UNMIL and the LNP to launch the pilot for the "Swab Programme" UN Police and the Government of Sweden have supported a project to help the Liberia National Police's Forensic Unit build capacity in investigating serious crimes (UN Police) Specialized training, the development of forensic protocols and standard operating procedures and the provision of equipment, such as new state-of-the-art evidence collection vehicle complete with solar panels and the necessary equipment for processing crime scenes Basic crime scene investigation kits (PP 78) Mobile forensic/crime scene kits (PP 78)
Ground-Penetrating Radar (see also, *Information Collection*: *Radar*: *Ground-penetrating*)	Locate graves, weapons cache, etc.

INFORMATION COLLECTION

This Section has considerable conceptual overlap with other areas, including: *Communications*; *Information Management*; *Analysis, & Dissemination*; *Positioning & Tracking*.

Cameras	
Aerial/airborne	Aerial data and geospatial information (PP 50) Aerial visibility (PP 78) When combined with emerging technologies in urban policing—including static, mobile and personal cameras together with shot spotting technology (that uses sophisticated acoustics to source the origination of gunshots) aerial visibility measurably strengthens on the ground policing Airborne imagery (PP 134) Expertise in image analysis; using the UN's own aircraft such as UAS (PP 133) Remote viewing terminals (PP 133) Aerial imagery should be available in real-time Aerostat [CAR]
Fixed: Closed-circuit television (CCTV) / Digital video networks / Web cameras	"Hotspot" monitoring, e.g., Green Line in Nicosia (KW 236); Used to protect UN premises (KW 236) 24. Video Conferencing System (07) (UNIBAM I 144)[12] Remote viewing of hotspots and night operations (KW 236) Recommendation: Static CCTV with pan-tilt-zoom capability is an absolute requirement for all UN camps and installations (PP 55).
Satellite	Information from satellite reconnaissance has been provided to the UN by certain major powers on a need-to-know basis (PP 134) Frequent use of satellite imagery for map-making, change detection, ground and activity analysis (PP 133) Has yet to move from out-dated still images to dynamic near-real time reconnaissance (see Potential UN uses) High-resolution satellite imagery (PP 52)[13]

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[12] 1, 3 UNIBAM I 143.

[13] "The UN regularly uses satellite imagery for integration into geospatial information services and cartographic products using both commercial contracts and through extensive partnership networks. However, it has not systematically used such images as a source of near real-time operational information" (PP 52).

	Examples: Satellite Sentinel Project; Harvard Humanitarian Initiative's Signal Programme on Human Security and Technology; Human Rights Watch; Google Skybox Imaging; Skybox for Good; Digital Globe; European Union Satellite Centre
	Commercial satellite imagery (PP 134)
	Needs to incorporate satellite imagery to move to dynamic near real-time reconnaissance to achieve current situational awareness and immediate operational effect (PP 132)
Vehicle Mounted	No systematic plans, policies, or guidelines for use (KW 236)
	Personal equipment often employed (KW 236)
	Unsophisticated personal video cameras (PP 134)
	Commonly brought to UN observation posts and on patrols
	Used only in an ad hoc fashion in some missions (KW 236)
	14. Range Finder (6) (UNIBAM I 143)
	29. Digital Camera (53) (UNIBAM I 144)[14]
	30. Video Camera (19) (UNIBAM I 144)[15]
	Helmet Cameras (UNIBAM II 316)
	To facilitate real time recording of information at the site of operations; High definition, light-weight, built in battery pack, 5 hours and beyond recording capacity; quick to start; easy to mount; Cost: $90—300
	Use in all missions for patrols and in observation posts (KW 236)
	Use in an unattended fashion (KW 236)
	Specialized cameras in aircraft (KW 236)
	Record peace agreement violations or human rights abuses (KW 236)
	Maintain database of important clips (KW 236)
	Remote viewing of hotspots and potential flashpoints (KW 236)
	Video-enabled observation posts (PP 55)

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[14] 1, 3 UNIBAM I 143.

[15] 1, 3 UNIBAM I 143.

	Evolution in handheld digital imagery (both still and video cameras) provides important capabilities to augment and add value to peacekeepers' reporting from the ground (PP 59)
	Digital and light-weight binoculars offer greater resolution (PP 134)
	Digital binoculars (PP 134)
	Can capture high-definition images, magnify the images, and send the data directly to mission headquarters
	Image stabilization (PP 134)
	Some video devices can also include GPS and laser-range finders (PP 134)
	Modern digital cameras can also use time-and-date stamp images (PP 134)
	Unattended video cameras to replace unmanned observation posts (PP 134)
	Was used along important parts of the Green Line in Cyprus
	High-resolution digital cameras and continuous video networks operating via web-based platforms that can be augmented by satellite imagery (PP 50)
Night vision: Image Intensifiers (see below, *Sensors: Night Vision: Thermal Imaging*)	Too few possessed, or deployed in insufficient numbers (KW 236)
	Inadequate COE standards (KW 236)
	11. Rifle Scope (Night) (52) (UNIBAM I 143)
	18. Night Vision Devices (100) (UNIBAM I 144)
	Man Portable
	20. Night Observation Device (25) (UNIBAM I 144)
	02 x Reserve tripod Mounted
	Devices that also take pictures and videos were seldom found on UN missions prior to 2013 (PP 134), however this has now changed.
	Facilitate night patrols and night operations (KW 236)
	Night-vision goggles and tripod-mounted infrared cameras (PP 56)
	GPS-enabled night vision devices (PP 56)
	Aerial surveillance (PP 56)
	Goggles (PP 134)

"Open-Source Intelligence"	
Crowdsourcing	Use of "the crowd" to search for information in records, maps, digital archives, etc.
Open Source Collection	Use of tools, techniques, methods, and analysis to use *exclusively* publicly available information to support operations Social media (increased use) (PP 70)
Social Media Monitoring	Use of tools, techniques, methods, and analysis to use social media feeds to understand the "social" landscape of the operational environment Social media, crowdsourcing and traditional public media sources must be incorporated (PP 49)
Platforms	
Aircraft	Sensors mounted to fixed and rotary wing aircraft (PP 55) have been used.
Aircraft: Aerostat	Used for several years by MINUSMA in Kidal a nd by MINUSCA in Bangui, CAR above Logistics base
Aircraft: Fixed wing	Swedish J 29C Jets (PP 133) 1. UN's only major deployment of jets for surveillance in the Congo in the 1960s In modern UN operations, jet imagery was provided to the UN but the jets were from supportive member states, not the UN mission itself (PP 133); Jet and turboprop aircraft (PP 133).
Aircraft: Rotary wing (utility helicopter)	Have served as the main aerial reconnaissance for UN missions (PP 133) 1. Only cameras were hand-held, brought by crew, and lacking image stabilization or high resolution Pods to provide gyro-stabilization for more advanced cameras, including for visible light and forward-looking infrared imaging (PP 133) Used in a few missions
Aircraft: Unmanned	27. Tactical UAV (UNIBAM I 144)[16] 28. Miniature UAV (UNIBAM I 144)[17]

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[16] UAVs and Ground Surveillance Radars will be taken only if available with TCCs, required in the mission area and agreed upon in the MOUs" (UNIBAM 144).

[17] 1, 2 UNIBAM I 143.

(see also: *Transport: Air: Unmanned*; *Weapons: Unmanned*)	Tactical UAV (UNIBAM II 316)
	
	    Facilitate real time monitoring and relaying of critical information in support of peacekeeping operations in real time with live inputs; VTOL, Miniaturized/hand-held, Compact, Automatic flight control; Direct relay; Light weight, Day and night sensors, Smart Image technology, Long range, Autonomous Operation; Low cost (market price)
	
	Operational-level UAVs (PP 54)
	
	    Used in MONUSCO
	
	Nations' UAVs in several mission areas (including Bosnia and DRC) (PP 134)
	
	Belgian B-Hunter UAVs (PP 134)
	
	    EUFOR in the DRC 2006 elections
	
	UN-painted UAVs in the DRC (PP 134)
	
	In the DRC; flying under contract out of Goma
	
	Hand-held UAVs (PP 97)
	
	Medium-altitude long-endurance UAVs (PP 54)
	
	Smaller operational- and tactical-level (PP 54; 77)
	
	UAViators (PP 54)
	
	    Directory of UAV/imagery software used by organizations developing or using UAVs for humanitarian purposes

Digital/Cyber	
Personal (i.e., wearable tech.)	Use of sensors, devices, tracking tools, etc. on deployed members of a UN operation.
Space-Based (Satellite) (see also, above, *Cameras: Satellite*)	Use of space-based platforms to providing mapping, movement patterns and changes, damage assessment. Could include additional scanning for other electromagnetic radiation signatures (e.g., infrared, ultraviolet, etc.), plus communications links. See also, UNOSAT ("Operational Satellite Applications Programme") of the UN Institute for Training and Research (link).
Tower/Mast	Use of both portable and permanent towers and masts to hold cameras, audio sensors, public information systems, etc.
Vehicles	Use of sensors, devices, tracking tools, etc. on vehicles (both terrestrial and marine)

(see also, above, *Cameras: Vehicle Mounted*)	
Radar	
Air Surveillance (ASR) [for rockets, artillery and mortars (RAM) and aircraft, including UAVs]	Used in UNIFIL (KW 236)

UNIFIL: Truck-mounted radars to monitor mission airspace and counter-battery radar (COBRA) (PP 56). Counter-battery radar (Cobra) and truck-mounted air surveillance radar (Samantha) to track jets and helicopters (France) (PP 135).

Airborne Warning and Control System (AWACS) aircraft (United Kingdom) (PP 133)
    Offered its services to the UN to monitor the airspace above Southern Lebanon and adjacent waters
    UN instead developed system based on ground vehicles and ships
    While the UN has not yet employed its own airborne air-surveillance systems, it has benefitted from information provided by AWACS aircraft in previous missions.

Artillery-tracking radar and shot spotting technology can be used to identify the origin and trajectory of artillery, mortar, rocket fire and small-arms fire (PP 55), with relevance for attribution and observation.

Determine source of artillery fire (KW 236)

Remove UN personnel from fire (KW 236)

Track aircraft violating no-fly zones or sanctions or transporting illegal materials (KW 236)

Synthetic aperture radar for imaging from satellite and/or aircraft (KW 236)

"The UN could make better use of lighter, night-time-capable platforms, such as UAVs, aerostats or other raised platforms with mounted electro-optical infrared or radar radial-surveillance technology" (PP 55).

Chartered or contingent-owned aircraft with less expensive air-surveillance systems (albeit with more limited coverage) (PP 133)

Tethered balloon (PP 134)

Aerostats (PP 134)

With the cost of high-resolution cameras decreasing and their capabilities steadily increasing, aerostats will undoubtedly become commonplace in future peacekeeping operations |

Ground-Penetrating	Not used (KW 267; PP 135); but applications to discover underground weapon caches and mass graves (KW 267). Use as a ground sensors (PP 55)

Ground Surveillance	Used only in UNIFIL (KW 237)
	25. Surveillance Radars (04) (UNIBAM I 144)[18,19]
	Ground Surveillance Radar (UNIBAM II 317)
	    To provide early-warning of threat to COBs and Force Protection
	    Locate and identify personnel and vehicle movements, Minimum 2000m range, Man-portable and with alternative power source
	    Cost: market price
	Shatt al-Arab waterway during the UN's Iraq-Kuwait observation mission (PP 135)
	
	Detect trespassers along line of control or demilitarized zone (KW 237)
	Catch illegal smuggling or aggression (KW 237)
	Basic suite of sensors placed on portable elevated (PP 97)
	    Might include a combination of CCTV, motion sensors, infrared radar and ground radar

Marine	UNIFIL: radars abroad ships (PP 56); ship-borne radars (PP 135) Shoreline radars (MONUSCO) (PP 135) Tracking vessels in marine environments, especially in contested boarder regions with lakes and waterways (e.g., Great Lakes region of Africa)
Weather	Military and civilian weather reporting services to support operations and civil society

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[18] 1, 2 UNIBAM I 143.

[19] "UAVs and Ground Surveillance Radars will be taken only if available with TCCs, required in the mission area and agreed upon in the MOU" UNIBAM I 144.

Sensors	
Acoustic Sensors: Person or Vehicle Movement	26. Sensors (10) (UNIBAM I 144)[20][21] Yet to purchase (PP 135) However, in 1976, the US Sinai Field Mission successfully employed such sensors to monitor traffic across strategic passes in the Peninsula to aid the disengagement of Egyptian and Israeli forces Additionally, peacekeepers in Bosnia in 1993–95 concocted a make-shift acoustic sensor by placing a radio receiver in a cantonment facility for the heavy fighting equipment of the conflicting parties Detect weapons being removed from cantonment (KW 237)
Acoustic Sensors: Small Arms Fire Location	Not used for rifle fire (except makeshift) (KW 237); but rockets. artillery and mortar (RAM) tracking radars used in MINUSMA [reference?] Identify source of rifle fire for early warning and response (KW 237)
Chemical Sensors: Explosives Detector	Not used (except perhaps in Middle East PKOs) (KW 237) 63. Explosive Vapour Detector (01) (UNIBAM I 148) Detect weapons and ammunition (KW 237) Can detect explosives, their ingredients or chemical warfare agents and their precursors (PP 136)
Chemical Sensor: Working Dogs	Dogs to sniff for explosives (PP 136)
Long Range	Laser range finder, long-range detectors
Metal Detector: Hand-Held	Used to detect metal on persons entering some premises (KW 237) 67. Hand Held Metal Detector (06) (UNIBAM I: 148) Detect mines and weapons (KW 237)

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[20] UNIBAM I remarks (143):

    1 – Items if available in the TOE of the TCC Infantry Battalion Organization.

    2 – Items that may be used, only if the host State permits the operational use.

    3 – Items which may not be paid through COE reimbursement if not authorized.

    4 – Beneficial to carry to the mission but not covered under the COE reimbursement

  Explanation for the UNIBAM I citations: Taken from the Table of Equipment; first number (e.g., 26.) refers to the serial number provided in the table; the bracketed number (e.g., 10) refers to the grand total.

[21] 1, 2 UNIBAM I 143.

Metal Detector: Mine/UXO	Widely used for mine protection (KW 237)
	66. Deep Search Mine Detector (06) (UNIBAM I: 148)
	Improved sensors with better detection (KW 237)
Motion Detectors	Underexploited technology (KW 236)
	Intrusions Alarms
	Protect refugee/UN camps (KW 236)
	Coupled with automatic illuminators (KW 236)
	Motion-detection illuminators to warn of oncoming vehicles or persons (solar-powered versions can be charged during the day) (PP 136)
	Video cameras that can be triggered by motion-detectors; can be used to inspect undercarriages of vehicles for bombs (PP 136)
	Infrared break-beams (PP 136)
	Taut-wire fence: attempts to scale or cut the fence can trigger cameras and send signals to a monitoring centre (PP 136)
Night Vision: Thermal Imaging (see also, above, *Sensors*: *Night vision*: *Image Intensifiers*)	Not used, except in a few advanced aircraft (KW 236)
	33. Thermal Imaging Ground System (04) (UNIBAM I 144)[22]
	Mi-35 helicopters equipped with advanced infrared sensors (MONUC) (PP 56—7)
	Night foot/vehicular patrols (KW 236)
	Border control (KW 236)
	Forward-looking infrared in aircraft (KW 236)
	Thermal imaging (PP 50)
Pressure Transducer	Strain sensors to warn of vehicles moving on nearby roads or pathways (e.g., trying to skirt around the checkpoint) (PP 136)
Radio-Wave: Radio Scanners/Signal Monitoring	Not used systematically (except in Congo 1960-64 and 2006-07) (KW 267)
	Optical or electronic radar sensors (few missions) (PP 50)
	For tactical operations, e.g., against hostage-takers (KW 267)
Radio-Wave: Signal-Locating	Not used (KW 267)

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[22] 1 UNIBAM I143).

	Electronic Tracker (UNIBAM II 317)
	To track and monitor all personnel, vehicle and helicopter movements based on a digital map located in the Battalion Operations Centre.
	Real time tracking of GPS, Satellite monitoring, Digital map display, Process 300 entities
	Cost: market price
	For electronic countermeasures, e.g., detection of bugs in UN offices or of militia signals in jungles (KW 267)
	Real-time location systems (PP 28)
	Real-time tracking available for cell phones (PP 28)
Road Monitor	Measures passage of cars
Seismic Sensors	Geophones/seismic arrays
	Not used (KW 237); Detect persons or vehicles passing through a certain area (KW 237)
X-Ray Machine	For baggage and shipments
	Used in entrances to some buildings and UN-run airports (KW 237)
	Examine cargo (KW 237)
	Detect human and or other forms of smuggling (KW 237)

INFORMATION MANAGEMENT, ANALYSIS, & DISSEMINATION

This Section has notable overlap, conceptually, with other areas, such as: *Communications*; *Information Collection*; *Positioning & Tracking*.

Artificial Intelligence	
Big data analysis, change analysis, etc.	Review of large datasets, decision support, change analysis on image data.
"Command, Control, Intelligence, Surveillance, Recognisance" Integration	
Analysis and Display Software: Application	IBM's i2 Analyst's Notebook (PP 66)
	Currently used by ASIFU Mali and some missions
	MINUSMA's All Sources Information Fusion Unit (ASIFU) (Civil military teams equipped with small UAVs) (PP 66)

	Common intelligence software solution across missions with powerful query and cross-referencing capabilities (PP 64)
	
	COMPSTAT (automated information system to provide constant analysis from a centralized crime database) (PP 75)
	
	    Used by New York Police Department
	
	Crime analysis software (PP 77)
	
	    Vital for determining and generating appropriate resources required for supporting and guiding policing functions in peacekeeping operations
	
	Essential information management, analysis and communications tools (PP 64)
	
	    As well as professional analytic capacity to deliver sound analysis
	
	Joint Mission Analysis Centres (JMACs) (PP 64):
	
	    Satellite communications, dedicated server capacity, and database management and analysis software to facilitate efficient information gathering, storage, access, analysis and visualization; open-source information, and satellite and other imagery, GIS platforms, and secured Internet connection and data encryption capabilities
	
	Joint Operations Centres (JOCs) (PP 65):
	
	Redundant, advanced communications infrastructure (including portable communications equipment with backup power) (some current use)
	
	Includes ability to visualize output

Command and Control Systems	15. Mobile Command Post (05) (UNIBAM I 143) Command, Control, Communications, Computer and Intelligence (C4I) systems (PP 138) Available on the market as framework commercial off-the-shelf-products (easy to customize) Number of commercially available command and control information systems (PP 49) Provide customizable, GIS-enabled solutions for coherent operational interaction
Database	GoCase software (PP 78) UN Office on Drugs and Crime (UNODC)

	Comprehensive tool to assist with an end-to-end approach to investigatory support and case-tracking that can help strengthen the links between the police and wider justice system
	More comprehensive tools should be made available
	Joint Operations Centre and Joint Mission Analysis Centre structures developing Standard Operating Procedures
	System of monitoring and evaluation of national counterparts—SMART—to track the overall situation in the country (PP 75)
	Currently used to streamline reporting flows and track key indicators through a single database
	Used by UNMIT and later in MINUSTAH and UNMI
	These tools can be used to strengthen the mission's monitoring and advisory capacity
Dissemination	Internal web-based radio stations (PP 36)
	MINUSMA and UNMIK staff broadcast alerts, news and music anywhere the Intranet can reach
	MONUSCO's Community Alert Network (PP 74)
	Peace Operations Intranet (POINT) (PP 36)
	Established to facilitate all peacekeeping access to common information through a unified portal, improving discoverability, accessibility and transparency
	Pre-packaged loop messaging (PP 72)
	Used by UNMIK's Radio Ophelia: open-source automated digital FM radio channel
	Application networks of data exchange (PP 139)
	Foster seamless interlink to information and message handling, VTC, sensor and GPS handling and numerous other services
	Example: SitaWare solution (PP 139)
	Functional area subsystems (APPs) (PP 138)
	Incident tracking maps on a GIS Platform linked to command-and-control platforms as part of a common operating picture software package systems (PP 29)
	Inter-agency data sharing tools (PP 67)
	Need for coherent federated mission network accessible to all relevant actors in a given mission area (PP 34)

	"Peacekeeping missions should incorporate technology in the design and implementation of civilians strategies, in particular their early warning and early response mechanisms, to enhance their ability to detect, mitigate, deter, or respond to threats of violence against civilians" (PP 73). Radio France Internationale (RFI) model (PP 72) Where looped content can be fed into any enabled transmitter via satellite Standardized reporting system for use across all missions, incorporated with mobile reporting platforms (PP 47)
Geographic information systems (GIS)	GIS capabilities increasing; used for mapping (KW 238) Analytical intelligence products, including dynamic GIS (PP 132—3) Systems allowing user interaction and input for real-time picture (KW 238)
Image Processing	Review and analysis of image data into usable formats.

Information Management	DFS' Information and Technology Division (ICTD): Mobile deployed telecommunication system (MDTS) (Performance Peacekeeping)
	
	ICT-specific innovation laboratories in several missions (beginning in 2015) (PP 106)
	
	Strategically provided communications backbone by CITS (PP 59)
	
	    Units in some missions have reduced their reliance on traditional combat C2 nets
	
	Umoja (PP 100)
	
	UN SAGE (information and mapping tool for security-related incidents) (PP 137)
	
	    However, mission components generate large amounts of operational data that cannot fit into SAGE
	
	    No database tool provided by the Mission or UNHQ that would allow this data to be stored, managed and analysed
	
	"While UNHQ has invested resources to centralizing and provision of tools for the management of data related to mission finances, staffing and logistics, information management tools are absent" (Performance Peacekeeping).
	
	Assigned networks (e.g., medical, logistics or tactical operations networks) (PP 59)
	
	Better tools for internal document sharing, document management and archiving (PP 62)
	
	Decision support systems used in the intelligence environment (PP 138)
	
	    Based on a common standard protocol or other standard format that provides for easy database update and subsequent data mining and analysis

	Examples: NATO standardization such as MIP, LC2/JC3IEDM, APP6, STANAG and technology standards i.e., IP, J2EE, XML and web services
	Interfaces between radio and other communications networks, including satellite communications (SATCOM) (PP 59)
	Microwave, fiber link and beyond line-of-sight technologies are steadily improving (PP 97)
	Mutualink's network interface controller (PP 35)
	Proper information management systems (supported by technological tools) (PP 62)
	Use of small, light, mobile troposcatter equipment: has high and long-range data transmission and SATCOM switch capability should also be considered (Performance Peacekeeping)
Information Management: Social Media (see also, *Information Collection*: *Open Source*)	"Diplomatic Pulse" (PP page)
	eDiplomacy (PP 70)
	Unite community
	Social media (increased use) (PP 70)
	Social media, crowdsourcing and traditional public media sources must be incorporated (PP 49)
Open Source Information (see also, *Information Collection*: *Open Source*)	Analytic tools to monitor media (PP 70)
	Hootsuite, Tweetdeck, Radian6
	Crowdsourcing platforms, interactive SMS blasts (PP 70)
	UNICEF Rapid Pro and U-Report
	Cyber hygiene (PP 67)
	Hardware and software asset inventory, secure configurations of networks and systems, a system of continuous system monitoring and vulnerability mitigation, and means of controlling the distribution and use of administrative permissions
	Global Pulse (PP 68)
	Monitor open-source information and add to or assist in the analysis of information (PP 140)
	The GDELT Project; Storyful; Recorded Future; RapidMiner, SAS Text Miner; XMind; Mindjet; MindManager; Coggle; MindNode; FreeMind; NodeXL; ACH; FaultTree+; Swiftriver
	Open source (PP 67)
	Traditional and new social media, crowdsourcing platforms, and other information conduits, e.g. analytic clearinghouses
	RecordedFuture or Storyful (PP 67)

Situational Awareness Tools	Independent systems generated in parallel in UNIFIL, MINUSTAH, UNMIL and MONUSCO, have been reverse engineered into a common incident reporting platform with a shared taxonomy (PP 63) Information captured through modern ISR (PP 63) Can greatly enhance a mission's situational awareness, understanding of operating context, and help inform responses to emerging threats Encourage the co-location of its GIS capacity with the JOCs (PP 63) Geospatial visualization should be more widely used (PP 63) More structured and integrated approach to data collection, processing and dissemination (PP 63) Help maximize the use of GIS products and other data visualization
Other	

Business Intelligence & Risk Management	Contract Information Management System (CIMS) (PP 83)
	    Used by UN Somalia Risk Management Unit (RMU)
	UNICEF's DevTrac (currently used); Equitrack (next generation) (PP 82)
	
	Business intelligence policy (PP 82)
	Software solutions for data management, visualization and analytics (PP 84)
	    (e.g., SAP Business Objects, etc.)

"Managing the Remote Back Office"	Seamless, real-time communication and file-sharing with a remote and forward offices (PP 86) Share points (PP 86) Video-teleconferencing and point-to-point video chatting solutions (PP 86)
Mission Support	Global Field Support Strategy (GFSS) (shared services model) (PP 85) Used by DFS
Mobile applications, devices, & solutions	Distribution of smart phones or tablets is limited to high-level personnel in a mission (PP 59) Field Information Logging Application (FILA) (PP 60) Allows the mission to track GIS staff movement while in the field, and to record field survey operation information in real-time FILNAV (PP 60)

	GPS navigation application that allows users to navigate the Area of Operations
	Liaison Operation Information System (LOIS) application (PP 60)
	Standardized mobile communications capabilities (PP 58)
	UNIFIL's Blue Line Information System (BLIS) (PP 60)
	GIS solution devised, developed and implemented by the UNIFIL Joint GIS Section to support and manage the mission's marking activity of the Blue Line
	BLIS consists of maps, real-time geospatial data, imagery, procedures and tools, like mobile and desktop applications and Google Earth
	UNMAS Landmines and ERW Safety smartphone application (PP 47)
	Automated data collection and analytical tools to boost mandate delivery (PP 74)
	Better use should be made of Standardized mobile communications capabilities (PP 58)
	Data-enabled smart phones (with mobile applications e.g., Ping) (PP 37)
	Emergency connect capabilities (Ping, SpotConnect, or Spot GPS) on handheld devices (PP 27)
	Enhanced use and support of handheld devices or tablets equipped with specialized mobile applications (PP 59)
	Mobile applications
	File travel plans, automatically communicate GPS locations on a periodic basis, and alert base stations or headquarters (PP 27)
	Simple mobile applications and devices; social media tools should be made available to police (PP 75)
	Simplified, standardized and geo-enabled reporting templates via mobile (PP 59)
	Smart Policing (PP 75)
	Smart phones attached to their vests (used by Brazilian *Instituto Igarapé*); Android app locates the respective police officer via GPS and livestreams audio and video records to police headquarters; body and vehicle cameras
	SMS applications (PP 37)
	Emergency SMS to back up radio networks

Security	

Digital: Cybersecurity, Data Privacy, Encryption, Information Security	*ICT Backbone and Business Continuity*
	Field Technology Operations Centres (PP 87)
	  Used by DFS
	The Field Technology Operations Centre (FTOC) (PP 87)
	  Located within the Global Service Centre (GSC)
	The Global Service Centre (GSC) (PP 88)

Digital: Resilience & Redundancy	
Physical: Asset Protection / Ruggedized	

LOGISTICS, SUPPLY CHAIN, & INVENTORY

Limited coverage, see e.g., United Nations Department of Operational Support[23]

Supply Chain	Includes
	Demand Fulfilment Track & Trace Demand Planning Sourcing Logistics Storage and transport Delivery and Receipt

MEDICAL

(limited coverage in this list, see other sources)

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[23] See: UN Department of Operational Support, "Supply Chain" focus area.

Crisis Kits	Crisis kits (relatively complex emergency bag containing emergency medical drugs and equipment) (PP 42)
	Smaller emergency trauma kits (PP 43)
Diagnostics	
Other	112. Medical Equipment (01 Set) (UNIBAM I 153)
	"10-1-2" rule should be prioritized (PP 41)
	Air ambulances (PP 42)
	Remote office/communications kit (containing a laptop computer, scanner, printer, camera, GPS, satellite phone and BGAN) (PP 42)
	System of emergency communications (PP 43)
	Telemedicine (PP 43)
Surgical Tools	
Telemedicine	Remote delivery, combined with smartphone based diagnostics.
Trauma	Advanced life support (PP 43)
	Medical escorts should accompany high-risk patrols and other operations, and be equipped with redundant communications systems (satellite phone, UHF/VHF radios, and portable GPS) and emergency medical equipment (PP 42)
	Mass casualty chest (PP 43)
Veterinary Tools	

MISCELLANEOUS

Emergent Technologies and Concepts[24]	
The Digital Peacekeeper: Civilian	(PP 96)
	Business intelligence tools
	Including management dashboards, risk analytics, data-mining applications, and fusion capabilities

[24] Section title, subcategories, and information taken from *Performance Peacekeeping*.

	Environmentally-sensitive technologies
	RFID-enabled tracking
	Smartphones, tablets and other mobile devices
	An integrated and multidimensional common operational picture (with real-time visualized and geo-referenced data)
	Integrated information management, sharing, analysis and collaboration through common solutions
	Location tracing, geo-location and incident reporting technology (embedded in all UN vehicles)
	Connectivity solutions
	Such as the BRCK or other mobile connectivity kits
	Simulation and scenario-based technology tools
	State-of-the-art security solutions:
	Integrated into a broader organizational security framework; enhanced physical and IT security controls (such as biometric identification and access control measures and basic cyber hygiene measures)
The Digital Peacekeeper: Military	(PP 94)
	Visors ("head-up display monitor")
	Specialized mobility enablers (e.g., mine-protected vehicles and comprehensive sensor)
	Vehicles (core technology hubs)
	Physiological sensors
	Advanced technologies (including fuel cells, solar power-packs, individual mini-UAVs)
	Continuous connectivity (to enable secure and reliable communications for voice and data)
	Thermal sensors, night-time capable video cameras, and chemical sensors
	Non-lethal capabilities
	Information fusion and enhanced analytic tools
	Fed by open-source information, aerial, geospatial, and other remotely acquired data, commercial satellite imagery, and comprehensive sensor packages; to specific layers of map-based visualization of real-time information for enhanced situational awareness through ruggedized tablet or smartphone solutions
	Tracking and geo-location of individuals and vehicles (symbol-based visualization of the common operational picture)

The Digital Peacekeeper: Police	(PP 95)
	Biometric and identity management solutions (including integrated biometric databases)
	Mobile forensics and crime scene investigation equipment (such as DNA analysis and crime scene illumination equipment)
	End-to-end case tracking systems
	Diagramming systems
	Smart software solutions
	Mobile thermal imaging devices
	New technologies in hand-held devices have speech-recognition abilities; instant text translation
	Automated response systems
	Cameras in or atop vehicles
	Tablets and smartphones (immediate access to databases to provide geo-tagged and layered visualization)
	GPS and tracking technology
	Monitoring and surveillance technology
	Non-lethal weapons
Other	
	Armaments & Accessories 13. Flare Gun (18) (UNIBAM I 143) *Electronic Equipment/Instruments* 16. Compass (100) (UNIBAM I 144) 17. Binoculars (105) (UNIBAM I 144) 19. Binocular/Spotter Scope (100) (UNIBAM I 144) –Do- Tripod Mounted *Engineer Equipment* 68. Exploder Dynamo (01) (UNIBAM I 148)

	69. Prodders (12) (UNIBAM I 148)
	70. Under Carriage Inspection Mirrors (06) (UNIBAM I 148)
	71. Assorted Explosives & Stores (30 KG) (UNIBAM I 148)
	Fuses, Cords, Devices
	75. Field Defence Stores for COBs (06 Sets) (UNIBAM I 149)
	76. Pioneer Tool Kit (01 Set) (UNIBAM I 149)
	77. Chain Saw (02) (UNIBAM I 149)
	78. Field Engineering Stores (05 Sets) (UNIBAM I 149)
	Provided by UN
	79. Spike Bets (30) (UNIBAM I 149)
	Fuel Oil and Lubricants Storage (UNIBAM I 152)
	105. Barrels (90)
	106. Jerri Can (53)
	Miscellaneous Stores
	113. Containers (25) (UNIBAM I 153)
	IT & Office Equipment (As Required) (UNIBAM I 153)

POSITIONING & TRACKING

Section has overlap with other areas, such as: *Communications*; *Information Collection*; *Information Collection*; *Information Management, Analysis, & Dissemination*.

Boundary Demarcation & Monitoring
Mobile applications that allow for real-time field measurement to enable Blue Line marking with System of Incident Reports (SOIR) (PP 81)

Currently used by UNIFIL
 	
Commercially available smartphone applications (PP 81)
Mobile applications that allow for real-time field measurement to enable Blue Line marking with System of Incident Reports (SOIR) (PP 80)
Mobile thermal imaging systems (MTIS) (PP 81)
    Different types of sensors including long-range thermal sensors, high zoom video, radar, LRF, digital compasses, GPS, and digital maps with target positions
Sensor survey using GPS, satellite imagery, or LiDAR (PP 81)
    Remote sensing technology that measures distance by illuminating a target with a laser and analysing the reflected light; currently used by the African Union
Sensor technologies (including UAS) (PP 81)
Smaller-scale sensors (PP 81)
    Including cameras and radar
Wireless networks (PP 81)	

Communications	

Phone Tracking	

Location Tracking (see also, *Information Collection*)	

Blue Force (also Red, Green and White)	

Global Positioning System (GPS)	GPS used extensively; devices are individually owned, contingent owned, and UN owned (KW 238)
	21. GPS Man Portable (70) (UNIBAM I 144)
	    02 x Reserve
	22. GPS Vehicle Mounted (160) (UNIBAM I 144)[25]
	    All vehicles

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[25] 1 UNIBAM I 143.

	23. Electronic GPS Tracking System (01) (UNIBAM I 144)[26] Real-time tracking of vehicles (KW 238)
Identify Friend from Foe (IFF)	
Radio Frequency Identification (RFID)	Carlog used in most missions for UN vehicles (KW 238) Carlog (with GPS) (PP 28) Radio-frequency identification used to track weapons and UN supplies (KW 238)
Transponders & Tags, Vehicle Tracking	Tracking and fleet management systems (PP 28)

PROTECTION TECHNOLOGY

Concept overlap with *Safety and Security*.

Access Control	
Anti-Theft	Tamper-resistant tracking technology for both vehicles and heavy weapons systems (PP 27)
Security Systems	Including authentication, alarms, biometric scanning, etc.
Infrastructure	
Ballistic-Resistant Paint/Coating Barriers/Fences Containers Sandbags	
Personnel Equipment	
Body Armour, Helmet, etc.	Individual suites of operational and protective equipment (PP 27): Modern and effective body armour and helmets; fire blankets, individual field first-aid kits; crisis response instruction cards; backup power packs for mobile phones and other devices; mobile communications and Internet access

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[26] 1, 2 UNIBAM I 143.

	devices (preloaded with critical local information such as medical facilities and transportation hubs, as well as translation software); emergency-activated beaconing technology
	Electronic countermeasures linked to dedicated intelligence resources while on the move (PP 47)
Transport	
Aircraft	Aircraft protection technologies (chaff, missile & SALW fire detection, etc.)
Ground Vehicle	Bullet Proof Vehicle (UNIBAM II 319) For escort duties, faster protected (ballistic) mobility, Deterrence value; Close support; Ballistic protection, Protected mobility, 4x4 configuration, Turret and sideways weapon mountable; Cost: market price Mine Protected Vehicle (UNIBAM II 318) Provide protection from mines, UXOs and IEDs; Protection from Mine/UXO/IED blast, Ballistic protection, High protected mobility, 4x4 configurations, Turret weapon mountable; Cost: market price All conveys in areas are identified as a threat should be deployed with the minimum ability to self-recover (PP 46) Convoys could be supported by fixed or tethered surveillance platforms to increase surveillance capacity (PP 46) Heavy vehicle extraction capability and organizational level repair and remediation technologies (PP 47) IED, SALW fire detection, SALW ballistics, etc.
IED Protection	62. Remote Control bomb Disposal Device (01) (UNIBAM I 148)[27] 64. Electronic Circuit Bomb Detector (01) (UNIBAM I 148) 65. IED Jammer (01) (UNIBAM I 148)[28] Neutralize IED 72. Bomb Disposal Suit & Equipment (01 Set) (UNIBAM I 149) 73. EOD Suit & Equipment (01 Set) (UNIBAM I 149)

[27] 1 UNIBAM I 143.

[28] 1 UNIBAM I 143.

	"Bolt on" armour, ground-penetrating radar for subsurface mine detection, and hand-held explosive composition detection devices (PP 46)
	Electronic countermeasures (also referred to as IED jammers) (PP 46)
	Mine-protected vehicles (PP 46)

SAFETY AND SECURITY

Protection Technology overlaps with this Section.

Infrastructure

Essential technology suite for every encampment (PP 97)
 	
(Basic access control measures, such as commercially available remote-controlled barriers, could add to basic perimeter security measures and augment trenches and modern, easy to erect fencing or bastion parameters)
 	
Rapid response mechanism (aerial and ground sensors) (PP 136)
 	
Recommendation: No encampment, office compound, or staff accommodation should be without (PP 35):
    1. Back-up energy support (including primary or backup alternative energy solutions)
    2. Perimeter lighting
    3. Motion-detection technology
 	
Emergency communications tested on a daily basis

Technology	
(see also, *Information Collection*)	
Cameras	Smart camera technology using remote access to live feeds (Performance Peacekeeping)
Lighting	31. Search Light (110) (UNIBAM I 144) 02 x Reserve 32. Flood Lights (20) (UNIBAM I 144) 04 x Reserve Perimeter Lighting (Performance Peacekeeping) LED solar powered lighting systems

Motion Detection	Motion detection equipment tied to lighting.

TRAINING

On-Mission	
eLearning Platforms	Online peacekeeper training and courses (e.g., *Peace Operations Training Institute* courses), support material from the Department of Peace Operations' Integrated Training Service
Pre-Deployment Training	
Classroom and Lesson Based, including eLearning	FOI's "Camp Authoring Tool" (CAT) (PP 90) Integrated Training Services (e-learning) and the larger set of documents are at the Peacekeeping Resource Hub, DPKO and DFS websites and the Official Documents System (ODS) (PP 103) UN pre-courses like "Basic Security in the Field" Model should be expanded upon (PP 103) Modularization (PP 90) Current uses: security components, energy, supply, office accommodation, safety and fire protection, ICT, ablutions, light vehicles components and waste water systems Online peacekeeping and training portal (PP 102) Smart, interactive software (pre-deployment training of uniformed personnel) (PP 101) Through distance learning or assessed short courses Virtual command post exercises (PP 102)
Field Exercises	
"Peacegaming:" Role-Play and Table-Top Exercises	
"Peacegaming:" Simulations	Exercise Viking software, SWEDINT E-gaming for peacekeeping; Virtual Reality tools for simulations

TRANSPORTATION

See also, *Information Collection: Platforms* Section.

Air	

Fixed Wing	Example types:
	    Civilian Passenger
	    Civilian Cargo
	    Military Transport
	    Tactical and Strategic Airlift

Material & Supply Delivery	Precision Airdrop
Rotary Wing	
Unmanned	Any type (fixed or rotary wing) UAViators (PP 54), directory of UAV/imagery software used by organizations developing or using UAVs for humanitarian purposes
Ground	

Combat & Combat Support	Numerous types and variations with a range of functions, including:
	    Armoured personnel carriers (APCs)
	    Armoured recovery vehicles (ARVs)
	    Anti-IED/mine-clearing
	    Light armoured vehicles (LAVs)
	    Protected mobility vehicles (PMVs)
	    Tank/Heavy Armour

Miscellaneous	46. Water Tanker (06) (UNIBAM I 146)
	    10,000 litres
	47. Water Trailers (12) (UNIBAM I 146)
	    2000/7000 litres
	60. Refrigeration (Lorry) (06) (UNIBAM I 146)
	61. APCs Recovery (01) (UNIBAM I 145)

Marine	
Boats, Ships, Bulk Carriers, etc.	Including "Sea Containers" (these are often line-items in UN PKO Mission Budget Performance Reviews, used as storage).

WASTE MANAGEMENT

See also, *Environment* Section

Hazardous Materials
Liquid Waste (see also, *Water*)
Recycling
Solid Waste

WATER

See also Section on *Environment*.

Sourcing	74. Field Water Pumps (06 Sets) (UNIBAM I 149)
	98. Water Treatment Plants (05 Sets) (UNIBAM I 152)
	100. 500 Litres (25) (UNIBAM I 152)
	101. 1000 Litres (18) (UNIBAM I 152)
	102. 3000 Litres (12) (UNIBAM I 152)
	103. Bladders (30) (UNIBAM I 152)
	05 Reserve
	104. Jerri Can (53) (UNIBAM I 152)
	Greater use of rainwater collection, piping and storage systems (PP 33)
	Strategically resourced ground-penetrating radar and advanced geospatial imaging can help improve the odds of successful drilling (PP 32)
	Includes locating, drilling, extraction
Treatment	99. Water Treatment Devices (20 Sets) (UNIBAM I 152)

	Modern water purification technology; use of non-potable recycled water (PP 33)
	Personal water purification "straws" (PP 33)
	Includes desalinization technologies

WEAPONS (not comprehensive)

Aerial Systems	
(see also, *Information Collection: Platforms: Aircraft*)	
Fixed Wing: Fighter Aircraft	
Rotary Wing: Attack Helicopters	
Unmanned (see also: *Information Collection*: *Platforms*: *Aircraft*: *Unmanned*; *Communications: Jamming*)	Currently does not allow the use of unmanned aerial systems/vehicles for combat operations.
Heavy Weapons	
Anti-Ship	
Anti-Tank	
Artillery	
Ground to Air Systems	Air Defence/Anti-Aircraft Systems Anti-Missile & Close-In Weapon Systems (CIWS)
Howitzer	
Missile	
Naval	Torpedoes
Other	

Non-Lethal	
(see, *Weapons, Non-Lethal*)	
Small Arms and Light Weapons (SALW)	
Hand Gun	
Machine Gun	
Mortar	
Other	
Rifle	
Rocket Launcher	
Targeting	
Target acquisition and tracking	
(see also: *Information Collection; Information Management Sensors*; *Positioning & Tracking*)	

WEAPONS, NON-LETHAL[29]

Anti-Vehicle	
Counter-UAS/UAV (see also, *Communications: Jamming*)	Tools and techniques to reduce/remove threat of UAV threats
Counter-Vehicle	Tire deflation (spike belt); tyre slasher
Combat	
Obscurant	Smoke grenades (Battalion Manual Vol. 2: 133) e.g., Smoke screen

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[29] *UNIBAMII*: 2.11 : Crowd Management: 2.11.5 : Organization. Equipment. (133—4)

Crowd-Control	

Area Control/Immobilization	*Crowd/Riot Control Equipment* (UNIBAM I 151)
	    (One Company Set and Three Platoon Sets as per current COE Manual)
	87. Megaphone
	88. PA System
	89. Tear Gas Launcher
	90. Stun/Smoke Grenade
	91. Protective Shield
	92. Elbow, Knee, Shoulder Protection
	93. Helmet with Visor
	    Face Shield Ballistic
	94. Gas mask
	95. Baton
	96. Signal Pistol/Taser
	97. Barricade Shield
	
	Stun and smoke grenades (PP 76)
	Tasers (PP 76)
	
	Entangling Nets
	
	Bean-bag rounds (PP 76)
	Riot-control agents (such as tear gas) (PP 76)

Chemical Irritants	OC-spray (Oleoresin Capsicum) (Pepper Spray) (Battalion Manual Vol. 2: 133) Tear gas launchers; tear gas hand grenades (Battalion Manual Vol. 2: 133) Note that the Chemical Weapons Convention indicates these can be used for "domestic law enforcement purposes," so there is a legal argument to use them in certain cases in PKOs

Projectiles (e.g., rubber bullets, water cannon)	"It should be noted that the use of rubber bullets by UN police units has been banned by the DPKO" (Battalion Manual Vol. 2: 133). Rubber bullets (PP 76)

WEAPONS TRACING, TRACKING, & DESTRUCTION

Chemical, Biological, Radiological and Nuclear (CBRN)	
Conventional Weapons	Often linked into peace operation mandates and policies.
Explosive Remnants of War (See also, *United Nations Mine Action Service, UNMAS*)	Includes landmines, UXO, AXO, IED. Linked into peace operation mandates and policies.
Small Arms and Light Weapons (SALW)	Often linked into peace operation mandates and policies.

ACKNOWLEDGMENT

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