

PERFORMANCE PEACEKEEPING

FINAL REPORT

OF THE EXPERT PANEL ON TECHNOLOGY AND INNOVATION IN UN PEACEKEEPING

Hervé Ladsous

Under-Secretary-General
Department of Peacekeeping Operations

Ameerah Haq

Under-Secretary-General
Department of Field Support



Dear **Mr. Ladsous** and **Ms. Haq**,

22 December 2014

I am very pleased to forward to you the final report of the Expert Panel on Technology and Innovation in UN Peacekeeping. This report constitutes fulfilment of the task you entrusted to us six months ago, and we hope it meets the aims and expectations you envisaged.

The report argues for much wider deployment of technology and innovative practices to help strengthen peacekeeping and, in so doing, seeks to dispel some of the more pervasive myths that have impeded progress toward this aim. The report focuses the bulk of its discussion on the realities of operating in the field and makes a number of recommendations regarding technology to adapt now to aid peacekeeping staff and forces in fulfilling their mandates. It also offers thoughts on the longer-term challenge of keeping up with technology and discusses some of the issues to consider in building a culture that values innovation. In many places, the report highlights existing practice and progress in missions that can be adopted more broadly. You will note that we do not suggest a restrictive approach to prioritizing the report's recommendations, but you will find a number of suggestions to achieve immediate effects while setting the necessary foundation in place for longer-term impact.

In spite of its length, the report will not, inevitably, highlight, or even refer to, every technological innovation with peacekeeping relevance. No doubt readers of the report will identify interesting technologies, other capabilities, and innovative practice that the report does not mention. All to the good. The report seeks to catalyse as well as inform. It is also worth noting that any citations in the report of proprietary technologies by name were made with the intent to illustrate a point or clarify a capability—not to advocate for its specific adoption. The panel found it impossible to craft an operationally actionable document devoid of any reference to any “brand” names. Indeed, the word Google has itself become a common verb!

In doing its work, the panel has benefitted greatly from the support and cooperation of every part of peacekeeping and field support. We are especially indebted to the Office of the Chief of Staff and to the leadership and personnel of ICTD. We are also very grateful to David Haeri and the best practices team. In particular, Stacy McDougall, the panel's indefatigable secretary, has been the mainstay of the entire effort. A talented peacekeeper with experience in the field as well as at Headquarters, Stacy is thoughtful, thorough, and, in many ways, embodies the very culture of creativity and innovation that is more broadly needed throughout peacekeeping.

The members of the panel join me in thanking you for the opportunity you have given us to serve peacekeeping through our participation on the panel. We look forward to discussing the contents of the report with you and to the follow-up on the application of its findings.

Sincerely,



Jane Holl Lute
Chair

Executive Summary

The world is nearly halfway through the second decade of a technological revolution hastened by the global expansion of the Internet. Innovation and invention are accelerating in every sphere, and technologies once the exclusive province of scientists and technologists have come into everyday use for many of the world's people. Yet, despite the omnipresence of advanced technology and applications in our daily lives, United Nations peacekeeping remains well behind the curve.

The use of modern technology to help peacekeeping missions establish and maintain situational awareness, carry out their mandates, and protect themselves is neither aspirational nor luxury. The availability and effective use of such technology represents the essential foundation—the very least that is required today—to help peacekeeping missions deploy to and manage complex crises that pose a threat to international peace and security. No mission can be expected to succeed in today's complex environments without an ability to innovate and make effective use of technology, and no advantage should be withheld from those working for the cause of peace.

It is from this point of departure that, in June 2014, the Under-Secretaries-General for Peacekeeping Operations (DPKO) and Field Support (DFS) asked the Expert Panel on Technology and Innovation in UN Peacekeeping to recommend ways in which technology and innovation could enhance the enterprise's operational effectiveness. The panel cast a broad net, and quickly found itself humbled by the infinite possibilities that an enhanced focus on technology and innovation in peacekeeping could bring. The expansive scope of the present report and its recommendations reflect this, yet we have only scratched the surface. Our intent is to catalyze innovation and modernization, not to provide an exhaustive catalogue of options from which the Departments can pick and choose. We feel that technological innovation is simply moving too fast for the latter to be a useful approach.

The panel is not writing on a blank slate. Over the past decade, United Nations Member States have enacted a number of initiatives to further improve the political, military, rule of law and support foundations of peacekeeping missions in the field. These measures notwithstanding, few observers can argue that UN field operations manifest anything approaching up-to-date practice in the use of modern technology. On the contrary, missions frequently lack a wide range of the very capabilities now considered by most militaries, law enforcement agencies and international organizations to be minimally necessary to operate effectively. In fact, when it comes to technological necessities—much less advantage—the gap between what the average peacekeeping mission does have and what it should have is so pronounced, that some of the countries with the world's most capable military and police forces have been reluctant to participate in many of the more difficult and challenging peacekeeping operations.

In considering the ways to maximize technology and innovation in peacekeeping, we have taken a twofold approach: First, we offer observations and recommendations designed to achieve immediate impact. Second, we have taken a slightly longer view and make recommendations regarding how UN peacekeeping can evolve to become a learning enterprise that seeks out and applies new technologies and innovations on a continuous basis, thereby enabling it to be prepared for the future.

The priorities considered by the panel included: prioritizing how technology could be leveraged for mandate implementation, including the protection of civilians; interoperability, as a prerequisite for effective operations; federated mission networks, to enable information sharing; medical support; camp and installation security; and mobile communications and information platforms. Ultimately, the panel chose not to assign any particular order to our recommendations, but instead elected to present them organically, as they appeared in the text. We defer to the Departments to identify their own priorities for implementation.

Assumptions and Principles

Several assumptions underlie our examination of how technology can help strengthen peacekeeping missions. We assume that most, if not all, the requirements for peacekeeping can be met by widely available technology. We also assume that Member States will represent the first “port of call” when soliciting particularly specialized technologies for peacekeeping missions—in part, because they would likely have such equipment (as well as tested experience in its use), and in part, to help ensure transparency in the deployment and use of such technology under peacekeeping circumstances. We also assume that as peacekeeping seeks out new technologies and innovations, Member States will empower necessary changes and that DPKO and DFS would make the policy and process changes necessary to create a technology- and innovation-friendly framework to set a solid foundation for success.

Certain principles should guide the deployment and use of modern technology for peacekeeping. These principles include the need to: pursue widely-available solutions and avoid reliance on proprietary, esoteric technologies; prioritize mobility – both in the sense of agile maneuverability of mission assets and in the sense of mobile platforms for information technology (IT) and information; deploy technology that is robust, fit for purpose (acquired and used to meet clearly identified operational and technical needs) and relatively easy to maintain in the field; push technology as far forward as possible in the operational chain, reinforcing the “supporting-supported” concept; maintain a high degree of transparency in the consideration, adoption, deployment and use of sophisticated technological and information platforms; and source locally, or regionally, wherever possible those capabilities not provided by Member States.

Member States can contribute to the operational effectiveness of missions by making available technology, expertise, or training for those units that deploy. We argue that these countries, which we term “Technology Contributing Countries” or “TechCCs”, should be identified and engaged in much the same way that troop and police contributing countries (TCCs and PCCs) are today.

Exploding the Myths

Since fielding its first mission in 1948, UN peacekeeping has proven its ability to anticipate over-the-horizon needs and to adopt and sustain new or advanced technologies in the field. However, the prevailing political narrative surrounding technology and innovation has undermined the ability of peacekeeping to keep pace with innovation and to take full advantage of technologies that are essential to success. This narrative has also eroded the political and financial willingness of Member States to ensure the peacekeepers in the field can operate at a level at least as sophisticated as any spoiler they may encounter. We have sought to dispel these myths, in order to elevate, inform, and temper a constructive dialogue.

Technology will not supplant the need for human presence, but it can enhance peacekeepers' abilities to do their jobs more effectively. Most modern technologies are neither too expensive nor too sophisticated to be within the reach of peacekeepers, and their introduction will not increase the vulnerability of individual peacekeepers. Rather, technology will enhance the safety and security of UN personnel serving in difficult, remote, and dangerous environments. While there will always be "haves" and "have nots" when it comes to advanced technology, no country is immune to the constant need to catch up with the development of important and useful technologies.

"Technology" and "innovation" must not be seen as euphemisms for the introduction of non-transparent or intrusive technology into mission areas for narrow political purposes, as some would hold. Advanced technologies, including unmanned aerial systems, are an integral part of the update equation that can bring decided advantages to peacekeeping operations. Enabling a peacekeeping mission to use technology or other advanced means to gather information does not violate the basic principles of peacekeeping impartiality and state sovereignty. No partiality is shown to peacekeepers in providing missions with the same access to information that people around the globe can readily and openly access, and peacekeepers do not lose their impartiality simply because they are better aware of what is going on in their mission space. To execute their mandates, peacekeeping missions must be able to move fast to acquire, validate, and fuse information from a wide range of openly available sources to enhance situational awareness, augment security, aid operational planning, and support decision-making. UN peacekeeping simply cannot afford to cede the information advantage to those actors in a mission area determined to undermine prospects for peace and who use the advantages of modern technology to aid their violent cause.

Getting the Basics Right

Fuller deployment and use of modern technology and innovation can help preserve and sustain life in the field, reduce a mission's environmental footprint, and gain greater efficiencies over time. Immediate efforts to strengthen the technological foundation of peacekeeping operations, and thereby increase operational effectiveness, should focus on three key areas: getting the basics right; supporting operational imperatives; and streamlining mission support.

No one needs reminding of the challenging nature of peacekeeping missions. Yet, while the challenges faced in every area of operations are, to some extent, unique, a high threshold of commonality exists across the lifeline sectors that underpin every mission: security, shelter, water, energy, medical support, mobility, and communications. The failure to meet these basic needs can hamstring a mission from the very start, and scenarios of missions coping with shortfalls in these areas are all too familiar. They are also largely preventable.

The panel has made a number of recommendations intended to enhance the security of individuals, camps, accommodations, and mission operations—including patrols and convoys. Our recommendations also reflect modern peacekeeping's requirement for personnel that are mobile, agile and responsive to fast-breaking operational needs, and who can undertake forward expeditionary deployments into areas with little or no modern infrastructure for extended periods. Peacekeepers must be capable of deploying and redeploying rapidly within a mission area with minimum delay, day and night, and we point to certain areas where technology can be applied to enhance mobility, and more specifically, to mitigate risk and enhance awareness of the increased threat caused by improvised explosive devices (IEDs). Missions must also be able to provide timely, routine and emergency medical assistance *in situ*, and be able to extract personnel and transport them to higher levels of care when the need demands it. In our recommendations, we suggest ways technology can enhance the UN's ability to fulfil its duty and enhance the well-being of its personnel serving in the field.

As with so much of modern life, peacekeeping missions require energy for every conceivable aspect of their operations. However, many mission areas lack reliable access to local energy grids and continue to rely on diesel generators as a prime source of energy for operational needs. Similarly, in every mission, the production or procurement of large supplies of water for drinking and bathing poses serious challenges, and if not carefully sourced, peacekeepers risk finding themselves depleting the very reserves that their host communities count on. Our recommendations provide a pathway to a more sustainable approach which places less strain on the fragile environments and local communities in which peacekeepers serve, and which reduces the burden on mission support.

For any mission, effective communications to facilitate messaging up and down the chain with important operational, administrative, and real-time safety information is not a luxury, but rather, a life-saving necessity. While DFS does an exceptional job at connecting peacekeepers in remote and extreme environments, the kind of communications and Internet access needed to facilitate the same degree of command and control enjoyed by the majority of the world's organized militaries and police forces is largely restricted to urban settings. Limited bandwidth and the lack of interoperable systems represented the most common barriers to effective communications raised to the panel in our inquiry, and our recommendations address these barriers.

Operational Imperatives

The UN can do much more to introduce modern technology and innovative practice to enable peacekeepers to execute their mandates more effectively, and technology can greatly enhance the substantive work of peacekeepers. To illustrate this, we explore the key mandate areas of the protection of civilians, policing and the rule of law, and border/boundary demarcation and monitoring—all of which argue in favour of moving rapidly to acquire and deploy many of the technologies we discuss in our report.

Peacekeepers increasingly come to missions expecting at least a basic level of technology to enable them to do their work. Yet, especially in the areas of command and control, monitoring, reconnaissance and reporting, and information and communications technologies, peacekeeping operations simply do not currently possess anything approaching adequate numbers or types of technologies that militaries and police forces around the world accept not only as commonplace, but also as foundational to successful operations. This must change.

Real-time visibility into mission areas of responsibility allows for on-going operational assessments, and can enhance the safety and security of mission personnel. The panel recommends a broad range of technologies useful for these purposes, many of which are now available commercially, at comparatively low cost. Peacekeepers require a robust, redundant and interoperable system of radio, telephone and data communications that extends across the fullest range of any mission's area of operations. We make a number of recommendations regarding the provision of, and support for, mobile tools that will enhance peacekeepers' abilities to do their jobs and to align operational processes to the need for accelerated information flow. We also recommend specific technologies which we feel are essential for peacekeeping missions, and which will allow peacekeeping missions to continually adapt to the need to acquire, process, use, and share information from an ever wider range of information sources.

The exercise of authority, coordination of operations, and prioritization and direction of resources require regular and reliable access to high fidelity information, a critical enabler of operational effectiveness. Information captured by modern technologies can greatly enhance a mission's situational awareness and understanding, and help inform responses to emerging threats against civilians as well as UN personnel, assets, and installations. When interpreted and analysed by trained specialists in near real time, such information constitutes a powerful force protection and intelligence tool that UN peacekeeping should field immediately, without exception or delay. The need for better analysis tools and prioritized information requirements is also reflected strongly in our recommendations.

Decision makers in every setting the world over rely on current, high quality data to help them establish and validate situational awareness and ground their decisions. To create a solid foundation for data-driven or information- and intelligence-led decision-making, much of the way data is collected and managed in peacekeeping must be changed. Proper information management

systems, supported by technological tools, will allow for peacekeeping as a whole to overcome its current data sclerosis and achieve the data liquidity that would allow for information to be easily searched, queried against, measured, tracked over time, and visualized for better reporting, analysis and decision-making support. As peacekeeping operations grow in scale and complexity, there is a need to shore up accountability frameworks against which mandate progress is quantitatively measured. Peacekeeping is being called to account, and without the data it needs at its fingertips, it is hard-pressed to answer. Our recommendations on a more coherent approach to the use of business intelligence are intended to address this.

Given the demands on today's missions, peacekeeping can simply no longer afford to be the last to know. Information is a political resource, and its distribution can affect the interests of different actors and trigger resistance to—or acceptance of—peacekeeping missions. A more modern approach to strategic communications can enhance the mission's ability to deliver across its mandate. In addition, social media, crowdsourcing, big data and traditional public media sources must also be incorporated into the mix, and peacekeeping should maximize its use of open source information and analysis tools.

With circumstances of unfolding violence rocketing to the top of public consciousness around the world overnight, the Security Council faces enormous pressure to respond to urgent circumstances with peacekeeping and special political missions, authorized for immediate planning, deployment and operations. Circumstances on the ground may preclude the deployment of personnel, or even the insertion of an assessment team to take the full measure of unfolding events. The thriving global market for voice, video, and data from commercial satellites, sensor networks, and other technical feeds is today accessible by anyone, for a fee. It is our view that the Security Council should not deny itself timely access to the same information so easily available to news outlets, celebrity advocates, or anyone else. Indeed, no responsible decision maker can remain wilfully unknowing in today's world, with so much open source information so readily available to everyone. Open access technology and information exists to inform. We therefore propose the creation of a new kind of mission, the "Special Technical Mission" or "STM", to enable the Security Council to call on, organize, and legitimate the use of commercially available technical audio, visual, monitoring and surveillance technologies, ground and airborne sensors and other technical means and sources of data to inform its decision-making, prioritize action, and aid in planning, either standing alone or alongside existing peacekeeping missions.

Mission Support

Field Support personnel work tirelessly to strengthen the operating position of the men and women on the ground, but additional process innovations, supported by available technology, are still needed to further streamline support operations as the UN continues to strengthen the remote delivery of shared services.

Technology should assist managers to monitor, plan, anticipate, and decide. Incorporating greater use of technology and smart applications will necessarily entail shifts in the way decisions are made, supply chains are managed, and services are delivered, and our recommendations reflect this reality. Technology can help remote back offices alleviate the burden on managers working in mission areas whose time may be focused on urgent operational and strategic exigencies, and to lessen the mission's footprint.

In recent years, peacekeeping missions have been mandated to consider and manage the environmental impact of their operations, and DPKO and DFS have taken steps to lighten the environmental footprint through energy efficiency, greater water conservation, waste management and recycling, fuel efficiency, and increased use of environmentally-friendly construction materials. We make a number of recommendations on additional steps that could be taken to lessen the environmental footprint of peacekeeping. In addition, capability gaps in engineering make the rapid deployment of staff and materiel a challenge. Our recommendations reflect the need for multiple approaches to expand engineering capabilities, and have more to do with process and partnership than technology.

The Longer View, Challenges and Additional Thoughts

There is a clear need not only for the immediate implementation of certain technologies, but also for the institutionalization of innovation and continuous technological adaptation. The Departments must take deliberate and decisive action to meet these needs. In so doing, peacekeeping should not be constrained to thinking in the immediate term. In order to meet the needs of the future, it must be bold and forward thinking—even visionary—in its approach technology and innovation.

The ability to innovate and to exploit technology with speed and agility can be a game changer for missions, but the deployment and use of technology brings with it the need to anticipate and manage the effects and consequences of added range, reach, volume, and impact. Technology must be viewed as a strategic enabler in a complex environment, rather than simply a set of tools. It is too important to be treated as a service, rather than a strategic interest.

More fundamentally, as technology is lifted into the category of strategic enabler, peacekeeping at all levels must become an innovative enterprise. In the UN, however, many structural and operational barriers exist to building a culture of innovation. Chief among them is a clear lack of institutional responsibility for innovation. Innovation at the institutional level is itself a political and a strategic decision, anchored in the fundamental conviction that human creativity at all levels is a valuable quality to be nurtured. In the panel's strong view, DPKO and DFS leadership should demonstrably value innovation by creating the space for it to occur, absorbing its failures and rewarding its success. If peacekeeping is to become the innovative enterprise that it needs to be, institutional weight will need to be brought to bear, and we recommend institutional changes and partnership opportunities that we believe will enable the cultural shifts necessary for innovation.

The panel recommends that a commitment to continuous learning and innovation be formalized in peacekeeping in the form of a dedicated capacity for technology and innovation within the Departments, supported by a small advisory group and field-based innovation incubators, together with a small cadre of “technology scouts”, designated centres of excellence within the UN, and an “idea factory”. The goal should be to develop a holistic, collaborative model that combines substance with function, and which reaches beyond DPKO and DFS to leverage innovators and substantive actors across mission components, including UN agency partners, and which can pull in other local actors, and reach out to industry and academic centres of excellence. DPKO and DFS should commit to a broad program of continuous learning and training, and the establishment of forums where new technologies or innovations might be presented and discussed.

Adopting and integrating the suggestions contained in our report will require (in some cases significant) investment up front—but existing funds can be repurposed for a good deal of what we recommend. In addition, we highlight the importance of considering the overall cost of technological solutions in terms of a system’s life cycle to capture the true sense of cost efficiencies. Inadequate funding for training and high turnover have contributed to the reluctance to introduce new technologies into field missions. Thus, the need for trained personnel is an undercurrent that runs throughout our report, and our recommendations reflect this reality. As well, if it is to make strides in greater use of technology and bridge implementation to the future, the UN must also ensure that personnel with specific skills can be attracted to and retained in peacekeeping missions and headquarters.

We are also well aware that the introduction and expansion of modern technology into a peacekeeping mission might lead some observers to develop unrealistic expectations regarding the ability of a mission to deliver results along unmanageable timelines. The UN must find the balance between actively supporting and sustaining high-tech missions while at the same time avoiding alienating traditional or new contributors that lack similar capabilities. The acquisition, processing, use and dissemination of information is as much a political question as an operational one. Here it is worth noting, in particular, that cyber security in the form of basic cyber hygiene, respect for privacy, and clear rules and procedures regarding the collection, processing and sharing of information are vital to the fundamental integrity of peacekeepers and peacekeeping operations.

We anticipate that a number of our recommendations will generate a lively political discussion: all to the good. It is our hope that our work will catalyse a more forthright, transparent, solutions-oriented discussion on technology as a critical enabler of peacekeeping, and move away from the myths that have cast this imperative in a negative light. In our report, we encourage DPKO and DFS to establish a standing consultation with TCCs, PCCs and TechCCs to identify early points of concern and work through deployment and use strategies that permit peacekeeping missions to enjoy the advantages provided by modern technology, and help to manage expectations.

Technology and innovation alone cannot do all that needs doing to strengthen UN peacekeeping, and all that needs doing cannot be done by DPKO and DFS alone. Laying the foundation for more technologically-enabled peacekeeping will require visionary leadership, political will, strengthened partnerships, and shifts in organizational culture. The Member States must be full partners, and active in their support for action here. Maximum transparency should remain a principle of the use of peacekeeping technology, in particular when used to enable information gathering and sharing. Peacekeeping must also not lose sight of the need for continuous review, lessons capture, adaptation, and transparent engagement with all stakeholders as new technologies are integrated into operations. It should also ensure that strong procedural safeguards and effective oversight mechanisms are in place for its use. More fundamentally, the UN must be willing to make the necessary policy changes and process innovations to adapt to this new landscape, or investments in technology will, quite frankly, be useless.

The panel well recognizes that technology is not a panacea. No panelist believes that simply throwing technology at a problem will help a peacekeeping mission fulfill its mandate. A field operation might have all the enabling technology in the world, yet still be ineffective or unwilling to use it. But the moment is now for peacekeeping to take greater advantage of the waves of technology and innovation washing over every dimension of life in societies the world over. It is in this spirit that our report has been prepared and our findings and recommendations presented.

Table of Contents

Cover Letter		02
Executive Summary		03
I	Introduction	14
	A. Some Context	16
	B. The Expert Panel	18
	C. Framing the Report	18
II	Assumptions and Principles	20
III	Exploding the Myths	22
IV	Getting the Basics Right	26
	A. Safety and Security	26
	B. Shelter	30
	C. Water	32
	D. Communications and IT	34
	E. Energy	38
	F. Health and Well-Being	41
	G. Mobility	45
V	Operational Imperatives	49
	A. Command and Control	49
	B. Monitoring, Reconnaissance and Reporting	50
	C. Communications, IT and Information Management	58
	1. Information Use, Processing and Dissemination	61
	2. Strategic Communications	70
	D. Selected Programmatic Priorities	72
1. Protection of Civilians	73	
2. Policing and Rule of Law	74	
3. Border/Boundary Demarcation and Monitoring	81	
E. Business Intelligence and Risk Management	82	

VI	Mission Support	85
	A. Managing the Remote Back Office	86
	B. Supply Chain Resilience	87
	C. ICT Backbone and Business Continuity	87
	D. Engineering	89
VII	The Longer View	93
	A. The Digital Peacekeeper	93
	B. Investing in Peace Operations in the Field	97
VIII	Challenges	99
	A. Managing Expectations	99
	B. Understanding the Real Costs	100
	C. Building a Culture of Innovation	104
IX	Additional Considerations	108
	A. The Politics of Technology and Innovation	108
	B. Legal Considerations	108
X	Final Thoughts	110
XI	Summary of Recommendations	111
Annexes		124
	A. The Expert Panel	124
	B. Terms of Reference	126
	C. Technology and Innovation Spotlights	131
	1. Monitoring and Surveillance Technologies	131
	2. Information Management and Command and Control Tools	137
	3. Open Source Information and Analysis Tools	140
	D. Consultations	141
	E. United Nations Peacekeeping Missions	143
	F. Acknowledgments	144

I. Introduction

Since 1948, United Nations peacekeepers have been deployed to protect and strengthen fragile peace. Today, numbering over 120,000 personnel in the field, UN peacekeeping represents the largest deployed multinational military, police and civilian capability in the world. Operating in some 16 missions in 18 countries, peacekeeping missions have enormous responsibilities to safeguard civilian populations, monitor volatile conditions on the ground, and help create the political and physical space necessary for societies in conflict to broker their differences without the need to resort to, widen, or resume large-scale violence.

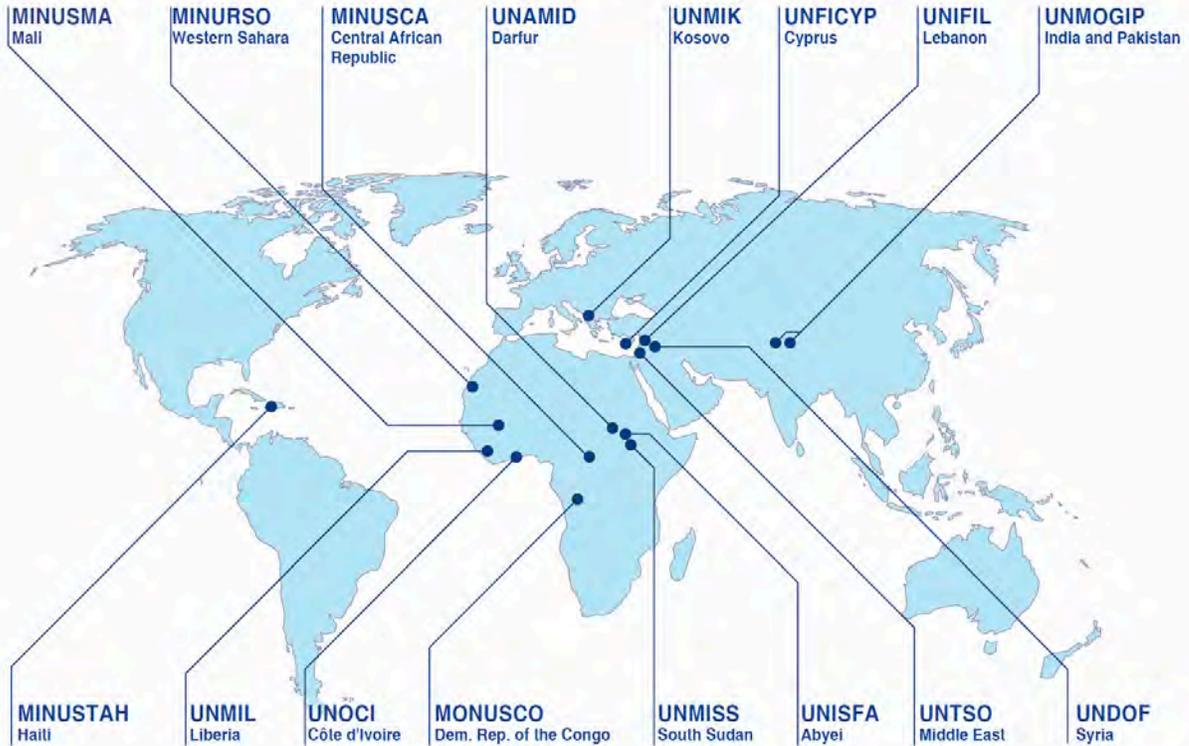
Modern peacekeeping missions confront highly complex and politically fraught challenges of massive scope and scale—under the best of circumstances. Typically introduced into environments of simmering violence between highly charged groups, peacekeeping missions deploy with multifaceted and high profile mandates to address deeply contentious issues, often across vast distances. Over the decades, the job has become even more difficult, especially in complex intra-State conflicts. Cycles of violence, fuelled by unhelpful regional forces supplying steady streams of weapons, ammunition and cash have ensnared generations of warring groups and spilled across borders. These conflicts pose clear threats to international peace and security.

To address these threats and to succeed in their task, peacekeeping missions count on the strong political support of the Security Council and on the resources of the Member States. On the ground, a mission relies on the political experience and expertise of its leadership, the agility and professionalism of its civilian staff, and the operational competence of its military and police forces. Missions also depend on the use of modern technology and expedient processes to conduct operations, fulfil their mandates, and account for the resources with which they have been entrusted. Indeed, no mission can be expected to succeed in today's complex environments without an ability to innovate and make effective use of technology.

As this report is written, the world is closing on its second decade of the technological revolution brought about by the global expansion of the Internet. Technologies once considered out of reach for everyday use—such as instant communications, precise geo-positioning or highly accurate optics are now in common use almost everywhere, all the time. The gains in power, speed and accuracy can hardly be overstated. Computing power, data-storage capacity, and transmission speeds continue to increase by multiple orders of magnitude with every new generation of technology. Advances in mobile platforms have extended—quite literally—the knowledge and power of the human experience to every corner of the globe. Once the exclusive province of elite academic and exclusive government operations, the Internet has, in a span of just twenty years, grown to reach over three billion of the world's population—and more people and more machines come online every day.

UNITED NATIONS PEACEKEEPING OPERATIONS

December 2014



UNITED NATIONS PEACEKEEPING A GLOBAL PARTNERSHIP



PEACEKEEPING IS SUPPORTED BY

193 member states

WHO CONTRIBUTE
PERSONNEL, EQUIPMENT & FUNDS

WORKING WITH OUR INTERNATIONAL PARTNERS

AU
African Union

EU
European Union

AND OUR UN PARTNERS INCLUDING

The World Bank

UNDP
United Nations Development Programme

UN WOMEN

PEACEKEEPING INCLUDES

16 MISSIONS
ACROSS **4** CONTINENTS

SECOND LARGEST MISSION IS IN

[UNAMID] **Darfur**
16,096 personnel
IN PARTNERSHIP WITH **AU**
African Union

***BUDGET 7.83** BILLION
LESS THAN **0.5%** OF WORLD MILITARY EXPENDITURES

122,969 TOTAL FIELD PERSONNEL
128 COUNTRIES CONTRIBUTING TROOPS, POLICE & MILITARY PERSONNEL

PEACEKEEPING HAS A GLOBAL LOGISTICS OPERATION

	56	AIRPLANES
	12	SHIPS
	144	HELICOPTERS
	34,742	VEHICLES
	30	HOSPITALS
	284	MEDICAL CLINICS

WORKING IN PARTNERSHIP WITH THE HOST COUNTRIES WE HELP PEOPLE AROUND THE WORLD

7M TOTAL AREA OF COUNTRIES WE OPERATE IN
M LOCAL POPULATION OF COUNTRIES WE OPERATE IN

UNITED NATIONS PEACEKEEPING
**A FORCE FOR PEACE.
CHANGE THE FUTURE.**

un.org/peacekeeping

*Source: UN Peacekeeping Budget, 2014-2015.
 *Population data from the United Nations World Population Prospects, 2014.

Source: *United Nations Peacekeeping*

Map: Cartographic Section / Department of Field Support

Innovation and invention are accelerating in every sphere. Basic sensor technologies that control our thermostats, safeguard our buildings, and aid our cars, refrigerators and hospitals are in widespread use in offices, homes and businesses around the world. Mobile phones with high-resolution digital cameras and voice recorders allow us to capture images and events as they happen and transmit them instantaneously and as widely as our imaginations allow. Specialized information platforms are now accessible through open source code, and powerful data analytic tools are in widespread application. Improvements in power, lighting, communications, and information processing have opened up new possibilities in research, development, and operations in every field.

Yet, despite the near omnipresence of advanced technology and applications in our daily lives, UN peacekeeping remains well behind the curve. While no one would assert that peacekeeping should be at the leading-most edge of research and development in new technologies, surely, we all can agree that it can and must leapfrog into—at least—the current day and position itself to face the challenges of the future.

With this conviction, the Expert Panel on Technology and Innovation in UN Peacekeeping presents its foundational conclusion up front: **peacekeeping missions must deploy with at least the same technological advantages that most governments and enterprises around the globe now find operationally indispensable in today’s world.** The present report offers a number of observations and findings to underscore this conclusion and examines the implications for the immediate and long-term future of UN peacekeeping.

A. Some Context

The panel recognizes that it is not writing on a blank slate. Since the establishment of the Department of Peacekeeping Operations (DPKO) in 1992, close observers of UN peacekeeping have regularly called for the strengthening of this vital capability of the international community. A landmark study concluded in 2000, commonly known as the [Brahimi Report](#), made a number of recommendations to strengthen peacekeeping. Some of those recommendations that seemed path-breaking at the time—such as doctrinal shifts in the approach to strengthening rule of law institutions, or the development of a global support strategy supported by a permanent logistics hub—are now deeply entrenched in the very fabric of modern peace operations in the field, and demonstrate the UN’s capacity for innovation.

In fact, over the past decade, Member States of the United Nations have enacted a number of initiatives to improve still further the political, military, rule of law and support foundations of peacekeeping missions in the field, including [Peace Operations 2010](#), the [New Horizon initiative](#), the [Global Field Support Strategy](#) and the work of the [Senior Advisory Group on Peacekeeping Operations](#). The present report builds on this corpus of intellectual and policy work. Indeed, recognizing that the demand for and complexity of UN peacekeeping missions has only continued to grow and evolve, the Secretary-General has again called for a comprehensive look at this vital

tool for international peace and security, appointing a [High-Level Independent Panel on Peace Operations](#) led by former President José Ramos-Horta of Timor-Leste.

The deliberations of the current panel have also proceeded (in some cases concurrently) with other work streams in the Departments of Peacekeeping Operations and Field Support (DFS). The work of the Capabilities Steering Group, endorsed in October 2014 by the Expanded Senior Management Team, analysed expected capability needs going forward. It proposed priority work streams around four key desired attributes of peacekeeping in 2020: agility; duty of care; responsiveness to emerging environments; and planning. Technology has a role to play across them all.

In addition, the recent work of an internal DPKO/DFS Enabling Assets Assessment Team also dovetails with the panel's work, finding that technology is as much a critical enabler as medical support and strategic lift that should be planned for and rapidly deployed. The on-going work of the [International Forum for the Challenges of Peace Operations](#) has continuously highlighted the need to enhance the tools and capabilities of UN peace operations, including technology, to more effectively meet contemporary and future challenges. The panel has also benefited from numerous discussions with highly experienced peacekeepers in every facet of field operations.

Notwithstanding the various measures undertaken over the past decade to understand and strengthen peacekeeping, few observers can argue that UN field operations manifest anything approaching up-to-date practice in the use of modern technology. **On the contrary, missions frequently lack a wide range of the very capabilities now considered by most militaries, law enforcement agencies and international organizations to be minimally necessary to operate effectively.** In fact, when it comes to technological necessities—much less advantage—the gap between what the average peacekeeping mission does have and what it should have is so pronounced, that some of the countries with the world's most capable military and police forces have been reluctant to participate in many of the more difficult and challenging peacekeeping operations. They cite inadequate medical facilities, a lack of airlift, unreliable lines of communication for resupply, and poorly specified emergency evacuation facilities and procedures, among other reasons. The lack of basic enabling technology lies at the heart of many of these arguments, and, of course, those countries that do contribute troops and police units (TCCs/PCCs) are also adversely affected by these same critical capability gaps.

Moreover, as peacekeeping missions work to create space for political dialogue, social recovery and economic development in difficult, austere and dangerous conflict environments, the lines between warring combatants have increasingly become blurred, with peacekeepers compelled to confront a wider range of unconventional and asymmetric threats. As a result, over the past dozen years, peacekeepers have themselves been the target of violence, with tragic results. In 2014 alone, 29 peacekeepers have been killed and 85 wounded in Mali, including nine peacekeepers in a single ambush. Under these conditions, the question of what more can be done to strengthen the hand of peacekeeping becomes even more urgent, and this report examines how technology and innovation can play a greater role.

B. The Expert Panel

In June 2014, the Under-Secretaries-General for Peacekeeping Operations and Field Support charged this expert panel with a six-month mandate to recommend ways in which technology and innovation can enhance the operational effectiveness of peacekeeping. Generously supported by the Government of Denmark, the panel reached out widely—both in person and virtually, collectively and individually—to field missions, capitals, academic researchers, policymakers, UN Agencies, Funds, and Programmes, the NGO community, and commercial industry. Materials outlining the composition of the panel, its terms of reference, and selected list of consultations appear in the Annexes.

This report reflects the judgement of the panel regarding key issues and questions of how peacekeeping can make more effective use of technology and innovation to strengthen operations in the field. It touches upon, and endeavors to answer, questions that arose in the course of its inquiry: What key technologies should be deployed in every peacekeeping mission? What challenges surround the use of these technologies? What are the most effective strategies to overcome barriers? How should the UN approach the question of capacity development? How best to address challenges of interoperability? How might peacekeeping leadership foster greater innovation?

The use of up-to-date technology to help peacekeeping missions establish and maintain situational awareness, carry out their mandates, and protect themselves should be thought of as neither distant aspiration nor luxury. Rather, the availability and effective use of such technology represents the essential foundation—**the very least that is required today**—to help peacekeeping missions deploy to and manage complex crises that pose a threat to international peace and security.

Having said this, the panel recognizes that technology is not a panacea. Political will, strong leadership, the support of the Security Council, and the collective will of troop and police contributing countries are also foundational to the success of any mission. In addition, important technological factors—such as reliable sources of power, availability of bandwidth, the requirements for technical literacy, and others discussed below, can limit what we can expect from technology alone. Nevertheless, the panel believes strongly that no mission should deploy without a foundation of capability in the areas highlighted in this report.

C. Framing the Report

In considering the ways to maximize technology and innovation in peacekeeping, the panel has taken a twofold approach: First, the report offers observations and recommendations designed to achieve immediate impact in such areas as mission life support, operational imperatives (e.g., aerial surveillance, information gathering, command and control) and mission support. In so doing, the report seeks to establish a clear picture of what modern peacekeeping demands right now.

The panel sought to identify where and how the introduction of technology and innovation can help solve particular problems in the field, and the report highlights several examples of particularly innovative ideas that could help make peacekeeping more effective. Annex C illustrates several leading technologies—again, available immediately. Here, it is important to note that the report’s highlighting of a particular technology does not constitute the endorsement of a particular product or vendor. Rather, we point to these examples simply to provide a tangible illustration of what is out there. We also recognize that technology is fluid, and the technologies presented in our report and its annexes will evolve and advance over time, as should peacekeeping’s approach to seeking out and employing technology to deliver its mandates.

Second, the report also takes a slightly longer view and makes recommendations regarding how UN peacekeeping can evolve to become a learning enterprise that seeks out and applies new technologies and innovations on a continuous basis, thereby enabling it to be prepared for the future.

The report seeks to establish the basis for a threshold consensus that no peacekeeping operation should deploy without the essential technology to help ensure mission success. This imperative applies not only in the “lifeline” sectors of safety and security, water, power, communications, transportation and emergency assistance, but also to operational and support activities that underpin military, political, rule of law, human rights and humanitarian operations.

In the following discussion, the report touches on the current landscape, provides illustrations of where and how technology and innovation might help solve particular problems and increase effectiveness, discusses the barriers that exist to creating a culture of innovation, and considers the principal implications and potential effects of its recommendations. Finally, while much of the discussion that follows draws on lessons learned and technology applications from the military, the panel recognizes that no technology is the exclusive province of any one particular component. In addition, the panel well recognizes that peacekeeping is not war-fighting. But the panel believes that efforts to keep the peace can learn from advancements in military technology. No advantage should be withheld from those working in the cause of peace.



II. Assumptions and Principles

The panel made several assumptions in its examination of how technology can help strengthen peacekeeping missions. For example, the panel assumed that most, if not all, the requirements for peacekeeping could be met by widely available—as opposed to arcane or proprietary—technology. Second, the panel assumed that Member States would represent the first “port of call” when soliciting particularly specialized technologies for peacekeeping missions—in part, because they would likely have such equipment (as well as tested experience in its use), and in part, to help ensure transparency in the deployment and use of such technology under peacekeeping circumstances.

The panel also assumed that as peacekeeping seeks out new technologies and innovations, the Departments of Peacekeeping Operations and Field Support would make the policy and process changes necessary to create a technology- and innovation-friendly framework to set a solid foundation for success, and that the Member States would empower necessary changes. The panel recognized too, that technology, including the solutions offered in this report, must always be seen through a practical lens and understands that there may be important exceptions to its recommendations. But reverse engineering a technology or innovation to fit poor policies and processes only serves to automate dysfunction and limit the effectiveness and efficiencies that might otherwise be gained. If peacekeeping is unwilling to adapt, investments in technology will, quite frankly, be useless.

Finally, the panel assumed that missions currently have, at best, an incomplete understanding not only of what technology is “out there”, but even of what technology they have currently in place, where it is being used, or by whom. Therefore, as an early step to improve this picture, the panel recommends that **each mission create a technology map of its systems and technologies against its programmatic and support requirements to establish an understanding of the capabilities within its control. A mission-specific “tech map” would create a foundation for informed decisions regarding additional requirements and improve accountability for the technology that is deployed. Similarly, DFS should maintain an up-to-date mapping of the major systems and capabilities throughout all field missions.**

In addition, and, indeed, perhaps first, **missions and headquarters should create an “information map”, to establish a clear understanding of how essential information is collected, used, for what purpose, stored, and shared, and by whom.** Used together, the information and tech maps can help decision makers maximize the use of technology to support their priority information needs.

In sum, the panel looked for affordable technologies that are available off-the-shelf and in widespread use, user friendly, robust, agile, transportable, and easily maintained in the field. With this in mind, the panel concluded that certain principles should guide the deployment and use of modern technology. These principles include the need to:

1. Pursue **widely-available solutions** and avoid reliance on proprietary, esoteric technologies;
2. Prioritize **mobility**—both in the sense of agile manoeuvrability of mission assets and in the sense of mobile platforms for IT and information;
3. Deploy **robust technology fit for purpose** (acquired and used to meet clearly identified operational and technical needs) and **relatively easy to maintain in the field**;
4. Push technology as far **forward** as possible in the operational chain, reinforcing the “supporting-supported” concept;
5. Maintain a high degree of **transparency** in the consideration, adoption, deployment and use of sophisticated technological and information platforms; and
6. **Source locally**, or regionally, wherever possible for those capabilities not provided by Member States.

At a deeply fundamental level, technology functions to magnify the human senses and extend human reach. But it is important to keep in mind that the deployment and use of technology brings with it the need to anticipate and manage the effects and consequences of the added range, reach, volume and impact.

Recommendations:

- **Each mission should create a “tech map” of its technology holdings, and DFS should maintain a field-wide mapping to create the foundation for informed decisions regarding capabilities and needs.**
- **Missions and headquarters should create an “information map”, to establish a clear understanding of how essential information is collected, used, for what purpose, stored, and shared, and by whom.**

III. Exploding the Myths

Before considering the specific applications of technologies in greater depth, it is worthwhile to dispel some of the more prevalent myths regarding technology in order to elevate, inform, and temper a constructive dialogue at all levels—tactical, operational, political and strategic. Pernicious myths regarding the intent or use of high tech in the field undermine the ability of peacekeeping to take advantage of technologies that are essential to success. Moreover, such misleading narratives unhelpfully erode the political and financial willingness to ensure the peacekeepers in the field can operate at a level at least as sophisticated as any spoiler they may encounter.

Myth	Reality
<p><i>Technology and machines substitute easily and automatically for troops or other human resources on the ground.</i></p>	<p><i>In peacekeeping, there is no substitute for the presence of the peacekeeper—whether military, police, or civilian. Technology can enhance peacekeepers’ abilities to do their jobs, but it cannot supplant the need for the human presence. Rather than serve as a simple substitute for manpower, technology and innovation are best thought of as ways to enhance peacekeepers’ abilities to deliver across their mandates—which can range from traditional military monitoring to protection of civilians to strengthening human rights and building the rule of law. Moreover, by harnessing the power of information and data liquidity, technology and innovation can help UN planners develop more effective strategies, strengthen operations in the field, and provide greater visibility into mission activities.</i></p>

Myth	Reality
<p><i>“Technology” is simply a euphemism used by some Member States to introduce and operate drones—a particularly non-transparent and intrusive technology—into mission areas for narrow political purposes.</i></p>	<p><i>Unmanned aerial systems or vehicles (UAS or UAVs), more commonly known as drones, do certainly represent a part of the update equation that can bring decided advantages to a peacekeeping operation in the areas of safety, security, situational awareness, and command and control. Readers should recognize that this technology is becoming ever more widely available for every conceivable application in the commercial, law enforcement, military and social spheres. Indeed, miniature, or so-called “pocket” drones, are becoming much more common—in spite of efforts in some jurisdictions to control their use. While UAS do give dramatically greater visibility into a mission area, they can hardly be considered more intrusive than the mission itself. Indeed, UAS represent the kind of technology that no mission should do without, except under specifically defined political circumstances. They are simply too useful a tool to pretend otherwise. That said, the panel believes strongly that the deployment and use of UAVs, and the systems that underpin their use, must be fully transparent from the start.</i></p>
<p><i>Enabling a peacekeeping mission to use technology or other advanced means to gather information violates the basic principles of peacekeeping impartiality and state sovereignty.</i></p>	<p><i>We live in the age of nearly instantaneous access to information—in many areas of the world, by almost anyone, at almost any time. With the advent of the Internet and the widespread availability of communications and mobile devices, nearly 3 billion of the world’s people are online, as well as billions of devices, and countless machine-to-machine connections are being made in cyberspace every day. These numbers grow by the minute. No partiality is shown to peacekeepers in providing missions with the same access to information that people around the globe can readily and openly access, and peacekeepers do not lose their impartiality simply because they know more about what is going on in their mission space. Indeed, to execute their mandates, peacekeeping missions must be able to move fast to acquire, validate, and fuse information from a wide range of openly available sources, including near real-time satellite imagery, to enhance situational awareness, augment security, aid operational planning, and support decision-making. UN peacekeeping simply cannot afford to cede the information advantage to those actors in a mission area determined to undermine prospects for peace and who use the advantages of modern technology to aid their violent cause.</i></p>

Myth	Reality
<p><i>Modern technology is too expensive and too sophisticated, rendering it, for all practical purposes, out of reach for most national militaries and law enforcement agencies of the world.</i></p>	<p><i>Mobile communications, computing power, data storage, high-resolution optics, precise timing, spatial positioning, and a host of other technologies, once the exclusive province of scientists and technologists, have now come into everyday use for many of the world's people. In every country, military and police patrols make increasing use of global positioning systems (GPS), rely on mobile communications down to the individual level, and have expanded their use of geographic information systems (GIS). Moreover, adapted innovations in alternative energy, heating, air conditioning, wastewater treatment, and the use of sensor technology are all in widespread use.</i></p> <p><i>Having said this, it is true that when it comes to the Member States and highly advanced technology, there are "haves" and "have nots". Yet, it is also true that no country is immune to the constant need to catch up with the development of important and useful technologies. We are all, in a sense, chasing technology's leading edge.</i></p> <p><i>But while some states may be in the forefront of technology, many developing countries just moving into the tech space can skip decades of learning and accelerate modernization on the basis of current knowledge and practice without having to repeat the mistakes of others. To illustrate, the installation of communication towers across the continent of Africa will facilitate mobile communications and avoid the costly, unnecessary—and now simply outmoded—step of stringing copper wire.</i></p>
<p><i>In many parts of the world, modern technology is a hallmark of an "outsider", and will serve to increase the vulnerability of individual peacekeepers, especially in remote conflict settings.</i></p>	<p><i>While acknowledging the dangers posed to peacekeepers in the field, the panel believes that technology actually serves to enhance the safety and security of UN personnel serving in difficult, remote and dangerous environments. Perimeter lighting, motion detectors, ground radar and other sensors to detect unauthorized intrusions, along with emergency communications and other technologies provide an essential foundation for personnel security and operational safety. These technologies will not substitute for inadequate planning or poor decision-making, and staff that work in particularly challenging circumstances must have clear security guidance, regular training and information updates, and practiced emergency procedures to ensure their safety. But they must also have the aid of technology both to protect themselves against preventable harm as well as to rapidly summon aid when the need arises. Bolstering the safety and security of the women and men in the field will, in turn, strengthen their ability to protect others and deliver their mandates.</i></p>

Myth	Reality
<p><i>The UN does not anticipate over-the-horizon needs well and is unwilling or incapable of adopting and sustaining new or advanced technologies in the field.</i></p>	<p><i>While there is no question that the UN is still behind the curve when it comes to making use of up-to-date technology, peacekeeping has, again and again, proven its willingness and capability to take on hard challenges, to define future capability needs, and to innovate in its missions. For example, while many are focused on its use of drones, MONUSCO is currently piloting the use of TV whitespace to harness unused TV frequency to support data and Internet usage.</i></p> <p><i>The panel does recognize that a culture of innovation does not yet broadly exist across peacekeeping and recommends ways, below, to help create one. Simply put, the skilled and dedicated UN staff must be supported with a more accepting and supportive approach to technology and innovation to meet their needs.</i></p>

In sum, it is past time to put mythology aside and confront the need to introduce and expand the use of modern technology in peacekeeping missions. Immediate efforts to strengthen the technological foundation of peacekeeping operations in the field, and thereby increase operational effectiveness, should focus on three key areas: getting the basics right; supporting operational imperatives; and streamlining mission support.

IV. Getting the Basics Right

Peacekeeping missions are frequently deployed over large areas in extreme and fragile environments that often lack even the most basic infrastructure. While the challenges faced in every area of operations are, to some extent, unique, a high threshold of commonality exists across the lifeline sectors.

In other words, every mission requires the provisioning of security, shelter, water, energy, medical support, mobility and communications. The failure to meet these basic needs can hamstring a mission from the very start, and scenarios of missions coping with shortfalls in these areas are all too familiar: troop deployments stack up at initial reception sites or are postponed because accommodation is lacking. Inadequate communications endanger vulnerable patrols and confound even routine command and control. Over-reliance on bottled water leave missions saddled with tons of plastic waste, and the lack of black water and other waste management solutions threaten the fragile ecosystems in which missions operate. Productivity, and, in tragic extremes, lives, are unnecessarily lost due to treatable illness or injury because of a lack reliable access to first-rate medical facilities.

These scenarios are largely preventable.

Fuller deployment and use of modern technology and innovation can help preserve and sustain life in the field, reduce a mission's environmental footprint, and realize greater efficiency gains over time. The following sections discuss some technologies deployable today as a minimum capability threshold for mission lifeline essentials.

A. Safety and Security

Since 1948, nearly a thousand men and women serving the cause of peace under the UN flag have been lost to malicious acts. In the first half of October 2014 alone, 14 peacekeeping personnel died in hostile attacks. The security of individuals, camps and accommodation, and mission operations—including patrols and convoys—requires the integration of physical measures with recognized best practice in procedure and training. At a minimum, the panel believes that, with limited exceptions, **no encampment, office compound, or staff accommodation should be without: back-up energy support (including primary or backup alternative energy solutions); perimeter lighting; motion-detection technology; and emergency communications** tested on a daily basis. In addition, smart **camera technology using remote access to live feeds** has become extremely cost-effective, permitting continuous visibility of physical space and a capacity to document operations.

The panel also believes that **tamper-resistant tracking technology** should be installed on all vehicles and heavy weapons systems. We recognize that under certain extreme circumstances the existence of such tracking capabilities may serve to antagonize hostile elements seeking to misappropriate mission equipment and weaponry. However, the panel believes that the benefits of this technology for accountability under normal operating circumstances and for location and rescue in an emergency outweigh other concerns. In addition, **a number of mobile applications now exist for individuals to file travel plans, automatically communicate GPS locations on a periodic basis, and alert base stations or headquarters when they are overdue at their destinations.**

In addition, **individual suites of operational and protective equipment should include not only modern and effective body armour and helmets, but also 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 devices (preloaded with critical local information such as medical facilities and transportation hubs, as well as translation software), and emergency-activated beaconing technology** that can emit sound, radio wave, or light automatically or on contact with defined substances (e.g., blood, fuels, certain gases, etc.)—not unlike that found on aviation life vests where flashing beacons activate on contact with water. **Emergency connect capabilities** such as [Ping](#), [SpotConnect](#), or [Spot GPS](#) deployed widely on handheld devices would allow for satellite-accessed emergency call capabilities even when there are no cell towers in the area. When deployed in the field, staff must recognize that organizational knowledge of their location is key to their safety.



Tracking Technologies

Most UN vehicles have been equipped with the proprietary Carlog device that uses GPS to keep a record of vehicle location. The device not only shows the distances travelled but also indicates driving behaviour, including speed and acceleration. The reported benefits of the Carlog system include: reduced accidents and injuries; reduced repair costs; improved driving performance; better fuel efficiencies; more regular vehicle maintenance (improving vehicle reliability); reduced paperwork (no manual trip-tickets); a reduced number of unsafe/unauthorized trips; improved vehicle security (by use of the ID pass codes in addition to swipe cards); and better vehicle allocation management.

However, the panel is aware that the Carlog system has substantial limitations. The transmission of the information is not in real time, but downloaded when the vehicle is close (about 150 metres) to a receiving antenna. Therefore, the system does not provide an accurate picture of where vehicles or persons are located at any given time. Carlog provides a useful historical record but is of limited use when a vehicle or person is missing.

Real-time location systems, on the other hand, are widely available to improve peacekeepers' safety and possibly save their lives. By knowing in real time the peacekeepers' locations, missions will have greatly improved situational awareness.

For example, if peacekeepers are lost, missing, under threat or under attack, real-time tracking can aid in finding them rapidly.

In addition, inexpensive options for real-time tracking are available for cell phones, which most peacekeepers now carry on their person. Over the past decade, the cost of GPS-equipped phones has plummeted while accuracy has increased several-fold. In addition, miniaturization and the convergence of technologies have given modern sophisticated integrating capabilities. For instance, most smartphones can stamp the time/date and coordinates onto images and data from cameras, accelerometers, barometers, fingerprint readers and compasses.

With such real-time tracking systems, it is now imminently practical to locate all vehicles and peacekeepers in a mission at any given time, including in emergencies, in a flexible and cost-effective manner.

The panel understands the privacy implications of this discussion and urges DPKO and DFS to ensure its privacy policy and training is updated to appropriately control the collection, use, storage and sharing of information by UN personnel.

Finally, **tracking and fleet management systems are a minimum requirement for peacekeeping to ensure the safety and security of personnel as well as to manage and control operations.** A number of tracking technologies exist which combine GPS-enabled satellite tracking of a vehicle or individual via computer tracking/mapping platform to enable real-time visualization of personnel movements. Tetra radio systems, either handheld or attached to vehicles, provide one current example. For maximum effect, tracking platforms can be overlaid with incident tracking maps on a GIS platform and linked to command and control platforms as part of a common operating picture software package that would greatly enhance command and control (discussed in greater detail below). The panel notes current efforts to enhance the UN's tracking and fleet management capacity, and encourages the Organization to invest in the full functionality offered by tracking packages.

Recommendations:

- ***All encampments, office compounds and staff accommodations should have: backup energy support—including primary or backup alternative energy solutions; perimeter lighting; motion-detection technology; emergency communications; and camera technology using remote access to live feeds.***
- ***Tamper-resistant tracking technology should be installed on all vehicles and heavy weapons systems.***
- ***DPKO and DFS, in coordination with the Department of Safety and Security (DSS), should provide individuals with emergency contact capabilities and mobile applications to file travel plans, automatically communicate GPS locations, and alert base stations or headquarters when they are overdue at their destinations.***
- ***Individual suites of operational and protective equipment should include not only modern and effective body armour and helmets, but also 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 devices preloaded with critical local information such as medical facilities and transportation hubs, as well as translation software, and emergency-activated beaconing technology.***
- ***Peacekeeping should accelerate the full deployment of personnel and vehicle tracking systems as a minimum requirement for missions to ensure the safety and security of personnel as well as manage and control operations.***
- ***The panel urges DPKO and DFS to ensure its privacy policy and training are updated to appropriately control the collection, use, storage and sharing of information by UN personnel.***

B. Shelter

Modern peacekeeping requires forces that are mobile, agile and responsive to fast-breaking operational needs. These requirements, in turn, require forward, expeditionary deployments into areas with little or no modern infrastructure for extended periods.

The current requirement for the UN to provide deployed units with hard-wall accommodation within six months of deployment undermines the ability of contemporary missions to operate effectively by lashing forces to fixed locations based on the availability of accommodation, rather on the operational needs that may exist. Moreover, hard-walled accommodation is often engineering-intensive and very expensive. In addition, once installed in hard-walled accommodation, forces typically become tied to that physical location, and missions frequently find it an extremely difficult practical challenge to shift the forces dynamically to respond to changing operational needs. Finally, staff efforts to comply with existing regulations that call for hard-wall accommodation unhelpfully divert mission support priorities, especially during the crucial start-up phase, as missions seek to conform with these regulations at the expense of supporting operational imperatives. The limited availability of heavy engineering equipment, as well as horizontal and vertical construction expertise, combined with persistent challenges in staffing missions at start-up simply do not allow both imperatives to proceed in parallel. Something has to give.

Fortunately, **modern expeditionary shelter solutions** exist which can relieve some of the pressure to prioritize camp building at the expense of other mission critical functions. Advances in soft-wall accommodation include high-quality tentage that can provide operational flexibility and even elevated levels of comfort, as well as accommodate gender-based needs, at affordable prices. To be sure, expeditionary shelter solutions must meet standards of durability, be deployable, and be configurable to a range of climate and terrain conditions. Such shelter can be augmented with improved foundations and overhead protection. In addition, **expeditionary power technologies** exist to provide flexible sources for heating and cooling (including making use of alternative energy sources), as well as specialized facilities for cooking and ablutions.

Eco-friendly Building

In July 2012, DFS introduced eco-friendly building components into the systems contract for prefabricated buildings that also provide improved insulation for energy saving and noise attenuation. The Swedish Defence Research Agency's (FOI) Juba III/UN House Pilot Project incorporates renewable energy, power and water conservation, and waste management and has resulted in reduced energy consumption in one of peacekeeping's most challenging operating environments.

The panel recognizes that hard-wall accommodation can offer increased protection against certain kinds of threats. But we also believe that expeditionary accommodation offers appropriate levels of protection when combined with proper overhead cover, strong perimeter security platforms, and well-practiced emergency reaction capabilities.

Indeed, such mobile and flexible solutions are today in use. In MINUSMA, for example, members of the All Sources Information Fusion Unit are accommodated in multi-purpose tentage. In MINURSO, the Mission has used Weatherhaven tents for long-term storage installations. In another example, the IKEA Foundation partnered with UNHCR to develop a modular, flat-pack, solar-powered [Refugee Housing Unit](#), built to withstand harsh conditions and to be more durable than traditional refugee shelters. The shelter, built to modern urban code, can be assembled on site with no need for power tools or additional equipment. With regular maintenance, the shelter's expected lifetime is three years.



Source: Ikea Foundation/UNHCR



Source: [Gudbrandsdal Industrier AS](#)

Recommendation:

- ***The policy for hard-walled accommodation should be revised, in favour of expeditionary accommodation combined with a strong perimeter security platform and well-practiced emergency reaction capability.***

C. Water

Across the 16 peacekeeping operations currently deployed, monthly rainfall averages between **zero** and **377 mm** (nearly 15 inches). At one extreme is MINUSMA, where peacekeepers deployed over remote, arid terrain stress local infrastructure, especially scarce and precious water resources. At the other extreme is UNMIL, where peacekeepers face torrential seasonal rains that can sever main supply routes for many months each year, hindering mobility and leading to an overreliance on air transport to move personnel and material.

For every mission, however, the production or procurement of large supplies of water for drinking and bathing poses serious challenges. The panel recognizes that allocations differ across missions. However, the standard UN allocation of some 85 litres per person per day represents significantly more allocation than is available to local inhabitants in many mission areas, and in the panel's view, the UN cannot expect to continue to meet such an unsustainable burden.

Strategically resourced ground-penetrating radar and advanced geospatial imaging can help improve the odds of successful drilling. For example, the Geospatial Information Systems Section from the Brindisi Global Service Centre helped the peacekeeping mission in Mali successfully locate nearly two dozen water-producing boreholes, following earlier successes in Darfur and Western Sahara. While well-drilling technologies have improved, they will not substitute for sourcing large volumes of water where none exist. In addition, the overuse of underground reservoirs can lead to or exacerbate environmental degradation and social unrest. For these reasons, among others, greater reliance on water reclamation and reuse is necessary in peacekeeping environments where chronic water shortage is the norm.





To this end, the UN has made strides in its **use of modern water purification technology and in the use of non-potable recycled water**. DFS has introduced a systems contract for water reduction fixtures in ablution units, which help to conserve water. Under the water modularization module of this contract, grey water and recycled water systems are incorporated into standard camp design templates. DFS has also introduced systems contracts for field water and wastewater treatment plants, which has the potential to use surface water, rather than limited ground water. These plants allow for the proper treatment of sewage, provide recycled water for use in ablution and irrigation. However, the plants are not consistently used across field missions, and some, like MONUSCO, face maintenance issues related to improper or effective disposal of solid by-products. **DFS should engage global expertise to revise its approach to mission water plans to ensure greater use of reclaimed water and environmentally sound disposal of waste.**

More immediately, the UN can increase individual access to clean water in times of emergency through the issuance of **low-cost personal water purification “straws”** that render questionable water sources safer for consumption. Additionally, **greater use of rainwater collection, piping and storage systems** can increase the availability of consumable water from rainwater harvesting. This concept has already been introduced into systems contracts for prefabricated accommodations, but could be more widely adopted throughout peacekeeping.

Longer term, the panel believes that **peacekeeping should adopt a more flexible standard for water requirements in order to lighten a mission’s environmental footprint**, reduce drag on mission support, and achieve important savings. As noted, the UN’s current standard of water provisioning far exceeds many national allotments, and, bluntly, the current levels are unsustainable in many mission areas. The **panel strongly recommends that the Departments revise water allocation standards to more sustainable levels.**

Recommendations:

- ***Strategically resourced ground-penetrating radar and advanced geospatial imaging should be more widely used to find water.***
- ***DFS should engage global expertise to help ensure environmentally sound waste disposal.***
- ***Personal water purification “straws” should be issued to individuals for use in emergency situations, along with instructions for their use.***
- ***DFS should employ rainwater collection, piping and storage systems more widely in missions.***
- ***The panel strongly recommends that the Departments reassess the current water allocations, with the aim to revise to more sustainable levels.***

D. Communications and IT

For any mission, effective communications to facilitate messaging up and down the chain with important operational, administrative, and real-time safety and security information is not a luxury, but rather, a life-saving necessity.

In addition to limited bandwidth, the lack of interoperable systems represented the most common barrier to effective communications raised to the panel in its inquiry. Radio and other communication equipment brought by different T/PCCs are often incompatible, including with UN-owned equipment (UNOE), making communications between contingents, and even between members of a mixed patrol, difficult. This problem is by no means unique to the UN, but in peacekeeping, more strategic thinking is required to rectify the problem.

A fundamental prerequisite for the success of these measures is the availability of a coherent federated mission network accessible to all relevant actors in a given mission area. This approach, where the UN provides the basic communications infrastructure with others linking into it, could provide a practical solution at the tactical, operational and strategic levels. Such networks are common practice for many modern militaries and field operating organizations.

The increased use of IP-based equipment will also help overcome the interoperability issue—but caution is in order when relying on web-based applications, and proven methods of cyber security must be emplaced. In addition, triangular cooperation with T/PCCs, the UN and supportive Member States, or bi- or multilateral partnerships between Member States, could also contribute to overcoming the practical barriers of interoperability.

Interoperability Solutions

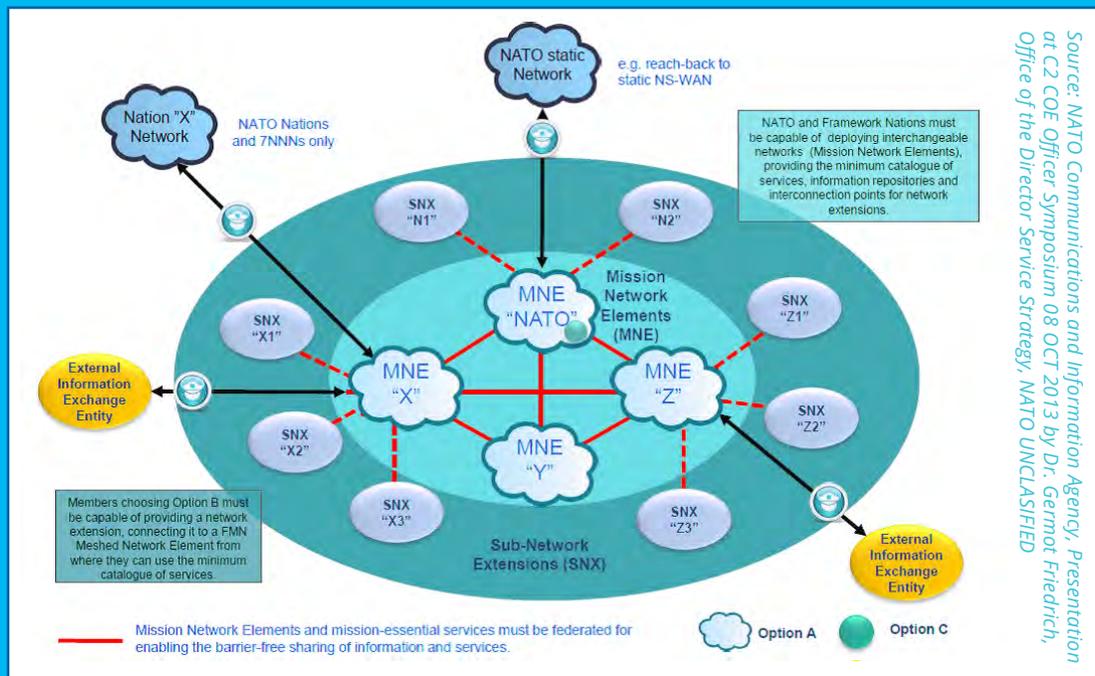
The lack of tactical-level technical interoperability between communication systems is an Achilles' heel of peacekeeping. Building interoperability solutions will require the UN to know more regarding who is using which system. Over the years, some international organizations and Member States have undergone extensive testing and exercises, allowing them to develop comprehensive interoperability databases, access to which could be granted to the UN. Alternately, the UN could build its own interoperability database over time, e.g., through predeployment exercises.

There are also immediate fixes, available commercially off-the-shelf. One example is Mutualink's network interface controller, a communication switch that bridges various communications systems in a mission area. Over the medium-term, a standards shift to IP-based communication systems by the UN and its contributing countries could pave the way easy and direct interface between various systems in the mission area and allow them to easily link into a UN-run federated mission network. The panel underscores, however, that web-based applications demand disciplined approaches to cyber security.

Introducing a federated mission network such as the example depicted in the graphic below would allow the UN to optimize the communications networks at operational and tactical levels, establishing a coherent communications network available to all UN actors in theatre. Other major international organizations have adopted such architecture at graduated levels of capability:

- **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.

The technological solutions to provide such strategically controlled solutions are available, and the Global Service Centre is well-suited technologically to handle the control over these and other command and control networks (see Annex C).



Source: NATO Communications and Information Agency, Presentation at C2 COE Officer Symposium 08 OCT 2013 by Dr. Gernot Friedrich, Office of the Director Service Strategy, NATO UNCLASSIFIED

Connectivity Solutions

DFS has actively sought solutions for continuous and reliable voice, data and video communications, while also moving towards a near-zero field footprint by centralizing data in their Global Service Centres in Valencia and Brindisi. DFS is piloting a number of other broadband wireless solutions that will extend the range and reach of Internet connectivity in field missions, and provide more agile support for ICT requirements. For example, Point-to-Multipoint, or PMP, is being piloted in MINUSCA, to allow upwards of 80 users to connect to a single point. Deployed under an existing systems contract, PMP will eliminate the need to provide single users with personal internet dongles or

other wifi-enabling devices, at relatively low cost. Unused gaps in TV whitespace are being piloted by MONUSCO, to provide connectivity and extend network coverage. MINUSCA is exploring the immediate deployment of a tactical long-term evolution (LTE) telecommunications system. DFS is also rolling out [Microsoft Lync](#), an individual videoconferencing and text-chatting solution similar to Skype, to certain missions under an existing systems contract. Additional solutions being explored, like medium-orbit low-latency fiber-speed satellite telecommunications networks such as [O3b](#), can significantly improve the performance of Internet services in field missions.

Internal Communications

Communicating internally and sharing information within and across missions and headquarters is equally as important as external communications. The Peace Operations Intranet (POINT) was established to facilitate all peacekeeping access to common information through a unified portal, improving discoverability, accessibility and transparency. Staff members working in the field have used the Intranet to develop inexpensive and effective ways to communicate to a mission's internal audience. For example, internal web-based [radio stations for MINUSMA and UNMIK](#) staff broadcast alerts, news and music anywhere the Intranet can reach.

DFS must prioritize **solutions for the interoperability problem at tactical, operational and strategic levels**. Because the UN is currently only responsible for providing communications to battalion and independent company level, **enabling the UN to provide comprehensive interoperability solutions at all levels will require a policy change**.

Every mission faces fundamental command and control challenges in basic connectivity. While DFS does an exceptional job at connecting peacekeepers in extremely remote and harsh environments, the kind of communications and Internet access to facilitate the same degree of command and control enjoyed by the majority of the world's organized militaries and police forces is largely restricted to urban settings. **Simply put, adequate mission command and control is not possible without continuous and reliable voice, data and video communications**. The panel recognizes that technology to enable such capability is commercially available and well known to DFS. Overcoming the challenges of cost will involve integrating long-term structural improvements to peacekeeping's communication backbone with specific capabilities that support critical mission needs. Initial investments may be substantial to achieve these baseline capabilities consistently across peace operations in the field, but savings over time do materialize, and, of course, one cannot put a price tag on the value of reliable communications for saving lives.

Beyond connectivity and interoperability, the panel would like to highlight two additional practical recommendations regarding communications as a mission lifeline. First, where mobile telephones are in wide use, SMS applications permit rapid transmission of threat and other emergency information. Every mission should establish and practice the use of emergency SMS as an essential means of intra-mission communication to back up radio networks. Secondly, where data-enabled smart phones are prevalent, mobile applications, such as Ping, can help locate personnel in case of emergencies. Again, missions should take the steps necessary to incorporate policies and practices to ensure these systems are widely available to and understood by all personnel.

Recommendations:

- ***The UN should prioritize solving the interoperability problem, shifting policy where needed to enable federated network or bridging solutions.***
- ***Every mission should establish and practice the use of emergency SMS as an essential means of intra-mission communication to back up radio networks.***
- ***Wherever possible, missions should take the steps necessary to incorporate policies and practices to ensure personnel location systems are widely available to and understood by all personnel.***

E. Energy

As with so much of modern life, peacekeeping missions require energy for every conceivable aspect of their operations: to power computers; operate vehicles; run communications and IT equipment; heat and cool accommodation; store food and medicine; and so much more. Many mission areas lack reliable access to local energy grids and continue to rely on diesel generators as a prime source of energy for operational needs. While reliable, diesel generators require vast amounts of fuel that must be transported over long distances and is susceptible to theft.

Moreover, diesel generators suffer significant energy loss, and their widespread use poses major environmental considerations. Several commercially available storage systems to harvest and retain energy runoff could be incorporated wherever generators are used to store excess energy generated during non-peak use. An even greater reduction in carbon emissions could be achieved through the use of a combination of alternative energies and storage of excess energy generated during non-peak periods, by all energy sources. The addition of synchronization panels and automatic switches to generators via systems contracts has already led to a reduction in energy consumption. However, these technologies require an advanced level of specialized skill.



Advances in alternate sources of energy, including solar and wind, can provide partial solutions for power needs, especially for specific applications such as powering isolated facilities. As an example, UNIFIL's full-scale solar arrays have been successful at reducing fossil fuel consumption. Aggressive application of **alternate energy technologies, especially those that can be sourced locally or regionally**, could significantly reduce the requirement of fuel transportation. In addition, **alternative energies are also quite reliable for less energy-intensive tasks, like charging batteries and powering communication devices**. Such alternatives represent an important source of energy redundancy and can easily power essential tasks in an emergency.

The panel notes that DFS has taken steps to increase the use of solar technology in combination with diesel generators, introducing solar PV-diesel hybrid power systems and stand-alone solar lighting systems into DFS systems contracts. Yet, this initiative has seen only limited success, due to missions' scepticism regarding the use of alternative energy technologies. In addition, high initial capital costs, limited experience with life-cycle management of these systems combine with scarce specialized skill sets to meet maintenance requirements make widespread adoption an uphill climb. However, successful interventions leading to immediate reductions in energy consumption have included the addition of solar water heaters to systems contracts for ablution units and can be explored for wider application.

The panel notes recent initiatives to encourage missions to engage the Global Service Centre's environmental engineering expertise to assess the possibility of increased use of alternative and renewable energy on a large scale. However, the panel also notes that attempts to introduce basic environmentally-friendly technologies that could lead to immediate energy reductions into DFS systems contracts have stalled in procurement. But **technologies such as light emitting diode (LED), energy-saving light fixtures and energy conservation devices (e.g., dimmer switches, photocells, timer switches and programmable energy management devices) are in widespread use across the globe and should be brought into every mission**.

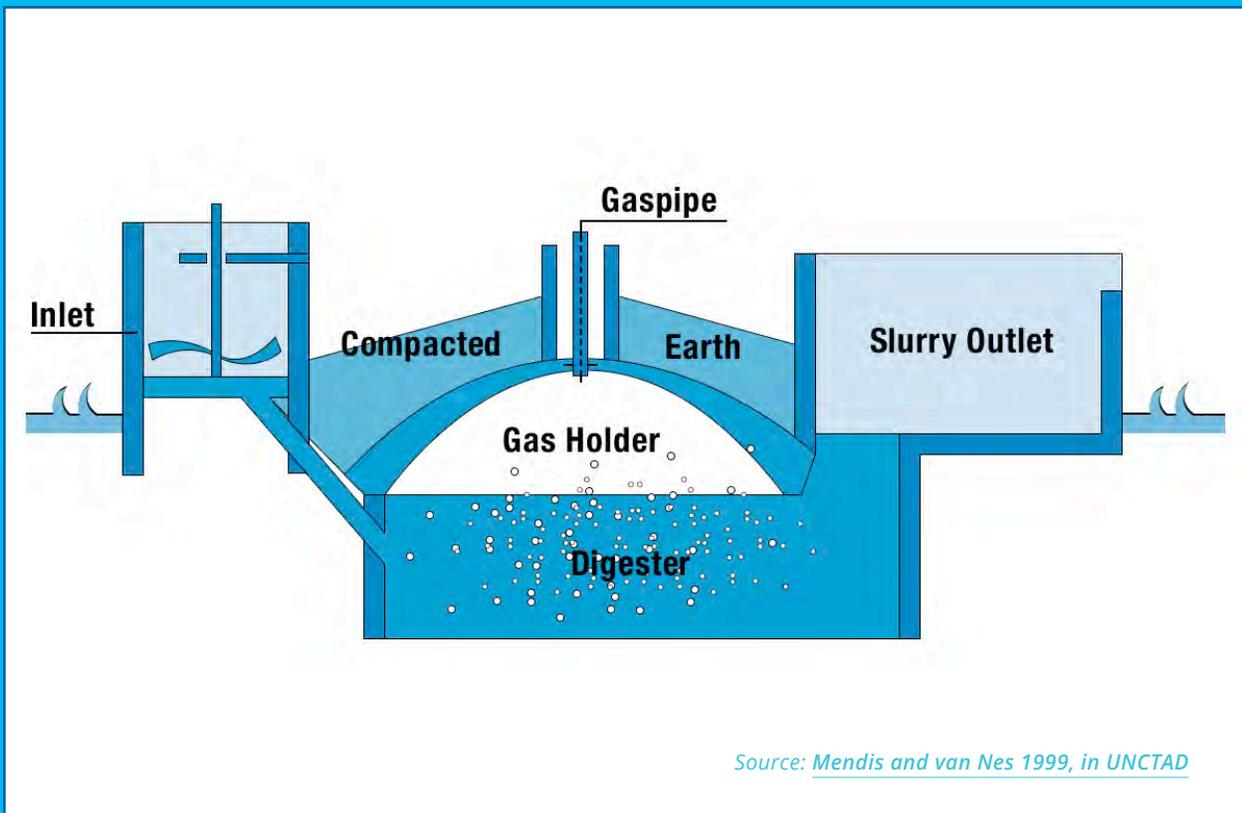
In short, peacekeeping should adopt, as a matter of priority, the systematic integration of alternate energies across all aspects of field operations and incorporate a life-cycle approach informed by best practice learning. It must also work through barriers to the procurement of basic and widely available technologies such as portable solar and expeditionary energy solutions that will net immediate gains. **The panel recommends a standing energy requirements board be established (perhaps in partnership with the Agencies, Funds and Programmes) to assess the applications where alternate energy could replace or complement traditional generation**.

In parallel, and over the longer term, **the Departments should continue to look towards additional alternatives to fossil fuels and field test them, with the aim of taking them to scale where possible**. ICTD has already conducted a pilot for the small-scale use of wind power at the Global Service Centre in Brindisi, and the use of biomass has also been examined. While these technologies do not appear, at the moment, to be sufficiently robust or scalable for peace operations in the field, neither, too can missions simply continue to default continually and completely to diesel. DFS must undertake an ongoing effort with Member States and commercial providers on technological advancements to meet peacekeeping's ever-burgeoning power needs.

Beyond Solar: Biogas

Biogas and other energy alternatives, can complement gas-fuelled generators. Used together, they could substantially reduce fuel consumption. Biogas is produced from organic waste that biodegrades by means of bacteria in an anaerobic environment, transforming into a compound of methane and carbon dioxide. The waste slurry produced in the process can be safely used crop fertilizer; it reduces greenhouse gasses, and has less odor than

other fertilizers. Typically, the biogas is utilized to produce electricity and heat in the plant's gas engine. The electricity produced is sent into the local off-grid environment or into a major power grid, to be used by local consumers. The plant is scalable to the size needed, and can be transported in 40 ft containers. According to an [UNCTAD report](#), in 2010, some 170,000 household biogas plants were operating in rural Nepal.



Source: *Mendis and van Nes 1999, in UNCTAD*

Recommendations:

- ***Peacekeeping should adopt as a matter of priority, the systematic integration of alternate energies across all aspects of field operations and incorporate a life-cycle approach.***
- ***Peacekeeping should work through barriers to the procurement of basic and widely available technologies that will net immediate gains.***
- ***The panel recommends a standing energy requirements board be established to assess the applications where alternate energy could replace or complement traditional generation.***
- ***The Departments should continue to look towards additional alternatives to fossil fuels and field test them, with the aim of taking them to scale where possible.***
- ***Alternative energy technologies should be aggressively applied where possible, especially those that can be sourced locally or regionally. They should also be used for less energy-intensive tasks, and as an important redundancy.***
- ***DFS should conduct an overview of widely available energy saving technologies and conservation devices and devise a prioritized strategy for introducing these technologies into every mission.***
- ***When operational circumstances permit, DFS should place limits on fuel consumption to promote the use of alternative energy, and create encampment kits that provide alternate energy backup sources.***

F. Health and Well-Being

The UN owes its field personnel—whether military, police or civilian, national or international—a duty of care regarding expert medical services, regardless of their location. Missions must be capable of providing timely, routine and emergency medical assistance in situ, and be capable of extracting personnel and transporting them to higher levels of care when the need demands it.

The panel has observed that, with few exceptions, missions struggle to deliver critical urgent care within the “golden hour”—the 60-minute period beginning at the moment of injury that represents an internationally recognized time period within which casualties should receive lifesaving and urgent life sustaining care. The lack of such care constitutes a powerful dissuasive to potential T/PCCs and civilian staff alike, many of which purchase their own third-party evacuation insurance.

A number of organizations are moving to organize medical support according to an informal “10-1-2” rule. By this standard, a patient receives on-site critical care within the first 10 minutes after identification of illness or injury. The patient is stabilized within one hour and evacuated to appropriate higher levels of care within the first two hours. Should more sophisticated medical attention be required, further evacuation falls within the following two hour window.

In the panel’s view, **peacekeeping should adopt this standard and prioritize the installation of well-functioning emergency alert systems linked to rapid and expert medical response.** In order to ensure on-site critical care, particularly in high-risk areas, **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.**

The UN Medical Emergency Response Team (UNMERT) has developed, and is currently field testing, crisis kits which consist of a relatively complex emergency bag containing emergency medical drugs and equipment suitable for the treatment of a wide range of trauma conditions, to be carried by a trained Medical Officer for treatment of a small number of patients; a remote office/communications

Air Ambulances

Specialists in medical evacuation regularly deploy air ambulances that serve as airborne intensive care units equipped with state-of-the-art emergency care capabilities staffed by aero-medical specialists.



Source: [PhoenixAir](#)

kit (containing a laptop computer, scanner, printer, camera, GPS, satellite phone and BGAN, allowing a response team to be semi-independent); and a mass casualty chest, with larger quantities of medical items. **Individuals deployed to extremely remote locations should be trained and equipped to make use of [smaller emergency trauma kits](#) that give them the ability to perform basic triage in the field. All individuals should be provided with a basic trauma pack. And again, a system of emergency communications with override features for the most urgent message should form a part of every mission's communications and IT suite.**

In addition, **missions simply must have the capacity to render advanced life support—either exceptionally within the mission area, or, more commonly, via Medevac to competent regional Level IV trauma centres.** The panel notes the progress that has been made in telemedicine over the past decade and believes that every mission should establish such reach-back links to support forward deployed medical personnel. Telemedicine provides opportunities for remote decision-making specialist advice, diagnostics and patient care, and should be available to every operating location within a mission.

Relying on adequate ICT support, telemedicine would allow field or forward deployed personnel to link to the Chief Medical Officer or other medical staff via teleconference or video. Rear medical personnel would work with the medics on scene to assess the situation, link to specialists outside of the mission, and provide vital advice and support during the most critical phase of injury or acute illness. Indeed, particularly during the hours of darkness, when mission mobility is often significantly curtailed, immediate access to expert advice and assistance could prove life-saving. To reiterate, reliable access to this reach-back care will place a premium on communications and IT connectivity, but **the panel strongly recommends that dedicated channels for this purpose be established in every mission.**

The panel also notes the importance of morale and welfare in every mission—for both individual civilian peacekeepers as well as uniformed military—and especially **notes the importance of technology in providing outlets for relaxation and connectivity to loved ones outside the mission area.** Movie, music and game libraries, as well as phone “banks” and video conferencing help maintain positive esprit de corps, especially in remote areas. However, **missions must take active steps to prevent piracy and other unauthorized use of materials obtained for mission use.** Additionally, missions must ensure that they comply with all applicable laws, and have in place an active campaign for cyber hygiene to avoid the introduction of malware and other cyber threats into the mission area. Cyber security is discussed in greater detail below.

Finally, the panel notes that the current approach to Statements of Unit Requirements (SURs) regarding medical support tend toward the “minimum necessary” vs. the “best possible” approach. This area clearly represents one in which those **Member States with advanced technology and capability can be called upon to support a mission as a Technology Contributing Country (“TechCC”) to join with TCCs and PCCs in forming the foundation of effective operations in the field.**

The Technology Contributing Country (TechCC)

For decades, UN peacekeeping has made use of forces from Member States that contribute troops, formed police units and other expertise—individual police officers, military observers and staff officers—for operations on the ground. But while TCCs and PCCs provide manpower and, where possible, the essential equipment these units use to operate in national settings, at times, they lack important essentials and very often they lack the technologies discussed in this report. Examples include tactical UAVs, ground sensors, command and control systems, explosive detection, data analytics, advanced medical equipment and other technologies. Where TCCs and PCCs do have such capabilities, frequently the distribution of the technology is limited as is the expertise to use or maintain the equipment.

Moreover, many countries are dissuaded from offering up troops or police for ground missions. Their reasons are varied, but the panel believes that these same countries can still contribute to the operational effectiveness of missions by making available technology, expertise, or training for those units that do deploy.

Technology Contributing Countries, or TechCCs, should be identified and engaged in much the same way that T/PCCs are today. DPKO and its components should work closely with DFS to identify those technologies, capabilities, and support necessary to develop a Statement of Unit Requirements (SUR) and approach Member States to obtain commitments. Technology can be obtained via “wet” (maintenance, training and all other necessary support included), “damp” (partial support only), or “dry” (equipment only) engagements, much as with certain other support capabilities. Individual Member States could agree to provide these packages, or TechCC Consortia could be formed by several Member States to assemble the right mix of equipment and maintenance as well configure appropriate support and maintenance facilities staffed by trained personnel.

Recommendations:

- ***Peacekeeping should adopt the 10:1:2 standard by prioritizing the installation of well-functioning emergency alert systems linked to rapid and expert medical response.***
- ***A system of emergency communications with override features for the most urgent message should form a part of every mission's communications and IT suite.***
- ***The panel strongly recommends that dedicated channels for this purpose be established in every mission.***
- ***Medical escorts should accompany high-risk patrols and other operations, and be equipped with redundant communications systems and emergency medical equipment, in particular in high-risk areas.***
- ***Individuals deployed to extremely remote locations should be trained and equipped to make use of emergency trauma kits, and all individuals should be provided with a basic trauma pack.***
- ***Missions must have the capacity to render advanced life support—either exceptionally within the mission area, or more commonly via Medevac.***
- ***The UN should call upon Member States with advanced technology and capability to provide specialized support to missions in the area of health care.***
- ***Missions should provide outlets for relaxation and connectivity to loved ones outside the mission area, while taking active steps to prevent piracy, other unauthorized use of such resources, and ensure an active posture of cyber hygiene.***

G. Mobility

Peacekeepers must be capable of deploying and redeploying rapidly within a mission area with minimum delay at all hours of the day or night. The ability for peacekeepers to move about an area of operations can be constrained by any number of factors: terrain, climate, lack of roads, lack of proper recovery kits, the presence of unfriendly elements—including mines and improvised explosive devices (IEDs)—and even the hours of darkness. The inability of mission forces to move freely within their area of mandated responsibilities is unacceptable.



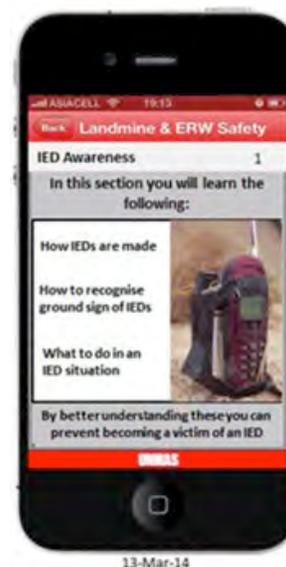
Peacekeeping missions face an increased threat from improvised explosive devices (IEDs), which put the safety and security of mission personnel at risk and severely restrict operational scope. The panel discussed the issue of counter-IED technologies, and techniques and notes the important finding that no complete remedy exists within the capability of any national military or police force. While many commercial technologies advertise themselves as counter-IED, little operational experience exists to validate these claims. There are, however, areas where technology can be applied, to enhance mobility, mitigate risk and enhance awareness.

To enhance mobility, **the panel recommends that all convoys in areas where IEDs are an identified threat deploy with the minimum ability to self-recover.** Heavier maintenance and recovery support could be pre-positioned at forward locations to reduce response time in the event of catastrophic damage to a vehicle preventing self-recovery. If the threat level is significantly high to warrant maintenance and recovery assets to be imbedded in a convoy, these teams should travel in **mine-protected vehicles**—which can also serve as emergency evacuation platforms for injured. In addition, convoys may be equipped with **small tactical UAVs as mobile intelligence, surveillance and reconnaissance (ISR) platforms to survey choke points and hazard areas along the route as needed to enhance overall security.**

A thorough **analysis of the type and extent of the IED threat** would identify the appropriate response that could include the use of electronic countermeasures (also referred to as IED jammers) and, in particular for pre-identified, or historical, hot spots, convoys could be **supported by fixed or tethered surveillance** platforms to increase surveillance capability. The panel notes that missions must have sufficient communications infrastructure and analytical capacity to rapidly translate what is being detected by the various sensors and subsequently transmitted to moving convoys on the ground. **Additional “bolt on” armour, ground-penetrating radar for subsurface mine detection, and hand-held explosive composition detection devices** are among the other technologies that could be made available for immediate use.

More immediately, however, in missions where the threat assessments indicate the presence of IEDs, specifically those incorporating radio-controlled initiation systems, **convoy operations should incorporate the use of electronic countermeasures linked to dedicated intelligence resources while on the move** to mitigate the threat. **Where IEDs are an identified threat, all convoys should deploy with sapper pioneering teams equipped with heavy vehicle extraction capability and organizational level repair and remediation technologies.**

Alongside the use of technology, there is still a need to get back to the basics of fundamental military and police work, which is critical for mitigation. This requires and increased understanding of the threats of explosive devices, which technology can facilitate. Missions have made some use of such innovations as the **smartphone application, [UNMAS Landmines and ERW Safety](#)**, to help identify and understand threats associated with landmines, explosive remnants of war (ERW) and IEDs. Available in multiple languages, the application is accessible by anyone. Such tools do not, however, substitute for predeployment IED awareness training. Other important non-technological measures include explosive detection dogs at camp entry points, and highly skilled and rapidly deployed EOD/IED teams.



The panel notes that a number of commercial offerings claim to “defeat the device”, but, because of the complexity of this challenge, **peacekeeping should partner with TechCCs and other interested Member States on an in-depth and ongoing look at this threat.** A number of national militaries and police forces have direct experience with coping with the IED threat under a range of operating conditions, and **UN peacekeeping should open a direct and extended collaboration with all Member States with such experience to develop a strategy for incorporating this learning into current practice.**

Over the longer term, the UN should have the benefit of Member State collaboration to degrade the complex web of financiers, bomb builders, and those that physically place the devices. **Peacekeeping should work together with relevant partners** to synchronize activities and prioritize resources across the organization.

In addition, the development of a standardized reporting system for use across all missions will help enhance the flow of timely, accurate and detailed reporting from military and police contingents, and should incorporate mobile reporting platforms. Readily available counter-IED doctrine has yet to be developed for peacekeeping, and no formal reference exist for mission planners and staff. Current work to develop guidelines to address IED threats is a good step forward, but further effort is needed to develop explosive ordnance disposal (EOD) and weapons technical intelligence (WTI) manuals. Finally, **counter-IED capabilities must be included in initial contingency planning and be a standard line in peacekeeping budgets.**

Recommendations:

- *Where IEDs are an identified threat, all convoys should deploy with the minimum ability to self-recover, together with sapper pioneering teams equipped with heavy vehicle extraction capability and organizational level repair and remediation technologies.*
- *These teams should, where indicated, travel in mine-protected vehicles.*
- *Convoys should employ small tactical UAVs as mobile ISR platforms to survey the route and to augment other route reconnaissance and security measures. All operations and convoys should be equipped with fixed or tethered surveillance platforms to offer increased surveillance capability, and mobility enablers.*
- *Wherever required, missions should be equipped with electronic countermeasures and linked to dedicated intelligence resources while on the move.*
- *Where required, additional “bolt on” armour, ground-penetrating radar and hand-held explosive composition detection devices could also be made available for immediate use.*
- *In addition to predeployment IED awareness training, technological tools should be used to enhance awareness and understanding of IEDs among UN personnel, especially in missions with such threats.*
- *UN peacekeeping should open a direct and extended collaboration with all Member States with C-IED experience to develop a strategy for incorporating this learning into current practice.*
- *The UN should, together with Member States, take an in-depth look at the foundational elements that comprise the threat of IEDs, with the aim to devising a strategy to address its root causes. Peacekeeping should work with relevant partners to synchronize activities and prioritize resources across the organization.*
- *Counter-IED capabilities must be included in initial contingency planning and be a standard line in peacekeeping budgets.*

V. Operational Imperatives

The panel believes that the UN can do much more to introduce modern technology and innovative practice to enable peacekeepers to execute more effectively on their mandates. Especially in the areas of command and control (C2), monitoring, reconnaissance and reporting, and information and communications technologies, peacekeeping operations simply do not currently possess anything approaching adequate numbers or types of technologies that militaries and police forces around the world accept not only as commonplace, but also as foundational to successful operations. This circumstance must change.

Moreover, decision makers in every setting the world over—in both the public and private sectors—rely on current, high-quality data to help them establish and validate situational awareness and ground their decisions. Information supplied from official mission elements is only one source of such information. Increasingly, social media, crowdsourcing and traditional public media sources must also be incorporated into the mix. Smartphones and, for that matter, cellular towers, are now relatively cheap and widely available. The Internet is also increasingly accessible, and reaches into the far corners of the globe. The panel believes that missions must seize the technological advantages of the 21st Century to their advantage. Brief discussions of specific applications follow.

A. Command and Control (C2)

The exercise of authority, coordination of operations, and prioritization and direction of resources require regular and reliable access to high fidelity information. Peacekeeping missions have begun to adapt to the need to acquire, process, use and share information from an ever wider range of information sources. **A number of commercially available command and control information systems can provide customizable, GIS-enabled, solutions to enable more coherent operational interaction from patrol to sector to mission and higher headquarters** (see Annex C). Such systems include functional area subsystems for the preparation and distribution of plans, orders and directives (which can now be prepared simultaneously via Internet-enabled sharepoints). Changes and updates to plans are made easier through dynamic updating by pushing out only new information and changes to originally disseminated documents, thus reducing stress on already overtaxed bandwidth. Simplified user interfaces designed for field conditions can give users instant access to the same and frequently updated information and support the synchronization and performance of operations at all organizational levels.

The panel recognizes that technology cannot solve all the problems associated with command and control, yet, feels that there is a need to rethink the present C2 architecture. The mission Joint Operations Centre (discussed in greater detail below), if cascaded downwards and infused with the appropriate technology and authority, could be a natural home for strengthened C2 support.

Recommendation:

- *The UN should put in place a customizable GIS-enabled command and control information system to enable more coherent operational interaction from patrol to sector to mission and higher headquarters, supported by continuous and reliable voice, data and video communications.*

B. Monitoring, Reconnaissance and Reporting

The ability to monitor an area of responsibility—whether a border, a conflict zone, or a camp perimeter—is central to delivering every peacekeeping mandate. Real-time visibility into mission areas of responsibility allows on-going operational assessments, and can enhance the safety and security of mission personnel. A broad range of technologies are useful for these purposes, including, for example, **high-resolution digital cameras and continuous video networks operating via web-based platforms** that can be augmented by satellite imagery to expand situational awareness. In addition, **thermal imaging** improves vision, both day and night, and ground surveillance radar can clearly detect persons at distances of several kilometres and vehicles farther out, constrained, of course, by line of sight limitations and the ability to distinguish ground clutter. Much of this technology is now available commercially at comparatively low cost.

Aerial data and geospatial information is critically important to any peacekeeping mission and provides invaluable intelligence for many operational contexts. Precise positioning combined with overhead visualization of mission environments are already part of daily life in a few peacekeeping missions, as are optical or electronic radar sensors to observe borders and ceasefire lines, and monitor ground activities, such as force build-ups and demobilization. These technologies have also been used to assess damage after a disaster.

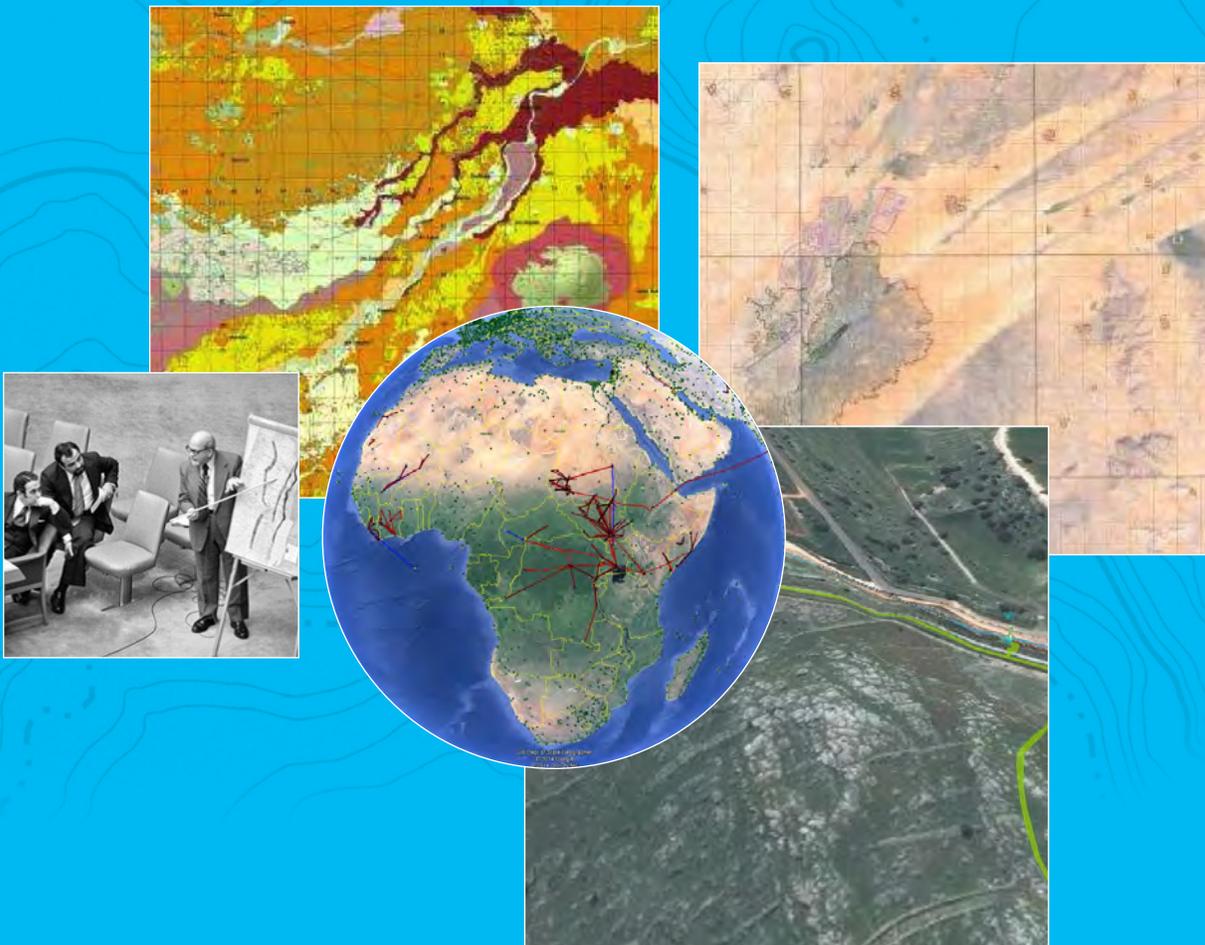
The panel notes that some of these technologies remain quite sensitive to weather and require thoughtful employment, especially in difficult terrain. Moreover, such technologies will not substitute for poor process or improper synthesis, and because they can put an enormous amount of information at the ready disposal of any user, they can even contribute to, on the one hand, decision paralysis due to information overload, or, on the other, rogue decision-making if adequate precautions are not put in place.

The panel acknowledges the potential for misuse of information—whether deliberate or inadvertent—from systems deployed in mission areas. Thus, **the panel urges that clear policies be employed, and leadership accountability be established, to help ensure that information is properly and lawfully obtained, stored, used, processed and shared, and that prevailing privacy laws are respected.**

GIS

—*No longer just about making maps*

Geographic information systems (GIS) allow users to collect, store, manipulate, analyse, manage and portray a wide range of data containing a geographic component (e.g., physical data such as terrain, hydrography, meteorology obtained through remote sensing sensors; socio-economic data such as demography, transport infrastructure, incidents, etc.). An analyst can display a large amount of information organized in layers, perform computations on them in an interactive manner to identify relations, including the spatial and temporal dimensions, and provide results in a cartographic format or for inclusion in applications, such as web map applications. Such application can provide a common operating picture used for situational awareness, analysis and modelling of relationships, patterns, trends, and process or planning potential course of actions.



Satellite Imagery

High-resolution satellite imagery is now widely available on the open market and extensively used by humanitarians, human rights advocates and others in the non-profit sphere. Humanitarian and advocacy organizations, such as the [Satellite Sentinel Project](#) and the [Harvard Humanitarian Initiative's Signal Programme on Human Security and Technology](#), rely on readily available satellite imagery in their work. [Human Rights Watch](#) regularly uses satellite imagery in its advocacy work, and it now employs image analysts on staff. [Google Skybox Imaging](#) services include direct satellite tasking, or the procurement of imagery, video or pre-analysed imagery. Its [Skybox for Good](#) initiative contributes satellite imagery to “projects that save lives, protect the environment, promote education, and positively impact humanity”. [Digital Globe](#) is yet another example of commercially-available satellite imagery. The [European Union Satellite Centre](#), which has access to a panoply of satellite assets, has been tasked by DPKO to provide near real-time image analysis and other geospatial information to the UN in support of operations on the ground.



Source: ESA

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. While some Member States share proprietary satellite imagery with the UN, restrictive confidentiality caveats often apply. The panel strongly believes that, as a matter of priority, **the UN should make more systematic use of commercial satellite imagery**—available to anyone willing to pay for it—**both to enhance operational effectiveness and to increase peacekeepers' safety, by enabling its near real-time sourcing and dissemination.**

More generally, **the panel would like to propose the creation of a new kind of mission—the Special Technical Mission, or STM**—to enable the Security Council to keep up with events on the ground in rapidly changing circumstances. It is the panel's view that the Security Council should itself have at least the same access and information at its fingertips as every major news outlet.

The Special Technical Mission (STM)

Under provisions of the UN Charter, the Security Council has primary responsibility to maintain international peace and security. This responsibility has only grown over the decades, and today, with the continuous global 24/7 cycle of news and the explosion of social media, circumstances of unfolding violence rocket to the top of public consciousness around the world overnight. Again, because of its unique responsibility to maintain international peace and security, the Security Council faces enormous pressure to respond to these urgent circumstances. In the first instance, of course, the Council must have confidence that it is thoroughly informed as to what is actually happening on the ground.

At times, however, circumstances on the ground preclude the deployment or movement of UN personnel, or even the insertion of an assessment team to take the full measure of unfolding events. Yet, Council action is required to check the further deterioration of conditions, as vivid images of unfolding violence or devastation are broadcast around the world.

In these circumstances, the Security Council should institute the use of a Special Technical Mission (STM) to call on, organize, and legitimate the use of technical audio, visual, monitoring and surveillance technologies, ground and airborne sensors and other technical means, to inform their decision-making, prioritize action and aid in planning.

STMs can either be authorized as stand-alone missions (led by an SRSG located in situ or elsewhere) or alongside existing PKOs or SPMs. Their mandates would be carefully circumscribed and

limited in scope and duration. Acting in its capacity to safeguard international peace and security, the Security Council would receive regular reporting from these missions that would include a full accounting of the technical means employed.

STMs would be staffed by dedicated analytic, technical and specialized procurement staff to process information in real time, ensure operations are conducted in accordance with Council mandates, and conform to UN acquisition rules and regulations. Because STMs would likely be required on an urgent basis, standing contracts for necessary technical services should be negotiated and emplaced, subject to regular audit and review.

To assuage political concerns, STMs should be highly transparent and rely principally on the considerable commercial assets that are already widely available around the world. The thriving global market for voice, video and data from commercial satellites, sensor networks, and other technical feeds is today accessible by anyone, for a fee.

There is simply no reason the Council should deny itself timely access to the same information so easily available to news outlets, celebrity advocates, or anyone else. In certain circumstances, assets for the STM could be drawn from Member States, including from the host country where circumstances are unfolding, or even neighbouring states. Because these assets would be deployed under the provisions of a Security Council resolution and their use overseen by the Council, such operations, and the information they generate, should enjoy a high degree of legitimacy.

As noted earlier, the panel believes that unmanned aerial systems constitute an indispensable source of information and should not only remain part of the peacekeeper’s toolkit, but their use should also be immediately expanded. Such operational-level assets, such as the system in MONUSCO, provide powerful surveillance and visualizations capabilities in addition to functioning, under the right circumstances, as a commanding deterrent.

The panel believes that the MONUSCO experience could be replicated in many other missions with requirements for medium-altitude long-endurance UAVs. However, the UN should not overly restrict itself or its thinking on the use of UAS, and should move to more operationally-flexible and tactically-deployable assets. In this regard, **the panel believes that smaller operational- and tactical-level assets are also required and that miniature UAVs should be incorporated into standard requirements without delay.** These assets are already being brought to missions by contingents that consider them essential equipment for military deployments, but the UN has yet to acquire the technology under its own flag.



Source: Aeryon Labs, Wikipedia



Source: Mini-UAV, UN OCHA Asia Pacific

UAViators

UAViators, the Global Humanitarian UAV Network, is a global volunteer network of humanitarians and professional, civilian and responsible hobbyist UAV pilots who share information and coordinate in support of a range of humanitarian efforts. UAViators work on the basis of a **code of conduct** for the safe and responsible use of UAVs in humanitarian situations, in line with humanitarian principles. They also keep an updated and publicly available directory of **UAV/ imagery software** and organizations developing or using UAVs for humanitarian purposes.

Aerial Surveillance

A “bird’s-eye” view is possible from aircraft, providing a longer line of sight and a wider area of observation than from the ground. Aircraft can travel with great speed and go directly to their destination. Once on site, they can adopt the optimum observation altitude and angle for safe viewing. Some airborne cameras can lock on to their observation targets, keeping them in the centre of view even as the aircraft circles above. The image feed can be sent in real-time to remote observers, whether the aircraft is manned or unmanned.

However, aircraft cannot generally view inside buildings (except with penetrating radars and infrared through some structures) and often have to fly at high altitudes to escape the reach of ground fire. Yet, for many tasks, more effective use of aerial surveillance would fill a critical need. For border patrols, for example, aircraft can cover an entire border of 500 km several times a day, and is also valuable for large-scale area coverage. However, aerial observation can be hindered by weather conditions.

The humanitarian community has also [recognized the value of UAVs](#) and has been incorporating them into relief operations, primarily for data collection and to inform and prioritize response. They have also recognized the potential for the use of UAVs to deliver humanitarian and logistics assistance, particularly in remote or otherwise hard to reach populations in need. In June 2014, OCHA released a report on the use of UAVs in humanitarian response, and UNICEF is currently exploring how UAVs fit into its work and has funded student research on humanitarian uses of UAVs. The International Organization for Migration (IOM) partnered with UNOSAT to conduct UAV missions in Haiti in 2012, to survey progress in rebuilding following the 2010 earthquake, and in 2013 used UAVs in partnership with commercial providers in the United States to identify and map flood damages and standing water (where mosquitos and epidemics thrive) following Hurricane Sandy.

Force protection packages on raised platforms, such as masts or aerostats, are an essential asset for peacekeeping missions. In addition, sensor-mounted fixed wing and rotary aircraft have been used by the UN to gather information and deter violence. The forward-looking infrared radar (FLIR) and synthetic aperture radar (SAR) mounted Apache helicopters in Mali that feed into the All Sources Information Fusion Unit (ASIFU) are good examples of more powerful piloted surveillance platforms, but the panel recognizes that this option may not be cost-effective for many missions. **As an immediate measure, 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.**

Radar

Since the discovery that radio waves bounce off distant objects, technologists have developed many different types of radar to determine the range, speed and direction of objects such as aircraft, ships, vehicles, artillery and human beings. They can also be used to create images, especially when placed on moving platforms like satellites or planes or on vehicles for penetrating into the ground. Because radar relies on electromagnetic waves of much longer wavelength than visible light, they can operate both day and night, and in all weather conditions. The United Nations Interim Force in Lebanon (UNIFIL) has made more use of radars than any other UN mission, using truck-mounted radars to monitor mission airspace and counter-battery radar (COBRA) to track artillery fire. The mission also uses radars aboard ships in its maritime task force to scan water, land and air.

As an added capability, ground sensors add critical information to the operating picture and should be part of any comprehensive sensor suite. Remote video cameras can add to a “concentration with mobility” operational approach, where an appropriate mission response follows information feeds in real time. Video-enabled observation posts or other points can be used to monitor hotspots or strong points, and inform quick response. The panel strongly believes that **static CCTV with pan-tilt-zoom capability is an absolute requirement for all UN camps and installations**. Moreover, ready access to forensic and historical imagery can also be useful when mediating disputes between parties to a conflict, or for historical context and informed intelligence analysis. As with other sensor data, good archiving and retrieval is key to effective analysis.

Radars of all types must be put into wider use. Ground-surveillance radar monitors movement of personnel or vehicles and can often detect approaching threats. Ground-penetrating radar can be used to identify underground bunkers, weapons caches and even graves. In addition, 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 as a useful augmentation capability for force protection and ceasefire verification, but their current use by peacekeeping is extremely limited.

Breaking the Night Barrier

Peacekeepers carry out their duties day and night—but they must be better equipped to handle the demands of night operations. Night-vision goggles and tripod-mounted infrared cameras could allow the UN to operate more adeptly after dark in every mission. GPS-enabled night vision devices could enable night-time search and rescue operations. Where necessary, remotely operated systems can be employed. In addition, aerial surveillance can also be a tremendous enabler of night-operations, as was the case in November 2006 when MONUC made use of Mi-35 helicopters equipped with

advanced infrared sensors to observe the movements of a renegade force advancing to attack the town of Goma and inform its response. The UN should ensure that its personnel are equipped with adequate night-vision capabilities, as a matter of course, and increase its use of night-time-capable aerial visualization and monitoring platforms.



Recommendations:

- *Aerial data, geospatial/geographic information, and other remotely acquired data are of critical importance to any peacekeeping mission and should be available as a matter of course.*
- *Clear policies should be emplaced, and leadership accountability be established, to help ensure that information is properly and lawfully obtained, stored, used, processed, and shared, and that prevailing privacy laws are respected.*
- *As a matter of priority, the UN should make more systematic use of commercial satellite imagery by enabling its near real-time sourcing and dissemination to enhance operational effectiveness and increase peacekeepers' safety.*
- *The panel recommends the creation of a new kind of mission—the Special Technical Mission, or STM—to enable the Security Council to call on, organize, and legitimize the use of technical audio, visual, monitoring and surveillance technologies, ground and airborne sensors and other technical means (e.g., ground and airborne sensors), to keep up with events on the ground in rapidly changing circumstances, inform their decision-making, prioritize action and aid in planning.*
- *For the UN to make maximum use of UAVs, greater use of smaller, tactical-level assets is required, and miniature UAVs should be incorporated into standard requirements without delay.*
- *Comprehensive sensor suites (radars, cameras, infrared and other sensors) with command post-fusion centres should be a standard requirement at all UN camps and installations, with static CCTV an absolute requirement.*
- *As an immediate measure, the UN should make better use of night-vision goggles, infrared cameras, and lighter, night-time-capable aerial visualization and monitoring platforms with mounted radial-surveillance technology.*

C. Communications, IT and Information Management

Peacekeepers require a robust, redundant and interoperable system of radio, telephone and data communications that extends across the fullest range of any mission's area of operations. Unstable Internet connections, lack of bandwidth, limited Internet and telephone coverage, and limited availability of software updates and spare parts can complicate the effective use of technology.

Better use should be made of standardized mobile communications capabilities deployable at short notice and manned by civilians or contributed forces, such as those developed by DFS' Information and Communications Technology Division (ICTD). Their mobile deployed telecommunication system (MDTS) are versatile Command and Communication containers that hold everything needed for operational command and control, packed within a 20-foot ISO sea container to meet the military's field-specific, command and control start-up needs and designed for a temporary deployment of up to 60 days or longer, if needed.

Mobile Connectivity

Mobile connectivity fly-away kits are currently being developed in the Regional Service Centre Entebbe and MINUSCA to support not only senior management and critical mission entities, such as the Joint Operations Centre, but also battalions in the field, to allow for their rapid movement with immediate communications capacity. More nimble than the MDTS, described above, the kits will ultimately combine a portable satellite link with at least 25Mb/s of bandwidth; up to 10 access points; laptops; and satellite and cellular and data-enabled smart phones. Depending on the end user, they may also 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](#).



Meeting the Need for Instant Tactical Communications

Mobile phone use globally has seen tremendous growth and provides a clear indication of the premium placed upon real-time information flow. Mobile phone use has become so widespread that missions, in every case, establish links to locally available mobile networks to meet the needs of their personnel, however notoriously unreliable, insecure and susceptible to sabotage in areas

of unrest. With the advent and proliferation of mobile telephony and data-driven communications, units in some missions have reduced their reliance on traditional combat C2 nets, relying instead on a strategically provided communications backbone by CITS. Notwithstanding the value of this commercial backbone strategy, which ensures that every outpost of a mission has at least one functional link, the panel believes that much more is needed.

More specifically, the panel believes that there is an immediate need for peacekeeping to **ensure that a fully functioning tactical radio network backbone be emplaced in missions. Assigned networks, e.g., medical, logistics or tactical operations networks, should be well controlled and information flow properly regulated. There is also a need to establish interfaces between radio and other communications networks, including satellite communications (SATCOM).** In addition, the panel supports the **continued use of the decades-old workhorse HF radio as backup to satellite communications capabilities and believes that communications personnel in the field should continue to be trained in its use.**

Communications at the Operational Level

Peacekeepers, civilian and uniformed alike, increasingly come to missions expecting at least a basic level of technology to enable them to do their work yet they are often not provided with the tools necessary for a major prerequisite: connection into the mission's common operating picture in real time. The UN can add to the digital peacekeeper's toolkit through the **enhanced use of and support to handheld devices or tablets equipped with specialized mobile applications.**

Peacekeepers can feed into the mission's common operating picture in real time, by pre-loading or providing access to simplified, standardized and geo-enabled reporting templates via mobile devices. Commercial applications are widely available and could be easily tailored to the needs of peacekeepers, as has been done in UNIFIL.

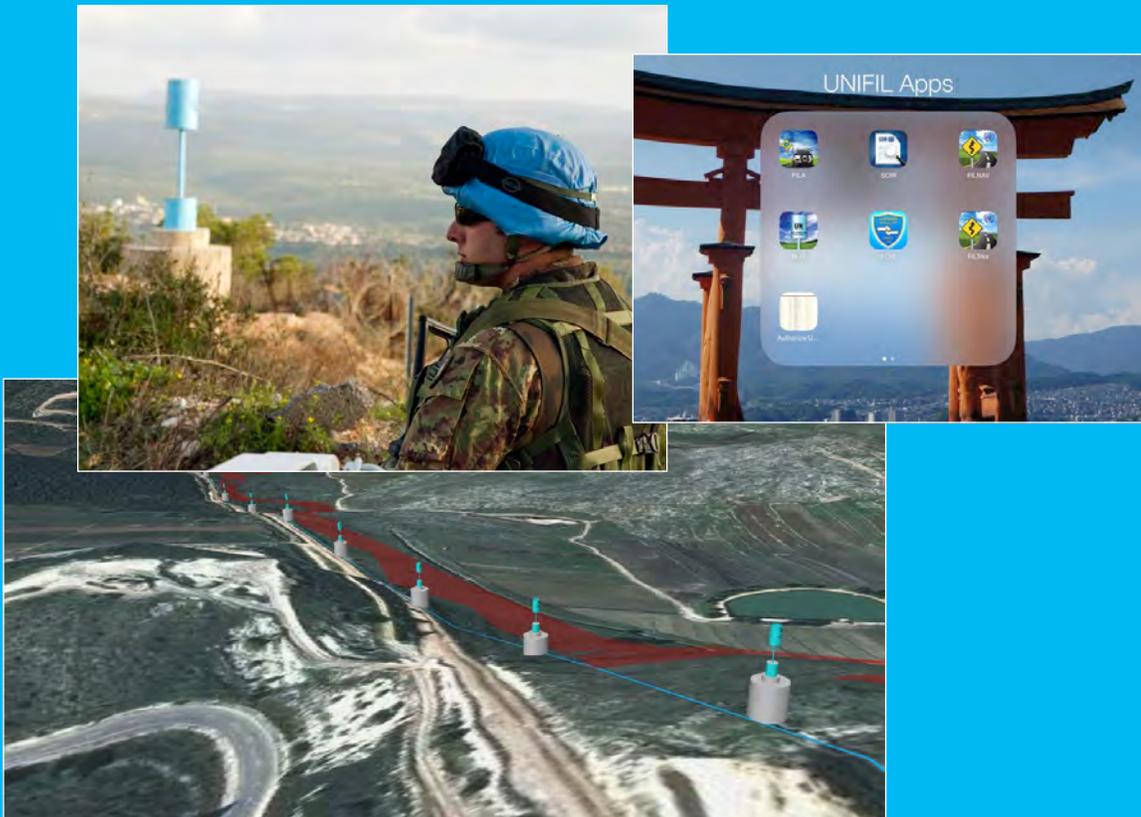
In addition, the revolution in handheld digital imagery—for both still and video cameras—provides an important capability to augment and add value to peacekeepers' reporting from the ground. The panel notes, however, that privacy considerations must be taken into account concerning the use and storage of such information.

Currently, the distribution of smart phones or tablets is limited to high-level personnel in a mission, which denies access to many useful services to military and civilian staff members, military observers and police officers. This approach to fielding technology should change with immediate effect. Peacekeeping's ICT policies should be revised to enable the provision of, and support for, GPS-enabled mobile tools that will enhance peacekeepers' abilities to do their jobs and tools that will allow them to align operational processes to the need for accelerated information flow. Such policies should be coupled with appropriate guidance to regulate bandwidth-heavy personal uses of this technology, and to safeguard against unauthorized use and to protect privacy.

Mobile Solutions

UNIFIL's Blue Line Information System (BLIS) is a 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, which was established in the year 2000 to confirm the withdrawal of Israeli forces from Lebanon. BLIS consists of maps, real-time geospatial data, imagery, procedures and tools, like mobile and desktop applications and Google Earth. BLIS mobile allows users to search and access geospatial data and photos related to the Blue Line, and provide real-time Blue Line activity figures. BLIS mobile is available on iOS enabled mobile devices, accessed on secure servers. It contains offline cached map and high-resolution satellite imagery,

allowing for online and offline viewing and editing of thematic layers, search and display of Blue Line activity, geospatial data and photos, and display device GPS location and UTM coordinates of screen-tapped locations. Its Field Information Logging Application (FILA) allows the mission to track GIS staff movement while in the field, and to record field survey operation information in real-time. FILNAV is a GPS navigation application that allows users to navigate the Area of Operations, while the Liaison Operation Information System (LOIS) application allows Liaison Officers working in the field to respond in real-time to incidents or alleged violations, thereby helping to diffuse tensions.



Recommendations:

- ***The UN should ensure that fully functioning HF radio networks as the backbone of all communications in missions. Assigned networks should be well controlled and information flow properly regulated, and interfaces between radio and other communications networks must be established.***
- ***The UN's ICT policies should be revised to enable the provision of, and support for, mobile tools that will enhance peacekeepers' abilities to do their jobs and tools that will allow them to align operational processes to the need for accelerated information flow.***
- ***Peacekeeping missions should make enhanced use of, and support handheld devices or tablets equipped with specialized mobile applications.***
- ***Smartphones or tablets should be made immediately available to military and civilian staff members, military observers and police officers regardless of rank.***
- ***Better use should be made of standardized mobile communications capabilities deployable at short notice and manned by civilians or contributed forces.***

1. Information Use, Processing and Dissemination

Information is a critical enabler of operational effectiveness and a foundation for mission success. However, the UN's approach to information technology suffers from the same afflictions that beset other major enterprises, namely, the inability to know what it has or know what it needs. In turn, peacekeeping missions find themselves either caught up in the "the fog of more"—that is, more information from more sources, yet greater uncertainty about how to prioritize and effectively use this information. Other missions find that they seldom have the kind and fidelity of information necessary to operate effectively in their own area of responsibility.

A central debate surfaced over the course of the panel's inquiry concerning the amount and quality of information available to mission leadership. Some panellists believe that peacekeeping missions do not necessarily need more information, rather, they need better information at the right time in the right place to enable effective decision-making. Other panellists took the view that peacekeeping in fact does need more information across the entire range of its requirements to enable fuller analysis. Still others are reluctant to rely on the use of more technology as the answer to this question, opting for greater human engagement, particularly in the context of protection of civilians. Clearly, each of these positions has value. The important question surrounds the conditions under which each argument is most relevant.

The question of whether the UN has enough information, or whether it needs more information, remains unresolved. However, it is clear that leaders feel that they lack the information they need to take informed decisions. It is only through the implementation and use of proper analysis tools against prioritized information requirements that this question can be answered. As an immediate action, **the panel recommends that every mission undertake a comprehensive review (at least) annually of its information priorities, as well as its information gathering, management, analysis and dissemination practices as measured against those priorities.**

In the panel's view, much of the way data is collected and managed in peacekeeping must be changed. Current reliance on PDF documents, faxes, code cables, and even e-mails (often printed out for circulation and action) requires too much manual intervention, as important information is largely inaccessible and locked in documents. Proper information management systems, supported by technological tools, would allow for peacekeeping as a whole to overcome its current data sclerosis and achieve the data liquidity that would allow for information to be easily searched, queried against, measured, tracked over time, and visualized for better reporting, analysis and decision-making support. Such systems could also assist in the long-overdue breaking down of information silos across mission and headquarters components, and between the field and headquarters.

In addition, the panel understands that for the last several years all information systems projects—which had been vetted and prioritized by the DFS-DPKO Information Management Committee—were either not approved, or cut from the budget. If the panel's recommendations are to bear fruit, the Organization and its membership will need to financially commit to these changes.

In a survey conducted on behalf of the panel, respondents articulated the need for better tools for internal information sharing, document management and archiving. Moreover, problems of over- and under-protecting information has often led to difficulties in coordination with partners and in unified command and control. In the panel's view, progress here will depend on three factors: sound technology to enhance data liquidity; proper processes and policies in place to govern the collection, use, dissemination and storing of information; and regular training to ensure all personnel know how to use the systems correctly and lawfully. **DPKO and DFS should implement systems, with clear roles and responsibilities and relevant substantive training to field missions, to improve internal information sharing and electronic records management and achieve data liquidity.**

In addition, the panel questions the level of demand for information and reporting imposed on every mission by UNHQ. Extraordinary time and attention is diverted from mission operations in order to respond to information requests from New York. An integrated mission-wide information management system that provides for real-time access to data by the field and headquarters could alleviate this burden and support the shift toward data-driven reporting, while also supporting a mission's common operational picture. **Peacekeeping should revise its reporting requirements to enable, where appropriate, single reports from the field to serve multiple purposes. In addition, missions should strengthen the capacity of Joint Operations Centres (JOC) to maximize their role as the information hub of the mission.**

The acquisition, processing, use and dissemination of information is as much a political question as an operational one. As the UN moves towards information-led peacekeeping, **it should engage with Member States to determine an appropriate governance structure for the use of certain technologies used to collect information. DPKO and DFS should also continuously review and update related internal policies and procedures as technology evolves, and is incorporated into mission operations.**

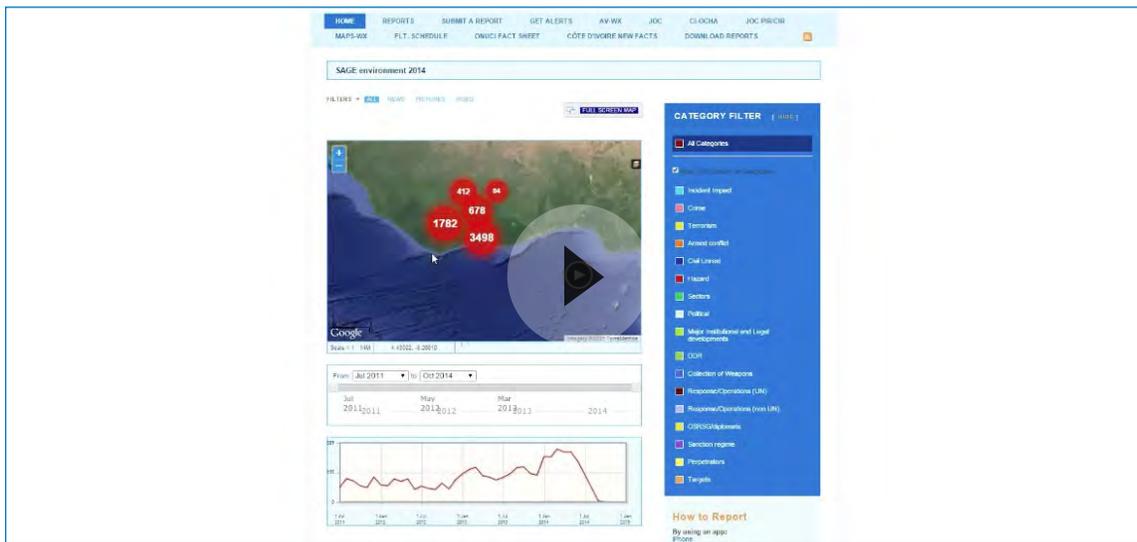
Improving Situational Awareness

Information captured through modern ISR technologies can greatly enhance a mission's situational awareness, understanding of its operating context, and help inform responses to emerging threats against civilians as well as UN personnel, assets and installations. When interpreted and analysed by trained specialists in near real time, such information constitutes a powerful force protection and intelligence tool that UN peacekeeping should field immediately, without exception or delay.

Local developments have sought to solve, in part, the requirement for real-time situational awareness, data visualization and analysis because most **JOCs, Joint Mission Analysis Centres (JMACs) and GIS offices in the field still lack the basic tools—hardware and software—to acquire, process, use and disseminate information effectively.** Without these tools—especially the means to track and report incidents across the mission area, JOCs and other mission components frequently design their own systems. The result is inconsistent reporting and often inaccurate analysis. This situation requires immediate attention.

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. The resulting tool, known as UN SAGE, was developed for use across all missions. The panel notes that UN SAGE has faced some challenges in initial pilot testing exposing, for example, a lack of buy-in from some military and police components and, in some missions, the desire on the part of mission support for it to be managed by a dedicated database manager. If peacekeeping sticks with UN SAGE, these issues must be resolved. But the panel notes that many application platforms exist to layer information to enable visualization of steady state operations or unfolding events.

The panel believes generally that geospatial visualization should be more widely used. The majority of missions have GIS units, but some have yet to reach their full potential, concentrating on providing deployment and other static maps rather than supporting other mission assets to develop and operationalize tools using geo-tagged information. The panel believes that **peacekeeping requires a more structured and integrated approach to data collection, processing and dissemination to help maximize the use of GIS products and other data visualization.** In addition, **missions should encourage the co-location of its GIS capacity with the JOCs wherever possible.**



Technology for Analysis

All missions have capacities to analyse the threat and opportunity landscape in their areas of operations and larger areas of interest. In some integrated missions, the Joint Mission Analysis Centres carry out these tasks and perform the information fusion function. Yet, they often lack even basic analytic support tools. Traditionally tasked with long burn analysis related to a mission’s mandate, JMACs are increasingly being called on to provide short- to medium-term analysis, or to provide analytic support to operations in real time. It appeared to the panel that some JMACs are resisting shorter-fused requirements, but the panel believes that JMACs may be best positioned to take on these functions to permit mission operations to be fully informed by the information available in the area of operations.

As missions continue to acquire advanced ISR technologies, and as mandates and operating contexts continue to evolve, specialized analytic capacities and additional tools will be required. It will be equally important that all of the mission’s analytic capabilities, such as the U2 in Force Headquarters, the Security Information and Operations Centres (SIOC), or Security Information Coordination Units (SICU), are provided with the essential information management, analysis and communications tools, as well as professional analytic capacity to deliver sound analysis. Where these and other analytic capacities operate together in a single area of operations, they should build on or complement each other, rather than compound the effects of competing narratives and incomplete operational pictures.

The panel believes strongly that **it is imperative to develop a common intelligence software solution across missions with powerful query and cross-referencing capabilities.** Designed to ingest structured and unstructured data (e.g., information, graphics, imagery, all file formats, open source material, GIS data, telephone text messages, social media, etc.) from all available information sources, such a common solution would alleviate current issues of data incompatibility and establish a basis for practice and training across all peace operations.

Joint Operations Centres (JOCs)

As the integrated current operations information hub of a mission, the JOCs' core function is to ensure 24/7 situational awareness to support mission leaders' decision-making. Under the revised JOC Policy issued in 2014, JOCs are also expected to facilitate integrated operations coordination so that mission leadership can ensure that the operational activity of mission components and that of the UN Country Team (UNCT) are complementary and coherent. JOCs are also responsible for the mission's integrated reporting to Headquarters.

The JOCs' situational awareness functions should allow a mission's leadership to identify, prevent,

mitigate or respond rapidly to threats or emerging threats. However, as noted, currently, JOCs are not uniformly provided with the necessary tools (and too often, the specially-trained personnel) to be able to collect, collate and visualize information in real-time. Collocating GIS and other critical mission components with the JOCs can help strengthen its situational awareness, crisis management, reporting and decision-support capacity. JOCs also require—but rarely have—redundant, advanced communications infrastructure (including portable communications equipment with backup power) to ensure that command and control can be rapidly re-established in the event of a relocation or IT outage.

Joint Mission Analysis Centres (JMACs)

JMACs are integrated strategic-level assets for the SRSG to support planning, decision-making and mandate implementation. By drawing on all sources of information available within a mission area, JMACs provide assessments of crosscutting issues that seek to identify those that may impair the mission's ability to deliver its mandate, and opportunities for mission engagement. Increasingly, JMACs are expected to provide these multi-source integrated analysis and predictive assessments with short time horizons, and some JMACs are also broadening their lens to take a regional look.

JMACs require specialized information and equipment in order to effectively carry out their prescribed functions. JMACs must have access to satellite communications, dedicated server capacity, and database management and analysis software to facilitate efficient information gathering, storage, access, analysis and visualization. In addition, JMACs require regular access to open source information, and satellite and other imagery, GIS platforms, and secured Internet connection and data encryption capabilities.

The ASIFU

MINUSMA's All Sources Information Fusion Unit (ASIFU) was established to provide the mission's force commander with fused, relevant, timely, actionable and integrated intelligence analysis. While still in a relatively early phase of its operations, the ASIFU has sought to develop a strong information position for the mission based on a multidisciplinary approach to information gathering. The ASIFU relies on centralized coordination of a decentralized organization of personnel and sensors deployed by its intelligence, surveillance and reconnaissance companies in Bamako and Gao. These units include civil-military teams equipped with small UAVs, as well as mission review and advisory teams. The ASIFU also engages heavily in open source information gathering, and liaison with all mission components.

One such tool is IBM's i2 Analyst's Notebook, which is being used in some missions, as well as by the ASIFU in Mali. Recently, MINUSMA's JMAC was also provided with this software, which has enabled greater sharing of analysis products between the two components. While some users consider this tool to be overly complex, costly, and requiring a relatively heavy training and human resource burden, others seemed quite content with its performance. To be sure, i2 is by no means the only available tool. The panel understands that the UN has sought other options, but that attempts to pilot a proof of concept with another vendor for a tool specific to peacekeeping has been side-lined in the procurement process.

Information Sharing

To add to a common and comprehensive operational picture, there is a need to enhance information sharing between the security analysis components of a mission, UN Agencies, Funds and Programmes, and other humanitarian actors in the field. The panel has noted a hesitation to share certain information across the UN system, and perceives this reluctance to be largely driven by concerns about losing "control" of information or revealing sources, or fear that humanitarian space could erode due to close links with peacekeeping missions. However, from a strategic point of view, sharing information available to all UN parties and partners in a given area of operations would provide all actors with a more complete situational awareness and understanding. **DPKO and DFS should work to establish common information exchange policy and protocols to**

pave the way for better information sharing, while also taking cognizance of humanitarian and other principles.

The panel notes inter-agency efforts under way to establish data and information standards for exchange. Peacekeeping should **explore the use of available inter-agency data sharing tools**, such as OCHA's common operational data sets and humanitarian exchange language, while ensuring adherence to appropriate information sensitivity, classification and handling policies.

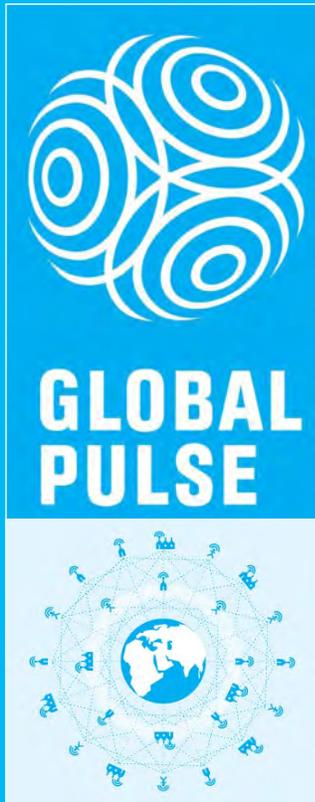
In addition, **the Departments of Peacekeeping Operations and Field Support should pursue partnership opportunities with UN Global Pulse, OCHA and UNICEF to capitalize on combined analytic capabilities and learning.**

Open Source Information

Given the demands on today's missions, peacekeeping can simply no longer afford to be the last to know. Open source information gathered from traditional and new social media, crowdsourcing platforms, and other information conduits—such as analytic clearinghouses—can augment situational awareness and help complete a mission's analysis picture. **Missions must make better use of open source information in the immediate term by establishing information priorities, alerting all staff to the information needs, and providing easy to access reporting tools.** The Departments should also provide appropriate tools that automate information gathering and analysis from open sources, including social media, such as [RecordedFuture](#) or [Storyful](#) (see Annex C).

In reality, this effort will require easier access to the Internet, which is, in the current experience of many mission colleagues across the field, often stymied by access controls and bandwidth restrictions. **The UN should prioritize the development of policies to govern the access, use, processing, storage and sharing of information gained from open sources and reiterate the policy that lifts restrictions on personnel engaged in open source information collection. At the same time, DPKO should train peacekeeping personnel engaged in open source information gathering on proper ways to collect, use, process, store and share this information to ensure appropriate protection for privacy and security.**

Finally, and importantly, there is also a need to follow basic cyber hygiene to prevent or rapidly mitigate the vast majority of known cyber attacks. **The UN should immediately implement basic cyber hygiene—at a minimum, to include 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.**



Big Data Solutions

Global Pulse offers big data analysis solutions to UN system partners. Drawing open source feeds from such providers as Twitter, Global Pulse can gain helpful insights into local trends. In one example of its work, Global Pulse is working with Stellenbosch University, a centre of excellence in speech recognition, to develop the hardware and software for an innovative radio-to-text translation platform, that will allow the capture of local, public call-in-talk radio programming, translate it into text, and, using pre-determined keywords,

analyse it for sentiment. This tool will be available for use by its partners to query data to inform programmatic interventions or to gauge the success of messaging and adapt it as necessary.

Once developed, the tool will become a common good and can be continuously iterated and further developed in partnership with others. Such a tool has applicability in peacekeeping contexts to provide feedback on public information campaigns, monitor airwaves for hate speech, or, potentially, as an early warning mechanism.

Cyber Hygiene

In the wake of highly publicized breaches around the world, nearly everyone has at least heard about cyber security, even if many remain largely in the dark about just what that term means. What are the most important things to look at when evaluating the cyber security posture of any enterprise? What constitutes the minimum standard of due care when it comes to protecting information technology and data holdings?

Basic cyber hygiene –

- *Hardware and software asset inventory;*
- *Limited administrative permissions; and*
- *Real-time (automated) network and system monitoring and vulnerability patching.*

These measures have been demonstrated to stop over 80 per cent of all known attacks. Cyber hygiene allows an enterprise to know what's connected to and running on its networks, have the latest information on the state of repair that the networks are in, and control who has the ability to bypass, override, or change the networks' security settings. When things go amiss, enterprises can, with these controls in place, find out quickly and move rapidly to respond. When facing an audit that includes cyber security, organizations should compare what the auditors are looking at to what technical experts actually know to be the most important things to do—and to do first—to achieve measurable cyber security.

Recommendations:

- *Modern surveillance and reconnaissance suites are powerful force protection and intelligence tools that UN peacekeeping should field immediately, without exception or delay.*
- *As it acquires more specialized technology, the UN should also ensure that the specialized personnel and additional tools required are provided.*
- *Every mission should undertake a comprehensive review (at least) annually of its information priorities, as well as its information gathering, management, analysis and dissemination practices as measured against those priorities.*
- *DPKO and DFS should implement systems, with clear roles and responsibilities and relevant substantive training to field missions, to improve internal information sharing and electronic records management and achieve data liquidity.*
- *Peacekeeping should revise its reporting requirements to enable, where appropriate, single reports from the field to serve multiple purposes, and missions should strengthen the capacity of JOCs to maximize their role as the information hub of the mission.*
- *JOCs, JMACs (or a mission's other analytic capacity) and GIS components should be immediately provided with the tools required to collect, process, use and disseminate information effectively, to the benefit of decision makers. GIS capacities should be co-located with the JOC wherever possible.*
- *To enable missions to make better immediate use of open source information, the UN should reiterate the policy that lifts Internet restrictions for those engaged in open source information collection, and provide training on basic cyber security and ethics protocols. It should also ensure that open source analytic tools are immediately available and accessible to those whose core business requires them.*
- *Peacekeeping should pursue partnership opportunities to capitalize on combined capabilities and learning.*
- *DPKO and DFS should work with UN Agencies, Funds and Programmes and other humanitarian actors in the field to establish a common information exchange policy and protocols sensitive to humanitarian principles, to enhance common situational awareness and understanding, and explore the use of available inter-agency data sharing tools.*
- *As the UN moves towards intelligence-led peacekeeping, it should engage with Member States to determine an appropriate governance structure for the use of certain technologies used to collect information.*
- *The UN must continuously review and update related internal policies and procedures as technology evolves and is taken on board by peacekeeping.*
- *The UN must immediately implement basic cyber hygiene—at a minimum, to include hardware asset inventory, 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.*

2. Strategic Communications

A mission’s strategic communications capacity plays a critical part in conveying key messages both internally, and externally, as well as undertaking effective outreach to the host population, national authorities and international audiences. Missions have made increased use of social media in recent years, but the practice across mission areas is far from systematic, and many missions are simply not reaching those who need to hear key messages. The UN still lacks a comprehensive policy for the use of social media, which the panel understands is currently being developed. In the absence of a policy, in some cases, the use of social media has had a divisive effect internally and conveyed mixed messages to an external audience. Many of the observations regarding open source information, noted above, apply to social media.

eDiplomacy

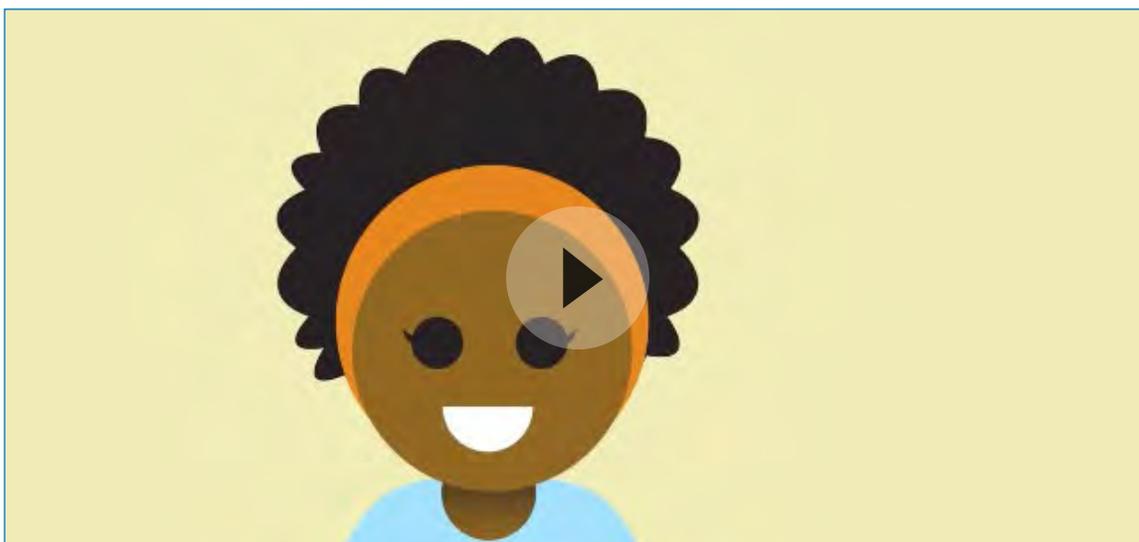
DPA is pioneering efforts to embrace eDiplomacy and other innovations to help channel ideas and harness the power of information from new media. While the definition of digital- or eDiplomacy is still a matter of some debate, at root, it refers to the use of the Internet and new information technologies to help achieve diplomatic objectives. Often associated with social networking platforms, eDiplomacy seeks to harness information tools for enhanced research, internal and external communication, knowledge management and public engagement.

DPA has worked to mainstream digital diplomacy through the creation of the UNite community, as well as encouraging desk officers to monitor developments, share information, amplify UN messaging, and solicit feedback in their mission areas. In addition, DPA and OICT are also working on a “Diplomatic Pulse”

tool to help monitor official online governmental sources of information.

And in peacekeeping...

Colleagues from the DPKO Office of Operations, DPKO/DFS Policy, Evaluation and Training Division (DPET), and the United Nations Operations and Crisis Centre have engaged with DPA to form an informal and cross-departmental low level panel on technology and innovation in UN peace and security. This panel seeks to increase awareness of desk officers on the possibilities offered by new and emerging technologies to enhance information collection and analysis. Participants have laid out a three-pronged strategy incorporating sensitization, training and structural change—for example, through modifying the terms of reference for desk officers to include information management or enhanced technological awareness.



A more modern approach to strategic communications can improve the mission's ability to deliver across its mandate. Peacekeeping should rethink its strategic communications paradigm and adopt an approach that prioritizes informing, engaging and advocating. It should embrace audience segmentation (understanding and targeting specific demographic audiences within a contact area) and devise communication strategies that are more multifaceted, operational, interactive and data-driven. There are readily available tools that could enable this shift, including the use of crowdsourcing platforms, interactive SMS blasts such as [UNICEF Rapid Pro and U-Report](#), and analytic tools to monitor media, for example [Hootsuite](#), and [Tweetdeck](#), and [radian6](#), gauge perceptions and sentiment. Many of these tools are open source, or available at low or no cost online (see Annex C). Given how fast this field is evolving, however, the panel notes that UN personnel must have access to training to stay abreast of the latest tools, especially those that help control for bias.

“Transparency is our strongest way of articulating our impartiality and building trust of the parties...[and] in the international community. To be effective, transparency must be meaningful. Information must be accessible through a range of media channels. Traditional diplomatic tools, with their emphasis on discretion and ambiguity, no longer suffice. The strength of the...state...those who oppose it, or other actors...the level of development and sophistication of its people and the intense interest of... [the] international community make the need for a proactive information strategy particularly urgent.... [I]t is also a challenge for peacekeeping operations in general. 21st century peacekeeping must be focused on information operations as much, if not more, than manpower on the ground. A strong UN INFO OPS unit should be stood up immediately to take on this challenge in UN peacekeeping missions...the UN must be able to engage actively with and through new media.”

—Senior Peacekeeping Field Leader End of Assignment Report

The panel recognizes that establishing UN radio is not always the most efficient and cost-effective way to broadcast. Peacekeeping can and does partner with local radios to convey its messages, while also assisting in local media development and capacity-building. There are also widely available, low-cost solutions for the rapid deployment of strategic messaging. The Radio France Internationale (RFI) model—where looped content can be fed into any enabled transmitter via satellite—is an example that the UN should consider at mission start-up. By providing low-cost connection kits to local radio stations to begin broadcasting UN messages before local UN radio is established, such outreach could be particularly valuable at a time when the mandate is least understood by local actors and resistance of a mission’s presence by some may be high. The use of pre-packaged loop messaging also has the potential for strategic messaging in times of crisis. For example, in UNMIK, [Radio Ophelia](#) is an open-source automated digital FM radio channel with very low bandwidth that provides looped content through transmitters via computer. The UN should seek local partnerships in content production wherever possible.

Recommendations:

- ***Peacekeeping should rethink its strategic communications paradigm, and employ available tools to make it more multifaceted, operational, interactive and data-driven.***
- ***Upon the promulgation of a comprehensive policy for the use of social media, DPKO and DFS should provide the necessary training to support its implementation.***
- ***The UN should seek out and employ low-cost solutions for the rapid deployment of strategic messaging whenever required.***

D. Selected Programmatic Priorities

Technology can greatly enhance the substantive work of both field and headquarters. Yet, the panel looked hard during its inquiry for innovative uses of technology in the field. There were some examples, for instance in MINUSMA, where the DDR section was developing a “piggyback” layer to UN SAGE that would allow it to visualize data and move away from simple database formats, and in MONUSCO, where several mission components feed into a customized protection database tool to allow for information sharing across components working on similar issues. More broadly, as noted above, human rights and humanitarian actors are increasingly looking to technology to enable their own work.

To illustrate the potential uses of technology in programmatic areas, the panel focused on key mandate areas, including the protection of civilians, policing and the rule of law, and border/ boundary demarcation and monitoring—all of which argue in favour of moving rapidly to acquire and deploy many of the technologies discussed above.

1. Protection of Civilians

Protection of civilians lies at the heart of nearly every multidimensional peacekeeping mission, and success in this domain is central to the legitimacy and credibility of UN peacekeeping and to the cause of sustainable peace more broadly. Technology can enhance situational awareness and understanding, as well as aid in planning and operational decision-making. Technology can also help tailor not only military and police interventions for populations at risk, but also civilian-led humanitarian and protection interventions.

Without a sound information and intelligence foundation, early warning of deteriorating circumstances becomes a matter of chance, and mobilizing a coherent early response to mounting trouble an impossible task. Moreover, without a reliable, high fidelity means to collect, use, process and share information and data, missions will founder from the start. The UN simply must have access to real-time information along with the technical means and enablers described in the foregoing sections, to allow them to have a more forward-leaning posture, to develop accurate appraisals, and to deliver well-honed political and operational recommendations. **Peacekeeping missions should incorporate technology in the design and implementation of protection 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.**

As noted, UN operated radio stations or recorded programming represent an important communications tool to help inform local communities and dispel rumours that can lead to displacement, or worse. For example, in Liberia, UNMIL Radio regularly broadcasts in the country's six main local languages and produces content in some additional eleven languages. With the largest reach of any radio station in the country, UNMIL Radio is heard by over 85 per cent of the population and is regularly re-broadcast by community radio.



Yet, while **technology can also help peacekeepers extend their reach and provide messaging to empower communities to be partners in their own protection**, it must be used with care. For example, MONUSCO's Community Alert Network initially provided mobile phones to communities to gather information about emerging threats and inform response. After some trial-and-error, the network has transitioned to a "hotline" solution, through which communities contact the mission's community liaison assistants to provide early warning information. This approach minimizes the unintended consequences arising from providing technology directly to local communities in high-risk settings. In addition, the need still exists **to protect sensitive information as well as the privacy of individuals, in particular those vulnerable to abuses**.

Recommendations:

- *Peacekeeping missions should seek to incorporate technology in the design and implementation of protection of civilians strategies, in particular their early warning and early response mechanisms.*
- *Missions must take care to protect sensitive information as well as the privacy of particularly vulnerable individuals in protection scenarios.*
- *Peacekeeping should continue to seek ways to use technology as an empowerment tool in protection of civilian contexts, while remaining mindful of possible risks.*

2. Policing and the Rule of Law

A mission's rule of law mandate often involves working with a state emerging from conflict, to rebuild their capacity in policing, judicial proceedings, and penal operations, and their overall governance and accountability capacity. Automated data collection and analytic tools would be of immediate use to boost mandate delivery. Indeed, while some of these tools are already in place (and could be scaled up and replicated across missions), they often intersect with manual systems and lose the advantages of automation.

Throughout UN peacekeeping, police have become increasingly important to work with national counterparts to prevent crime, build capacity, strengthen service delivery and enhance local confidence in law enforcement. UN police routinely work with national counterparts to plan operations, conduct routine patrols, and engage local communities in their work. UN police and formed police units can benefit from many of the technologies that should also be made available to their military counterparts in any mission, and both benefit from common services, such as the mission's ICT infrastructure, JOCs and JMACs. In addition to working alongside military components to keep the peace, UN police place local capacity building and community stability at the centre of their actions.

Making simple mobile applications and devices available to police is a first step toward enhancing their ability **to simplify and streamline routine and incident reporting**, and accelerate the pace at which reports can be received and acted upon. Such applications can also be useful **to track the movement of personnel**. Furthermore, **the increased use of social media tools as part of a concerted strategic information operation** can strengthen community relations, instill confidence and help communities become more engaged in their own protection. Smart policing initiatives can also help to enhance oversight and accountability, in particular in locations where confidence in the police is low.

Simple **tools exist can be used to strengthen the mission’s monitoring and advisory capacity**. In UNMIT, for example, and later in MINUSTAH and UNMIL, UN police developed and implemented a system of monitoring and evaluation of national counterparts—SMART—to track the overall situation in the country. Initially seen as a tool for later stages of mandate implementation, these SMART systems are now being used to streamline reporting flows and track key indicators through a single database, and could easily be replicated across other missions. These systems can provide a comparative basis for tracking broader rule of law indicators, and can help the mission to assess impact and track resource utilization. The system is low cost, low tech, is based on existing IT infrastructure, and can be handed over to national counterparts at the end of a mandate.



Smart Policing

The Brazilian organization Instituto Igarapé is working to develop technical solutions for “smart policing”. In three pilot areas—Rio de Janeiro (2013-2014), Cape Town (2014), as well as in Nairobi (2014)—police officers patrol certain areas with smart phones attached to their vests. An Android app locates the respective police officer via GPS and livestreams audio and video records to police headquarters. In addition, more and more law enforcement agencies are making use of body and vehicle cameras to both document rapidly unfolding events, aid in forensic analysis, and help maintain accountability among police officers.

With growing links between transnational organized crime and conflict, peacekeepers are required to strengthen the capacity of national law enforcement agencies to gather and hold data, and to analyse and disseminate that information. Police have specialized analysis needs that may not fit neatly into a mission's intelligence structure, which prioritizes military operations. **Crime analysis software is vital for determining and generating appropriate resources required for supporting and guiding policing functions in peacekeeping operations.**

These systems are already in widespread use by many police services around the world, and if implemented in peacekeeping missions, could benefit peacekeepers' ability to more effectively manage the deployment of police assets and create a culture of information sharing internally and with national counterparts. In addition to these tools, continuous interaction with national and international bodies (such as Interpol) can also strengthen the peacekeeping's integration with broader efforts to tackle transnational organized crime.

Technologies traditionally thought to be military in nature, such as **UAS, can also be extremely useful to police and should be made more widely available for police (and civilian) work in missions**, as in MONUSCO, where UAS can be tasked in support of police operations and where local police have also requested support to inform their own planning and deployment. Smaller, tactical-level UAVs can help police monitor crowd control situations or cope with more serious emerging threats. On one field visit, the panel met with a police officer who had deployed with a mini-UAV which he was using to inform weapons incidents and other investigations. This officer used the device to capture this video of a severe aviation incident, which enabled investigators to chart a path through the rubble and not disturb crucial evidence.



When combined with emerging technologies in urban policing—including widespread use of 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.

Policing is only one piece of the rule of law pillar, which extends to judiciary (including prosecutions) and corrections. These components are often engaged in helping the host government strengthen the capacity of its own agencies and institutions. The police and other mission components **can leverage technology to enhance their training of national counterparts**. In addition, it is the panel's view that **more comprehensive tools should be made available to assist with an end-to-end approach to investigatory support and case-tracking that can help strengthen the links between the police and the wider justice system**. [GoCASE](#) software, developed by the UN Office on Drugs and Crime (UNODC), is an example of such a tool, designed to initiate and track petitions, informant reports, legal cases, intelligence packages and other processes into a centralized information system, with the aim of streamlining the investigation's case processes and increasing investigations' efficiency. GoCASE contains a data management module that facilitates the capturing, storing and retrieving many types of information, including documents, events and exhibits related to a case, along with an electronic storage facility that allows for the controlled distribution of case files according to defined roles and permissions. **Basic crime scene investigation kits and mobile forensic/crime scene kits should also be made available to missions, as well as biometrics technology and data basing capability, such as fingerprint scanners.**

Formed police units are often called on to establish a clear presence, show force, interpose or even engage with gangs or other local criminal force. For example, as noted above, to better enable crowd management (a common task within the broader mandate of the protection of civilians), monitoring technologies such as miniature UAVs can be a most effective asset, allowing commanders to get a sense of the operating environment in real time. Given the scarcity of some of these resources, however, **missions must establish procedures to prioritize allocation and create policies and procedures for timely sharing of information and data products between military and police. Moreover, better integration between the components will help alleviate the need to acquire duplicate technologies.**



In short, the technologies and innovations discussed above operate at every level of need in peacekeeping by helping skilled personnel do the work, manage the mission, and optimize organizational performance. Continued training is especially important for personnel to stay current with the technology.

Recommendations:

- *Peacekeeping missions should strengthen cross-component integration to alleviate the need to acquire duplicate technologies, and must establish policies and procedures to prioritize allocation of technology and the timely sharing of information and data products between civilians, military and police.*
- *The UN should make simple mobile applications and devices available to police to streamline routine and incident reporting, track the movement of personnel and facilitate “smart” policing.*
- *UN police should be provided the tools necessary to increase their use of social media as part of a concerted strategic information operation, to strengthen community relations, instil confidence and help communities become more engaged in their own protection.*
- *Simple tools that can be used to strengthen the mission’s monitoring and advisory capacity, such as the SMART system, should be replicated, and missions should explore how to leverage technology to enhance their training of national counterparts.*
- *Peacekeeping should make wider use of crime analysis software to inform resource needs, deployment patterns and protection activities.*
- *UN police should make greater use of vehicle and personnel mounted cameras interlinked with shot spotting technology and should be able to easily access and task UAS platforms, such as that deployed in MONUSCO. Mini- or tactical UAVs will measurably aid in regular policing work.*
- *The UN should seek to make wider use of end-to-end case tracking tools that can help strengthen the links between the police and the wider justice system should be made available. Basic crime scene investigation kits, mobile forensic/crime scene kits and biometrics technology are also important.*
- *Missions should review applicability of non-lethal technologies, and work with UNHQ and TechCCs to identify potential solutions as appropriate.*

Mobile Border Demarcation Tools

Internally-developed mobile demarcation platforms can allow peacekeepers to plot border points on the ground in real time, with great accuracy. UNIFIL has developed mobile applications that allow for real-time field measurement to enable Blue Line marking, with accuracy of within 2 cm by drawing from two continuously operating fixed referencing stations.

The mobile platform—System of Incident Reports (SOIR)—is an

adapted iOS commercially available web-based platform with multiple data overlays using UNIFIL GIS information. The data captured is stored behind UNIFIL firewalls, via SSL uploads from pre-loaded tablets, to maximize data security. UNIFIL has worked to customize and extend the technology for UNDOF and UNFICYP as well. This technology has allowed UNIFIL to build confidence between the parties—who trust the accuracy of the mission’s data for demarcation.



3. Border/Boundary Demarcation and Monitoring

Many peacekeeping missions today have border or boundary demarcation or monitoring as a central component of their mandates. Examples abound. In UNIFIL, liaison officers work with Lebanese and Israeli counterparts to demarcate the Blue Line. Along the Line of Control between India and Pakistan, UNMOGIP observers monitor a ceasefire and in UNFICYP, peacekeepers maintain the buffer zone between the communities. In UNISFA, peacekeepers work with a Joint Border Verification and Monitoring Mechanism and are tasked with maintaining a demilitarized border zone. In MINUSMA, peacekeepers face the daunting challenge of helping Malian security forces fight transnational organized crime over borders that stretch over 2,000 km long. Peacekeepers in UNMIL and UNOCI developed an inter-mission cooperation framework under which military, police, civilian and agencies, funds and programme personnel work together to promote cross-border dialogue and stabilization efforts, strengthening the capacity of local security forces to reduce cross-border flows of weapons and potential armed elements.

Sensor technologies, including UAS, are an essential element in border monitoring, with consent of the stakeholders, and these technologies can enhance peacekeepers' abilities to detect and respond to security threats (see Annex C). Smaller-scale sensors, including cameras and radar can be used to configure "alert zones" in volatile border areas. Wireless networks can allow radars to transmit their information to a central command post and inform immediate response. Commercially available smartphone applications can also alert users to the crossing of terrestrial and maritime borders.

Mobile thermal imaging systems (MTIS) can also assist UN Police to monitor criminal activity and provide real-time monitoring and communications about suspicious movements. They can be used for surveillance with different types of sensors including long-range thermal sensors, high zoom video, radar, LRF, digital compasses, GPS, and digital maps with target positions. They offer high mobility and are easy to upgrade. However, the panel cautions that there are important human rights and privacy issues that must be taken into account when employing any technology in a law enforcement or border setting.

UAS can enable other missions to delineate and map borders with tremendous accuracy. Sensor survey using GPS, satellite imagery, or LiDAR (a remote sensing technology that measures distance by illuminating a target with a laser and analysing the reflected light) are routinely used by the African Union to support demarcation of the numerous African borders that are not yet marked, and could be of tremendous immediate utility to peacekeepers.

Recommendations:

- ***The UN should seek to make better use of sensor technologies and aerial visualization, including UAS, satellite imagery, cameras and radar in border monitoring activities, with consent of the parties as required.***
- ***Mobile thermal imaging systems (MTIS) can also assist UN police to monitor criminal activity and provide real-time monitoring and communications about suspicious movements.***

E. Business Intelligence and Risk Management

As peacekeeping operations grow in scale and complexity, there is a need to shore up accountability frameworks against which mandate progress is measured in quantitative data-driven terms. Current methods being used to translate mandates into mission plans, programmes and activities with benchmarks and indicators of progress are being challenged from multiple directions. Member States are requesting increased use of measureable, indicator-driven reporting, and the Secretary-General requires data-driven reporting from senior leadership in their management compacts, against larger Organizational goals. Missions are also requesting more precise data-driven methods for strategically monitoring and evaluating mandate progress. In short, peacekeeping is being called to account, and without the data it needs at its fingertips, it is hard-pressed to answer.

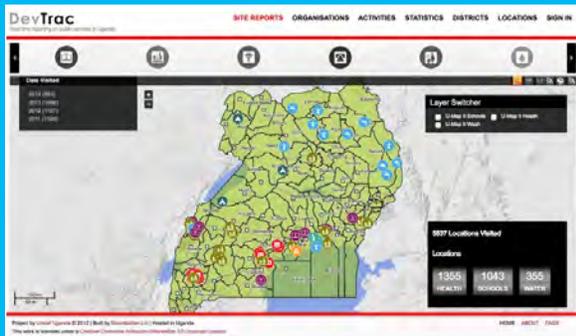
DPKO, DFS and field missions have distinct needs for data-driven monitoring and business intelligence: DPKO needs cross-cutting and integrative data reporting against the totality of mandate progress from a strategic point of view, including harder-to-measure indicators such as conflict dynamics. DFS needs integrated strategic and operational data that is specific to its core business. Missions need not only cross-cutting mandate and business intelligence, but also operational and tactical level data at a more granular level and more rapid pace to allow for more immediate and targeted on-ground response.

A more coherent approach to the use of business intelligence would require the Departments **to develop and implement a business intelligence policy**, clarify the responsibilities of every office with respect to this policy, and give personnel access to appropriate training and tools. **DPKO and DFS should assess their current ad hoc approaches to data-driven reporting and business intelligence and take steps to bring coherence to this much-needed capability.**

DFS has already begun to build and exploit a strategic level analytics dataset that can be mined based on budget data, but more work is needed to deliver comprehensive real-time information solutions, across the entire mission spectrum from substantive mandate implementation to the plumbing and wiring of a mission. Some support areas have already begun to establish systems for better data management, such as finance, human resources, and aviation, but other key areas, including logistics, Contingent Owned Equipment (COE) and procurement. But DPKO and substantive mission entities have been slower to the task, but the panel notes the development of a strategic management system being used by some in headquarters.

In order to develop business intelligence tools, **priority information requirements must be established with discipline**, and peacekeeping headquarters, as well as mission leadership, must use these requirements to guide information gathering and govern the processes and structures for using, storing and sharing the information over its mission life. In addition, programme and support personnel must work closely together to refine the information management systems throughout a mission's life cycle.

Tracking Progress



Source: UNICEF

UNICEF's [DevTrac](#) is a business intelligence dashboard that allows users to track activities of the UN and donor partners in field programming, thereby avoiding duplication, informing of more efficient use of resources, and alerting users to potential fraud. [UNICEF's innovation labs](#) continue to develop this open source tool, and will soon scale out its next generation, Equitrack.

Such a tool could also be adapted to allow integrated peacekeeping missions and their partners to coordinate activities under a common framework, while also managing and mitigating risk.

Managing Risk

Risk management is not a task novel to UN peacekeeping. Every enterprise seeks to manage risk. The UN Somalia Risk Management Unit (RMU), for example, provides risk management advice, carries out risk assessments of partners or vendors on behalf of UN agencies, and conducts monitoring on behalf of UN entities, and, in some instances, donors. It also established and manages a web-based Contract Information Management System (CIMS). It is a user-friendly tool built using free software, to improve information sharing and transparency in a structured and secure manner that can help missions manage risks associated with contracts and vendors.

The tool currently contains information on over 2,000 UN vendors and partners and over 5,000 contracts from 14 UN entities with a contract value of approximately USD 3.6 billion. It captures performance assessments, risk assessments and identifies the number and scale of contracts held by individual entities. It

also includes lists of persons and entities designated for sanctions by the Security Council.

The RMU is currently developing bespoke tools within CIMS, for use by donors and other partners with the extension of the RMU programme. These include a mapping tool to view programmes by GPS locations, entity, implementing partner; contractor, value and type of project; a Human Resources Vetting Information Record Tool to improve due diligence and screening and identify people who have been terminated by the UN as a result of gross misconduct (only available to senior-level UN Human Resource managers); a Civil Servant and Ministry Payments Tool to reduce duplication of payments; and a Monitoring Tool for mapping and exchange of information relating to monitoring activities. The RMU has been replicated in Afghanistan and represents a useful approach to risk management that may be replicated or customized for use in Libya, the Middle East, Iraq, the DRC and Mali.

Many tools are available on the market to help the Departments manage, analyse and visualize data. These tools include available software solutions for data management, visualization and analytics—both for more specialized applications (e.g., [SAP Business Objects](#), etc.) as well as for greater transparency. Business intelligence represents a powerful accountability tool, and technology can help the Departments lay the data foundation for successful use of this tool. Management processes that systematically focus on the core metrics of peacekeeping operations (e.g., deployment speed, budget delivery, procurement speed, shared service quality, etc.) must be improved from the top down. The panel recognizes that building out this capacity will involve outlays in training or hiring staff with specialized skills.

Recommendations:

- ***DPKO and DFS should assess their current ad hoc approaches to data-driven reporting and business intelligence and take steps to bring coherence to this much-needed capability.***
- ***Peacekeeping should prioritize the development of business intelligence tools, and setting, establishing or strengthening priority information and dataset requirements, underpinned by policy, guidance and training.***
- ***Information management should be prioritized at start-up and refined throughout a mission's life cycle, and priority information requirements of the mission (and of headquarters) translated into processes, structures and governance mechanisms.***
- ***The way data is collected and managed must be changed, to enable a smarter approach to peacekeeping. The Departments should consider using commercially-available tools to help them manage, analyse and visualize data.***

VI. Mission Support

Since well before its establishment as a separate Department in 2008, Field Support personnel have worked continuously to strengthen the operating position of the men and women on the ground, but additional process innovations, supported by available technology, are still needed to further streamline support operations. Incorporating greater use of technology and smart applications will necessarily entail shifts in the way decisions are made, supply chains are managed, and services are delivered. In the panel's view, data-driven decision-making and mission support tools can enhance the management, operation and accountability of missions.

It is not too much to say that the ability to exploit technology with speed and agility can be a game changer for missions. **The UN must view technology as a strategic enabler in a complex environment, rather than simply a set of tools, and establish the requisite framework to allow it to become an integral part of institutional strategy. Mission C/CITS should have regular access to senior mission leadership to advise on more effective use of ICT** in support of mission mandates and operations and to ensure cyber security is properly prioritized.

As the Global Field Support Strategy (GFSS) approaches the end of its initial fielding stage, mission support operations have already begun the shift to a shared services model, allowing DFS to streamline and consolidate non-location-dependent functions and increase process efficiency. By reducing redundancies, the strategy has aimed to deliver cost savings through economies of scale—reducing support footprints in mission and reducing turnover related to the constraints of non-family duty stations. GFSS also has sought to allow mission leaders to focus on enabling front-end mandate implementation, placing back-end services elsewhere. Thus, the support focus has turned from a regional service centre model to one that identifies the optimal division of labour for shared service delivery, consolidating and leveraging existing providers.

Recommendations:

- ***The UN must view technology as a strategic enabler for operations in a complex environment, rather than simply a set of tools, and establish the requisite business framework to allow it to become an integral part of institutional strategy.***
- ***Mission C/CITS should have regular access to senior mission leadership to advise on more effective use of ICT in support of mission mandates and operations and to ensure cyber security is properly prioritized.***

A. Managing the Remote Back Office

Remote back offices are intended to lighten a mission's footprint—particularly in difficult or sensitive missions—and to alleviate some of the administrative burden on managers deployed forward. Where remote back office operations are considered, **solutions that allow multiple users in different locations to track the progress of a particular process should be developed. However, the panel stresses the need to rationalize and streamline business processes, before technology is placed atop them.** As the panel has cautioned earlier, automating poor processes will only serve to perpetuate dysfunction, and imposing that dysfunction on dislocated mission functions will only make operations that much harder to manage.

As the Departments continue to reduce the in-mission footprint and strengthen remote support and service delivery, **tools to support real-time collaboration, information sharing and communications should be prioritized.** Seamless, real-time communication and file-sharing with a remote and forward offices is a powerful enabler which makes flexible, remote service delivery viable. Video-teleconferencing and point-to-point video chatting solutions provide an important personal connection that can sometimes be lost to remote or automated service delivery. In addition, share points can allow for instantaneous information exchange and collaboration in real time.

Technology should assist managers to monitor, plan, anticipate and decide. Back office support should include a business analysis function that reduces the information management and processing burden at all levels. The panel believes that **DFS should explore the concept of a centralized business intelligence “fusion” centre located in remote back offices to help streamline managing and reporting on mission support functions.**

Recommendations:

- *As the Departments strengthen remote back-office support models, they should rationalize and streamline business processes, before emplacing technology solutions.*
- *Tools to support real-time collaboration, information sharing and communications should be prioritized by the Departments, including a system to allow multiple users in different locations to track the progress of a particular process in the immediate term.*
- *DFS should strengthen its approach to the centralized business intelligence “fusion” centre located in remote back offices to streamline management and reporting on mission support functions.*

B. Supply Chain Resilience

The combination of technology and process innovation can help streamline logistics and supply chain management, the goal of which is to deliver the required goods (and services) to the right point at the right time in the right quantity and quality. In peacekeeping, it also entails keeping costs down.

While the UN's approach to supply chain and assets management is expected to change with the full implementation of Umoja in FY 2016/17, **simple technology can already provide a boost, including basic satellite-enabled convoy tracking, RFID-enabled assets and shipment tracking. Modern inventory tracking technology should be in pervasive use throughout peacekeeping.** Over the longer term, a comprehensive approach to business intelligence will bolster interaction between collaborative structures and inform the development of flexible shared supply systems, sourcing, warehousing and strategic planning.

Recommendation:

- ***DFS should invest in basic satellite-enabled convoy tracking, and RFID enabled assets and shipment tracking, and modern inventory tracking technology, to immediately enhance supply chain resilience.***

C. ICT Backbone and Business Continuity

DFS has introduced Field Technology Operations Centres to manage networks remotely as the centrepiece of the shared services concept for ICT. The ability to control major networks over long distances provides the UN with the ability to monitor network performance and initiate corrective technical measure down to the switch or router level. The shared services concept conserves resources and helps provide more consistent technical solutions to similar problems, while helping to identify systematic errors in the network and appropriately prioritize the distribution of upgrades. **The panel supports these developments. We also recognize that rapid access to competent tech support will be key to making these systems work.**

Recommendation:

- ***DFS should continue to build the capacity of Field Technology Operations Centres, to enable rapid access to tech support across all missions.***

Field Technology Operations Centres

The Field Technology Operations Centre (FTOC), located within the Global Service Centre (GSC), is comprised of two twin ICT facilities located in Valencia and Brindisi that provide a load-balanced, integrated approach to supporting the provision of ICT infrastructure, systems and services to the field. The FTOC also supports standardized functional and service management processes that allow the Organization to meet an increasing number of enterprise-wide ICT support demands such as Umoja.

As of September 2014, the GSC supported some 45,000 computers and 1,300 servers through 374 satellite earth stations. Some 30 million telephone calls and 220 million e-mails are routed through the GSC annually, and it hosts upwards of 9,000 video conferences a year.

The Global Service Centre



D. Engineering

Capability gaps in engineering—especially horizontal construction (e.g., site preparation and essential infrastructure preparation) make the rapid deployment of staff and materiel a challenge. Major missions typically undertake 60 to 100 priority horizontal engineering projects during the start-up phase, yet missions lack the resources necessary to undertake more than a few of these at the same time. As a result, it is impossible to deploy peacekeepers quickly, in particular to remote areas where they are often most urgently needed. As noted above, camp construction is often prioritized over other operational tasks, and this administrative hurdle often slows down support to mandated programmes.

Multiple approaches to expand engineering capabilities are necessary, and, at heart, have more to do with process and partnership, than technology. For example, civilian architects, design engineers and project managers could be provided by Member States through non-reimbursable loans or gratis personnel, or from other members of the UN family like UNEP or UNOPS (UN Office for Project Services). Horizontal engineering bottlenecks could also be reduced by TCCs contributions of enabling equipment and personnel.

The UN should consider reviving modalities for Member States to provide specialized civilian capacity as Civilian Contributing Countries—CCCs—not unlike other national commitments to provide election or human rights monitors—to undertake specific, short-term engineering projects. The panel recognizes that the Organization has some history with this concept, but believes it is worth revisiting.

One of the key objectives of the Global Field Support Strategy was to reduce mission start-up times by using predeployment resource requirement planning, standardization and modularization. Modularization is intended to enable field missions to ramp up field activities quickly, using preconfigured basic modules that can be adapted to different types of deployments. Modules have included security components, energy, supply, office accommodation, safety and fire protection, ICT, ablutions, light vehicles components and waste water systems. The panel notes that DFS has developed enormous experience with mission start-up over the last decade and can mobilize the necessary skills and systems contracts to make rapid start-up much more fluid than in the past. Such “just-in-time” resourcing should be adapted to other programmatic dimensions of missions, particularly at start-up, to enable mandate implementation to begin at once.

Reducing the environmental footprint of peacekeeping missions. Strengthening just-in-time delivery, as well as remote supply and service provision, permits these functions to be reduced within or removed from a mission’s physical area of operations, which, in turn, can help manage a mission’s environmental impact on local areas. Shifting from hard wall to more expeditionary accommodation, as noted earlier, will also help reduce a mission’s footprint and control waste. In recent years, as peacekeeping missions have been mandated to consider and manage the



FOI's "Camp Authoring Tool" (CAT) allows planners to create a virtual model of a UN peacekeepers camp that shows the effects on energy and water consumption of different design choices, such as adding shading or insulation.

Using Technology to Help Plan Camps

environmental impact of their operations, and DPKO and DFS have taken steps to lighten the environmental footprint through energy efficiency (renewables), greater water conservation, waste management and recycling, fuel efficiency, and increased use of environmentally-friendly construction materials.

Peacekeeping acknowledges the findings of the 2012 [United Nations Environmental Programme study](#) pointing to its significance for a more eco-friendly environmental impact. The present number of peacekeepers in the field consumes some 10 million litres of water and creates approximately 180 tons of solid waste per day. Moreover, peacekeepers are responsible for 56 per cent of the greenhouse gas emissions produced by the UN as a whole and, in 2012 the UN spent USD 700 million on fuel alone. The potential to reduce consumption and all associated costs is clear.

The panel notes that there are numerous widely available, simple and inexpensive innovations and technologies for immediate application to help reduce the carbon footprint of missions in the field, including **smart thermostats, low-energy lighting, and low-flow showers and toilets. In addition, the use of metres and an accompanying system for the collection, monitoring and reporting of data** on the environmental impact of missions is a critical first step to gathering the baseline information needed to inform camp planning and monitor consumption on an ongoing basis. The panel also notes the **introduction of generator canopies** to muffle sound and reduce noise pollution as well as **modernized air-conditioning units** fitted with CFC-free refrigerants, heat pumps and DC inverters, which reduce energy consumption (air conditioning in the field alone constitutes anywhere from 40 to 60 per cent of a given facility's electrical load). These innovations should be applied throughout peacekeeping as a matter of standard operating procedure.

In addition, **DPKO and DFS should consider several means to incentivize conservation-minded practices among the TCCs and PCCs** by, for example, increasing reimbursement rates for resource-efficient equipment, or adding a new category of “self-sustainable” equipment to the list of reimbursable COE.

The panel notes that currently, cost-benefit calculations for equipment procurement are based on the duration of a mission mandate—typically modelled at 12 months. **UN systems contracts should be reformed to incorporate a life-cycle approach to allow the UN to procure more environmentally friendly technologies that may initially be costly, but over time usually lead to significant savings.** Systems contracts should also directly integrate complete life-cycle solutions so that the vendor providing equipment is also in charge of its removal and environmentally responsible disposal. This innovation is particularly important given many host states’ lack of legal and regulatory frameworks as well as capable waste management infrastructure.

The panel notes that MINUSMA was the first UN mission explicitly mandated to consider the environmental impact of its actions. But mandatory language from the Security Council should not be required to provide the impetus for baseline targets of a mission’s environmental effects. **DPKO and DFS should begin immediately to issue planning guidance to require regular measurable improvements in the use of renewable energy in every mission as well as measurable reductions in non-recyclable waste.**

Finally, regarding procurement, the panel has drawn the same conclusion as so many other observers: the UN acquisition and procurement system does not well serve the needs of the field. Nowhere is this statement more true than with respect to modern technology. The pace of technological innovation and application happens over weeks and months, not years.

The panel recommends that the UN system create a fast-track system to identify and meet technology requirements of the field and that this system operates within a 6-month window to secure initial operating capability and a 12-month window for full operational deployment. If a technology system or service cannot meet these windows, the UN should not pursue them.



Recommendations:

- *The UN should take a partnership approach to meeting critical engineering capabilities provided by Member States through non-reimbursable loans, gratis personnel, or TCC contributions of enabling equipment and personnel, or provided through arrangements with other members of the UN family.*
- *DFS should also revive modalities for Member States to provide specialized civilian capacity as Civilian Contributing Countries (CCCs) to undertake specific, short-term engineering projects.*
- *Widely available, simple and inexpensive innovations and technologies, including but not limited to those detailed above, should be applied throughout peacekeeping as a matter of standard operating procedure.*
- *Peacekeeping should immediately emplace meters and an accompanying system for the collection, monitoring, analysing and reporting data on the environmental impact of missions to inform camp planning and monitor consumption on an ongoing basis.*
- *DPKO and DFS should determine, together with TCCs and PCCs, ways to incentivize conservation-minded practices.*
- *UN systems contracts should be reformed to incorporate a life-cycle approach to procurement, and to directly integrate complete life-cycle solutions.*
- *DPKO and DFS should begin immediately to issue planning guidance to require a certain percentage of renewable energy in every mission. Similarly, the Departments should institute field-based systems to facilitate and track the measurable reduction in non-recyclable waste.*
- *The panel recommends that the UN system create a fast-track system to identify and meet technology requirements of the field and that this system operates within a 6-month window to secure initial operating capability and a 12-month window for full operational deployment. If a technology system or service cannot meet these windows, the UN should not pursue them.*

VII. The Longer View

The foregoing discussion has presented a number of recommendations to immediately incorporate modern technology into peacekeeping operations. As noted, the panel also considered the longer view and examined ways to embed an awareness of and appreciation for how technology and innovation can strengthen peacekeeping over time. In this respect, two areas in particular, stand out: strengthening the individual peacekeeper—whether military, police, or civilian; and strategic investing in peacekeeping.

A. The Digital Peacekeeper

Technology can immediately strengthen operations by linking enhanced physical capabilities at the individual and organizational levels with improved process to meet operational demands. But peacekeeping should not be constrained to thinking in the immediate term. In order to meet the needs of the future, it must be forward thinking—even visionary—in its approach to imagining the realm of possibilities. Rather than add written narrative at this point, several graphics illustrate the potential.

The Panel recommends that **DPKO and DFS establish an 18-month goal of equipping individual peacekeepers with some of the up-to-date technologies discussed in this report, and devise a schedule for ongoing training, technology refresh and periodic review to allow peacekeepers to keep pace with the world around them. Similarly, those who are supporting the digital peacekeepers by providing data, analysis and other real-time assistance must be adequately equipped and trained.**

Recommendation:

- ***DPKO and DFS should establish an 18-month goal of equipping individual peacekeepers with up-to-date technologies, and devise a schedule for ongoing training, technology refresh and periodic review to allow digital peacekeepers and those providing them with reach-back support to keep pace with the world around them.***

The Digital Peacekeeper: Military

Military peacekeepers require an array of integrated communication, information sharing and command and control networks. They require real-time situational awareness and early warning information, to enable them to fulfil their mandates while responding to threats. They must also be able to report incidents and events immediately, with automated location and unit identification.

In future, visors act as a “head-up display monitor” to access real-time situational information, visualized data, and media streams from surveillance systems or body cameras.

Peacekeepers have continuous connectivity to headquarters at every level to enable secure and reliable communications for voice and data.

Specialized mobility enablers, such as mine-protected vehicles and comprehensive sensor-suites, offer added force protection.

Thermal sensors, night-time capable video cameras, and chemical sensors are integrated into the peacekeepers’ personal equipment.



Non-lethal capabilities augment their ability to respond to threats.

Vehicles act as core technology hubs that provide mobile communications and data centres and also act as mobile operations and analysis cells for forward-deployed units.

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, support decision-making at the tactical, operational and strategic levels.

Physiological sensors provide the peacekeeper, the chain of command and nearby medics with real-time readings and emergency alert capabilities, to enable emergency medical response.

Access to specific layers of map-based visualization of real-time information for enhanced situational awareness through ruggedized tablet or smartphone solutions anywhere, anytime.

Contributes to a common operational picture and collaborates as part of a unified peacekeeping network.



Tracking and geo-location of individuals and vehicles improves safety and security, situational awareness, and command and control during operations.

Advanced technologies, including fuel cells, solar power-packs, individual mini-UAVs, and robotics can enhance mobility, performance, endurance, range, and load-carrying capabilities of military contingents.

Symbol-based visualization of the common operational picture enables fast and well-informed decision-making and aids in coordinating response, while helping to bridge language barriers where they exist.



The Digital Peacekeeper: Police

To be effective, UN police must have integrated access to a mission’s security and information exchange networks and to situational awareness, predictive analysis and early warning information. Such access will allow them to better assist national law enforcement actors to help build their own capacity over time.

Biometric and identity management solutions, including integrated biometric databases, can enhance a broad range of law enforcement tasks, such as border control, civil identification, and the registration of witnesses and criminals in areas where government-issued identification is not common or available.

A variety of mobile forensics and crime scene investigation equipment, such as DNA analysis and crime scene illumination equipment, allow for faster processing of crime scenes.



End-to-end case tracking systems can help a mission work with national partners to strengthen all phases of law enforcement, from arrest, to investigation, prosecution and punishment.

Diagramming systems quickly illustrate crime scenes and accidents and can even help predict locations of future incidents.

Smart software solutions provide accurate and real-time data on crowd numbers, densities, and dispositions and can spot patterns that indicate potential threats.

Mobile thermal imaging devices can help to detect illicit cross-border movements of people, weapons, or goods.

Contributes to a common operational picture and unity of effort operations as part of a unified peacekeeping network.



Specialized mobility enablers, such as riot- or mine-protected vehicles offer added protection.

New technologies in hand-held devices have speech-recognition abilities. Numerous applications are emerging to allow for instant text translation.

Automated response systems relay information in real-time to enable timely reporting.

Cameras in or atop vehicles can document incidents in the field and feed into mission-wide situational awareness.



Tablets and smartphones allow immediate access to databases to provide geo-tagged and layered visualization of tailored information for enhanced situational awareness and access to relevant supporting information and images to help prevent crime or other hostile acts.



GPS and tracking technology allow commanders to know which patrol units are nearest an incident in order to inform and enable rapid response and any needed assistance.

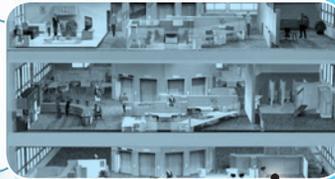
Monitoring and surveillance technology allows police to monitor hot spots and other high-risk areas for early indicators of hostile actions and to help identify suspects and improve security.

Non-lethal weapons offer the formed police units additional capabilities to respond to riots and other volatile situations without having to resort to deadly force.

The Digital Peacekeeper: Civilian

Civilian peacekeepers have a wide range of duties and responsibilities that span both the programmatic as well as support sides of peacekeeping. Technology can enhance their ability to deliver their mandates, share information securely and easily on mobile devices from anywhere in a mission area, and contribute to data-driven planning and decision-making.

Information is valued, utilized and managed as a strategic asset for all mission elements, and prioritised information requirements established by senior mission leadership enable data-driven mission planning and mandate implementation.



An integrated and multidimensional common operational picture, with real-time visualized and geo-referenced data, provides the mission's core situational awareness capability in support of tactical, operational, and strategic decision-making, thus enabling a coordinated response.

Business intelligence tools, including management dashboards, risk analytics, data-mining applications, and fusion capabilities, help managers and mission leaders track progress and address challenges.

Integrated information management, sharing, analysis and collaboration are facilitated through common solutions designed with data liquidity in mind. Peacekeepers are regularly made aware of and trained on information security and data privacy protocols.

Environmentally-sensitive technologies help reduce the mission's carbon footprint.

RFID-enabled tracking technology streamlines supply chain management and logistics.



Location tracing, geo-location and incident reporting technology is embedded in all UN vehicles for convoy management, and is included in personal equipment issued to all civilians.

Smartphones, tablets and other mobile devices enable real-time information gathering and reporting, with specialised applications designed to meet substantive and support needs.

Contributes to a common operational picture and collaborates as part of a unified peacekeeping network.

Connectivity solutions, such as the BRCK or other mobile connectivity kits, allow peacekeepers to work in even the farthest reaches of a mission area.



Simulation and scenario-based technology tools are used for training and planning.



All personnel are trained in the use of emergency communications, and individuals are issued with basic trauma packs and trained in the use of emergency medical kits.



State-of-the-art security solutions are integrated into a broader organizational security frameworks, and enhanced physical and IT security controls, such as biometric identification and access control measures and basic cyber hygiene measures, are in place.

B. Investing in Peace Operations in the Field

The panel recognizes that adopting and integrating the suggestions contained in this report will require (in some cases significant) investment up front. As noted at the outset, the panel prioritized identifying technology available on the market today at reasonable cost, but the panel also highlighted the importance of considering the overall cost of technological solutions in terms of a system's life cycle to capture the true sense of cost efficiencies.

The practical illustration of UN installation security makes the point. Currently, peacekeeping installations devote considerable manpower to static and perimeter guard duties. Guard duty can be augmented by equipping each camp or installation with a basic suite of sensors placed on portable elevated mounts for flexibility and greatest range. For 360° coverage 24/7, such a suite might include a combination of CCTV, motion sensors, infrared radar and ground radar. The addition of handheld UAVs would enable further investigation of potential threats or blind spots and allow installations to change up its monitoring coverage with minimum impact on personnel. 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 perimeters. **DFS should develop an essential technology suite for every encampment that incorporates these measures and engage TechCCs to help provide them as needed.**

In addition, **missions simply need more bandwidth**, including via satellite. The wide use of web-based videoconferencing interfaces, such as Skype, greatly enhances operational efficiency and provides missions with important links to the deep field. In some mission areas, poor intra-theatre communications infrastructure delays the transmission of information, impairs the mission's ability to make maximum use of available software platforms, and, in the extreme, compromises mission security. If information-led operations are to become the standard, budgets must reflect this reality. Again, smartly negotiated systems contracts and the engagement of TechCCs can help control costs.

Microwave, fiber link and beyond line-of-sight technologies are steadily improving. The use of small, light, mobile troposcatter equipment, which is on the market as off-the-shelf, and which has a high and long-range data transmission and SATCOM switch capacity, should also be considered to enhance the flexibility of the system.

Again here, the panel wishes to underscore that information management must be prioritized at start-up, and that mission leaders must be accountable to define the priority information requirements of the mission, adjusting them as circumstances demand. At the same time, mission support must deliver real-time information solutions and tools, including, for example, secure mission-dedicated clouds in which a scalable and configurable enterprise operational database system manages routine operational activity and project data to replace section-specific databases and feed into a common operating picture. In fact, the panel believes that

mission data should be managed in a secure, dedicated mission cloud (accessible by authorized staff at Headquarters) with all operational data available via flexible query. Missions that insist on holding important or sensitive data on local servers must be required to justify that decision, especially in volatile environments where the ready compromise of data integrity and personal privacy must be assumed.



Recommendations:

- *DFS should develop an essential technology suite for every encampment that incorporates the measures detailed above, and engage TechCCs to help provide them.*
- *Budgets must reflect the shift to information-led operations, and allow for the necessary bandwidth to support them.*
- *Microwave, fiber link and beyond line-of-sight technologies such as mobile troposcatter should be considered to enhance ICT system flexibility.*
- *Mission data should be managed in a secure, dedicated mission cloud with all operational data available to UN leadership via flexible query.*

VIII. Challenges

The panel recognized up front the challenges that must be overcome when discussing the need to upscale the use of technology in peace operations. Chief among these challenges is the need to manage expectations, understand the true costs of increasing the technological profile of missions in the field (including the need to address the human resource requirements of a tech-savvy staff), and building a culture of innovation.

A. Managing Expectations

Employing technology to maximum effect is a priority for peacekeeping, but it raises important issues. In particular, the introduction and expansion of modern technology into a peacekeeping mission might lead some observers to develop unrealistic expectations regarding the ability of a mission to deliver results along unrealistic timelines. The UN must find the balance between actively supporting and sustaining high-tech missions while at the same time avoid alienating traditional or new contributors that lack similar capabilities.

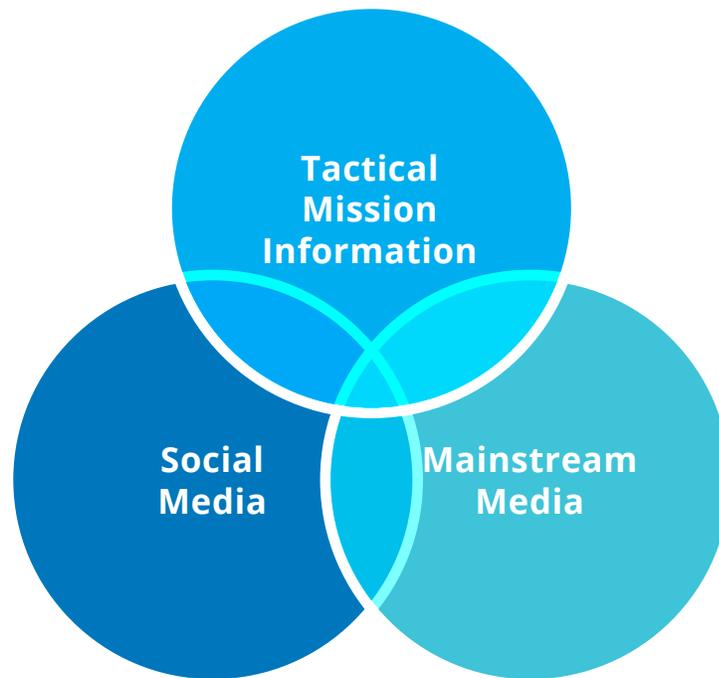
In addition, for unusual situations, including urgent unforeseen deployments, highly sensitive, time-constrained negotiations, or other unique circumstances, intense political pressure will place a premium on quick, correct and discrete action. In these situations, high-quality crisis information management is the global expectation—assistance comes too late when one is unable to communicate.

Much of the technology discussed in this report can help peacekeeping better cope when the whole world is watching. Moreover, as the UN becomes more familiar with using modern technology in field applications, it will become more adept at reconciling the intersecting circles of tactical mission information, mainstream media and the social media of the world's population.

No one needs daily reminding of the challenging nature of peacekeeping missions, but the panel believes that a **regular stakeholder dialogue devoted to discussing how the deployment and use of technology is affecting operations** would enhance transparency and help manage expectations on all sides.

Recommendation:

- ***Regular and transparent stakeholder dialogue on the deployment and use of technology should be held to manage expectations of all stakeholders and ensure political transparency.***



B. Understanding the Real Costs

While the panel has urged the greater use of technology and innovation in field missions, it recognizes that moving in this direction comes at a cost. Two areas are worth highlighting: dealing with legacy systems and managing the human dimension of enhanced technology.

Coping with Legacy Systems

The panel was struck by the field’s frustration with in-place automated administrative processes that have long outlived their usefulness. One senior police officer estimated that 10 per cent of his component’s daily work is lost to legacy systems, whether through processing requests via outmoded means or working through technical failures of systems that were never designed to carry the loads they do. Nevertheless, legacy systems persist in every complex enterprise, and **DFS should continue its accelerated work through OICT to devise and execute a prioritized plan to terminate legacy systems and consolidate data centres.** As part of this exercise, every mission should be required to consolidate data holdings and, as noted earlier, move its data to a secure, mission-specific cloud.

The panel supports the move, wherever possible, to a shared services model, and in particular to enterprise resource systems to replace legacy systems with integrated solutions. Enterprise platforms such as Umoja are important, but having said this, the panel recognizes the widespread disappointment—indeed, bordering on animosity—of field personnel toward Umoja. Nevertheless, we judge that negativity to be more about a lack of business readiness, poor process, and a lack of adequate training, rather than outcome.

To be sure, Umoja has had its problems. In MINUSMA, for example, the Umoja roll-out coincided with the mission's start-up, and procurement ground to a halt—according to one interlocutor, not one light fixture was purchased for an entire fiscal year, and urgently required personal protective equipment needed for EVD-readiness stalled in the procurement pipeline. **To realize the benefits of Umoja's full potential, DFS and DPKO must institute fundamental changes to existing policies, processes and workflows.** As one individual put it: "I have now learned how the engine of the car works, but nobody has taught me how to drive it". With its implementation over budget and off schedule, Umoja requires the time and space for a reset. The tool is valuable, but it cannot alone compensate for poor process, incomplete policies, extreme operational demands, and a widespread lack of training—especially during its own deployment phase. **DPKO and DFS should incorporate the lessons learned from the Umoja fielding to strengthen its full implementation and to guide deployment of other technology solutions going forward.**

Addressing the Human Dimension

To make strides in greater use of technology and bridge implementation, **the UN must ensure that personnel with specific skills can be recruited and retained for peacekeeping missions and headquarters.** This will require the **integration of requirements for enhanced technological awareness and skillsets, such as information management, in the terms of reference or generic job openings for certain posts.** In some cases, the core competency of technological awareness is no longer sufficient for the task at hand.

At a general level, **all peacekeeping personnel must have access to the necessary courses that will train them in the basic operation and maintenance of the systems deployed throughout a mission and to the rules by which information, especially sensitive information, can be shared with other parties.** In practical effect, this means that staff must **be given time to train, enjoy the support of their management for training, and have reliable access to computers with adequate connectivity.** The panel notes that inadequate funding for training and high staff turnover have contributed to the reluctance to introduce new technologies into field missions, but the need for trained personnel is an undercurrent running throughout this report that must be made explicit. The panel also recommends that **senior mission leaders be provided with the requisite training to understand and employ the tools for decision support at their disposal.**

Perhaps with a touch of irony, human resource training is also an area where technology can be brought to bear, and here the panel notes that **Member States accept the responsibility for providing predeployment training of uniformed personnel. Smart, interactive software provides a mechanism to certify or otherwise attest that they have fulfilled this responsibility, for example, through distance learning or assessed short courses (provided adequate bandwidth is available),** as a step towards unburdening already stretched training services.

Similarly, a centralized, easily accessible online peacekeeping e-learning and training portal could also strengthen uniformed and civilian peacekeepers' readiness to deploy. **DPKO and DFS should empower the Integrated Training Service to design and conduct predeployment exercises using computers or other modern technology.** In addition, **virtual command post exercises** have proven highly effective at low cost to allow mission leadership to familiarize themselves with each other, with the operating environment, and with the mission mandate prior to deployment. Asynchronous exercises can be employed in low-connectivity areas.

Yet, here as elsewhere, and to repeat: the UN must take care not to automate poor processes, or to impose unnecessary reporting requirements on the very systems technology and innovation seek to help. The daily grind to “feed the beast” is already overwhelming. DPKO and DFS must work with the governing bodies to devise accountability mechanisms that give visibility into system usage without imposing cumbersome and duplicative reporting schemes.

Finally, for highly specialized skill sets, the panel believes that Departments should either outsource training needs, contract for the specialized skills, or call on Member States. The landscape is simply changing too fast, and the operational demands of peacekeeping are too great to expect the UN to develop, sustain and manage the training expertise that is itself required to support the use of sophisticated technology in the field.



Training and Exercises

The increasingly computer-connected and globalized world means that people can communicate in ways unthinkable in the past. Virtual meetings through free applications such as Skype and Google Hangouts are helping overcome the barriers of time and space. This has the potential to revolutionize the training of UN peacekeepers, especially through distance-learning courses and exercises.

Some UN training publications are available online from the 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 \(ODS\)](#). A few UN pre courses like “[Basic Security in the Field](#)” have exams that are completed online to obtain a certificate. This model can be extended for more in-depth and operation-specific training. Distance-learning courses can proliferate to cover many subjects to better prepare peacekeepers for deployment.

Even more significantly, the UN can make greater use of predeployment exercises involving peacekeepers in different countries. Instead of meeting for the first time in the field, the UN personnel—military, police and civilian—can meet online and train together in a

virtual exercise, perhaps one customized for their future deployment. While the UN has experimented with some different types of predeployment trainings, Member States and their peacekeeping training institute can greatly help the UN to create more possibilities.

Even with participants in countries and locations of low Internet bandwidth, exercises are feasible. Real-time conversations are not always necessary; rather the organizers can send instructions by e-mail and receive responses in an asynchronous fashion so exercises take place over days. Communications via e-mail or text could include detailed attachments to provide responses to various scenarios. This way, different peacekeepers can coordinate the plans they have developed and try to arrive at a common course of action for anticipated situations or emergencies in the field. Much more sophisticated simulations are also possible, including with the use of real-time simulators or multi-player games across continents. The global gaming community is already involved in massive coordination for fictional war-fighting. It is time for this new global trend in computer-aided gaming to assist the cause of peacekeeping.

Recommendations:

- ***DFS should continue its accelerated work through OICT to devise and execute a prioritized plan to terminate legacy systems and consolidate data centres.***
- ***The UN should move, wherever possible, to a shared services model, and in particular to enterprise resource systems to replace legacy systems with integrated solutions. However, to realize the full potential of these solutions, DFS and DPKO must institute fundamental changes to existing policies, processes and workflows.***
- ***DPKO and DFS should incorporate the lessons learned from the Umoja fielding to strengthen its full implementation and to guide deployment of other technology solutions going forward.***
- ***The UN must ensure that personnel with specific skills can be recruited and retained for peacekeeping missions. For highly specialized skill sets, the Departments should outsource training needs, contract for the specialized skills, or call on Member States. The required technological skill levels of personnel should be reviewed and incorporated into job descriptions.***
- ***All peacekeeping personnel must have access to courses to train them in the basic operation and maintenance of the systems deployed throughout a mission, and the rules by which information, especially sensitive information, can be shared with other parties. Senior mission leaders should also be provided training to understand and employ the tools for decision support at their disposal.***
- ***The UN should explore the use of smart, interactive software as a mechanism to certify or otherwise attest that uniformed personnel have fulfilled predeployment training requirements, for example, through distance learning or assessed short courses.***
- ***DPKO and DFS should empower the Integrated Training Service to design and conduct computerized predeployment, virtual command post and asynchronous exercises.***

C. Building a Culture of Innovation

As the UN moves towards intelligence-led and information-driven operations, all personnel will become more dependent on well-functioning applications and high-tech communications. Such widespread dependence effectively lifts the issue of technology into the category of strategic enabler. To make best use of these enablers, peacekeeping at all levels must become an innovative enterprise.

Innovation revolves around connecting good idea to the tools, products, people and procedures to solve a problem in a new, different and intelligent way. In the UN, however, many structural and operational barriers exist to building a culture of innovation. Chief among them is a clear lack of institutional responsibility for innovation. Simply put, innovation has no organizational home, nor defined process for take-up within peacekeeping. No office within the Departments has responsibility to capture innovative ideas, evaluate them, or even promote them when others do the work. Moreover, although innovation is ongoing at field and at UN Headquarters, no systematic way to broadly test or scale innovative ideas and integrate them across peacekeeping exists. With some notable exceptions, such as UN Police's SMART system, good ideas tried and tested at mission level usually never see the light of day.

It is generally true that peacekeeping has not yet become a learning organization. The panel does note a kind of systemic resistance to new thinking, especially when ideas come up the chain. Too often, innovation is seen as a distraction from the task at hand. In addition, and if truth be told, political barriers to innovation often come from Member States that mobilize every manner of argument—too costly, too time consuming, too biased—before they will support novel or innovative behavior in the UN.

Innovation at the institutional level is itself a political and a strategic decision, anchored in the fundamental conviction that human creativity at all levels is a valuable quality to be nurtured. In the panel's strong view, DPKO and DFS leadership should demonstrably value innovation by creating the space for it to occur, absorbing its failures, and rewarding its success.

If peacekeeping is to become the innovative enterprise that it needs to be, institutional weight will need to be brought to bear. The panel recognizes that innovation and bureaucracy are organizational antipodes. Yet, examples of support for innovation surround us. For example, UNICEF's Innovation Unit is world renowned as a centre for excellence in innovation, and UN Global Pulse places innovation at the core of its business model. Other offices and agencies, such as OCHA and UNHCR, have also prioritized innovation. The panel believes that **DPKO and DFS have much to learn from partnering with them**. For their part, the Agencies, Funds and Programmes must get past the biases that exist in their organization against collaboration with peacekeeping missions on the ground. The stakes are simply too high for the people we all serve. Similarly, **peacekeeping should also seize on opportunities to partner with external leaders in technology and innovation**, and who want to aid the cause of peace.

Innovation should be institutionalized in peacekeeping **in the form of a dedicated office for technology and innovation within the Departments**. This office should oversee an ad hoc advisory group composed of internal and external experts whose focus is to evaluate needs, assess new technologies, and prioritize them to leadership for adoption on an ongoing basis. The office would also input information into all budgetary and legislative reporting processes, including the Special Committee on Peacekeeping Operations (C34), the Advisory Committee on Administrative and Budgetary Questions (ACABQ) and General Assembly's Fifth Committee, making full use of the mission and HQ "tech maps" to reinforce priority needs across peacekeeping in the field.

This office would be empowered to take decisions, in line with the strategic priorities set by senior leadership, but which would also consider other "quick fixes" as needed. It would also have tasking

authority to enable rapid piloting or field testing. To begin, field-focused **innovation incubators could be established in selected missions** to serve as feasibility filters and to pilot projects, where proposals could be tested at small scale or explored as proofs of concept. Smaller missions might be supported by a small travelling team that can visit missions on their own initiative or by request. These incubators could also push ideas directly up to the office. **The office could also sponsor an “idea factory”—a web-based forum to source innovative ideas, crowdsource reactions, and identify volunteers to implement them.**

Streamlining the point of entry for innovation in the form of distributed small-scale innovation incubators can enable a bottom-up approach to innovation, help avoid a parallel track approach and dissuade “turf wars”. Such incubators can evaluate the feasibility of any given initiative and help innovators “connect the dots”. Permitted to operate on a fast track, innovation incubators can bypass the normal layers of bureaucracy and take promising ideas straight to the advisory group, so that good ideas are assured the space to stand in the sunlight and grow, and innovations are incentivized.

The panel notes plans for the roll-out of ICT-specific innovation laboratories in several missions, beginning in 2015. However, the panel believes that innovation incubators should not be limited to finding tech solutions alone. For the concept to succeed, innovators must have a solid understanding of user needs, in particular in programme support. In other words, innovation, particularly in the introduction and use of technology, will not be supply driven, but rather, client oriented. The goal should be to develop a holistic, collaborative model that combines substance with function, and which reaches beyond DPKO and DFS, to leverage innovators and substantive actors across mission components, including UN agency partners, and which can pull in other local actors, and reach out to industry and academic centres of excellence.

By taking a broader, partnership-oriented approach to innovation, peacekeeping and other field missions can potentially serve as an important incubator to field test the innovations of others. By reaching out to the local community, in particular enterprising young people, peacekeeping can encourage collaborative innovation with those who have the pulse of the local community. This, in turn, could be an important avenue for outreach, capacity-building, and programme support for peacekeeping.

In this systemic top-down, bottom-up approach, all peacekeepers would be empowered to constantly scan the horizon for new and better solutions. To facilitate this cultural shift, DPKO and DFS should commit to a broad programme of continuous learning and training, and the establishment of forums where new technologies or innovations could be presented and discussed. They should also designate **a small cadre of “technology scouts”**, possibly volunteers, and possibly including a person specifically designated as a “tech watch officer”, to take the pulse of the global trends, maintain open channels of communication with inter-agency partners, relevant centres of excellence, innovators, market leaders and research institutions, and to inspire and advise the entire peacekeeping enterprise.

In order to reinforce and sustain the technology baseline, and to promote the enhanced use of technology in peacekeeping, **centres of excellence should be established and nurtured throughout peacekeeping and field support.**

Principles for Innovation and Technology in Development

UNICEF's Principles for Innovation and Technology in Development are a set of nine best-practice guidelines intended to inform the design of technology enabled programmes. Although they have been developed specific to development contexts, they have important applications in peacekeeping contexts as well. The principles have been endorsed or adopted by WHO, HRP, USAID, Gates Foundation, UN Global Pulse/EOSG, WFP, OCHA, UNDP, SIDA, IKEA Foundation, UN Foundation and UNHCR.

1. Design with the User
2. Understand the Existing Ecosystem
3. Design for Scale
4. Build for Sustainability
5. Be Data Driven
6. Use Open Standards, Open Data, Open Source and Open Innovation
7. Reuse and Improve
8. Do No Harm
9. Be Collaborative

Source: UNICEF



Recommendations:

- *DPKO and DFS should partner with—and learn from—others innovating within the UN system and with external leaders in technology and innovation.*
- *DPKO and DFS should establish a dedicated office for technology and innovation, supported by a small advisory group and field-based innovation incubators, together with a small cadre of “technology scouts”, designated centres of excellence within the UN, and an “idea factory”.*
- *DPKO and DFS should commit to a broad programme of continuous learning and training, and the establishment of forums where new technologies or innovations could be presented and discussed.*

IX. Additional Considerations

A. The Politics of Technology and Innovation

Peacekeeping has come a long way in the past decade. Intelligence is no longer a dirty word, and the Departments of Peacekeeping and Field Support now routinely engage in mission planning in accordance with UN rules and regulations well before a mandate is obtained from the Security Council.

But, as the earlier discussion on myths demonstrated, some continue to hold strong views opposed to widening the use of some technology by peacekeeping missions. As the Departments continue to seek out and employ such technology, there is much work to be done to bring the Member States along. DPKO and DFS should establish a standing consultation with TCCs, PCCs, TechCCs, and CCCs to identify early points of convergence, as well as concern, in order to work through deployment and use strategies that permit peacekeeping missions to enjoy the advantages of modern technology. The panel believes that a number of its recommendations will generate a lively political discussion. Panellists are prepared to support the Departments in these discussions in the months ahead, as necessary.

Recommendations:

- ***DPKO and DFS should establish a standing consultation with Member States to identify early points of concern and work through deployment and use strategies that permit peacekeeping missions to enjoy the advantages of modern technology.***

B. Legal Considerations

UN peacekeeping missions and their members are bound by the provisions of the Charter, UN rules and regulations, as well as by the international law of armed conflict, and international humanitarian and human rights law. They are also bound to respect the laws and regulations of the host country.

This includes the right to privacy and extends to domestic and extraterritorial surveillance, the interception of digital communications and the collection of personal data. The panel believes that as peacekeeping moves more towards information-driven operations and seeks that information from multiple sources, including monitoring and surveillance technologies, it must ensure that strong procedural safeguards and effective oversight mechanisms are in place. In this regard, the [High Commissioner for Human Rights](#) recognized a “clear and pressing need [to ensure] compliance of any surveillance policy or practice with international human rights law, including the right to privacy, through the development of effective safeguards.” The Departments should revise the existing SOP and policy on monitoring and surveillance technology and any other relevant guidance to take account of advances in the technology field.

Under current policy, DPKO must consult with the Security Council and obtain the host Government’s consent prior to deploying a UAS, due to the relatively novel, sophisticated, and unique circumstances of its employment by UN peacekeeping in recent years. It is important to note that all data and imagery collected by these systems becomes UN property and is subject to the same rights, exemptions and protections as other UN property, and maintained and protected under the UN confidentiality regimes. The panel anticipates that as UAVs become more ubiquitous, this technology will be incorporated into force generation and SURs very much as with other capabilities.

The panel believes that maximum transparency should remain a principle of the use of peacekeeping technology, in particular, when used to enable information gathering and sharing. The Organization will need to ensure full transparency in the use of technology as well as ensure that technology is deployed for its intended purpose and that personnel are well trained on its appropriate use. The development of strong guidelines, rules and procedures for the collection, use, storage, sharing, protection and security of data, and other information will also help to assuage concerns about access and use of information collected in accordance with a mission’s mandate, data privacy, as well as host country sovereignty. At the same time, the panel feels that the deployment of certain technologies should not be unnecessarily delayed by lengthy standard-setting processes. As technology is constantly evolving, so too will the Departments’ own experience. A solid initial foundation of guidelines, rules and procedures will need to be iterated over time, as practice evolves.

Recommendations:

- ***UN peacekeeping must ensure that strong procedural safeguards and effective oversight mechanisms are in place for the increased use of monitoring and surveillance technologies.***
- ***The Departments should revise the existing SOP and policy on monitoring and surveillance technology and any other relevant guidance to take account of advances in the technology field.***

X. Final Thoughts

As the panel has pointed out in a number of areas, there is a clear need not only for the immediate implementation of certain technologies, but also for the institutionalization of innovation and continuous technological adaptation. The Departments must take deliberate and decisive action to meet these needs. But technology and innovation alone cannot do all that needs doing to strengthen UN peacekeeping, and all that needs doing cannot be done by DPKO and DFS alone. As the panel noted at the outset, the deployment and use of technology brings with it the need to anticipate and manage the effects and consequences of added range, reach, volume and impact. The Member States must be full partners and active in their support for action here.

The Organization must not lose sight of the need for continuous review, lessons capture, adaptation and transparent engagement with all stakeholders as new technologies are integrated into operations. As also noted earlier, the Departments must commit to the policy and process changes necessary to create a technology- and innovation-friendly framework to set a solid foundation for success. The panel also believes strongly that the Organization must pay due attention to, and make commensurate investments in, the implementation bridges that will allow it to flourish through the introduction of technology and to grow into an Organization that embraces, values and empowers innovation.

As noted at the outset, the panel recognizes that technology is not a panacea. No panellist believes that simply throwing technology at a problem will help a peacekeeping mission fulfil its mandate. A field operation might have all the enabling technology in the world, yet still be ineffective or unwilling to use it. But the moment is now for peacekeeping to take greater advantage of the waves of technology and innovation now washing over every dimension of life in societies the world over. It is in this spirit that this report has been prepared and its findings and recommendations presented.

XI. Summary of Recommendations

- *Each mission should create a “tech map” of its technology holdings, and DFS should maintain a field-wide mapping to create the foundation for informed decisions regarding capabilities and needs.*
- *Missions and headquarters should create an “information map”, to establish a clear understanding of how essential information is collected, used, for what purpose, stored, and shared, and by whom.*

GETTING THE BASICS RIGHT

A. Safety and Security

- *All encampments, office compounds and staff accommodations should have: backup energy support—including primary or backup alternative energy solutions; perimeter lighting; motion-detection technology; emergency communications; and camera technology using remote access to live feeds.*
- *Tamper-resistant tracking technology should be installed on all vehicles and heavy weapons systems.*
- *DPKO and DFS, in coordination with the Department of Safety and Security (DSS), should provide individuals with emergency contact capabilities and mobile applications to file travel plans, automatically communicate GPS locations, and alert base stations or headquarters when they are overdue at their destinations.*
- *Individual suites of operational and protective equipment should include not only modern and effective body armour and helmets, but also 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 devices preloaded with critical local information such as medical facilities and transportation hubs as well as translation software, and emergency-activated beaconing technology.*

- *Peacekeeping should accelerate the full deployment of personnel and vehicle tracking systems as a minimum requirement for missions to ensure the safety and security of personnel as well as manage and control operations.*
- *The panel urges DPKO and DFS to ensure its privacy policy and training are updated to appropriately control the collection, use, storage and sharing of information by UN personnel.*

B. Shelter

- *The policy for hard-walled accommodation should be revised, in favour of expeditionary accommodation combined with a strong perimeter security platform and well-practiced emergency reaction capability.*

C. Water

- *Strategically resourced ground-penetrating radar and advanced geospatial imaging should be more widely used to find water.*
- *DFS should engage global expertise to help ensure environmentally sound waste disposal.*
- *Personal water purification “straws” should be issued to individuals for use in emergency situations, along with instructions for their use.*
- *DFS should employ rainwater collection, piping and storage systems more widely in missions.*
- *The panel strongly recommends that the Departments reassess the current water allocations, with the aim to revise to more sustainable levels.*

D. Communications

- *The UN should prioritize solving the interoperability problem, shifting policy where needed to enable federated network or bridging solutions.*
- *Every mission should establish and practice the use of emergency SMS as an essential means of intra-mission communication to back up radio networks.*
- *Wherever possible, missions should take the steps necessary to incorporate policies and practices to ensure personnel location systems are widely available to and understood by all personnel.*

E. Energy

- *Peacekeeping should adopt as a matter of priority, the systematic integration of alternate energies across all aspects of field operations and incorporate a life-cycle approach.*
- *Peacekeeping should work through barriers to the procurement of basic and widely available technologies that will net immediate gains.*
- *The panel recommends a standing energy requirements board be established to assess the applications where alternate energy could replace or complement traditional generation.*
- *The Departments should continue to look towards additional alternatives to fossil fuels and field test them, with the aim of taking them to scale where possible.*
- *Alternative energy technologies should be aggressively applied where possible, especially those that can be sourced locally or regionally. They should also be used for less energy-intensive tasks, and as an important redundancy.*
- *DFS should conduct an overview of widely available energy saving technologies and conservation devices and devise a prioritized strategy for introducing these technologies into every mission.*
- *When operational circumstances permit, DFS should place limits on fuel consumption to promote the use of alternative energy, and create encampment kits that provide alternate energy backup sources.*

F. Health and Well-being

- *Peacekeeping should adopt the 10:1:2 standard by prioritizing the installation of well-functioning emergency alert systems linked to rapid and expert medical response.*
- *A system of emergency communications with override features for the most urgent message should form a part of every mission's communications and IT suite.*
- *The panel strongly recommends that dedicated channels for this purpose be established in every mission.*
- *Medical escorts should accompany high-risk patrols or other operations, and be equipped with redundant communications systems and emergency medical equipment, in particular in high-risk areas.*
- *Individuals deployed to extremely remote locations should be trained and equipped to make use of emergency trauma kits, and all individuals should be provided with a basic trauma pack.*

- *Missions must have the capacity to render advanced life support—either exceptionally within the mission area, or more commonly via Medevac.*
- *The UN should call upon Member States with advanced technology and capability to provide specialized support to missions in the area of health care.*
- *Missions should provide outlets for relaxation and connectivity to loved ones outside the mission area, while taking active steps to prevent piracy and other unauthorized use of such resources, and ensure an active posture of cyber hygiene.*

G. Mobility

- *Where IEDs are an identified threat, all convoys should deploy with the minimum ability to self-recover, together with sapper pioneering teams equipped with heavy vehicle extraction capability and organizational level repair and remediation technologies.*
- *These teams should, where indicated, travel in mine-protected vehicles.*
- *Convoys should employ small tactical UAVs as mobile ISR platforms to survey the route and to augment other route reconnaissance and security measures. All operations and convoys should be equipped with fixed or tethered surveillance platforms to offer increased surveillance capability, and mobility enablers.*
- *Wherever required, missions should be equipped with electronic countermeasures and linked to dedicated intelligence resources while on the move.*
- *Where required, additional “bolt on” armour, ground-penetrating radar and hand-held explosive composition detection devices could also be made available for immediate use.*
- *In addition to predeployment IED awareness training, technological tools should be used to enhance awareness and understanding of IEDs among UN personnel, especially in missions with such threats.*
- *UN peacekeeping should open a direct and extended collaboration with all Member States with C-IED experience to develop a strategy for incorporating this learning into current practice.*
- *The UN should, together with Member States, take an in-depth look at the foundational elements that comprise the threat of IEDs, with the aim to devising a strategy to address its root causes. Peacekeeping should work with relevant partners to synchronize activities and prioritize resources across the Organization.*
- *Counter-IED capabilities must be included in initial contingency planning and be a standard line in peacekeeping budgets.*

OPERATIONAL IMPERATIVES

A. Command and Control

- *The UN should put in place a customizable GIS-enabled command and control information system to enable more coherent operational interaction from patrol to sector to mission and higher headquarters, supported by continuous and reliable voice, data and video communications.*

B. Monitoring, Reconnaissance and Reporting

- *Aerial data, geospatial/geographic information, and other remotely acquired data are of critical importance to any peacekeeping mission and should be available as a matter of course.*
- *Clear policies should be emplaced, and leadership accountability be established, to help ensure that information is properly and lawfully obtained, stored, used, processed and shared, and that prevailing privacy laws are respected.*
- *As a matter of priority, the UN should make more systematic use of commercial satellite imagery by enabling its near real-time sourcing and dissemination to enhance operational effectiveness and increase peacekeepers' safety.*
- *The panel recommends the creation of a new kind of mission—the Special Technical Mission, or STM—to enable the Security Council to call on, organize, and legitimate the use of technical audio, visual, monitoring and surveillance technologies, ground and airborne sensors and other technical means (e.g., ground and airborne sensors), to keep up with events on the ground in rapidly changing circumstances, inform their decision-making, prioritize action and aid in planning.*
- *For the UN to make maximum use of UAVs, greater use of smaller, tactical-level assets is required, and miniature UAVs should be incorporated into standard requirements without delay.*
- *Comprehensive sensor suites (radars, cameras, infrared and other sensors) with command post fusion centres should be a standard requirement at all UN camps and installations, with static CCTV an absolute requirement.*
- *As an immediate measure, the UN should make better use of night-vision goggles, infrared cameras, and lighter, night-time-capable aerial visualization and monitoring platforms with mounted radial-surveillance technology.*

C. Communications, Information Technology and Information Management

- *The UN should ensure that fully functioning HF radio networks as the backbone of all communications in missions. Assigned networks should be well controlled and information flow properly regulated, and interfaces between radio and other communications networks must be established.*
- *The UN's ICT policies should be revised to enable the provision of, and support for, mobile tools that will enhance peacekeepers' abilities to do their jobs and tools that will allow them to align operational processes to the need for accelerated information flow.*
- *Peacekeeping missions should make enhanced use of, and support handheld devices or tablets equipped with specialized mobile applications.*
- *Smartphones or tablets should be made immediately available to military and civilian staff members, military observers and police officers regardless of rank.*
- *Better use should be made of standardized mobile communications capabilities deployable at short notice and manned by civilians or contributed forces.*

1. Information Use, Processing and Dissemination

- *Modern surveillance and reconnaissance suites are powerful force protection and intelligence tools that UN peacekeeping should field immediately, without exception or delay.*
- *As it acquires more specialized technology, the UN should also ensure that the specialized personnel and additional tools required are provided.*
- *Every mission should undertake a comprehensive review (at least) annually of its information priorities, as well as its information gathering, management, analysis and dissemination practices as measured against those priorities.*
- *DPKO and DFS should implement systems, with clear roles and responsibilities and relevant substantive training to field missions, to improve internal information sharing and electronic records management and achieve data liquidity.*
- *Peacekeeping should revise its reporting requirements to enable, where appropriate, single reports from the field to serve multiple purposes, and missions should strengthen the capacity of JOCs to maximize their role as the information hub of the mission.*

- *JOCs, JMACs (or a mission's other analytic capacity) and GIS components should be immediately provided with the tools required to collect, process, use and disseminate information effectively, to the benefit of decision makers. GIS capacities should be co-located with the JOC wherever possible.*
- *To enable missions to make better immediate use of open source information, the UN should reiterate the policy that lifts Internet restrictions for those engaged in open source information collection, and provide training on basic cyber security and ethics protocols. It should also ensure that open source analytic tools are immediately available and accessible to those whose core business requires them.*
- *Peacekeeping should pursue partnership opportunities to capitalize on combined capabilities and learning.*
- *DPKO and DFS should work with UN Agencies, Funds and Programmes and other humanitarian actors in the field to establish a common information exchange policy and protocols sensitive to humanitarian principles, to enhance common situational awareness and understanding, and explore the use of available inter-agency data-sharing tools.*
- *As the UN moves towards intelligence-led peacekeeping, it should engage with Member States to determine an appropriate governance structure for the use of certain technologies used to collect information.*
- *The UN must continuously review and update related internal policies and procedures as technology evolves and is taken on board by peacekeeping.*
- *The UN must immediately implement basic cyber hygiene—at a minimum, to include hardware asset inventory, 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.*

2. Strategic Communications

- *Peacekeeping should rethink its strategic communications paradigm, and employ available tools to make it more multifaceted, operational, interactive and data-driven.*
- *Upon the promulgation of a comprehensive policy for the use of social media, DPKO and DFS should provide the necessary training to support its implementation.*
- *The UN should seek out and employ low-cost solutions for the rapid deployment of strategic messaging whenever required.*

D. Programmatic Priorities

1. Protection of Civilians

- *Peacekeeping missions should seek to incorporate technology in the design and implementation of protection of civilians strategies, in particular their early warning and early response mechanisms.*
- *Missions must take care to protect sensitive information as well as the privacy of particularly vulnerable individuals in protection scenarios.*
- *Peacekeeping should continue to seek ways to use technology as an empowerment tool in protection of civilian contexts, while remaining mindful of possible risks.*

2. Policing and the Rule of Law

- *Peacekeeping missions should strengthen cross-component integration to alleviate the need to acquire duplicate technologies, and must establish policies and procedures to prioritize allocation of technology, and the timely sharing of information and data products between civilians, military and police.*
- *The UN should make simple mobile applications and devices available to police to streamline routine and incident reporting, track the movement of personnel and facilitate “smart” policing.*
- *UN police should be provided the tools necessary to increase their use of social media as part of a concerted strategic information operation, to strengthen community relations, instil confidence and help communities become more engaged in their own protection.*
- *Simple tools that can be used to strengthen the mission’s monitoring and advisory capacity, such as the SMART system, should be replicated, and missions should explore how to leverage technology to enhance their training of national counterparts.*
- *Peacekeeping should make wider use of crime analysis software to inform resource needs, deployment patterns and protection activities.*
- *UN police should make greater use of vehicle and personnel mounted cameras interlinked with shot spotting technology and should be able to easily access and task UAS platforms, such as that deployed in MONUSCO. Mini- or tactical UAVs will measurably aid in regular policing work.*
- *The UN should seek to make wider use of end-to-end case tracking tools that can help strengthen the links between the police and the wider justice system should be made available. Basic crime scene investigation kits, mobile forensic/crime scene kits and biometrics technology are also important.*
- *Missions should review applicability of non-lethal technologies, and work with UNHQ and TechCCs to identify potential solutions as appropriate.*

3. Border/Boundary Demarcation and Monitoring

- *The UN should seek to make better use of sensor technologies and aerial visualization, including UAS, satellite imagery, cameras and radar in border monitoring activities, with consent of the parties as required.*
- *Mobile thermal imaging systems (MTIS) can also assist UN police to monitor criminal activity and provide real-time monitoring and communications about suspicious movements.*

E. Business Intelligence and Risk Management

- *DPKO and DFS should assess their current ad hoc approaches to data-driven reporting and business intelligence and take steps to bring coherence to this much-needed capability.*
- *Peacekeeping should prioritize the development of business intelligence tools, and setting, establishing or strengthening priority information and data set requirements, underpinned by policy, guidance and training.*
- *Information management should be prioritized at start-up and refined throughout a mission's life cycle, and priority information requirements of the mission (and of headquarters) translated into processes, structures and governance mechanisms.*
- *The way data is collected and managed must be changed, to enable a smarter approach to peacekeeping. The Departments should consider using commercially-available tools to help them manage, analyse and visualize data.*

MISSION SUPPORT

- *The UN must view technology as a strategic enabler in a complex environment, rather than simply a set of tools, and establish the requisite business technology framework to allow it to become an integral part of institutional strategy.*
- *Mission C/CITS should have regular access to senior mission leadership to advise on more effective use of ICT in support of mission mandates and operations and to ensure cyber security is properly prioritized.*

A. Managing the Remote Back Office

- *As the Departments strengthen remote back-office support models, they should rationalize and streamline business processes, before emplacing technology solutions.*
- *Tools to support real-time collaboration, information sharing and communications should be prioritized by the Departments, including a system to allow multiple users in different locations to track the progress of a particular process in the immediate term.*
- *DFS should strengthen its approach to the centralized business intelligence “fusion” centre located in remote back offices to streamline management and reporting on mission support functions.*

B. Supply Chain Resilience

- *DFS should invest in basic satellite-enabled convoy tracking, and RFID enabled assets and shipment tracking, and modern inventory tracking technology, to immediately enhance supply chain resilience.*

C. ICT Backbone and Business Continuity

- *DFS should continue to build the capacity of Field Technology Operations Centres, to enable rapid access to tech support across all missions.*

D. Engineering

- *The UN should take a partnership approach to meeting critical engineering capabilities provided by Member States through non-reimbursable loans, gratis personnel, or TCC contributions of enabling equipment and personnel, or provided through arrangements with other members of the UN family.*
- *DFS should also revive modalities for Member States to provide specialized civilian capacity as Civilian Contributing Countries (CCCs) to undertake specific, short-term engineering projects.*
- *Widely available, simple and inexpensive technologies to enable a mission to reduce its environmental footprint should be applied throughout peacekeeping as a matter of standard operating procedure.*
- *Peacekeeping should immediately emplace meters and an accompanying system for the collection, monitoring, analysing and reporting data on the environmental impact of missions to inform camp planning and monitor consumption on an ongoing basis.*

- *DPKO and DFS should determine, together with TCCs and PCCs, ways to incentivize conservation-minded practices.*
- *UN systems contracts should be reformed to incorporate a life-cycle approach to procurement, and to directly integrate complete life-cycle solutions.*
- *DPKO and DFS should begin immediately to issue planning guidance to require a certain percentage of renewable energy in every mission. Similarly, the Departments should institute field-based systems to facilitate and track the measurable reduction in non-recyclable waste.*
- *The panel recommends that the UN system create a fast-track system to identify and meet technology requirements of the field and that this system operate within a 6-month window to secure initial operating capability and a 12-month window for full operational deployment. If a technology system or service cannot meet these windows, the UN should not pursue them.*

THE LONGER VIEW

A. The Digital Peacekeeper

- *DPKO and DFS should establish an 18-month goal of equipping individual peacekeepers with up-to-date technologies, and devise a schedule for ongoing training, technology refresh and periodic review to allow digital peacekeepers and those providing them with reach-back support to keep pace with the world around them.*

B. Investing in Peace Operations in the Field

- *DFS should develop an essential technology suite for every encampment, and engage TechCCs to help provide them as needed.*
- *Budgets must reflect the shift to information-led operations, and allow for the necessary bandwidth to support them.*
- *Microwave, fibre link and beyond line-of-sight technologies such as mobile troposcatter should be considered to enhance ICT system flexibility.*
- *Mission data should be managed in a secure, dedicated mission cloud with all operational data available to UN leadership via flexible query.*

CHALLENGES

A. Managing Expectations

- *Regular and transparent stakeholder dialogue on the deployment and use of technology should be held to manage expectations of all stakeholders and ensure political transparency.*

B. Understanding the Real Costs

- *DFS should continue its accelerated work through OICT to devise and execute a prioritized plan to terminate legacy systems and consolidate data centres.*
- *The UN should move, wherever possible, to a shared services model, and in particular to enterprise resource systems to replace legacy systems with integrated solutions. However, to realize the full potential of these solutions, DFS and DPKO must institute fundamental changes to existing policies, processes and workflows.*
- *DPKO and DFS should incorporate the lessons learned from the Umoja fielding to strengthen its full implementation and to guide deployment of other technology solutions going forward.*
- *The UN must ensure that personnel with specific skills can be recruited and retained for peacekeeping missions. For highly specialized skill sets, the Departments should outsource training needs, contract for the specialized skills, or call on Member States. The required technological skill levels of personnel should be reviewed and incorporated into job descriptions.*
- *All peacekeeping personnel must have access to courses to train them in the basic operation and maintenance of the systems deployed throughout a mission, and the rules by which information, especially sensitive information, can be shared with other parties. Senior mission leaders should also be provided training to understand and employ the tools for decision support at their disposal.*
- *The UN should explore the use of smart, interactive software as a mechanism to certify or otherwise attest that uniformed personnel have fulfilled predeployment training requirements, for example, through distance learning or assessed short courses.*
- *DPKO and DFS should empower the Integrated Training Service to design and conduct computerized predeployment, virtual command post and asynchronous exercises.*

C. Building a Culture of Innovation

- *DPKO and DFS should partner with—and learn from—others innovating within the UN system and with external leaders in technology and innovation.*
- *DPKO and DFS should establish a dedicated office for technology and innovation, supported by a small advisory group and field-based innovation incubators, together with a small cadre of “technology scouts”, designated centres of excellence within the UN and an “idea factory”.*
- *DPKO and DFS should commit to a broad programme of continuous learning and training, and the establishment of forums where new technologies or innovations could be presented and discussed.*

ADDITIONAL CONSIDERATIONS

A. The Politics of Technology and Innovation

- *DPKO and DFS should establish a standing consultation with Member States to identify early points of concern and work through deployment and use strategies that permit peacekeeping missions to enjoy the advantages provided by modern technology.*

B. Legal Considerations

- *UN peacekeeping must ensure that strong procedural safeguards and effective oversight mechanisms are in place for the increased use of monitoring and surveillance technologies.*
- *The Departments should revise the existing SOP and policy on monitoring and surveillance technology and any other relevant guidance to take account of advances in the technology field.*

ANNEX A

THE EXPERT PANEL



Jane Holl Lute served as Acting Under-Secretary-General, Field Support, and as Assistant Secretary-General for Peacebuilding Support and Peacekeeping from 2003 to 2009. From 2009-2013, she served as Deputy Secretary for the United States Department of Homeland Security. Concurrent to chairing this panel, Ms. Lute serves as the Special Advisor to the Secretary-General on the relocation of the Residents of Camp Huirrya outside of Iraq. Earlier in her career, Ms. Lute was executive vice president and chief operating officer of the United Nations Foundation and the Better World Fund. She also served on the United States National Security Council staff under Presidents Bush (41) and Clinton and had a distinguished career in the United States Army. She has a PhD in political Science from Stanford University and a J.D. from Georgetown University Law Centre.



Ib Johannes Bager has a long and distinguished career in the Danish Army, retiring with the rank of Major General in 2011 as a senior commander for NATO and a specialist in signals and communications technologies. In his retirement, Major General Bager focuses primarily on preservation of the Danish military historical heritage holding several posts as president and chairman of a number of historical associations.



Walter Dorn teaches military officers from Canada and about 20 countries at the Canadian Forces College and at the Royal Military College of Canada. He is a professor of defence studies and recently served as Chair of the Department of Security and International Affairs. As an operational professor, he has researched, visited and served in several UN missions and at UN Headquarters. He has been a training adviser in DPKO and a UN electoral officer in the field. He has also served as a visiting professional at the International Criminal Court. Dr. Dorn is a scientist by training and has conducted lab work on arms control verification technologies. He has been advocating for technological innovation in UN peacekeeping for several decades. He is author of the book [Keeping Watch: Monitoring, Technology & Innovation in UN Peacekeeping](#) and several [articles](#) on the subject.



Micheal Fryer served in Darfur as the Police Commissioner for UNAMID from 2007-2010. Prior to this assignment, he served for 37 years in the South African Police Service where he headed the Specialized Operations Division and served as Commander of the South African Special Task Force, retiring with the rank of Major General. He is active in senior mission leadership training, and serves as a police mentor for the United Nations and the African Union, and under bilateral police capacity-building frameworks. Major General Fryer has also served as a member of the Technical Expert Reference Panel (on the UN troop cost survey).



Abhijit Guha has recently concluded a term as the Director of the Office for Peacekeeping Strategic Partnerships in the Department of Peacekeeping Operations and also served as the Military Advisor ad interim in 2013 and the Deputy Military Adviser 2010 – 2012. Prior to joining the United Nations, Lt. General Guha had a distinguished military career in the Indian Army. Lt. General Guha attended the Indian National Defence Academy and was commissioned in the Regiment of Artillery in June 1974. A graduate of the Defence Services Staff College and the National Defence College, he served as an instructor in both institutions, and as Directing Staff in the Indian Military Academy. In addition to a number of senior staff appointments at the brigade, group army and Army headquarters, Lt. General Guha has commanded at every level, including Division Command. He retired from the Indian Army in 2013.



Stacy McDougall is a member of the Departments of Peacekeeping Operations and Field Support, who has provided support to the panel during its work. She joined the UN in 2005 and has been a UN peacekeeper since 2008, proudly serving in various positions in MINUSTAH, UNMIL and UN headquarters. She holds an MSt in International Human Rights Law from the University of Oxford, and an MA in Sustainable Development from the SIT Graduate Institute.

ANNEX B

TERMS OF REFERENCE

Background

Over time, UN peacekeeping has made steady progress in introducing new technologies and other innovations to improve delivery and mandate implementation. As technological advances grow exponentially and peacekeeping mandates continue to evolve in complexity and scope, a concerted effort is needed to ensure that both efficiency gains and cost savings from the use of new and emerging technologies may be realized and leveraged to enable peacekeepers to respond to an increasing number of complex, multidimensional tasks in our field missions. Peacekeeping should benefit from ongoing technological innovations in a systematic and integrated manner.

The Under Secretaries-General for Peacekeeping and Field Support see this as a priority and have suggested the establishment of a high-level expert Panel to review the range of possibilities for the use of new technical tools and technological innovations, while taking stock of those already in use in missions.

For example, the introduction in field missions of information sharing and storage platform called UN SAGE that improves situational awareness by merging incident and other data with GIS; the use of unarmed, unmanned aerial systems in MONUSCO for enhanced data gathering to improve safety and security and situational awareness; a Community Alert Network in the DRC that employs mobile telephone technology to support early warning for local communities; a wide variety of GIS products to improve knowledge and understanding of ground realities in real time; integrated platforms and systems for managing most support operations (procurement, supply, logistics, etc.); improved air-conditioning and power generation systems to rationalize power use and reduce greenhouse gas emissions.

The possible applications of technological innovations are numerous and have the potential to improve tremendously the way peacekeeping is done, enhancing operational effectiveness, improving or multiplying impact, and enhancing safety and security of peacekeepers and host communities. However, there is still a long way to go before peacekeeping operations can begin to be aware of and benefit from technological innovations in a systematic manner.

Mandated mission tasks to potentially benefit from improved technology/innovation:

- *Provision of security by military/police components to threats to civilians and the peace*
- *Provision of security to UN personnel, assets and premises*
- *Support to host government and national authorities in programme implementation*
- *Wide range of monitoring and reporting activities*
- *Geographic Information Systems (GIS) and mapping, particularly for elections support*
- *Coordination and integration of UN presence*
- *Advising, planning, and coordination at the local and national levels*
- *Capacity-building and training, and national capacity development*
- *Communication and public information*
- *Provision of basic administrative functions*

Objectives

The overall objective of the project is to identify technologies and innovations that will assist field missions with implementation of mandated tasks in a more efficient and effective way, looking both at technologies already deployed as well as technologies that can be newly introduced. More precise scope of technologies is defined below.

A 5-member Panel of high-level experts will explore areas where technology can be leveraged by conducting a sampling of current challenges and opportunities in different types of missions, from more traditional missions to those with multidimensional complex mandates. The proposed missions are MINUSTAH, UNIFIL, MINUSMA, UNMISS and MONUSCO. The Panel will consist of senior members with military, police and mission support backgrounds, who will be assisted by external technical experts. The expert Panel will be supported by DPKO and DFS staff members who have an in-depth awareness of the subject matter, both from the programmatic and the technical side. The Panel will have staff support of one full-time assigned staff member.

Scope

The focus of the project will be on identifying tools, technologies and innovations in response to stated and identified needs that will improve the ability of field missions to implement their mandates more effectively and efficiently. Broadly categorized, the mandated tasks that could benefit from technological innovations are:

- **Monitoring and reporting.** *A wide range of military, police and civilian tasks fall into this category, ranging from “monitoring the cessation of hostilities” (UNIFIL) to “to monitor, help investigate and report to the Council specifically on violations and abuses committed against children...” (MINUSMA).*
- **Provision of security (military and police operations), safety and security of staff as well as the security of UN property and premises.** *An example in this category would be “...Requests MINUSTAH to continue to support the Haitian authorities in their efforts to control the flow of small arms, the development of a weapons registry, the revision of current laws on importation and possession of arms, reform of the weapons permit system and the development and implementation of a national community policing doctrine”*
- **Supporting the host government and national authorities in programme implementation.** *An example in this category would be “to continue to collaborate with the Government of the DRC in the swift and vigorous implementation of the action plan to prevent and end the recruitment and use of children and sexual violence against children by FARDC...” (MONUSCO).*
- **Capacity building and training.** *Activities geared towards national capacity development, such as “supporting the mentoring and training of corrections personnel and strengthening of institutional and operational capacities” (MINUSTAH).*
- **Programme implementation.** *Where the mission is responsible for programme implementation in areas such as security sector reform or disarmament, demobilization and reintegration. For example “...Implement the United Nations system-wide protection strategy in the Democratic Republic of the Congo, operationalizing it with MONUSCO’s protection strategy built on best practices and extend useful protection measures, such as the Joint Protection Teams, Community Liaison Interpreters, Joint Investigation Teams, Surveillance Centres and Women’s Protection Advisers...”*
- **Advising, planning.** *An example in this category would be “to continue its collaboration with OCHA and the UNCT in supporting the humanitarian and recovery efforts and further encourages all actors to continue to engage in joint planning and coordination at the national and local level” (MINUSTAH).*
- **Coordination.** *“Requests the Secretary-General to appoint expeditiously a Special Representative for Mali and Head of Mission of MINUSMA, who shall, from the date of appointment, assume overall authority on the ground for the coordination of all the activities of the United Nations, and its agencies, funds and programmes, in Mali and shall use good offices and coordinate efforts of the international community...”*

- **Communication and Public information.** *“Welcomes progress made by MINUSTAH in communications and public outreach strategy, and requests it to continue these activities”*
- **Provision of basic administrative functions.**

The expert Panel may explore different aspects of the introduction of technological solutions into field operations, including legal implications, political sensitivities, potential implications for troop- and police-contributing countries, equipment maintenance and upkeep, training on use of new tools, cost-benefit analysis, among others. These factors should be factored into the formulation of recommendations on new technologies and innovation to DPKO/DFS management, but should not impede their exploration.

Outside the scope:

- *Tools and technological improvements at UNHQ, unless there are direct relationships or interdependencies with the proposed field solutions.*

Suggested areas for review:

- *Areas that have already been identified by DPKO-DFS as primary beneficiaries for the work of the expert Panel are safety and security of personnel; environmental management; GIS and mapping; and reporting and information management. The expert Panel may wish to consider these areas as a starting point for its work.*

Methodology

The expert Panel will be based in New York at UNHQ where in-briefings with senior management, the DPKO/DFS Working Group on Technology and Innovation in Peacekeeping, and other relevant stakeholders will be conducted. It will be up to the expert Panel to determine if field visits are warranted and if field visits are to take place, which missions are to be visited. There is, however, an expectation that some of the discussions and interviews with mission personnel could be conducted through structured telephone and/or video teleconferences.

In addition to potential field visits, the methodology suggested includes a combination of document review, meetings and a series of focus groups. It is anticipated that the expert Panel will also consult and involve any organization and/or individual who they feel could progress the agenda. To support the work of the expert Panel, seminars may be organized with interested partner research institutions or Member States to allow a dialogue between the Panel and key partners in the field, such as other UN system entities with field presences, academic and research institutions, non-governmental organizations, regional organizations and arrangements that also have field operations, industry leaders, entrepreneurs and individuals.

Once formed, the expert Panel may decide on a methodology of work that best suits their strengths.

Output

The expert Panel will present a report with findings, solutions and concrete recommendations for the short, medium and longer term. The report should highlight cost and other considerations. Recommendations should also take account of existing UN systems and infrastructure for the sustainability of suggested solutions. The Panel's recommendations will also address how DPKO-DFS can stay current of new technologies and mainstream innovative solutions to benefit peacekeeping.

The final report is due six months after commencement of the assignment.

Funding and Resources

Funds for staff costs are being provided extra-budgetarily by Member States as well as through cost sharing with partner research institutions. Missions that receive the expert Panel will be expected to coordinate the visit to optimize time on the ground and provide logistics and other assistance, including transport, accommodation, security clearances, local language translation, and other support.

Support

Members of the DPKO/DFS Working Group on Technology and Innovation in Peacekeeping will support the work of the Panel in their areas of expertise. In addition, the Panel will have one dedicated substantive support staff. He/she will be assisted by other expert staff at UNHQ on a part-time basis, as well as designated mission focal points for the project.

A network of external partners consisting of members of the wider UN family, Member States, research institutions, non-governmental organizations and corporate entities will support the effort by providing their own input and informing the Panel about areas of common interest and synergies with the project.

ANNEX C

TECHNOLOGY AND INNOVATION SPOTLIGHTS

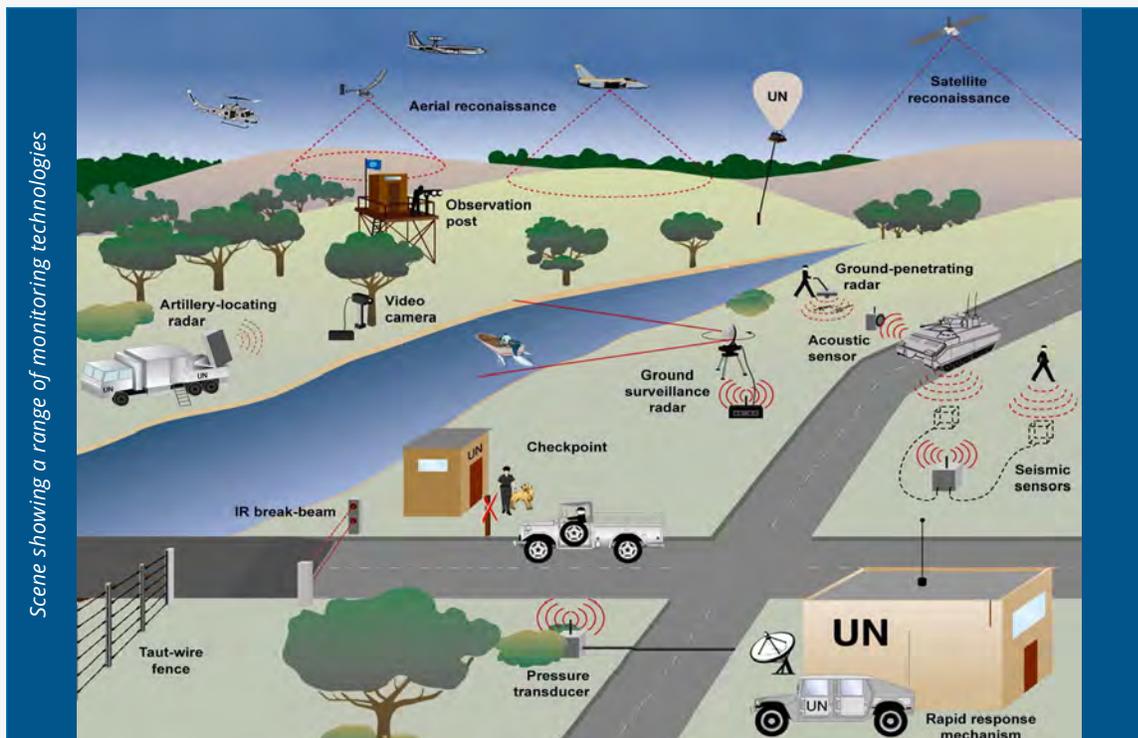
1. Monitoring and Surveillance Technologies

Monitoring and surveillance are critical functions for the fulfilment of mission mandates. For instance, they are needed to: verify cease-fires and peace agreements; protect civilians and regions; oversee elections; support human rights; uphold sanctions; secure borders; and reduce the illegal trade in exploited resources. When dangerous armed groups and spoilers of peace processes are at large, it is vital to know their movements and nefarious preparations, especially to achieve early warning and preventive action.

Far too often, UN peacekeepers have been unable to stop massacres, prevent atrocities, catch smugglers, identify aggressors and spot human rights violators. In many cases UN missions did not have adequate tools to foresee or to act, even when the political will was present. Many atrocities are committed under the cover of darkness, yet UN missions are poorly equipped for night-time surveillance. Also many violations occur far from UN camps, especially in missions with large geographical areas of responsibility; yet the UN lacks the necessary technological capacity for remote monitoring, including little or no infrastructure for unmanned overhead surveillance and unattended ground sensors.

Without technological aids monitoring is extremely limited at night, over large areas, in remote or difficult terrain and for underground objects. In addition, information and image recording, analysing, sharing and authenticated storage is challenging without proper hardware and software.

Monitoring and surveillance technologies offer the UN a way to increase the range, accuracy and duration of observation. These technologies facilitate continuous monitoring. They can also increase effectiveness, including cost-effectiveness in many cases, while decreasing intrusiveness, especially in places where a human presence is not required 24/7. With technological enablers, peacekeepers can be better positioned and move rapidly over large areas in response to indicators sensed remotely. Furthermore, these technologies enhance the safety and security of staff in the field, allowing them to be based further from constant danger and reducing the likelihood that they will be caught by surprise, ambushed or kidnapped. Finally, technology provides a means for information recording and evidence storage to share more easily, accurately and quickly with UN headquarters. In addition, when deemed appropriate, the information can be shared or shown with the conflicting parties or other bodies, such as national or international tribunals.



Source: A. Walter Dorn, *Keeping Watch: Monitoring technology and innovation in UN Peacekeeping*, Tokyo, UN University (2011)

Many types of monitoring and surveillance technologies are readily available for use in peacekeeping. The figure above illustrates a range of applicable aerial and ground-based technologies.

Most of the technologies shown in the figure are not currently in use in UN operations. Some have never been used in UN history. All can make a major difference in UN effectiveness. The following “gap analysis” shows the possibilities and the deficiencies, beginning with the top of the figure, which focuses on space and aerial imagery.

I. Overhead Imaging: Eye in the Sky

Satellites: For decades, information from satellite reconnaissance has been provided to the UN by certain major powers on a need-to-know basis. However, the organization needs to acquire its own sources of imagery to come to its own judgments. Fortunately, commercial satellite imagery is rapidly becoming more capable, timely, and cost effective. To its credit, the UN makes frequent use of such imagery for map-making, change detection, ground and activity analysis; but, the world organization has yet to move from outdated still images to dynamic near real-time reconnaissance to achieve current situational awareness and immediate operational effect. The UN needs to incorporate imagery into its analytical intelligence products, including dynamic Geographic Information Systems (GIS). In the past, significant obstacles were costs (several thousand dollars

per satellite “scene”) and turn-around time (weeks to months after a request). Nonetheless, as more commercial satellites are launched into orbit and image costs decline, the UN will find these obstacles are quite surmountable. The latest generation of commercial satellites, including micro-satellites, boasts a resolution of better than 0.25 metres, allowing UN missions to count people from space. Such technology can help the UN answer questions such as: “How many refugees are moving along a certain road today?” or “how many houses and huts were burned in an attack yesterday?” or “Where are roving gangs poised to strike next?” or “What are the spatial-temporal patterns and trends during rainy and dry season by the rebel groups?” Already, human rights NGOs are using satellite imagery to identify the locations of massacres and graves, thereby influencing the perpetrators, including both governments and rebel groups. Similarly, news organizations routinely include satellite images to illustrate locations and events in their stories. The UN can increase its capacity to analyse imagery by employing full-time analysts, expanding satellite imagery access models and developing practical expertise. Expertise in image analysis can also be gained with airborne imagery, including using the UN’s own aircraft such as UAS.

Reconnaissance Aircraft: Helicopters have served as the main aerial reconnaissance platform for UN missions, but in most cases the only cameras aboard were hand-held, brought by the crew and lacking image stabilization or high resolution. In a few missions, pods were attached to the helicopters to provide gyro-stabilization for more advanced cameras, including for visible light and forward looking infrared (FLIR) imaging. But, with a few exceptions, these were older generation equipment, not advanced enough to meet the peacekeepers’ needs for actionable information. Aerial imagery should be available in real time to peacekeepers on the ground using remote viewing terminals. Advanced aircraft are available for large-area reconnaissance at higher altitudes, safe from ground fire. For instance, jet and turboprop aircraft provide viewing of conflict zones at high speeds and altitudes and can carry significant imaging payloads. Anachronistically, the UN’s only major deployment of jets for surveillance was in the Congo in the 1960s. Swedish J 29C jets successfully observed the activities of mercenaries and secessionist forces possessing aircraft that attacked UN forces. The UN reconnaissance jets were of immense value in disproving false concerns and confirming valid ones, including impending attacks. In modern UN operations, jet imagery was provided to the UN but the jets were from supportive Member States, not the UN mission itself.

Airborne Air-surveillance: Shortly after the 2006 Lebanon war, the United Kingdom offered the services of its Airborne Warning and Control System (AWACS) aircraft to help the UN monitor the airspace above Southern Lebanon and the adjacent waters. But because of the immense cost of flying such aircraft, the UN had to turn down the offer. Instead, the UN developed a 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. For example, NATO reported extensively on no-fly zone violations over Bosnia in the period 1992–95. Looking forward, the UN should obtain chartered or contingent-owned aircraft with less expensive air-surveillance systems, albeit with more limited coverage.

Unmanned Aerial Vehicles (UAVs): The UN has benefitted from the generous support of nations flying UAVs in several of its mission areas, including in Bosnia and the Democratic Republic of the Congo (DRC). In 2006, the European Union Force (EUFOR) flew Belgian B-Hunter UAVs during the tense election period in the DRC. UN personnel were invited to view UAV imagery on large screens in EUFOR headquarters near Kinshasa, but the UN did not have its own data feed. In December 2013, after several procurement attempts since 2006, the UN finally began operating its own UN-painted UAVs in the DRC, flying under contract out of Goma airport. These have proved immensely useful in expanding the mission's situational awareness. In short, this was a pioneering and successful step forward in making use of a powerful emerging technology.

Aerostats: Another emerging but simpler overhead technology is the tethered balloon. While the UN has yet to employ aerostats, it is actively exploring ways to use them to monitor sensitive areas, including vulnerable airstrips and the UN's own camps and facilities. The relatively fixed and visible platforms, can also serve as useful waypoints and aerial markers for travellers, especially in wide-open areas or at unmarked borders. With the cost of high-resolution cameras decreasing and their capabilities steadily increasing, aerostats will undoubtedly become common place in future peacekeeping operations. This is also true of a wide range of other imaging systems, including the ground-based systems illustrated in the figure.

II. Ground-based Monitoring and Surveillance

Observation Posts have been used by the UN since its earliest missions to view sites of conflict and UN areas of responsibility. Often these posts were placed in high locations (e.g., on hills) and manned with observers equipped with heavy high-power binoculars. Today, digital and light-weight binoculars offer greater resolution. Unsophisticated personal video cameras are already commonly brought to UN observation posts and on patrols. The imagery acquired could be important as evidence to confront perpetrators or used in depositions in court cases. Often simple video cameras or cell phones are used, but more sophisticated digital binoculars can be purchased to capture high-definition images, magnify the images and send the data directly to a regional headquarters. Some video devices include image stabilization to remove the effects of hand tremors. Video devices can also include GPS and laser-range finders to determine the coordinates of far-away objects, including persons trespassing into demilitarized or protected areas. Modern digital cameras can also time-and-date stamp images and provide special means for data authentication (to prevent editing or falsification). Video cameras can also be left unattended, as was done by the UN along important parts of the Green Line in Cyprus, thus replacing manned observation posts and allowing the peacekeepers to deploy more effectively.

Night Vision Devices, including goggles, can make night observation and patrolling possible. Otherwise, it becomes impossible to navigate roads or forest paths at a time when most atrocities and violations are committed. The UN mission in Haiti used night vision capabilities to launch operations at night in order to gain the upper hand over gang leaders. This meant fewer casualties and quicker arrests. Unfortunately, many missions and contingents have only the most rudimentary devices. In addition, devices that take pictures and videos are seldom found in UN missions.

Artillery-locating Radars (left-centre of the figure) were seldom used in peacekeeping, and today they are found in only one mission (UNIFIL in Lebanon, see Box on radar). In addition to its counter-battery radar (Cobra), France has also supplied truck-mounted air-surveillance radar (Samantha) to track jets and helicopters at a range of 30 kilometres or less. This is enough to cover the airspace over UNIFIL's area of operation on land (i.e., to the Litani river). UNIFIL has also employed powerful ship-borne radars for maritime domain awareness. By contrast, shoreline radars were established in MONUSCO to monitor traffic on Lake Kivu.

The figure also shows, on the other river bank, other important forms of radar.

Ground-Surveillance Radar (GSR) can detect movement on land or in nearby waterways. They can track boats, helping the UN and host states to intercept and stop illegal transits of contraband, minerals or human beings. For instance, the UN bought a radar system to monitor boat traffic in the Shatt al-Arab waterway during the UN's Iraq-Kuwait observation mission. In a few other missions, several developed countries deployed GSR to monitor movements around their camps and in UN areas, such as the Green Line in Cyprus. But these technologies did not stay after the particular units withdrew so they were of limited use to the mission.

Ground-Penetrating Radar (GPR) can help detect underground objects such as landmines, buried weapons or mass graves. This form of radar has not yet been deployed by the UN, probably owing to the sophistication and expertise needed to interpret the radar images. A further drawback is that, with so many objects under the surface, it is usually necessary to first locate suspected areas carefully using additional sources of information.

Acoustic and Seismic Sensors: the UN has yet to purchase such sensors, though as far back as 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. The sensors detected sound and ground vibrations from vehicles and walking persons, providing round-the-clock monitoring. The resulting information was provided to the UN Emergency Force II². Showing initiative, 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. The receiver could hear engines starting after a belligerent party broke UN locks to reclaim weapons. The UN would then rush to prevent the movement and use of the heavy equipment for fighting. Effective technologies have evolved and the UN can do much more with remote ground sensors by applying creative thinking.

²[Michael Vannoni, *Sensors in the Sinai: A precedent for Regional Cooperative Monitoring*, Sandia National Laboratories, SAND96-2574 \(1998\)](#)

Checkpoints and Strong Points are key UN methods to maintain some control and to prevent escalations in conflict zones. They constrain access for combatants and check that passing vehicles or persons do not possess weapons or explosives. One traditional method of inspection is to deploy dogs to sniff for explosives; however, other forms of chemical sensing are possible, though costly, for use at entrances to high risk and vital infrastructure, such as airports. Chemical monitors can detect explosives, their ingredients or chemical warfare agents and their precursors. In addition, several older and cheaper technologies can assist at checkpoints, including: motion-detection illuminators to warn of oncoming vehicles or persons (solar-powered versions can be charged during the day); pressure transducers (strain sensors) to warn of vehicles moving on nearby roads or pathways (e.g., trying to skirt around the checkpoint); and video cameras that can be triggered by motion-detectors and can be used to inspect the undercarriages of vehicles should they be hiding bombs or contraband. Infrared break-beams can alert of trespassers or break-ins into UN-guarded facilities.

Taut-Wire Fences can be useful around UN compounds or other high-value sites to spot intruders or trespassers. Attempts to scale or cut the fence can trigger cameras and send signals to a monitoring centre. While not yet deployed, the fences could help stop thieves and armed attackers since they provide not only a warning mechanism, but also a protective barrier.

Rapid Response Mechanism: the utility and effect of the above aerial and ground sensors can be multiplied when they are connected to a rapid response mechanism. Monitoring can trigger a force to send peacekeepers who can view a conflict scene even as they are travelling towards it. They can gauge the situation, determine who to speak with and decide how much force, if any, may need to be applied. The revolution in sensor technology offers a new world of opportunities to make peace operations more effective.

2. Information Management and Command and Control Tools

I. Information Management

While tools such as UN SAGE may be used as an information management and mapping tool for security related incidents, mission components generate large amounts of operational data that cannot fit into SAGE. This data is stored and managed through a variety of simple tools, from spreadsheets to Microsoft Word documents or just in shared drives or emails. Many components/sections have their own, informal “Information Manager”. However, these staff members have widely varying information management ability, and tend to keep the data internal to their component/section.

This approach leads to number of challenges:

- a. Only summary data are included and shared in SitReps, with rich operational details hidden in opaque section-owned spreadsheets, documents and emails.*
- b. With only textual data shared via SitReps, it is difficult for the mission to maintain an updated view of the state of key indicators. In other words, it is not possible to have an accurate dashboard showing how the mission is performing against its mandate.*
- c. Because each section’s data is hidden within the section, there is no way to intersect or overlay different section’s data to detect correlations, patterns or trends. It is also not possible to search for data, by keyword for example, across multiple sections’ data.*
- d. Statistical or aggregated reporting of activities, projects and performance indicators are usually manually generated by section information managers without the use of reporting tools that can auto-generate such statistics and reports. This results in duplicate effort across sections and is also prone to human error.*
- e. With heavy staff rotation, in particular of uniformed personnel, data can be easily lost, and incoming staff have to start collecting data from scratch again.*
- f. When data is stored in individual PCs, there is high risk of data loss due to technical problems, such as hard disk crash or virus attacks.*
- g. If mission premises need to be evacuated, this data cannot be accessed until staff members are allowed to return.*

There is 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.

The panel has identified examples of suitable decision support systems used in the intelligence environment, which provide commercially available solutions to the requirement for exploitation of vast amounts of data. These systems are based on a common standard protocol or other standard format that provides for easy database update and subsequent data mining and analysis. Typically NATO standardization such as MIP, LC2/JC3IEDM, APP6, STANAG and technology standards i.e. IP, J2EE, XML and web services are used. However, because the products used for intelligence functions are designed for that very purpose, substantial customization would be needed to fulfil UN requirements.

An affordable alternative could be an interoperability product such as **IRIS**, which is widely used in more than 40 countries. A market leader, IRIS uses structured data such as USMTF 2000 and NATO ADatP3 formatted messages as its transmission standard. The information mapping tool is designed specifically to develop and execute the data mappings required to automatically pass structured information from one database to another. As databases hosted at the various UN agencies and missions have a tendency to differ, a tool like this would overcome the problem of database interoperability.

Its man-machine-interface is developed in such a way that it simplifies and structures the preparation and validation of information and reports. This software solution is available as stand-alone application or as a server-client solution and integrates in most cases seamlessly into standard products such as Microsoft Office, providing the framework for writing, editing and sending information

The presently used formats and messages in currently available off-the-shelf systems will not cover all UN requirements. However, the IRIS system automatically generates the layout and data entry components required for the user to create and manage structured documents and has a user friendly and intuitive web-based management tools available for defining and managing information in a structured way. This would enable the adding on of commercial tools for automated data management, data mining and analysis as well as data dissemination. Tools produced by Tableau, Blue Yonder and Newprosoft are just a few. The use of these tools, however, should only be seen as an interim short- to mid-term solution.

II. Command and Control Tools

Command, Control, Communications, Computer and Intelligence (C4I) systems providing coherent and seamless application interaction from the individual soldier on the ground to division level are available in numbers on the market as framework commercial off-the-shelf (COTS) products, and which are easy to customize. The following solutions are offered only as representative examples, as there are quite a number of other good products on the market equally well suited for the purpose.

Major features within these systems are functional area subsystems (APPs) for preparation and distribution of plans, orders, directives and reports, which can be prepared simultaneously by many elements of a staff, and then replicated directly to the proper users. Subsequently, they can be dynamically updated by only replicating the delta value of the original information thus reducing

the need for data transmission capacity. All users thus have access to the same and frequently updated information, which supports the synchronization and performance of operations at all organizational levels, it being military, police or civilian.

These application networks of data exchange also foster seamless interlink to information and message handling, VTC, sensor and GPS handling and a numerous number of other services. Even though this type of systems in accordance with the UN paradigm only will cover the levels from UNHQ over Mission HQ to battalion and independent company level, they will not only provide for more efficient and streamlined procedures, but also predeployment preparations and training are seen to gain a lot from this.

One example is the [SitaWare](#) solution, which provides flexibility in mission planning through collaborative construction of textual and graphical plans and orders, allowing for simultaneous input to the planning cycle from different physical installations. It has a tailored view on available information, which reduces information overload and provides for the situational awareness need during each phase of current operations. Through the use of correlation and aggregation tools combined with formation filtering it is adjusting the information picture to match the actual needs. An intelligent search functionality provides for finding information fast and easily. As the product uses private cloud deployment, no client installation is required, making a typical deployment fast and uncomplicated.

A rather comprehensive interoperability package is available such as MIP, NFFI, NVG, link 16, AIS etc., which actually reaches far beyond UN needs. If so wished, 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.

Another well proven solution is the [Comm@nder Army system](#), which offers an 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. The system is delivered through integrated C4ISR box (hardware, software and communication).

Comm@nder Army is designed for short time deployment and provides on-demand information access via web portal from any web browser and a shared Recognized Ground Picture using a rather intuitive tactical editor leveraging a Geospatial Information System. Mission-oriented applications for planning and execution within the standard functional areas are rather strong (order, planning, logistics). As to interoperability military and civil interoperability services are provided through standards such as NVG/KML, MIP, ADatP3, and XML

Training to use such systems is obviously an issue, and if employed, implementation bridges will need to be provided by the UN. TCC/PCCs not familiar with this kind of technology might find it a challenge to interact with the man-machine interface. However, in some of the products on the market this problem has been handled by introducing a simplified front end, which has proved to be very useful. Further, such systems are well suited for predeployment training, as they in a training set up actually can be accessed via the Internet.

3. Open Source Information and Analysis Tools

Myriad tools exist to help monitor open source information and add to or assist in the analysis of information. Some examples are provided below:

- **The GDELT Project** monitors broadcast, print, and web-based news sources from around the world, in 100 different languages.
- **Storyful** allows users to monitor social media in real time and alert users to important information, and can be a useful tool for source verification.
- **Recorded Future** provides users with the ability to analyse over 600,000 open web sources in seven languages, to provide insight into emerging threats.
- **Rapidminer**, is an open source, advanced analytics platform that can be used for machine learning, and to mine data and run predictive analytics.
- **SAS Text Miner** is a software suite designed to discover and extract information from text.
- **XMind**, **Mindjet MindManager**, **Coggle**, **MindNode**, and **FreeMind** are mind mapping software that allow users to gather, analyse and use complex information.
- **NodeXL** is a free, open-source template for Microsoft Excel 2007, 2010 and 2013 that facilitates the exploration of network graphs.
- **ACH** is a tool that allows users to test their analysis of competing hypotheses.
- **FaultTree+** is a software that allows users to construct event tree analyses.
- **Swiftriver** is a tool developed by Ushahidi that allows users to filter and analyse real-time data.

ANNEX D

SELECTED LIST OF CONSULTATIONS

In addition to extensive consultations within DPKO and DFS, the panel also consulted with the following non-exhaustive list of groups or organizations in the preparation of this report.

Consultations

- *United Nations Special Committee on Peacekeeping Operations*
- *United Nations Military and Police Advisors Community*
- *ZIF Centre for International Peace Operations, Berlin, Germany*
- *Instituto Igarapé*
- *European Union Satellite Centre*
- *Google Ideas*
- *Ushahidi*
- *United Nations Global Pulse*
- *United Nations Children's Fund, Innovation Unit*
- *UAViators*
- *Crisismappers*
- *ICT4Peace Foundation*
- *New York Police Department*
- *United Service Institution of India*
- *International Peace Institute*
- *Norwegian Institute of International Affairs*
- *United States Institute of Peace*
- *Heads of UN Police Components*
- *UN Department of Safety and Security*
- *UN Office of Information and Communications Technology*
- *iRevolution*

Field Visits

- ➔ *United Nations Organization Stabilization Mission in the Democratic Republic of Congo*
- ➔ *United Nations Multidimensional Integrated Stabilization Mission in Mali*
- ➔ *Regional Service Centre, Entebbe, Uganda*
- ➔ *Global Service Centre, Brindisi, Italy*
- ➔ *UNICEF Innovation Lab, Kampala, Uganda*
- ➔ *UN Global Pulse Lab Kampala*
- ➔ *United Nations Assistance Mission for Iraq*

Written Inputs

- ➔ *United Nations Multidimensional Integrated Stabilization Mission in Mali*
- ➔ *United Nations Organization Stabilization Mission in the Democratic Republic of Congo*
- ➔ *United Nations Truce Supervision Organization*
- ➔ *United Nations Operation in Côte d'Ivoire*
- ➔ *United Nations Mission in Liberia*
- ➔ *United Nations Interim Administration Mission in Kosovo*
- ➔ *United Nations Mission for the Referendum in Western Sahara*
- ➔ *United Nations Interim Force in Lebanon*
- ➔ *African Union/United Nations Hybrid Operation in Darfur*
- ➔ *United Nations Military Observer Group in India and Pakistan*
- ➔ *United Nations Stabilization Mission in Haiti*
- ➔ *United Service Institution of India*

ANNEX E

UNITED NATIONS PEACEKEEPING MISSIONS

- *MINURSO United Nations Mission for the Referendum in Western Sahara*
- *MINUSCA United Nations Multidimensional Integrated Stabilization Mission in the Central African Republic*
- *MINUSMA United Nations Multidimensional Integrated Stabilization Mission in Mali*
- *MINUSTAH United Nations Stabilization Mission in Haiti*
- *MONUSCO United Nations Organization Stabilization Mission in the Democratic Republic of the Congo*
- *UNAMID African Union/United Nations Hybrid Operation in Darfur*
- *UNDOF United Nations Disengagement Observer Force*
- *UNFICYP United Nations Peacekeeping Force in Cyprus*
- *UNIFIL United Nations Interim Force in Lebanon*
- *UNISFA United Nations Interim Security Force for Abyei*
- *UNMIK United Nations Interim Administration Mission in Kosovo*
- *UNMIL United Nations Mission in Liberia*
- *UNMISS United Nations Mission in the Republic of South Sudan*
- *UNMOGIP United Nations Military Observer Group in India and Pakistan*
- *UNOCI United Nations Operation in Côte d'Ivoire*
- *UNTSO United Nations Truce Supervision Organization*

ANNEX F

ACKNOWLEDGEMENTS

The panel would like to extend its gratitude to the Government of Denmark for generously funding its work. The Centre for International Peace Operations in Berlin, Germany, also provided exceptional support to the panel, hosting a partners dialogue to inform our deliberations. We are also indebted to many UN personnel, past and present, who provided insights and inputs for this report, in particular, those working in field missions who so graciously facilitated our visits and accommodated our inquiries. No less deserving of our appreciation are the dedicated staff members who make up the Working Group on Technology and Innovation, who have sought to consistently engage with us throughout the course of our work. We are humbled by your continued commitment to serving the UN in the pursuit of peace, and to promoting innovation, progress and change.

The panel is grateful to the Under-Secretaries-General of Peacekeeping Operations and Field support, Mr. Hervé Ladsous and Ms. Ameerah Haq, for their dedication to making technology and innovation a priority for peacekeeping. We also extend our thanks to Assistant Secretaries-General Banbury, Mulet, and Titov, and to their respective offices, for supporting and facilitating its work. The panel would also like to gratefully acknowledge the support of Mr. David Haeri, Director of the Policy, Evaluation and Training Division and would like to note, especially, the contribution of the Policy and Best Practices team, notably Mr. Thomas Chang, Ms. Heather Belrose and Ms. Anima Dua-Agyeman. Mr. Sofian Mossallam of the Department of Political Affairs also provided invaluable support to our work.

In the same way, the panel benefitted greatly from the advice and support of Mr. Rudy Sanchez, Director of the Information and Communications Technology Division in DFS and his team—in particular, Ms. Suzanne Shanahan, Ms. Amy Weesner, Mr. Axel Weber and Ms. Kiran Fatima. We would also like to thank Ms. Donna Maxfield, Chief of Staff and, from the Peacekeeping Information Management Unit within her office, Ms. Christina Goodness and Mr. Luke Redmond. The panel is also deeply grateful for the many staff members who shared with us their ideas and innovations from the field and from headquarters, and whose excitement about the possibilities ahead inspired us. We are particularly indebted to those who allowed us to dive deeply into their work, and to shine light on their efforts in our report.

Beyond the two Departments, the panel wishes to extend its thanks to Assistant Secretary-General/ UN Chief Technology Officer Ms. Atefeh Riazi; Mr. Robert Kirkpatrick, Director, UN Global Pulse; and Mr. Chris Fabian, Senior Advisor on Innovation to the Executive Director of UNICEF, for their insightful and stimulating engagement in the process. Finally, we have strengthened many of our findings and recommendations thanks to the constructive engagement with representatives of many Member States who reached out to the panel during its deliberations with important suggestions and recommendations of their own. For all of the foregoing assistance, the panel is grateful, and believes it forms a strong foundation for implementation of many of the report's findings going forward.