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INTEROPERABILITY CHALLENGES FOR THE FUTURE

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Prepared by: Concept Development and Experimentation (CD&E) Multinational Interoperability Working Group (MIWG)
Document Custodian: Operations Support (Ops Sup) MIWG
Document Review: On request
SIGNATORIES
(VERSION 4.0)

DAVID L. JOHNSTON
Real Admiral
Deputy Chief Joint Operations
Australian Defence Force

JONATHAN VANCE
Major General
Director of Staff, Strategic Joint Staff
Canadian Forces

DIDIER CASTRES
General des Corps d’Armée
Deputy Chief of staff (Ops)
French Joint Defence Staff

ANDREAS KRAUSE
Konteradmiral
Director, Joint Operations Staff (FMOD)
German Ministry of Defence

SALVATORE FARINA
Generale di Divisione
Director, Political-Military Planning Div.
Italian Defence General Staff

ROBERT JUDSON
Air Vice-Marshal
Assistant Chief of the Defence Staff (Ops)
UK Ministry of Defence

ROBERT B. NELLER
Lieutenant General
Director of Operations, J3
U.S. Joint Staff
MIC FUTURE COALITION OPERATING ENVIRONMENT (FCOE)

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PREFACE

The Multinational Interoperability Council (MIC) is an operator-led multinational forum that addresses the core issues affecting coalition interoperability. The MIC identifies issues and articulates actions which, if nationally implemented, would contribute to more effective coalition operations. Following the MIC Principals meeting in December 2003, the Capstone MIWG tasked the CD&E MIWG with preparing a concept paper describing the desired functional capabilities for a Coalition Information Exchange Environment (CIEE).

In 2008, the CIEE was replaced by and expanded upon in the first version of the current document -- Future Coalition Operating Environment (FCOE), Interoperability Challenges for the Future (FCOE, V3.0). This second version of the FCOE was developed by pulling key trends, ideas, and capabilities directly from MIC nations’ existing strategic and operational documents that address issues related to coalition operations.
EXECUTIVE SUMMARY

This document envisions the future operating environment for the purpose of informing strategic and operational level interoperability development (Part I—Context) and identifies the key functions and capabilities likely required to operate effectively within a future coalition (Part II—Application). Within the MIC, this document informs internal strategy development and the Quadrennial Gap Analysis. It provides a framework for enhanced interoperability in the anticipated future coalition operating environment of 5-20 years in the future at the operational and strategic levels of coalition employment. In particular it outlines the essential military implications of future trends and the key functions and capabilities that MIC nations may need when conducting future coalition operations.

The future coalition operating environment will be as volatile, uncertain, complex, and dynamic as it is today, if not more so, driven by the ascendant global trends described in this paper. The future coalition operating environment must therefore be one in which interoperability has been contemplated and addressed well in advance. In light of the likelihood that MIC nations will increasingly operate with interagency and non-governmental organisations, these trends create several interoperability challenges for coalition nations in the areas of interoperable capabilities, common doctrine development, coalition planning, exercises and experimentation. MIC nations aim to establish compatible processes and complementary capabilities in the areas of coalition force preparation, logistics, CIS, command and control, and plans and operations.

Part I uses a strategic trends approach to describe a future coalition operating environment. The trends discussed are based on a review of national and international futures documents. This approach goes beyond merely identifying the likely future military threats deriving from security concerns against which coalition forces will have to posture. Rather, it seeks to identify key developments across the geopolitical landscape that will shape the wider context within which coalition forces may have to operate.

Trends in the future coalition operating environment are arranged into the following eight general categories: Demography, Globalisation, Natural Resources and Energy, Climate Change, Cultural and Communication, Social and Political, Economic, and Science and Technology. These eight generic trends combine to create mounting challenges for future coalition operations and have implications with regard to the conditions for future security policy, as well as for the design and employment of military forces.

Over the next 5 to 20 years there will be a changing balance of Global Power. FCOE Part I further defines four categories of potential adversaries: State Actors, Failed and Failing States, Chronically Fragile States and Non-State Actors. Part I also outlines the key Enduring Drivers for the Character of Future Conflict. These drivers are weapon and technology proliferation, the defence exploitation of technology, the future battlespace with its overlapping environments and the cognitive domain, and finally the legal framework and its associated challenges for the MIC nations.

Part I concludes by outlining a list of interoperability challenges. By focusing current multinational efforts on interoperability challenges, the likelihood of meeting future coalition objectives is increased.
Part II of the FCOE analyses four interoperability challenges (Compatibility, Capabilities Integration, Information Sharing and Interagency Coordination) and two cross-functional challenges (Strategic Communication, and Legal Requirements). These challenges are used as focal points upon which to orient multinational capability development. The analyses are built along nine lines of development (Leadership Development, Command and Control, Education and Training, Doctrine, Logistics, Knowledge Advantage, Shared Situational Awareness, Organizational Constructs, and Planning). From the analyses, key capability gaps are identified within each interoperability and cross-functional challenge.

The fundamental risk of not progressing towards interoperability in these functional areas is coalition forces that are ill-equipped and ineffective against the challenges they may face in the world to come.
PART I - CONTEXT

1. PURPOSE
This document envisions the future operating environment for the purpose of strategic and operational level interoperability development (Part I—Context) and identifies the key functions and capabilities likely required to operate effectively within a future coalition (Part II--Application). Within the MIC, this document informs internal strategy development and the Quadrennial Gap Analysis. It is meant to stimulate thoughtful debate and serve as a catalyst for the presentation and consideration of interoperability ideas. National militaries and agencies may also use Future Coalition Operating Environment: Interoperability Challenges for the Future to influence their own concepts and doctrine to assess potential integration requirements and opportunities within their organisations. The MIC will respect future analysis of other member states.

2. SCOPE
This document provides a framework for enhanced interoperability in the anticipated future coalition operating environment of 5-20 years in the future based on the lead nation principle at the operational and strategic levels of coalition employment. It outlines the essential military implications of future trends and the key functions and capabilities that MIC nations may need when conducting future coalition operations. It also identifies the increasing need for the implementation and promotion of an advanced Comprehensive Approach.

3. ASSUMPTIONS
When outlining and assessing the issues in this paper the following general assumptions have been made:

- The MIC nations have significant global interests and will wish to remain leading actors on the international stage.

- In the future, adversaries will seek asymmetric advantage to exploit our weaknesses, and they are likely to use a different logic than our own.

- MIC nations will generally act with others who share common interests. As such, operating with partners and allies in military coalitions will be key to success during operations.

4. VISION FOR FUTURE COALITION OPERATIONS
To be successful in the complex and shifting operational environment anticipated in the future, coalition forces must improve the speed and quality of decision-making and enhance their unity of effort, while acting on a high level of flexibility. The end state and a common strategic vision are to be shared initially. The future coalition operating environment must be one in which interoperability has been contemplated and addressed well in advance. This requires an investment in several fields including interoperable capabilities, common doctrine development, and coalition planning, exercises, and experimentation.
All instruments of national power may be employed in future coalition operations. This requires a comprehensive approach that must be developed, understood, exercised, and technically and legally enabled. Underpinning this approach is the intent to operate as a case-oriented compilation of a united, net-enabled force; a force which is interconnected, interoperable, and able to share situation awareness with all relevant actors. Standardised or commonly understood data definitions, metadata, protocols, operating procedures, tactics, techniques, and procedures, and unclassified software can enable enhanced interoperability. Commercial off-the-shelf or government off-the-shelf web and basic core services can lead to lower costs and shorter development and acquisition timelines. Greater use of these readily available products should be a common denominator in future multinational systems and software acquisitions. Security access, reliability, and vulnerability challenges must be addressed as reliance on commercial off-the-shelf and government off-the-shelf products increases.

On the basis of different political mandates on the use of a comprehensive approach, future coalitions must be able to conduct rapid mission and end state analysis for the purpose of generating commander’s guidance and enabling decentralised execution, while employing compatible doctrine, command, and operating concepts as much as possible. The ability to share information in a collaborative environment and to quickly adapt to changing situations continues to be essential. MIC nations aim to establish compatible processes and complementary capabilities in the areas of coalition force preparation, logistics, CIS, command and control, and plans and operations. Thus, the conditions necessary for success in the future coalition operating environment revolve around a coalition organisation characterized by information flows that are not unduly constrained, where the key parts of the organisation share situational awareness, and where acts of individual parts may be self-synchronized. Team building and confidence are also key aspects.

A lead nation coalition capability to achieve timely and precise coalition effects, in all terrains and against unpredictable and adaptive adversaries, must also be identified and developed on a case-by-case basis. To this end, legal, cultural, and other impediments to information sharing, intelligence gathering, and dissemination across mission partners must be resolved. Use of North Atlantic Treaty Organisation (NATO) doctrine among MIC nations is seen as an appropriate enabler1.

To effectively move towards the MIC vision outlined above, the following lines of development, as a minimum, must be addressed:

- **Leadership Development.** Focused leadership development on coalition planning and decision-making with emphasis on involvement of all relevant actors
- **Command & Control.** An agreed-upon clear and robust C2 structure
- **Education and Training.** A practical education and training programme which emphasizes multinational and interagency aspects of coalition operations

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1 It is essential that Australia, as the only non-NATO MIC nation, has access to NATO doctrine so that they can align their doctrine where appropriate.
• **Doctrine.** Common and shared operations doctrine among MIC nations using the NATO doctrine where deemed appropriate

• **Logistics.** Preparation, deployment, sustainment, redeployment, and reconstitution capability and capacity that facilitate successful coalition operations

• **Knowledge Advantage.** Knowledge advantage is the effective tailoring and rapid updating of individual information requirements through common situational (including cultural) awareness and understanding at all levels

• **Shared Situational Awareness.** Command systems and procedures that promote continuous shared understanding of mission, intent, guidance, and progress

• **Organisational Constructs.** Flexible, adaptive, and agile organisational constructs which allow the coalition to respond to the complexity of the environment

• **Planning.** System, procedural, and organisational constructs that facilitate rapid, continuous, and near simultaneous consultation and planning

Operating as part of a Comprehensive Approach will be necessary. As such, enhanced functions will be required to address the integration and coordination of plans and actions across government departments within and across nations at both strategic and operational levels (note: MIC nations use four different languages).

5. **MAJOR TRENDS OF THE COALITION OPERATING ENVIRONMENT**

This document uses a strategic trends approach to describe a future coalition operating environment. The trends discussed below were selected based on a review of national and international futures documents. This approach goes beyond merely identifying the likely future military threats deriving from security concerns against which coalition forces will have to posture. Rather, it seeks to identify key developments across the geopolitical landscape that will shape the wider context within which coalition forces may have to operate. Defence decisions about how to posture in relation to these issues are considered over time, with the appropriate balance of judgment and risk, and take time to form and implement. This is appropriate, considering that the consequences of these strategic decisions tend to endure for some while. Nevertheless these trends can create neither a complete nor a definite picture of future developments. They merely help to gain a picture of expectations and to inform the decision-making process without being its sole basis. Therefore the existence of alternate futures has to be considered whenever discussing the Future Coalition Operating Environment.

Trends in the future coalition operating environment are arranged into the following eight general categories: **Demography, Globalisation, Natural Resources and Energy, Climate Change, Cultural and Communication, Social and Political, Economic, and Science and Technology.** These eight generic trends combine to create mounting challenges for future coalition operations and have implications with regard to the conditions for future security policy, as well as for the design and employment of military forces. Although certain trends may appear predictable, clear predictions concerning future
developments remains impossible. Shocks and strategic surprise remain certain. Coalition nations must therefore be prepared to anticipate shocks that may significantly alter the pace and/or the trajectory of these global trends and to adapt accordingly in a timely manner.

5.1 Roles of a Coalition in the Future Environment

MIC nations will likely to be required to lead coalitions in the future multi-polar world, with some nations more likely to lead in specific areas.

One of the key presentational advantages of operating as part of a coalition is that providing their actions are decisive and unified, they often give a level of both acceptability and legitimacy to military action within the international framework during ‘intervention’ type of operations.

Another clear advantage for the participants is that large coalitions increase the sharing of the burden of military operational fiscal costs among several nations. Different nations can contribute appropriate available expertise and niche capabilities to operations using individual nations’ military strengths whilst taking less risk by not exposing individual weaknesses. Due to individual political circumstances some nations will be able to provide a full range of combat capabilities whilst others may only be willing or able to provide limited supporting functions to a campaign.

Over the past century western coalitions provided defensive forces as a deterrent against other state actors or were used for war fighting roles in conflict. Whilst these functions remain, in the future it is likely that military coalitions will play a greater role in assisting regions affected by large-scale natural and humanitarian disasters.

Security policy and military capability implications:

- The need for greater understanding between MIC nations on individual doctrine and force preparations used in planning for operations.
- Clear and continuous knowledge of each nation’s capabilities in specialised areas, including perceived strengths and weaknesses and potential capability gaps.
- MIC nations should aim to operate and train together in a wider range of roles from war fighting to disaster relief and humanitarian missions.
- Operating with partners and allies in coalitions will be key to successful operations, but may add complexity
- Need to enhance capacity for intelligence sharing.

5.2 Demographic Trends

The current global population of 6.8 billion people will reach 7.6 billion individuals by 2020 (8.3 billion by 2030). Future population growth will mainly take place in the less developed countries. The small amount of population growth projected for more developed countries will be in the United States and Canada. The geographic imbalance in population growth will only intensify in the
upcoming years. This trend will most likely be nonlinear mainly due to possible variations as a function of changing fertility rates. Africa is the region with the highest birth rates and the largest percentage of population growth. Even after declines, Africa’s birth rates remain high and its population is very young.

Growth of the mainly Arab countries of the Middle East and North Africa has slowed as a result of major changes in marriage and childbearing in recent decades (e.g. Lebanon, Egypt, Iran and Tunisia).

Asia is projected to grow, despite substantial declines in births rates in many eastern Asian countries (e.g. Taiwan, Japan, South Korea – all of which have aging populations). These countries face the problems of population declining and extreme aging in their societies. China's population is still increasing but a decline is projected for 2030. China may also see a significant ageing in its population as a result of its one-child policy. The strongest absolute population increases will likely occur in India.

Extremely low birth rates in most European countries have intensified the discussion about population decline. Europe’s population is projected to decline by 2015. Russia in particular has to deal with a declining population due to low fertility rates and a disproportionately high male mortality rate.

Although the world population is aging, the proportion of the population aged between 15 and 24 in less developed countries will continue to be higher than in more developed countries. This youth bulge has implications on job opportunities, youth expectations, opportunities for development and economic growth and consequently has implications for migration and security issues.

Of particular importance is a general trend toward urbanisation. By 2030, more than 60 percent of the world’s population is expected to live in urban areas. Most of the increase in world population will be attributed to huge and growing mega-cities and migration from less-developed to more-developed regions of the world. Mass movements of humanity may result in political and social strains within and among developed and developing nations.

Security policy and military capability implications:

- Increasing risk of humanitarian catastrophe caused by a mixture of demographic trends and the inability of authorities to fully cope with population growth and urbanisation, the scale of which would likely require military support to civil authorities.

- Increasing potential for conflict as a consequence of a growing global populace, especially in developing regions and countries with large numbers of disenfranchised youth, the scope of which may result in increasing military engagements.

- Increasing potential for combat in urban and littoral areas.

- Demographic challenges will impact on future military recruitment practices in some coalition countries.
5.3 Globalization

The mega-trend process of Globalisation (which revolves around the transmittal of capital, trade, intellectual property, movements of persons and migration flows, economic activity, wealth and resources) represents a global network of physical linkages that are essential for the access and use of the global commons. These links join all the major centres of trade, finance, intellectual endeavour, energy production, logistics and markets. Much activity will occur in the global commons – the domains or areas that no one state controls, but on which all rely. They also, whether in the maritime, air, cyber or space arenas, either follow routes that pass through vulnerable chokepoints or are dependent on specific elements of technology such as satellite ground stations and internet server nodes. The control and security of the effective means of delivery of globalisation are a major security concern of the major powers.

Globalisation is likely to be increasingly driven by the consumer requirements of the rapidly developing rising powers as well as by the existing markets in the developed world. However this will require continued access to resources, especially those of energy, water, food and intellectual capital. The potential exploitation of developing and failed or failing states by more wealthier or aggressive nations for resources is likely to become a source of conflict. International crime is also an unwelcome facet of globalisation; which will rise to levels significantly above the current level of $1 trillion per annum; along with corruption it will continue to destabilise weaker states and regions.

Security policy and military capability implications:

- Access to armaments is easier; this makes control over stocks, transfer and exchanges more and more difficult. Irregular actors can get easier access to high end equipment. This allows both state and non-state entities to challenge established norms as well as stronger opponents on an equal basis.

- Containing the effects of crisis; in a globalised world crisis will need to be contained and ever more controlled by various military and non-military means as the ramifications of these crisis will escalate often due to globalisation itself.

- Nuclear and WMD proliferation risks will increase through globalisation.

- Need to consider the involvement of actors such as PMFs (private military/security firms/companies), which, if not strictly controlled can represent new sources of instability and become nothing more than unwelcome militias.

- In a globalized world, particularly in space and cyberspace, private companies must be considered.

- Globalised or global issues will call for global responses, global influence strategies, stronger alliances and coalitions, stronger interoperability initiatives (shared vision, shared means and assets, and optimised interactions between actors in theatre).
5.4 Natural Resource And Energy Trends

Sustained global development will involve a delicate balance between the physical/ ecological limitations of natural resources and the desire among numerous government and non-government institutions to utilise those resources for economic growth. Access to resources and stable pricing will continue to be a primary concern for these institutions. Competition for strategic resources may increase due to a growing global appetite and decreasing availability. Currently, the global demand for oil is increasing an average of 1.7 percent annually with resources estimated to last approximately 35-40 more years. An increasingly elaborated discussion concerning when the time the oil peak might occur reflects the difficulties and ambiguity of a complex topic. By the 2030s oil requirements could go from 86 to 118 million barrels per day. The central problem in the near term is a shortage of drilling platforms, engineers and refining capability. Additionally, world-wide supplies of resources for nuclear power, an important energy provider, are currently estimated to last until 2060, depending on the adopted technological standard of future plants. Industrialised nations will continue to research alternative energy sources while being actively engaged in securing resource-rich regions and corresponding lines of communication. Whilst these alternative energy sources (bio-fuels and renewable energy) could generally meet higher demand for global energy, competition is likely over the finite amount of suitable agricultural land available to grow fuel related crops.

The supply of gas, either piped directly, or as liquefied natural gas will be of increasing importance, especially as developed states try to meet the challenges of climate change.

Continued economic development and urbanisation could create shortages of food and fresh water. Demographic trends and water shortages could merge to create a growing number of people without sufficient access to fresh water. Food and water will become increasingly valuable and, for the first time in some regions, a scarce resource. The number of nations facing water shortages (currently, North African, Near and Middle Eastern nations) is expected to increase from thirty-one up to forty-eight (including India and Northern China), impacting up to 35 percent of the global population. Additionally, increased mono-cultural agriculture practices, deforestation, intensified livestock breeding, and over-fishing of oceans and rivers may threaten global food production.

Security policy and military capability implications:

- Environmental and resource developments may widen the distance between locations of origin and consumption for fossil energies and food. As a consequence, the associated means and lines of communication could become increasingly important strategically. Some common energy markets might disintegrate. Economically integrated regions might be driven to find alternative ways to jointly access required resources.

- Those regions will integrate these strategic needs into the respective political approaches. Military forces may be called upon to lead peacekeeping or peace enforcement initiatives including securing global lines of communication associated with critical resources.
• Maritime boundary disputes and energy supplies will become critical factors in maintaining economic stability, especially within the EU, China, Japan and Asia. Other energy resources and the critical infrastructure that supports them will be of equal importance.

• Natural disasters, coupled with governance structures ill-designed to absorb environmental pressures, particularly in less-developed countries, may increase the likelihood for military employment at the lower end of the range of military operations.

• Potential for conflict due to uneven distribution of resources, environmental hardships, and a lack of socio-economic prospects is likely to be most significant in an area stretching from Africa, to the Near East, and into Central Asia; parts of Central and South America may also be impacted.

• Increasing water and food shortages, in combination with environmental problems and effects related to global climate change, will likely cause significant migration movements worldwide. Some nations will regard the security of their water and food supplies as straightforward survival and will devote resources to defend, secure or acquire them. These trends will require constabulary and security-related military options.

• Confluence of demographic and natural resource trends increases the potential for open conflict both within societies and nation-states as well as between societies and nation-states.

5.5 Climate Change

Climate change has two major implications: First, the environment will change, with increased desertification, melting ice caps, reduced water run offs and more severe weather events will make the military operating environment more extreme; secondly, it will directly effect large numbers of people, many of whom who live in regions and states that will not be able to adapt quickly enough to avoid the worst climate change effects. This will further exacerbate the stability of states; especially those that are already vulnerable to other factors.

Climate change may be exacerbated by continued economic development and urbanisation, creating shortages of food and fresh water. The increasing likelihood of droughts in Australia and New Zealand, flooding in Latin America and Europe, coastal erosions and hurricanes in North America, and desertification in parts of Africa may create a cascade of natural resource issues. Increased mono-cultural agriculture practices, deforestation, intensified livestock breeding, and over-fishing of oceans and rivers may threaten global food production.

Measures against climate change might be delayed by managing other challenges of short-term priority (i.e.: shortages of resources not as apparent due to reduced demand during a global financial recession).
Security policy and military capability implications:

- This will create sources of instability that will need collective and reactive interventions to reduce the level of violence and provide a secure environment in which to tackle the problem in the affected regions.

- A greater understanding of the climate change global stress zones by the military is needed to be better prepared.

- Prevention of the breakdown of governance in many of the deteriorating regions.

- Potential for flooding in littoral and riverside areas may necessitate coherent preventive measures, as well as posturing for disaster relief.

5.6 Cultural and Communication Trends

The ‘Global Village’ is becoming more inter-connected with many developed nations becoming more multi-cultural in their population make-up. Racial and cultural intolerance of others is likely to remain an issue throughout most of the world. The effects of globalisation such as omni-present media, changes in the social fabric of populations, an individual's increased access to information, and urbanisation have already triggered culturally and religiously-motivated movements at local and regional levels. These cultural and religious movements emphasise ethnic particularities and the preservation of independence and cultural traditions. These often have global reach. The increasing trend towards cultural fragmentation based upon sub-cultural identities may clash with opposing movements attempting to force unification. There will be a need to define what to defend and what are considered key national values (including what to promote and preserve).

Certain countries may witness a growth in fundamentalist groupings because of political and economic orientations (e.g., largely authoritative governments, social and economic imbalances, widespread corruption, religious fundamentalist movements, etc.). These countries may increasingly rely upon their diaspora communities in Europe and other regions to influence other governments and populations. Existing mechanisms of crisis management, arbitration, conflict prevention, and containment may be insufficient to overcome the security challenges associated with current cultural trends. Revisions to these mechanisms may require changes that address the fading distinction between war and peace, the legal status of non-state actors, and the means to effectively deter terrorists and religious extremists.

Security policy and military capability implications:

- Non-state and state proxy actors will likely use non-military, asymmetric methods, and irregular warfare to defend their culture and identity or advocate change;

- Organised militaries will likely continue to have difficulty responding effectively to violence perpetrated by non-state actors;

- Conflicts deriving from identity issues regularly require ‘whole of government’-approaches rather than military solutions alone;
• Concepts that address national and transnational political and religious fundamentalism must be synchronised among coalition partners;

• Multinational collaboration tools that identify and interdict the global financial and logistical support of radical non-state actors are needed;

5.7 Socio-Political Trends

A dominant socio-political trend will be a dynamic tension between the continuing struggle for democratisation and the desire to maintain alternative systems of governance. A further complication is that individual and personal interests are likely to endanger collective interests. Democratic criteria other than free elections and a representative government should be taken into account when assessing governments around the world (e.g., basic human rights, accountability of public officials, good governance, status of women, status of minorities, responsiveness to needs of the populace, etc.). Such an expanded assessment would account for the various levels of social development that exist across the globe. Countries will continue to progress and evolve at different paces and in different directions. Tendencies toward modernisation and individualisation will contrast with traditional structures and could produce varying results that span all social functions.

Politically, we exist in a strongly integrated and interdependent multi-polar world, consisting of existing and rising superpowers, which may become more predominant. Its manifestations may range from cooperative to confrontational, leaving it undetermined whether this multi-polarity will lead to more or less international stability and order. Non-state actors, fuelled by their technological and economic means, will possess capabilities to challenge existing governments. Security will likely be a growing business, as corporations and governments operate in dangerous areas with a concomitant expansion of security risks.

Security policy and military capability implications:

• Prominent fault lines between disparate societies exist along Europe’s southern/southeastern borders;

• Imbalanced intra-societal and inter-societal developments may drive migration as a consequence of the difference in future possibilities and chances;

• Emerging new forms of security provision by non-state or state proxy actors may possibly challenge existing political structures (notably outside the area of influence of the superpower states);

• Interventions by the international community in failed and rogue states will increasingly focus on creating a basic security framework while promoting developments.

5.8 Economic Trends

Economic development will remain an important impetus for globalisation with unrestricted and uninterrupted use of cyberspace now vital for the global economy to function. The dynamics of the global economy will depend on whether the trend towards blurred economic boundaries continues
or whether a resurgence of strong nation-states will forge a return to traditional nation-state economic relationships. (i.e. a global economy versus global governance). The increasing complexity and speed of the global economic system combined with limited resources and markets may provide more significance to economic and resource alliances and blocs. Competing for access to markets and influence is increasingly becoming a joint governance-business issue, while traditional and international economic mechanisms are less effective. Another tendency includes the regionalisation of trade and investments in an effort to protect and strengthen regional equities. Complementing such economic global trends are changes such as continued weakening of the industrial sector and a strengthening of the service sector in most MIC nations. Changes are also underway within specific sectors that indicate an increasing need for a technically-savvy work force and a shift towards functionally-organised structures (most notably, infrastructure, information, and communication services).

Security policy and military capability implications:

- Potential for opportunities as well as risks concerning the continued globalisation of the economy.
- Possible marginalisation of individual economic, social, and political actors, including a potential for reactive violent behaviour.
- Reduced military budget for most MIC nations. Conflict prevention and management will require innovative risk mitigation tools. Likewise, there is an increased need for mutualisation and interoperability efforts in terms of common doctrine and capabilities.
- Extreme environments (i.e. space, deep underground, Deep Ocean, and Polar Regions) are increasing in economic, and therefore strategic, significance.

5.9 Science And Technology Trends

Over time, developments in science and technology and the defence-related capabilities from such developments have had a dramatic impact on the outcomes of military operations and the manner in which such operations have been conducted. The disruptiveness of both mature and emerging technology is especially worth noting. Rapid, revolutionary and novel scientific discoveries that are transferred or applied by cultures or societies (including military, business, economic) in unexpected, innovative ways can have the unanticipated effect of disrupting the status quo. This scientific and technological development can sometimes be unexpected and non-linear, triggering new and revolutionary changes and therefore influencing the way humans act and react.

Automation, customisation and miniaturisation support many technological breakthroughs that contribute to defence technology. Areas of interest include nanotechnology, microelectromechanical systems (MEMS), information systems and sensors, networking technology, biotechnology, new energy/power technology and cognitive/behavioural/social sciences. As the positive trends in these developments will continue, so will the negative and perverse application by today’s and future adversaries.
Security policy and military capability implications:

- Technological superiority can be as a weakness.
- Scientific and technological advances will more and more be driven by massive investments of private and multi-national companies instead of governments.
- COTS are available to everybody, including adversaries.
- High-tech and sophisticated systems could be neutralised by low-tech solutions.
- Potential of new and emerging science and technology has to be recognised at an early stage in order to be on the leading edge of technology.
- Energy concepts for ‘green’ fuels and efficient energy generation need to be developed.
- Trend towards more complexity needs to reflect the possible simplicity of an adversary.

6. POTENTIAL ADVERSARIES

Over the next 5 to 20 years there will be a changing balance of Global Power. Easiest to assess are the State Actors who may wish to oppose or, at the very least, challenge the current status quo. Failed and Failing States are likely to increase in number and will present varying challenges, few of which will be able to be ignored. Of greater concern are the Chronically Fragile States as it will be difficult to predict if, where and when intervention may become necessary to avoid a bad situation becoming considerably worse. One of the themes these states have in common is that the timescales the international community may be given to counter these threats will be short and the outcomes unpredictable. In the past 20 years the growing number of Non-State Actors, in various guises that have emerged as a new threat to all of the MIC nations (and their interests) as well as to all NATO member states have created a raft of challenges that will continue to expand and tax national governments for the foreseeable future. These actual and potential 4 groups of adversaries are explained in greater detail below.

6.1 State Actors

There will be residual challenges from Russia and even within Europe. There is likely to be little fundamental change in the strategic balance within the next 5 years. China will be one of the rising powers, but the US will first and foremost be the global hegemon. Some states may exploit alternative strategies (i.e.: hybrid strategies) to leverage their interests, evading direct competition with US (or other western) military power.

However, in a decade’s time, a shift towards multi-polarity will be underway. The defence expenditure in China is rising in the mid-term. China’s economic power will be the predominant influence in Asia and its influence will be global. China will maintain its status as a rising power, but is likely to feel constrained by access to resources, most crucially food and energy. The Chinese are likely to seek to secure lines of communication to vital resources and will devote a considerable effort to ensure their viability. China is looking to Africa, Latin America and Russia for resources and
influence, but might not hesitate to confront other powers if its interests are challenged. It will use all the elements of its national power, from state controlled commerce to influence over its Diasporas. Current activity in global computer networks and space already point to asymmetric capabilities that could strike at western vulnerabilities; countering these threats may become enduring defence tasks. Moreover, regional alliances may arise that could either confront or contribute to MIC-led coalitions.

The UN, World Trade Organisation, World Bank and IMF will increasingly be influenced by the rising powers. These states may then take a wider role in global security, consequently, the West may have to accept that it might not so easily achieve consensus (and thereby UN legitimacy) for its desired courses of action.

The upcoming global peak oil will lead to an extraordinary boost in power, for a limited period, for the exporting states. These states may use this window of opportunity to try and gain advantage by trying to influence the international system.

6.2 Chronically Fragile States

The changing international environment will continue to put pressure on the modern state system, likely increasing the frequency and severity of the challenges associated with chronically fragile states. These states are often a perfect breeding ground for radicalism and extremism. In some cases these are nuclear-armed or are critically important to enduring coalition interests. Over the course of the next several decades, conflicts are at least as likely to result from state weakness as from state strength.²

6.3 Sliding Powers – Failed and Failing States

States that cannot cope with the negative influences of globalisation, demography, climate change and resource shortages will risk collapse. Poor governance, economic deprivation, criminal expansion, and social inequality, already prevalent in parts of Africa, Asia, and Central America, are likely to spread further. Many failures will be accompanied by substantial outbreaks of violence. All MIC nations have large non-indigenous communities, particularly from South Asia, Africa and Eastern Europe (including Turkey), which provide us with a direct interest in either securing the stability of these regions or mitigating the consequences of any conflict.

6.4 Non-State Actors

Extremist non-state actors will present significant challenges. They are likely to range from state proxies such as Hezbollah through to major companies, to extremist interest groups or even transnational criminal gangs. They could employ a wide spectrum of military capabilities, albeit at limited scale, but they will nevertheless be capable of innovative tactics that exploit inherent coalition weaknesses. The merging of state proxies, extremist ideologies and even criminal intent will make extremist non-state actors hard to counteract.

7. ENDURING DRIVERS FOR THE CHARACTER OF FUTURE CONFLICT

Since the demise of the Iron Curtain, the use of MIC nations’ armed forces in conflict has broadly fallen into 2 overlapping clusters: acting as a force for good, and addressing new threats of WMD and Islamic extremism. This has resulted in a wide range of operations and needs but with a smaller footprint. Islamic extremism is likely to be the main issue for the coming decade. That said, homeland security, the Middle East and South Asia are likely to remain the main strategic areas of focus.

7.1 Weapon and Technology Proliferation

The consequences of nuclear proliferation are typified by ongoing international anxiety about Iran and North Korea, with the risks of pre-emptive action, regional arms races and other countries reassessing their nuclear status. The era in which many states engaged in multi-tonne production, weaponization and stockpiling of chemical and biological (CB) agents is over and the number of countries with offensive CB programmes is likely to remain small. However, international terrorists are seeking to acquire CB weapons. Non-state actors’ interest in CB capabilities will be limited mainly to simple toxins and poisons, but they may still use traditional CB agents. Moreover, while their use of a nuclear device without state sponsorship is less likely, acquisition of sufficient radiological material to generate a so-called ‘dirty bomb’ cannot be discounted. It is likely that coalition forces may be operating against, or near, a state with a ballistic missile capability, with at least one permanent Joint operating base within range of ballistic missile attack. The spread of ballistic missile defence capabilities may deter some states from developing or acquiring ballistic missiles, but it is unlikely to deter the threat completely.

As Weapons of Mass Destruction (WMD) spread, more states are likely to weaponize systems, either to deter opponents or as instruments of power in their own right. While it can be expected that Iran will join the list of nuclear weapon states, states in Asia, the Americas and the Middle East might also strive to obtain nuclear capabilities.

Proliferation of other weapon systems will be widespread and this will fuel instability and conflict. Based on the time required to develop new weapons, the west is safe for the near term, however weapon superiority may not be guaranteed past 2020. This has profound implications on how the West can manage its security; emerging powers will counteract Western air power by decentralising critical infrastructure, using camouflage, concealment and deception, and by countering conventional power with asymmetric means. Asymmetry could be through both low and high technology strategies. For example, the Chinese will use conventional capabilities and niche technology. Its doctrine of High Tech Local War could counter Western dominance in technology with low technology approaches. One example is by targeting pilots and aircraft maintenance teams, directly or through their families, rather than the aircraft themselves. Another is developing the relatively sophisticated but asymmetric means to deny US dominance in space, but without entering the kind of symmetric space race that Russia tried to win against the US and ultimately failed.
7.2 Defense Exploitation Of Technology

Technology affects the way in which an actor is able to fight and in turn the way in which he chooses to do so. Technological advantage, proliferation and the natural cycle of countermeasures will continue. Any perceived Western technological edge is being rapidly challenged. Space technology is proliferating and the domain is now contested; computer network operations are also a daily reality, with both military and civilian applications, but systems may be susceptible in the near future to Directed Energy Weapons (DEW). Unmanned systems now promise to become increasingly capable and autonomous. But adaptation is not the preserve of developed states. Examples abound of seemingly inferior adversaries able to achieve tactical success beyond that suggested by their level of sophistication. Moreover, their rate of adaptation or tempo has been faster than technologically-advanced opponents; low technology has far less financial drag.

Technology will offer military advantage to those who can afford to develop or exploit it, but the vanguard of technological development is shifting away from the military to the commercial sector. Our acquisition process will be driven not just by what we want, but also by what is available and what industry wishes to sell. Our adversaries, including poorer states and non-state actors, will increasingly exploit low-cost, evolving or emerging technologies to gain asymmetric advantage. This may frequently be to our disadvantage, but it may also present opportunities for our countermeasures.

In people-centric operations influence is a key function, generating actionable understanding coupled with the ability to strike. Our ability to attack will, nonetheless, remain vital, and will require us to exploit newer domains such as space and cyberspace. Precision and discrimination are essential, in both time and location, implying the need for persistence. Only then will an adversary be held at a disadvantage, providing military options to a commander, though the route to success will be through timely integration and synchronisation of capabilities.

7.3 The Future Battlespace - Overlapping Environments and the Cognitive Domain

While the physical environments that our forces will operate in will retain their distinct characteristics, operations within any one environment will become increasingly dependent on capabilities designed for a different environment, because each environment will have ever-deeper overlap with the others. For example, the maritime environment can no longer be described in purely naval terms; it is a hybrid environment. Significant land masses are directly influenced from the sea, which stretches from the deep-sea bed, through to shallow coastal zones, including the air and space above those areas and inland, typically influencing fisheries, urban, industrial and agricultural areas. Global communication and trade routes criss-cross the oceans. The sea bed carries energy pipelines and fibre-optics communication cables. The surface transports global trade. Globalisation has thus driven each one of the traditional land, air and sea environments to be more strongly influenced by each other. Cyberspace and space will arguably knit what had been three

3 The First World War is a good example of a number of technologies coming together to change the character of warfare. Telecommunications: vastly improving tactical level coordination of, for example, artillery; railways enabled large amounts of men and materiel to be marshaled; armour made its debut, ending the prospect of another trench-bound stalemate; and air power made its first full contribution, revolutionising reconnaissance on the battlefield while Zeppelins and Gotha bombers conducted German attacks on distant cities.
very distinct environments and areas of responsibility into a more interrelated but complex whole. The future Battlespace will be more contested, more congested, more cluttered, more connected, and more constrained.

The cognitive domain is also becoming increasingly more important. The globalisation of information allows all actors, state and non-state, to wield an influence on the decision making process of democracy. To preserve or being able to maintain the right political conditions for military engagement is a mandatory precondition to the success of an operation, whether that be for a projection of power or direct use of coalition armed forces. To secure such a precondition, a democracy needs to develop an influence strategy aiming at persuading any allied, neutral or opposing decision maker that their objectives (and selected modes of action to reach their military objectives) and end state bear legitimacy and credibility whilst also being relevant and efficient. Before, during and after conflict the cognitive strategy is implemented within the field of comprehension and perception of individuals or groups, to contribute to the construction of a favourable and positive situation in either the national interest of the intervening state or that of the coalition.

This capability to exert influence on identified targets (civilian authorities, their closest advisors and other elements of the general populous) takes place within the environment defined as both a virtual and physical space, within which information is emitted, released, exploited and received. The term ‘information’ includes the information itself as well as the information systems used to exploit it. The various actors within a crisis or conflict intervene within this space, to support or counteract the selected and implemented strategy. What is at stake is not only the credibility of the coalition partners but also the indirect pillars of image, power and foreign policy instruments: diplomacy, economy, principles of armed forces employment, etc.

Misinformation, manipulation, misunderstanding, lack of information accuracy, and the loss of real meaning are all key parts of the ‘battle of perceptions’. This ‘war of information’, if not won by the coalition, can severely disrupt our strategy of action, especially our military strategy of action. Today’s wars involve the clash of influence strategies between parties which aim at impacting perceptions. The minds of various populations, be they groups or individuals, and whether they are directly involved by the conflict or not, have become targets, in order to influence decisions, tarnish or lessen what has been declared as an achieved success or a victory. We have entered the battle of perceptions and winning it has become a key factor to the success of military strategies.

7.4 Legal Framework and Challenges

Western legal and social norms, which are essential to the legitimacy of our actions, will guide those actions, but will not guide the actions of many of our adversaries. Coalition action will remain bound by our own Western legal norms. This will include careful discrimination between combatant and non-combatants, the minimization of collateral damage, and careful control and precision in the use of force. All these practices, conditioned by military necessity, will continue to make current and future operation enormously difficult and challenging. If the demands for precision weaponry and the complementary need for greater and more accurate target intelligence continue to increase future operation may become much more costly.
There are also differences between MIC nations on issues of treaties and international protocols need to be defined and understood as they will create friction when operating together as a coalition (e.g.: differences in national stances on ROE, cluster munitions, land mines, etc).

Security policy and military capability implications:

- Legal frameworks impact on our military action (proportionality, target discrimination, and ethics, etc.).

- Legal challenges may be raised against the use of novel weapons and systems, such as Unmanned Aerial Systems, Directed Energy Weapons, non-lethal weapons and cyber operations.

8. INTEROPERABILITY CHALLENGES

The future coalition operating environment will be as volatile, uncertain, complex, and dynamic as it is today, if not more so, driven by the ascendant global trends previously discussed. In light of the likelihood that MIC nations will increasingly operate with interagency and non-governmental organisations, these trends create several interoperability challenges for coalition nations. These coalition interoperability challenges include:

- **Policy.** Each nation, whilst part of various individual coalitions, has different military policies and priorities based on their individual national needs. This exacerbates the challenges of interoperability as they are often beyond the gift of military personnel to change. As such it is important that each nation understands the key national policy differences in order to best mitigate the risks to the operational effectiveness of the coalition.

- **Procedures.** NATO procedures are often the most accessible and widely used ‘standard’ procedures for most MIC nations (this is not the case for AUS or certain parts of the US military (e.g.: PACFLEET). Consideration should be given to further expand the usage of these procedures to other nations where appropriate. Individual national procedures, particularly at the operational and tactical levels of operation, should be avoided whenever possible during coalition operations.

- **Facilities.** Facilities exist in each nation to support the national interest which can, in some circumstances, be used for coalition purposes. Clever and efficient shared usage of military (and appropriate civilian) facilities can enhance the overall strength of the MIC as a fighting and unified military force.

- **Compatibility.** Facilitate the compatibility of organisations, doctrine, training, technology, and equipment standards among coalition militaries.

- **Capabilities Integration.** Improve awareness of the disparate operational force capabilities and degrees of interoperability among nations and integrate these capabilities in a cohesive manner that supports coalition objectives.
• **Information Sharing.** Improve information sharing among national military systems within the constraints of national policy.

• **Interagency Coordination.** Establish policies, procedures, organisations, and systems to facilitate successful interagency coordination and synchronisation.

By focusing current multinational efforts on interoperability challenges, the likelihood of meeting future coalition objectives is increased. The latter four challenges identified above are used as focal points in FCOE Part II to orient multinational capability development analysis in order that coalition forces are better prepared to meet the challenges of the future.

9. **CONCLUSION**

Part I of this document establishes the context for future coalition operations and suggests that MIC nations will be participating in operations that span the full range of military operations. Trends that characterise the coalition operating environment of 5-20 years and beyond possess inherent risks, but also new possibilities for overcoming present day challenges. Environmental trends reflect global climate change, natural disasters, and the increasing importance of dealing with extreme environments. Other trends, associated with the behaviours of individuals or isolated groups, are driven by proliferation activities, religious fundamentalism, or non-state political movements. Finally, large-scale regional trends, such as demographic unrest, migration pressures upon the global economy, or turmoil erupting out of failed or rogue states, will likely impact entire societies and large portions of the global populace. Operating within the future environment created by these trends will require MIC nations to focus development efforts upon four interoperability challenges: **Compatibility, Capabilities Integration, Information Sharing, and Interagency Coordination.** Part II of this document analyses these challenges along the lines of development identified in Section 4.
PART II - APPLICATION

1. PURPOSE

The purpose of Part II of the Future Coalition Operating Environment: Interoperability Challenges for the Future is to look at the key challenges and what is required to operate effectively within a future coalition. It looks beyond key functions and capability areas, and addresses the very real practical challenges of interoperability. It highlights areas that the MIC nations should consider addressing (or at least be cognisant of) when planning to operate jointly. Within the MIC, this document informs internal strategy development and the Quadrennial Gap Analysis. It is meant to stimulate thoughtful debate and serve as a catalyst for the presentation and consideration of interoperability ideas at all levels of interoperability, from tactical to strategic.

The MIC Strategic Guidance Document (SGD) 2010 states that the main objective of the MIC is to influence the development of operational practices to enable more effective coalition operations, mainly by addressing their interoperability issues. FCOE Part II analyses four critical interoperability challenges identified in Part I against nine lines of development. These lines of development are directed at enhancing the awareness of the disparate capabilities which nations are able and willing to commit, as well as improving their degree of interoperability. Part II includes analyses of two cross functional challenges (Strategic Communication and Legal Requirements) which were derived from the Strategic Guidance Document.

2. INTEROPERABILITY CHALLENGES AND CONSIDERATIONS

2.1 Compatibility

Challenge Description

The military forces of the MIC nations should be able, without significant modification, to train and operate with each other’s procedures and equipment. This is a goal not easily realized since it must include compatible processes and interoperable capabilities in many areas: coalition force preparation, logistics, information systems, command and control, and planning, while national resources are constrained. Additionally, compatibility in these various areas will often be a critical supporting step to the achievement of capabilities integration among MIC nations. Challenges in compatibility span a spectrum from the commonality of supply and equipment to the compatibility of task or process accomplishment.

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4 Compatibility, Capabilities Integration, Information Sharing, and Interagency Coordination
5 Leadership Development, Command and Control, Education and Training, Doctrine, Logistics, Knowledge Advantage, Shared Situational Awareness, Organizational Constructs, and Planning
6 Interoperability: the will, common understanding and ability of coalition partners to bridge differences in culture, organisation, procedures and technology to effectively and efficiently cooperate towards achieving common goals

Military interoperability: The ability of military forces to train, exercise and operate effectively together in the execution of assigned missions and tasks (NATO AAP-6 ed. 2010).

Force interoperability: The ability of the forces of two or more nations to train, exercise and operate effectively together in the execution of assigned missions and tasks (NATO AAP-6 ed. 2010).
Analysis of Compatibility via Lines of Development

- **Leadership Development:** Leaders must become accustomed to working in coalition military headquarters to become comfortable and effective while serving with their military counterparts. They should have an understanding of coalition partner capabilities. Leaders must have opportunities early and often in their careers to develop these skills.

- **Command & Control:** The use of appropriate tools of liaison between several nations is a critical factor for the success of coalitions. The efficient use of “Liaison Teams” at the appropriate levels should be established as one of the training objectives of multinational exercises. Further, sufficient numbers of liaisons with the appropriate level of rank and experience need to be provided and equipped with communications, protection, and transport. Existing procedures that support compatibility in C2 and a common operating picture should be used in exercises and in operations.

- **Education and Training:** Minimum standards for Professional Military Education should be established among MIC nations, as well as criteria for assessing and monitoring the educational and training programmes’ ability to meet operational requirements. National education and training programmes should emphasize multinational aspects of coalition operations, including cultural preparation to operate within multinational environments (headquarters, staffs, units).

- **Doctrine:** Many interoperability issues arise from misunderstandings due to language, idiom, and doctrine. NATO doctrine is an example of multinational doctrine that is designed to minimize misunderstandings.

- **Logistics:** Units should be adequately equipped or prepared to provide logistical and administrative support to attached joint, coalition, or multinational forces. MIC nations should adapt their plans for development of national-level logistics automated systems that support logistics C2 with the intent to standardize so that information is shared and common reports produced.

- **Knowledge Advantage:** Knowledge Advantage is supported through committed and mutually-productive organizational relationships, extensive networks with key organizations outside the military and other government contingents, and effectively utilising all available information sources. In this regard, developing technology platforms that enhance interoperability and promote the timely passage of relevant information is important.

- **Shared Situational Awareness:** The development of compatible equipment and processes is required to support rapid consultation and planning. Senior leaders need to be aware of relevant strategic-to-tactical activities conducted in the information environment, following intelligent screening. A majority of degrade/counter/amplify activities consists of actions such as flexible deterrent options, force movements, distribution of aid. While tactical in

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9 Such as the Coalition Logistic Handbook or the Coalition Health Interoperability Handbook
10 ABCA Report Number 042, p. 5-6.
their nature, these activities can deliver a strategic message and therefore should be part of
senior leader information on effects in the information environment.13

- **Organizational Constructs:** Organizational designs should be created to accept compatible
  national contributions without modification. Within military segments of the coalition,
  nations should establish a minimum level at which multinational formations can effectively
  be used.14

- **Planning:** Acceptance of a baseline planning process and compatible tools facilitate coalition
  operations. Additionally, development of compatible security clearance and information
  release protocols to facilitate rapid consultation and planning is necessary.

### Key Capability Gaps

- Standardization
- Common lexicon for military concepts, doctrine and operations
- Common Rules of Engagement (ROE) appropriate to an operation
- Secure computing / voice / video capabilities among coalition members
- Utilization of existing services and support doctrine15 in training and exercises
- Common training
- Common tools for command and control

### 2.2 Capabilities Integration

**Challenge Description**

Whereas **Compatibility** addresses the ability of coalition partners to use each other’s equipment and
processes, **Capabilities Integration** addresses the coordinated and cohesive employment of nations’
complementary capabilities for effective operations. Capabilities Integration:

- Highlights the burden sharing of responsibilities amongst nations;
- Provides participating nations a flexible tool to support the ultimate goals of the coalition,
  while minimizing the impact of domestic constraints and limitations;
- Helps effective and efficient employment of nations’ scarce resources;
- Addresses possible coalition capability gaps in a Comprehensive Approach framework;
- Enhances the efficiency of force generation and force preparation processes.

The effectiveness of coalitions rests with the political will to share and pursue common objectives as
well as the extensive integration of capabilities, which assorted nations are able to put in place. Due
to individual political circumstances some nations will be able to provide a full range of military
capabilities whilst others may only be willing or able to provide limited contributions to a campaign.
Furthermore, different nations can contribute appropriate available expertise and niche capabilities
using individual nations’ military strengths whilst taking less risk by not exposing individual
weaknesses.

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14 Recent experience indicates that in high intensity operations the company is the lowest level for interoperability: platoon level
  and possibly lower may be possible in more permissive circumstances. NATO JALLC Observation, “Lowest Level Echelon at
  which Multinational Interoperability Can Reasonably Be Achieved,” 15 April 2009.
15 Such as the ABCA Coalition Logistic Handbook
Analysis of Capabilities Integration Lines of Development

- **Leadership Development**: The relationships and trust amongst military leaders will influence every aspect of multinational cooperation within future coalitions. Senior leaders should strive to achieve a sympathetic rapport with their multinational counterparts and develop an understanding of mutual capabilities, in order to shape policy through sound military advice.

- **Command & Control**: Confidence in partners is essential when working in a multinational environment. Commanders should be encouraged to develop mutual trust in the professional ability of their counterparts and develop respect for their culture, history, religion, customs and values. Time taken to understand partners will pay dividends during coalition operations. Increased integration of command structures should be considered as the primary enabler for capabilities integration in conjunction with a clear and politically agreed-upon chain of command.

- **Education and Training**: Mission rehearsal prior to an operation will emphasize the level of integration amongst the diverse national capabilities. This allows the synchronization of battlespace management systems, the definition of common SOPs, and the identification of operational issues and concerns sufficiently early to inform corrective actions. These efforts will help harmonize multinational staffs in the execution of key military tasks, thus identifying issues and concerns. The process of capabilities integration will be enhanced by minimizing coalition discrepancies through training, exercising and operating together.

- **Doctrine**: The continued use of NATO doctrine among MIC nations is considered an important enabler for coalition operations. National concepts and doctrine should have regard for coalition capability integration requirements. Promulgation of national policies potentially affecting capability development should be considered.

- **Logistics**: Capability integration is increasingly influenced by national acquisition processes and the dynamics of the industrial and commercial sectors, as well as by technological and budgetary inequalities amongst coalition contributing nations. While equipment interoperability at the operational level should be fostered through the identification of common minimum requirements and the standardization of procedures, technological niche capabilities offered by nations should be exploited as opportunities for integration. A clear understanding of the services and opportunities regionally offered by national facilities should be fostered among MIC nations and included into planning considerations.

- **Knowledge Advantage**: The awareness of the capability landscape, including any risks and possible measures for their mitigation, should be fostered at the highest political level well in advance of any commitment to coalition operations.

- **Shared Situational Awareness**: Before conducting any military operation, a coalition and its contributing nations will conduct several preparatory activities, sharing responsibility and working closely together to prepare forces for the operation.

- **Organizational Constructs**: Force generation is a critical part of the capability integration process, being affected by both political dynamics and military requirements. Force generation dialogue should commence concurrently with political engagement because early visibility of coalition nations’ operational capability and willingness is essential. Coalitions should take advantage of extant force generation databases (for example, NATO CJSOR) to
distil raw data on national military and non-military capabilities, national political and legal restrictions and caveats, into potential force capability packages with specific operational applications.

An efficient and comprehensive liaison structure, linking Coalition Headquarters at all levels, all force elements and other relevant organizations, will be paramount in any operation. This may include diplomatic and military agencies under diverse political authorities, as well as a potentially large number of international organizations (IOs) and non-governmental organizations (NGOs).

- **Planning**: Strategic and operational level planning should consider the integration and coordination of diverse capabilities across government departments, within and across nations.

### Key Capability Gaps

- Standards for Professional Military Education. National education and training programmes should emphasize multinational aspects of coalition operations
- Identification of mission needs that can be filled by niche capabilities
- A comprehensive liaison structure that links the Coalition Headquarters at all levels with all force elements and other relevant organizations
- Awareness of the capability landscape among coalition nations, including risks and possible measures for their mitigation
- Sufficient coalition training, exercising, and operating before operations

### 2.3 Information Sharing

**Challenge Description**

Information sharing is key to the MIC’s goal of delivering better, more efficient military capabilities that are coordinated around the needs of the task. It is essential to enable early planning, intervention and preventative work, for effective and timely responses to crisis, and for the collective security and wellbeing of any wider coalition. As coalition nations move towards partnership working and integrated services, professional and confident sharing of information is becoming more important to delivering the benefits of these new arrangements. In sum, good information sharing is a vital element in improving outcomes for all; it should be necessary, proportionate, relevant, accurate, timely and secure.

**Analysis of Information Sharing Challenges via Lines of Development**

- **Leadership Development**: Information sharing is an essential component of collaboration. There can be significant consequences to not sharing information just as there can also be to sharing information. Operational Security (OPSEC) and Personal Security (PERSEC) are often used as arguments for not sharing information. There are times and situations when this is true but on many occasions some risk must be taken in an effort to improve overall effectiveness amongst trusted partners, be they state nations or other individual actors. It is therefore important that practitioners can share information appropriately as part of their
day-to-day practice and do so confidently. Professional judgement within the coalition should normally be the deciding factor on whether to share or not, and what information is appropriate to share.

- **Command & Control:** Command and Control depend on successful information sharing. Information exchanges are implemented via dozens of open and proprietary protocols, message and file formats. There are four primary information sharing design patterns for sharing information: one-to-one, one-to-many, many-to-many, and many-to-one. Technologies to meet all four of these design patterns are evolving and include blogs, wikis, really simple syndication (RSS), tagging and chat. As technology advances, information sharing platforms will provide controlled vocabularies, data harmonization, data stewardship policies and guidelines, and standards for uniform data as they relate to privacy, security, and data quality. Without an understanding of these advancements in systems and processes, command and control will become increasingly problematic.

- **Education and Training:** Correct governance and agreed protocols will be essential for information to be transferred between organisations and nations. This will mean that originators and recipients will have a thorough understanding of the requirements and methods needed for Information Management (IM), Information Exchange (IX) and Information Assurance (IA). An appropriate training programme will be needed to support this aspiration.

- **Doctrine:** The changes in information sharing technologies occur at a speed that makes their integration into doctrine virtually impossible. As a result, doctrine should concentrate more on “what” is needed to be achieved rather than “how”.

- **Logistics:** Traditional military procurement processes struggle to cope with the pace of change in the information domain.

- **Knowledge Advantage:** Whilst the MIC’s common language is English there are a total of 4 different languages in use amongst the current partners. Although many personnel at the higher levels of command speak and understand English, this is often not the case at the tactical level. For information sharing to be effective at all levels there must be considerable effort made to investigate new ways to display and present data so that it can be more easily understood by these individuals. Modern IT language translators are improving year-on-year but there are times when nuances and subtle variations in meaning are lost using such systems. When other nations are involved in broader coalitions there may well be significant cultural and moral differences that will require even greater care when information is shared so as to ensure that true meaning and intent is maintained and that misunderstandings and possible offence are avoided.

- **Shared Situational Awareness:** There will always be human factors that affect much of what is shared and understood. What is paramount is that Data Protection laws and customs do not create data denial that degrades any coalition situational awareness. The Network Enabled Capability (NEC) triangle is comprised of people, systems and information\(^\text{16}\). Each

\(^{16}\) Data is defined as raw facts, without inherent meaning, used by humans and systems. Information is defined as data placed in context. Knowledge is information applied to a particular situation.
has a key role to play for any system to be effective. People have to understand their role in the pushing and pulling of information. It is the human element that normally analyses the data in most systems and then subsequently makes an assessment on which to act. Systems vary across MIC nations for all types of information technology, many of which are incompatible resulting in few truly joint multinational enablers. Overcoming this limitation must be a MIC priority as this alone will often halt information sharing despite the best intentions of personnel trying to operate together. Likewise agreements on access and security protocols on the information itself will need to be addressed.

- **Organisational Constructs:** Connectivity and systems compatibility often result in equipment interoperability issues within the coalition. This will be hard to overcome as current and legacy equipment is likely to remain in service for many years to come. Whilst many nations now strive for ‘joint’ systems between their armed services and other instruments of security and national power, the need to adapt them to work seamlessly with all the other MIC partner nations has often been a low priority. This has been due to individual nations’ own security fears and the fiscal costs involved to get such systems agreed by all. Compromises must be reached in the near future to try and fuse more national military IT systems so that at least limited connectivity and interoperability may be achieved. Current interoperable systems, mostly NATO based, tend to be centred on pushing historical information or providing real-time situational awareness.

- **Planning:** Interface with the media, in all its different forms, is part of the information sharing challenge. Agreed approaches within the MIC are not unachievable but once other nations join coalitions it will become much harder to maintain a unified approach. Done badly it can have negative long-term strategic effects whilst when done well it can often aid a coalition in attaining its ultimate goal in any given operation. At the very least information sharing with the media and wider general public must not hamper coalition efforts or alienate domestic, regional or international audiences. For information sharing to truly work, greater emphasis by the MIC nations’ militaries will need to be placed on the integration of information sharing in the Military Planning Process.

**Key Capability Gaps**

- Compatibility of information technology. This alone will often halt information sharing despite the best intentions of personnel trying to operate together. Likewise, agreement on access and security protocols on the information itself will need to be addressed.
- Common language for communication and information sharing
- Ability to maximise use of the media and to shape the information campaign
- Secure web-based interconnectivity allowing for broader access to trans-national data
2.4 Interagency Coordination

Challenge Description

The comprehensive approach is centred on the ability of all coalition military forces and other government departments, non-governmental agencies, and international agencies to plan, communicate and operate in a collaborative environment throughout all phases of an operation. These agencies will have their own agendas, and the need to coordinate with them may present a great challenge to achieving coalition goals. Unique challenges arise when stakeholders, including a widening array of non-military actors, come from different cultures. Coordination with third parties may further complicate interagency coordination.

Analysis of Interagency Coordination Lines of Development

- **Leadership Development:** Interagency cooperation should rely on habitual relationships based on trust and confidence at all levels of leadership within appropriate organisations and agencies. The diverse nature of crises makes it extremely difficult to plan for every possible combination of interagency relationship required and it may be necessary to pull together ad hoc organisations. Success in these situations will depend upon trustful leadership relationships previously established through participation in interagency training, exchange and exercise events involving coalition military and interagency partners. These events are essential in exposing operational and strategic leaders to high-level interagency decision making challenges and in developing interagency relationships and mutual understanding. National commitment to meaningful interagency and international leadership engagement, such as leadership liaison elements in pre-crisis periods, is essential.

- **Command & Control:** A perennial challenge for coalition military leaders is a limited influence over non-military agencies during operations. Establishment of a clear C2 structure is crucial for interagency coordination. It should consider relevant other governmental departments and incorporate, as appropriate, linkages with non-government and other international agencies. Equally important to effective C2 is the clear establishment of which organizations are supported and which are supporting. Additionally, networked C2 systems across agencies enhance coordination at all levels, reducing duplicate and contradictory command decisions in a complex campaign environment.

- **Education and Training:** National education and training programmes should emphasize multinational and interagency aspects of coalition operations, including cultural preparation to operate within multinational environments (headquarters, staffs, units). National and coalition training and exercises should incorporate interagency coordination objectives. New networking technologies such as virtual and distributed (remotely connected) training systems will help achieve maximum reach across various agencies.

- **Doctrine:** The use of common lexicon and terminology is paramount to efficient coordination. NATO standards are an appropriate baseline. Widely used non-military agency practices can add important elements to the doctrinal baseline.

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• **Logistics:** Logistical capabilities are far more effective if greater interdepartmental, interagency and international cooperation and coordination are achieved prior to the “execution” phase of any operation. Lessons identified from numerous recent humanitarian relief operations have emphasized the need for a multinational logistics framework which can describe how the military synchronizes planning and execution of logistics support within a non-combat/civilian led mission. In many circumstances, no single government, military or civilian organization will be able to accomplish its own goals without the support of the other agencies. One key element to the successful logistics support of a comprehensive approach is the availability of timely, accurate and relevant logistics information, which can be shared amongst the participating agencies and nations. Another major friction point which impedes successful logistic support within a CA is the complex legal and financial systems inherent among coalition members and others. Finally, the logistical needs of the host nation must be particularly considered and reflected in the planning and dialogue.

• **Knowledge Advantage:** This area was addressed Section 2.3

• **Shared Situational Awareness:** Situational awareness needs to be shared beyond military organizations, to include other interagency elements, regional organizations, NGOs, OGDs and commercial businesses.

• **Organisational Constructs:** Enduring formal arrangements that associate military, other-governmental, and non-governmental agencies improve interagency coordination through the establishment of coordinated pre-crisis procedures. Groups such as the Multinational Interagency Group, NATO’s Civilian Advisory Group, and Civil-Military Operations better prepare all agencies to stand up a functional construct with minimal delay. Interdepartmental memorandums of understanding and temporary appointments across agencies break down organisational barriers and develop a shared understanding of agencies’ roles. A growing challenge is the integration of new and potentially unconventional partners within a coalition construct. Partnership with these actors (such as former opponents, militias, transnational combatants, criminals with important linkages) can be crucial in achievement of a coalition’s aim, yet their consideration as a ‘coalition agency’ sits uncomfortably with planners. Interagency understanding of the utility and agendas of these actors, and the means with which coalition hierarchy wishes to engage with them is important. A coordinated approach to dealing with non-aligned actors such as contractors and service providers is also necessary across agencies. Government commitment to domestic interdepartmental coordination is a crucial prerequisite for an aligned national approach to multinational interagency coordination.

• **Planning:** Involvement of all the governmental departments and consultation of non-governmental and international agencies will optimize the planning process. However, civilian organizations usually hesitate to duplicate the perceived heaviness and ‘inflexibility’ of the military. They may consider contributing to military planning efforts but at the same time strive to keep their independence. Agencies must endeavour to gain a balanced understanding of the differing levels of planning fidelity. Awareness of these differences facilitates better coordination and should be accepted.

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Identifying and agreeing upon an achievable outcome, while difficult, is a central planning challenge. An understanding of the humanitarian and military spheres of activity requires mutual clarification of roles and activities in areas where the two domains intersect.\textsuperscript{19} An ideal planning team should include functional, regional, and planning experts representing all the agencies. But the lack of a joint assessment, strategy, or implementation plan will make it hard to agree on where resources should be focused, prioritized, and integrated into each agency’s efforts.\textsuperscript{20} An enhanced use of collaborative tools is necessary to improve the planning process when actors are globally dispersed.

**Key Capability Gaps**

- Coalition leadership engagement in dedicated fora that tests and enhances interagency coordination
- Availability of networked technology to enhance C2 structure and training systems to achieve maximum reach across agencies
- Incorporation of specific objectives addressing interagency coordination into exercise and training objectives
- Collaborative planning tools to allow interagency planners, even when globally dispersed, to work together in a virtual problem space to understand a common problem and plan and devise a solution
- National education and training programmes that emphasize interagency aspects of coalition operations

### 3. CROSS-FUNCTIONAL CHALLENGES AND OTHER CONSIDERATIONS

#### 3.1 Strategic Communication

**Challenge Description**

In modern societies information has evolved into a decisive element of all security-related operations. All aspects of coalition activities have an information and communication component. Understanding the strategic security environment, including the information environment, is an essential prerequisite for crisis/conflict prevention and resolution.

Across all coalition efforts, effective communication is essential to sustaining global legitimacy and supporting strategic objectives. Aligning actions with words is a shared responsibility that must be consistent across coalition partners. Effective Strategic Communication requires engagement and better understanding of attitudes, opinions, grievances, and concerns of the global public as well as audiences in the mission area. This will enable a coalition to convey credible, consistent messages and to develop effective plans, while better understanding how its actions will be perceived. The aim is to persuade and convince either the allies, the neutral actors or the opponents about the rightness of ours actions.

\textsuperscript{19} MIC 2009, The military contribution to Stabilisation Operations p. 73.
\textsuperscript{20} loc. cit.
As a cross-functional process, Strategic Communication seeks to coordinate the work of traditional communication functions, such as Public Diplomacy and Public Affairs, and the military capabilities integrated through the Information Operations (Info Ops) function with other non-lethal and lethal elements of operations, which often have an immeasurably greater impact on people's perceptions than words or imagery.

Strategic Communication is not an adjunct activity, but should be inherent in the planning and conduct of all operations and activities, political and military, across all lines of operation. Strategic Communication is necessary at all levels of policy, planning and execution of operations.

In the armed forces, information is recognised as a decisive factor. The military Info Ops function plans, coordinates and assesses information activities as an integral part of military operations. Furthermore, it distils a comprehensive and systemic understanding of the information environment, considering all capabilities and activities able to create effects.

Key Capability Gaps

- Development and dissemination of timely and culturally-attuned messages based on a shared narrative and coined in a comprehensive, mission-specific information strategy
- Coordination of information activities with other actions, and the efforts of other agencies and partners, to shape the information environment, and achieve desired effects on selected audiences
- Ability to access, produce and maintain updated information and knowledge on perceptions attitudes, behaviours and beliefs of potential audiences in complex social communication systems
- Ability to detect, monitor, translate and assess the effects of information activities of other stakeholders – whether friendly, neutral or adversarial
- Ability to estimate the direct and indirect effects of potential actions and signals on perceptions, attitudes, behaviours, beliefs and actions of selected audiences.

3.2 Legal Requirements

Challenge Description

Perhaps the most important and certainly one of the most fundamental aspects associated with operating in a Coalition Environment is that of legal probity. Without an agreed legal mandate it is unlikely that an operation would be commenced in the first place, and agreement between partners is essential to ensure that the coalition remains intact and focussed on the appropriate outcome.

Interventions are usually accepted and validated by the United Nations Security Council using resolutions to determine the possibility for states to use the chapter VI or VII of the UN charter.

International Law

International law governs international relations both in time of peace and in time of armed conflict. It covers, for example, the delimitation of international boundaries, international trade, the law of the sea, air and space law, human rights, protection of the environment, and diplomatic relations. It also regulates the circumstances in which states may use armed force (traditionally termed ‘jus ad
bellum) and the way in which armed force is actually used (traditionally termed ‘jus in bello’ or ‘the law of war’). Today the latter is more frequently known as ‘the Law of Armed Conflict’ (LOAC) or ‘International Humanitarian Law Applicable in Armed Conflict’ or more simply ‘International Humanitarian Law’ (IHL).

Law of Armed Conflict

The main purpose of the LOAC is to protect combatants and non-combatants from unnecessary suffering and to safeguard the fundamental human rights of persons who are not, or are no longer, taking part in the conflict (such as prisoners of war, the wounded, sick, and shipwrecked) and of civilians. At sea, the law also serves to identify and protect ships flying the flag of states not parties to the conflict. By preventing the degeneration of conflicts into brutality and savagery, the law of armed conflict aids the restoration of peace and the resumption of friendly relations between the belligerents. LOAC applies to international armed conflicts and to the conduct of military operations and related activities in armed conflict, however such conflicts are characterized.

The increasing reach of International Human Rights Law further controls the behaviour of armed forces and affords protections and advantages in certain situations to those who are affected by military operations. In stabilisation there may also be good political or military reasons for exercising a greater degree of self-restraint than is legally required.

LOAC comes from both customary international law and treaties. Customary international law, based on practice that nations have come to accept as legally required, establishes the traditional rules that govern the conduct of military operations in armed conflict. Additionally, soldiers are subject to national laws which must drive their behavior and derive from international law and treaty obligations.

The Contemporary Environment

Peace Support Operations (PSO), or what used to be known as “Operations Other Than War”, are the most prevalent contemporary military operations, and the type that a future coalition is most likely to be required to conduct. While the legal requirements are the same for a PSO as they are for a war of national survival, there are additional moral, ethical and practical constraints which could complicate the perceived legitimacy of an operation. It is true that commanders on all levels undoubtedly have a great strain placed on their shoulders when conducting PSOs. The potential to make a faux pas, due to an inadequate understanding of cultural nuances, while under the full and intrusive view of embedded media, merely adds to the requirement not just to do the right thing but to be seen to be doing it as well. Operating in a multi-national coalition environment exacerbates the potential problems. The following key points are relevant:

- A commander will need to appreciate his subordinates’ difficulties in balancing the risks to their own troops, against the need to offer maximum protection to the civil population.

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• There may be an absence of a well-understood, common moral code, especially when operating with a large mix of host nation military and civilian organisations.
• There may be risks associated with the reality of unity of effort in place of unity of command.
• There will be additional pressures when working in the glare of the global media.
• There may be an increasingly political nature of the role of the military commander.

The cultural requirement of the contemporary coalition commander has been identified as “an ability to respect the differences of others while still achieving effective command”\textsuperscript{24}. There are four attributes essential for a coalition commander:

• Political acumen,
• Diplomacy,
• Applied intelligence,
• Mental stamina.

All apply to any senior military leader, but they become particularly important when operating with forces and agencies from other nations. Local culture does not relieve the commander of his responsibility for maintaining ethical and moral standards. He will need to strike a balance between tolerating what is acceptable behaviour in one culture, against condemning that which is unacceptable in any circumstance. Through all its actions and messages, the international force should lead by example, demonstrate compassion and empathy for the population, maintain the moral high ground and provide a moral compass for others.

\textbf{Summary}

The law of war is binding not only upon States as such but also upon individuals and, in particular, the members of their armed forces. Parties are bound by the laws of war to the extent that such compliance does not interfere with achieving legitimate military goals. For example, they are obliged to make every effort to avoid damaging people and property not involved in combat, but they are not guilty of a war crime if a bomb mistakenly hits a residential area. By the same token, combatants that \textit{intentionally} use protected people or property as shields or camouflage are guilty of violations of laws of war and are responsible for damage to those that should be protected.

Maintaining the rule of law entails very different ethical obligations than fighting to establish it. Effective security exists when institutions, civil law, courts, prisons, and effective police are in place and can protect the recognised rights of individuals.

Maintaining complete legal and ethical concurrency across a coalition force will undoubtedly take significant time and effort, but doing so is essential if legitimacy, effectiveness, and positive public opinion are to be achieved. Without concurrency, mission failure is a virtual certainty.

\textsuperscript{24} Ibid
Key Capability Gaps

- Coalitions require an agreed legal mandate to ensure the coalition remains intact and to ensure focus on the appropriate outcome
- A well-understood, common moral code, especially when operating with a large mix of host nation military and civilian organisations
- Maintenance of complete legal and ethical concurrency across a coalition force

4. CONCLUSION

Coalition forces must be capable of swiftly operating in an orderly, efficient and integrated manner with elements from other member states in a coalition system with little to no modification or conversion required. The key to operational success will be the long-term and effective preparations conducted in advance of any deployment to overcome, or at least mitigate, any actual or perceived compatibility issues. In order to effectively operate as a coalition, the following summary of gaps should to be resolved:

Key Capability Gaps in Compatibility

- Standardization
- Common lexicon for military concepts, doctrine and operations
- Common Rules of Engagement (ROE) appropriate to an operation
- Secure computing / voice / video capabilities among coalition members
- Utilization of existing services and support doctrine\(^{25}\) in training and exercises
- Common training
- Common tools for command and control

Key Capability Gaps in Capabilities Integration

- Standards for Professional Military Education. National education and training programmes should emphasize multinational aspects of coalition operations
- Identification of mission needs that can be filled by niche capabilities
- A comprehensive liaison structure that links the Coalition Headquarters at all levels with all force elements and other relevant organizations
- Awareness of the capability landscape among coalition nations, including risks and possible measures for their mitigation
- Sufficient coalition training, exercising, and operating before operations

Key Capability Gaps in Information Sharing

- Compatibility of information technology. This alone will often halt information sharing despite the best intentions of personnel trying to operate together. Likewise, agreement on access and security protocols on the information itself will need to be addressed.
- Common language for communication and information sharing
- Ability to maximise use of the media and to shape the information campaign

\(^{25}\) Such as the ABCA Coalition Logistic Handbook
• Secure web-based interconnectivity allowing for broader access to trans-national data

**Key Capability Gaps in Interagency Coordination**

• Coalition leadership engagement in dedicated fora that tests and enhances interagency coordination
• Availability of networked technology to enhance C2 structure and training systems to achieve maximum reach across agencies
• Incorporation of specific objectives addressing interagency coordination into exercise and training objectives
• Collaborative planning tools to allow interagency planners, even when globally dispersed, to work together in a virtual problem space to understand a common problem and plan and devise a solution
• National education and training programmes that emphasize interagency aspects of coalition operations

**Key Capability Gaps in Strategic Communication**

• Development and dissemination of timely and culturally-attuned messages based on a shared narrative and coined in a comprehensive, mission-specific information strategy
• Coordination of information activities with other actions, and the efforts of other agencies and partners, to shape the information environment, and achieve desired effects on selected audiences
• Ability to access, produce and maintain updated information and knowledge on perceptions, attitudes, behaviours and beliefs of potential audiences in complex social communication systems
• Ability to detect, monitor, translate and assess the effects of information activities of other stakeholders – whether friendly, neutral or adversarial
• Ability to estimate the direct and indirect effects of potential actions and signals on perceptions, attitudes, behaviours, beliefs and actions of selected audiences.

**Key Capability Gaps in Legal Requirements**

• Coalitions require an agreed legal mandate to ensure the coalition remains intact and to ensure focus on the appropriate outcome
• A well-understood, common moral code, especially when operating with a large mix of host nation military and civilian organisations
• Maintenance of complete legal and ethical concurrency across a coalition force
<table>
<thead>
<tr>
<th>Lines of Development</th>
<th>Compatibility</th>
<th>Capabilities/Integration</th>
<th>Information Sharing</th>
<th>Interagency Coordination</th>
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</table>
| Leadership Development | • Leaders become accustomed to and in coalition operations | • Focused leadership development on multinational cooperation  
  • Strive to develop understanding of mutual capabilities | • Share information despite OPSEC and PERSEC | • Trustful leadership relationships previously established through training, exchange events  
  • Temporary assignments of officers in pre-crisis periods |
| Command & Control      | • Efficient use of liaisons/liaison teams | • Develop mutual trust and respect of one’s counterparts among all military personnel  
  • Integrate command structures | • Correct protocols for information sharing between organizations and nations | • Commitment to domestic interdepartmental coordination  
  • Establishment of clear C2 structure |
| Education and Training | • Minimum standards of PME  
  • Education will emphasize multinational and interagency aspects | • Conduct mission rehearsals prior to operations  
  • Enhance capability integration by training & exercising | • Correct governance and agreed protocols  
  • Train to understand InfoManagement, Exchange and Assurance | • Incorporate interagency coordination into exercises  
  • Use networked training capabilities |
| Doctrine               | • Align to common doctrine | • Continue to use NATO doctrine and explore potential capabilities integration | • Concentrate more on the “what” rather than on the “how” | • Use common lexicon and terminology; NATO standards are appropriate baseline |
| Logistics              | • Standardize national-level logistics-automated systems  
  • Provide logistic and administrative support to joint, coalition and multinational forces | • Identify common minimum equipment compatibility requirements  
  • Exploit national niche capabilities  
  • Understand regional opportunities presented by national facilities | • Traditional procurement processes struggle to cope with pace of change in information domain | • Adopt common intermodal conveyances, fuel types, and standard methods for convoys, etc. Prior to operations  
  • Need for multinational operational level logistics framework/interagency log program  
  • Shared vision to incorporate military and IA/NGO capabilities |
| Knowledge Advantage    | • Platforms that enhance timely passage of relevant information | • Identify multinational capability landscape at highest political level before operations | • Investigate new ways to display and present data to all MIC partners | • Investigate new ways to display and present data to all MIC partners |
| Shared Situational Awareness | • Compatible equipment to support consultation and planning  
  • Keep senior leaders aware of strategic & tactical activities | • Corporately prepare the force | • Overcome systems variations and incompatibility | • Situation awareness needs to be shared beyond military organizations |
| Organizational Constructs | • Organizations that can accept national contributions from other governmental departments  
  • Establish minimum level at which multinational formations can be used effectively | • Force generation commences with political engagement  
  • Take advantage of extant force generation databases | • Solve interoperability issues within MIC | • Temporary assignment of staff officers across agencies  
  • Engagement with unconventional actors such as militias, criminals  
  • Engagement with contractors |
| Planning               | • Baseline planning process & compatible tools  
  • Compatible security clearance and information release authorities | • Enhanced functions to address integration of diverse capabilities across departments among nations | • Integrate information sharing in the Military Planning Process | • Awareness of differences planning fidelity between military and civilian agencies  
  • Include all agencies in planning teams |
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MULTINATIONAL INTEROPERABILITY COUNCIL (MIC)

EXECUTIVE SECRETARIAT

J-3 DDRO/MOD

3000 Joint Staff, The Pentagon

Washington D.C.

js.mic.es@mail.mil

https://community.apan.org/mic