The Strategic Alignment of Geospatial Technology with the Objectives of UN Peacekeeping: An Open Geospatial Innovation Strategy

Dana Jon Kamason
UN Secretariat

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Executive Summary

This research has grown out of the researcher's long-standing interest in collaboration towards shared goals that stems from having worked for the United Nations (UN) in peacekeeping for the past 13 years providing geospatial information services to support peacekeeping operations.

Geospatial technology is a growing force in UN peacekeeping. Since its introduction in 2002, geospatial technology has been shown to have a positive impact in peacekeeping, in areas including military operational planning, situational awareness, boundary demarcation and monitoring, and conflict analysis. Now, such technology—widely adopted by the private, public, and third sector companies and organisations—provides a level of convenience and access to critical geographic information and solutions, which were not previously available.

Today, the UN is streamlining its geospatial resources and capabilities for its 16 peacekeeping missions around the world in favour of a more centralised geospatial support centre at Brindisi, in Italy—a reality that has significant implications for the direct geospatial services supporting the daily mission operations in the field.

However, it is widely believed that geospatial innovation in peacekeeping can benefit from sourcing external ideas and collaboration in order to adapt innovative geospatial solutions that may exist outside the UN's boundaries. Despite the wide availability of such solutions, the UN geospatial team has not instituted an effective, coherent strategy for collaborating with external innovators.

How can the UN efficiently leverage external sources of innovation to complement its geospatial capabilities in peacekeeping? This report seeks to answer this question by examining the literature on open innovation and drawing on

qualitative data and interviews with open innovation managers and practitioners, and UN peacekeeping geospatial staff. In doing so, this report provides a picture of the key internal factors required for the successful implementation of an open innovation initiative in peacekeeping.

This report's main findings indicate that many factors are critical for the successful adoption of open innovation strategy in UN peacekeeping, particular regarding (a) organisational culture, skills, commitment and motivation of staff members; (b) instituting an effective governance process and; (c) alignment with existing organisational strategy.

Acknowledgement

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Chapter 1: Introduction

In the private sector, innovation is not only perceived as a potent lever of competitive advantage (Dess and Picken, 2000) but is also considered the main driver of company performance (Drucker, 1988; Christensen, 1997; Thomke, 2001). Consequently, organisations no longer ask why innovation is important, but rather focus on the more contemporary question of how the processes of innovation can be managed more effectively and efficiently (Gassmann, Enkel, and Chesbrough, 2010). Studies have shown that organisations that innovate and respond to the continuous change and uncertainty of the external environment are more successful than their competitors (Brennan and Dooley, 2005).

However, the significance of innovation is not restricted to for-profit organisations alone. Indeed, a wide range of organisations—private, public, and third sector—are developing new strategies for leveraging the value of innovative external collaboration. The governments of both developed nations (such as the UK and the US) and developing nations (such as Ghana and Kenya) have in recent years established institutions for innovation aimed at accelerating the pace at which the countries can identify, develop, and scale solutions for their most significant and persistent challenges. In addition to internal innovation, an increasing number of organisations of all sizes have formed strategic alliances with other organisations in order to leverage complementary knowledge and resources to increase innovation (Teece, 1992; Powell and Grodal, 2004). This represents a paradigm shift that Chesbrough (2003a) has termed ‘Open Innovation.’

Chesbrough (2003a, 2003b) introduced the concept of open innovation as a more flexible business model—one with an open strategy for innovation management. Chesbrough defines open innovation as ‘the use of purposive inflows

and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation' (Chesbrough, 2003a). A key assumption of open innovation is that "not all of the smart people in the world work for you" (Chesbrough, 2003a). Indeed, knowledge today is more widely distributed and organisations can discover beneficial ideas and technologies from within an increasingly interconnected global community. Open innovation is a process designed to speed up innovation through internal and external collaboration. Thus, open innovation breaks down organisational boundaries and allows organisations to share and integrate knowledge and resources with partner organisations and internal business units. This paradigm is based on the view that organisations can and should open up their boundaries to combine both internal and external resources to create as well as capture business value (Chesbrough, 2003c). Chesbrough argues that open innovation encourages the flow of external ideas into the organisation as well as the transfer of internal know-how and technologies to external actors (Chesbrough, 2003c). Consequently, as illustrated by an increasing body of academic literature, special issue publications, and dedicated professional conferences, the notion of open innovation has quickly gained interest amongst researchers and practitioners alike.

In today's information-rich environment, with an increased demand for openness and transparency of knowledge, organisations can no longer afford to rely solely on their own resources and capabilities to advance their strategic goals (Chesbrough, 2006). Thus, the open innovation strategy has added a whole new perspective with respect to conducting innovation activities (Scholten and Temel, 2014). The definition suggests that organisations should put extra emphasis on collaboration and networking (Chesbrough, Vanhaverbeke, and West, 2006). Thus,

since its introduction, the open innovation approach has received a great deal of attention from organisations, especially large organisations (Scholten and Temel, 2014). Yet, in sharp contrast to the routine and collaborative innovation processes practised by most organisations, rarely have innovative geospatial ideas and knowledge from outside the boundaries of the United Nations (UN) been systematically adapted and applied to peacekeeping operations. As the UN Under-Secretary-General for Peace Operations, Hervé Ladsous, asserts, 'As the world around us changes, it is essential that the diverse stakeholders who authorise, finance and contribute personnel to peacekeeping operations collectively reflect on the role of peacekeeping in the changing landscape' (Ladsous, 2014). This statement reflects the view that in the recent years, there has been a recognised need for the development of a more collaborative approach to peacekeeping.

This research seeks to investigate (by way of qualitative analysis) ways to improve the level of geospatial innovation in UN peacekeeping efforts through exploration and exploitation of external knowledge. It is believed that peacekeeping innovation, specifically geospatial innovation, can benefit from external ideas and opportunities by scouting and adapting widely available innovative geospatial solutions that exist outside the organisation's immediate boundaries. The ultimate aim of this research is to develop a business case for the establishment of an open innovation strategy. Such a practice can encourage the identification of external technologies and solutions through innovative collaboration, and can foster the adaption of such solutions to address particular peacekeeping challenges, which may in part be satisfied through the use of geospatial technologies. Further, this would enable the holistic utilisation of peacekeeping geospatial resources and capabilities to help peacekeepers make more informed decisions concerning safety

and security, allowing them to better understand their working environments and the consequences of their choices, both for their own safety and security and for that of those they serve. The research focuses specifically on the utilisation of geospatial technology in support of peacekeeping in order to improve informed decision-making in the broad spectrum of peacekeeping operations.

1.1 Organisational Background

The UN is an intergovernmental nonprofit organisation headquartered in New York, with various field offices and operations worldwide. The UN was established on 25 October 1945, when its five permanent Member States—China, the US, the UK, France and Russia—and the majority of the leading 51 nations came together and endorsed the UN Charter. Now in its seventieth year of establishment, the UN today is a complex web of departments, offices, agencies, funds and programmes, with 193 Member States (United Nations [UN], 2014). Moreover, its global operations range from the maintenance of international peace and security to the fight against climate change.

According to its Charter, one of the UN's chief purposes is to maintain international peace and security (UN, 2014). Therefore, since fielding its first peacekeeping mission in 1948, the UN has sought to use peacekeeping as a tool for maintaining global peace and security. Today, the UN operates sixteen peacekeeping missions worldwide, led by the Department of Peacekeeping Operations (DPKO) and supported by the Department of Field Support (DFS). Diverse stakeholders authorise, finance and contribute personnel to the peacekeeping operations, which have an estimated annual budget of 8.2 billion US dollars (UN, 2014). With a global population that holds the UN accountable for

upholding world peace and security, the organisation is faced with the task of addressing such challenges through its global peacekeeping operations.

Problem Statement: The Challenges

As the primary tool for maintaining international peace and security, UN peacekeeping was mainly used to upkeep interstate peace and security during the Cold War (Fortna, 2008). However, with an increase in global conflict and volatility in places such as the Middle East, North Africa and parts of Sub-Saharan Africa, the demand for peacekeeping has grown and continues to grow. Over the last few years, the UN has established an unprecedented number of large and complex peacekeeping missions in such places as Somalia, the Central African Republic, Congo, and South Sudan. Furthermore, many previously intrastate conflicts are now becoming progressively regionalised or even internationalised (Ladsous, 2014).

The increasing scale and sophistication of modern peacekeeping operations, together with the increasingly complex combinations of military, police, and civilian personnel who are required to work together to fulfill unique mandates—ranging from the protection of civilian lives in South Sudan to the repair of roads and schools in Mali (Ladsous, 2014)—have created a multitude of challenges that are forcing the UN to identify new ways in which contemporary technology and innovation can be utilised to improve the organisation's operational effectiveness (Lute *et al*., 2014). Therefore, recognising that its response to these challenges will require greater levels of ingenuity and innovation, the UN aims to use modern technological advances such as geospatial technology to enhance the safety and security of personnel who serve in difficult, remote and dangerous environments around the

world, as well as to ensure the protection of the civilians that the peacekeepers are put in place to serve.

For example, in 2013, the UN introduced the use of unmanned aerial vehicles (UAVs) to monitor the conflict in the Democratic Republic of Congo. The use of such modern technology, especially in the area of real-time situational awareness, data visualisation and analysis, can significantly improve the operational effectiveness of peacekeepers. However, to succeed with new technologies requires creativity, experimentation and the development of knowledge and skills that are new to the organisation. Therefore, to accelerate its use of innovative approaches to problems on the ground, the UN needs to harness external knowledge while leveraging internal resources and capabilities outside its peacekeeping operations. Doing this will allow the UN to identify and employ creative solutions to peacekeeping challenges.

Geospatial Technology in UN Peacekeeping

It is believed that the utilisation of modern technology such as geospatial technology for missions' situational awareness, data visualisation and analysis can significantly improve the operational effectiveness of peacekeeping. Geospatial technology refers to the combination of location technologies used for the visualisation, measurement, and analysis of geographic features of the Earth. These typically include technologies such as Geographical Information Systems (GIS), Global Positioning Systems (GPS), Remote Sensing, Photogrammetry, 3D Modelling, Cartography, Mobile Mapping, and Topographic Surveying. Effective peacekeeping operations require the appropriate collection, collation, analysis, and presentation of heterogeneous data and metadata from the peacekeeping

environment to create situational awareness of that environment. Thus, geospatial technology has been identified as a strategic component of contemporary peacekeeping (Lute *et al.,* 2014).

As noted by Convergne and Snyder (2015), geospatial technology has been shown to have a positive impact in supporting peacekeeping in areas including military operational planning, situational awareness, boundary demarcation and monitoring, and conflict analysis. Moreover, a geospatial information services unit is currently present on almost every UN field mission. However, the geospatial function has not been utilised to its full potential (Lute *et al*., 2014). The peacekeeping geospatial service faces the challenge of reduced resources in the field due to the centralisation of various operations at the UN Logistics Base in Brindisi, Italy (UN General Assembly, 2014), thereby eliminating or limiting geospatial capabilities on the ground. Yet, there is an expectation that there should be efficient and timely geospatial support to challenges on the ground. Therefore, in order to enhance the level of responsiveness to challenges on the ground, the UN must prioritise its geospatial investment in peacekeeping and look for ways to exploit external sources of technology and innovation through externally commissioned collaborations.

Peacekeeping geospatial innovation has traditionally been pursued within a closed innovation paradigm. According to Chesbrough (2003b), closed innovation is a strategy in which organisations locate diverse and commercialised techniques internally. This self-reliant philosophy is currently practised by the UN peacekeeping geospatial community. The geospatial innovation process is confined to within each peacekeeping mission's boundaries. Occasionally, this has led to approaches that are inefficient, unsustainable, and time-consuming to manage. Chesbrough believes there are external alternatives that are not being used. These are geospatial

processes and solutions that can be adapted to address peacekeeping operational challenges, and which are not only more efficient but are also sustainable and more cost-effective. Therefore, by adopting an open and collaborative approach to geospatial innovation, peacekeeping could benefit from sustainable, market-based geospatial solutions that both build on the UN's internal capabilities and take advantage of diverse sources of external skills, creativity, and entrepreneurship.

Open Geospatial Innovation in Peacekeeping: The Value Proposition

In today's world of transparent knowledge, organisations need to engage in both exploration and exploitation in order to be innovative (Chesbrough and Crowther, 2006). According to Chesbrough and Crowther (2006), technology exploration is concerned with innovation strategies for capturing and benefitting from outside knowledge in order to enhance present technical advancements, whereas technology exploitation involves strategies for leveraging present technological abilities outside of company limits.

When employing peacekeeping as a tool for maintaining international peace, there is no guarantee of success. However, past research (Howard, 2007. p2) suggests that 'UN peacekeeping tends to be more successful when the peacekeepers are actively learning from the environment in which they are deployed.' Thus, to maximise the chances of success, peacekeeping has to adapt its operational concepts to the dynamic and challenging nature of its environment. The December 2014 UN Expert Panel on Innovation and Technology in Peacekeeping report argues "for much wider deployment of technology and innovative practices to help strengthen peacekeeping." The report's authors call for the immediate need to maximise the use of modern technology and innovation in peacekeeping (Lute *et al*.,

2014) in areas such as mission life support, operational imperatives (e.g., aerial surveillance, information gathering, command and control) and mission support. Moreover, amongst other things, Lute *et al*. (2014) make the following recommendations:

- ‘DPKO and DFS should partner with—and learn from—others innovating within the UN system and with external leaders in technology and innovation.’

- ‘Peacekeeping should pursue partnership opportunities to capitalize on combined capabilities and learning.’

- ‘Peacekeeping requires a more structured and integrated approach to data collection, processing and dissemination to help maximize the use of GIS products and other data visualization.’

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

- ‘Aerial data, geospatial/geographic information, and other remotely acquired data are of critical importance to any peacekeeping mission and should be available as a matter of course.’

It is within this context that open geospatial innovation, seen as a strategic enabler of operational imperatives in a complex peacekeeping environment, could present a better means to present more optimistic change. It is strongly believed that peacekeeping geospatial innovation can benefit from externally generated innovations and opportunities through the scouting and adapting of the widely available geospatial solutions that exist outside the UN’s immediate organisational boundaries. This research aims to investigate the challenges and opportunities faced in taking solutions that may exist in certain contexts and adapting them to particular peacekeeping challenges. As Stefan Lindegaard asserts, ‘The idea of integrating

internal and external resources to increase innovation productivity and prowess is just too good a value proposition to ignore' (Lindegaard, 2010, p.22). Implementing an open innovation strategy will open up the UN to exciting geospatial technological advances that would allow wider, faster, and better utilisation of its geospatial resources and capabilities in order to improve the return on peacekeeping investment.

1.2 Purpose and Objectives

This research seeks to investigate the feasibility of developing an open innovation strategic model by which the UN can leverage external sources of innovation, specifically regarding geospatial technology, to improve its operational effectiveness in peacekeeping. Accordingly, this report aims to develop a greater understanding of how the UN can leverage open innovation to both improve the utilisation of its geospatial resources and capabilities, as well as to increase the use of geospatial information in peacekeeping. Based on the review of the literature concerning open innovation, the researcher worked under the assumption that open innovation could be a beneficial approach to applying geospatial innovation in UN peacekeeping. It is the researcher's belief that such an approach would enable the UN to identify geospatial technology, solutions, and processes that already exist in certain contexts and adapt them to face particular challenges within the peacekeeping context.

Objectives

This research aims to identify the opportunities and challenges that companies face in adopting open innovation strategies, and to investigate how

organisations operate in environments where the goal is to identify and adapt external innovations. This not only implies a high level of uncertainty with respect to the innovation outcome, but also brings a diverse set of interests into the collaboration process, leadership, and organisational mindset, in addition to encouraging cultural change and the development of new skills (Lindegaard, 2010).

Specifically, the objectives of this project are

- to understand the key success factors, challenges and approaches to adopting an open innovation strategy,
- to investigate the opportunities for improving the operational efficiency of the military, police and civilian components of peacekeeping by identifying, adapting, and scaling geospatial solutions through an open innovation framework, and
- to determine the feasibility of, and provide recommendations for, the development of a strategic approach to collaboration and open innovation in peacekeeping.

Research Questions:

To achieve the objectives of this project, this study sets out to answer the following question:

- How can the UN efficiently leverage external sources of innovation to improve its internal geospatial capabilities and efficiency in peacekeeping?

Subsequently, this study is focused on the following two questions:

1. Which internal factors are crucial for the successful implementation of an open innovation initiative in peacekeeping?
2. Is open innovation a potential enabler of more rapid adoption of new geospatial technology in peacekeeping?

It is relevant to note that this study places emphasis on internal issues (such as governance and leadership), and focuses on how to set up the peacekeeping geospatial function to reap the benefits of open innovation. The aim is to use a phenomenological method to explore the research questions.

1.3 Limitations

Due to time limitations and academic requirements, the project scope will be limited to a feasibility study examining the potential for creating an open innovation initiative. The scope will be focused on the application of geospatial information technology in the broad spectrum of UN peacekeeping operations.

Chapter 2: Literature Review

2.1 Structured Review of Open Innovation

The extant literature has shown that innovation is an effective way for organisations to sustain and prosper (Tidd and Bessant, 2013; Cobbenhagen, 2000; Christensen, 1997; Collins and Porras, 1994). According to Nonaka *et al*. (2003), innovation is about ideas and knowledge. Innovation becomes apparent as a result of integrating knowledge from different sources (Tidd and Bessant, 2013); however, such knowledge may often lie outside of corporate boundaries.

In contrast to the conventional research and development (R&D) processes traditionally employed by companies, firms are increasingly opening up their innovation processes to include a diverse range of external sources of great ideas or unique capabilities (Lindegaard, 2010). This paradigm shift away from conventionally practiced R&D processes is what Chesbrough (2003a) terms 'open innovation.' Since its introduction in 2003, a broad awareness of the concept of open innovation and its significance to corporate R&D has developed. In light of the concept's alternate approach to the innovation management trend, open innovation has met with increased enthusiasm amongst academia and industry alike. As noted by Lichtenthaler (2008), in the open innovation model, firms supplement internal resources and capabilities by leveraging various external stakeholders to achieve inward movement of ideas and knowledge. The trends and implications supporting the notion of open innovation are highlighted from the strategic, behavioural, organisational, knowledge generation, business and legal standpoints, as well as with respect to the economic inferences of the approach (Enkel, Gassman and Chesbrough, 2009).

However, the majority of the research has looked at the outside-in strategy of open innovation, while the inside-out strategy remains less examined (Enkel, Gassmann and Chesbrough, 2009). A third method (combining both the outside-in and inside-out approaches) is also catching the attention of a considerable number of researchers. The existence of such diverse approaches to the concept highlights the importance of gaining more comprehensive knowledge about where and how open innovation could add value to knowledge-intensive processes. In simple terms, the approach has significant implications for emerging and new techniques of R&D administration (Enkel, Gassman and Chesbrough, 2009).

The new trend of open innovation is compelling companies to re-examine the ways in which their leadership stance mirrors the performance output of their business approach (Chesbrough and Appleyard, 2007). It is appropriate to contrast a few of the latest happenings in innovation with the conventional academic business strategy perspective. Organisations especially desire to evaluate the implementation of higher open strategies for innovation and to understand how such applications could be evaluated using business strategy theories. The conventional business approach encourages companies to build dependable protections against competition and to establish authority within the value chain, which can been seen as a nod towards developing obstacles to competition rather than encouraging openness (Chesbrough and Appleyard, 2007). Nevertheless, companies and entire industries, such as the software sector, are experimenting with new business frameworks grounded in the notion of harnessing collective inventiveness by way of open innovation. The obvious advancement of the few such explorations has challenged the perspectives of conventional business strategy.

In describing the concept of openness, Chesbrough asserts that open innovation primarily refers to ‘a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology’ (Chesbrough, 2003a). Accordingly, open innovation is about opening up the innovation process to enable a two-way flow of knowledge and technologies between a firm and its external environment. It involves the outside-in and inside-out movement of ideas and technologies (Lichtenthaler, 2008).

According to Chesbrough (2003a), the principle of open innovation lies in several key elements. First, it mirrors economic and social modifications in functioning patterns, where experts look for portfolio careers instead of a task-for-life with one employer. Second, globalisation has expanded the scale and scope of the organisational environment, enabling greater division of labour. Third, enhanced market elements like intellectual property rights (IPR), technology standards and venture capital (VC) allow companies to trade views. Lastly, the latest techniques create fresh ways of collaborating and coordinating across geographical boundaries.

2.2 Thematic Analysis of Open Innovation

Open innovation is a rich and diverse concept; it is therefore not surprising that Dahlander and Gann (2010) conclude that researchers tend to use different definitions of open innovation and focus their research on a diverse array of themes depending on the research context. Thus, following a structured review of the literature, this section will address a number of key themes of open innovation that the researcher has thus far deemed fitting for the research: the concept of open innovation, closed and open innovation (Chesbrough, 2003a), the context of open

innovation (Perkmann, 2007), open innovation processes (Gassmann and Enkel, 2004), the influence of leadership and culture (Martins and Terblanche, 2003), the aspect of internal knowledge management, and external relationship management. Figure 1 below illustrates a conceptual framework of the theoretical underpinnings of this research.

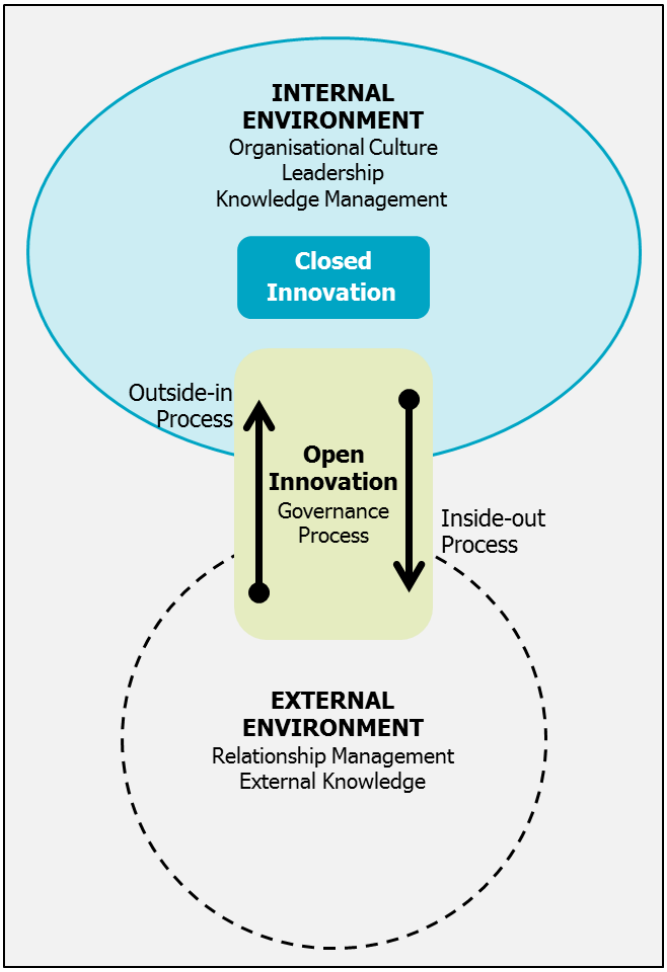

Figure 1: Theoretical research conceptual framework

2.2.1 The Concept of Open Innovation

Chesbrough (2003a) first proposed the notion of open innovation in his book, *Open Innovation: The New Imperative for Creating and Profiting from Technology*. According to Chesbrough (2003a), organisations in the 20th century made huge investments in internal R&D, attempted to employ the smartest available individuals

and operated in a closed environment. Such a strategy enabled them to develop innovative ideas, which they subsequently protected with intellectual property (IP) strategies. In a successful circle of innovation, the profit generated from IP was reinvested into internal R&D (Chesbrough, 2003a). However, in the 21st century, a shift towards globalisation, characterised by increasing R&D costs and an increased desire for transparency of knowledge, has caused a gradual breakdown of the closed innovation management process in organisations (Chesbrough, 2003a). Chesbrough thus proposes open innovation as a strategy by which organisations can and should soften their boundaries to combine both internal and external resources with their own capabilities to create as well as capture business value (Chesbrough, 2003a).

2.2.2 Closed and Open Innovation

Open innovation has been conceived as a strategy by which organisations open up their innovation processes and allow the inflow of knowledge across their boundaries as they seek to enhance their internal innovation capabilities. Thus, the limits of the organisation become blurred, enabling the identification and integration of resources and capabilities between the organisation and its external collaborators (Cousins, 2006). Organisations using the closed innovation approach, on the other hand, rely only on internal resources (Chesbrough, 2006). Today, the blurring of organisational boundaries can be seen across organisations in the public, private and third sectors (Cousins, 2006). Chesbrough (2007) argues that innovation is now accomplished through a network of organisations working collaboratively, rather than from within a single organisation.

However, it is worth noting that open innovation does not render internal resources obsolete; rather, the external resources are used to strengthen or are combined with internal resources.(Chesbrough, 2003a; Dahlander and Gann, 2010). Open innovation is about integrating internal resources with external sources of innovation. Thus, the level of integration reflects the degree of the organisation's openness, an aspect that can vary considerably amongst organisations involved in open innovation processes (Laursen and Salter, 2006). Indeed, organisations are positioned on a continuum, with closed and open innovation representing the ends of the spectrum (Chesbrough, 2006).

2.2.3 Context of Open Innovation

2.2.3.1 External Environment

The nature of the external environment is crucial to open innovation because firms adopting open innovation rely on external knowledge and resources to drive innovation. This strong reliance creates inter-organisational networks, which are defined as formally established co-operation arrangements that span multiple organisations (Powell and Grodal, 2004; Perkmann, 2007). The external environment provides the firm with the assets and expertise necessary to innovate; in other words, the specific needs of the firm are met by existing factors from the external environment rather than being developed internally (Perkmann, 2007). A key factor for a firm to successfully situate itself in its external environment, therefore, is its ability to search effectively for complementary external sources; firms must be able to locate the assets and skills that match its innovation needs. Perkmann (2007) points out that such a match rarely occurs as a result of searching

the whole range of options available to the firm; instead, firms generally tend to be socially selective in that they conduct searches based on their existing networks.

Earlier research has suggested that firms that have engaged in closed innovation should have the absorptive capacity to invest in internal research that utilises available external technologies (Cohen and Levinthal, 1990). The problem then would be inefficient utilisation of resources; firms that have engaged in internal R&D might have ideas or technologies that cannot be commercialised. These ideas or technologies could be licenced to other firms, or if they are left sitting on the shelf waiting for other internal development, they might eventually be exploited by others (Chesbrough and Crowther, 2006). It is therefore clear that the external environment is very important in the innovation process. Firms that engage in open innovation are dependent on the external environment; instead of simply reacting to external change, an open innovation firm views the external environment almost as an outer layer of its internal environment.

2.2.3.2 Internal Environment

Having discussed the importance of the external environment to open innovation, the question that arises is: What factors present in the internal environment facilitate open innovation? Chesbrough and Crowther (2006) explain that bringing outside technology into a firm requires the presence of champions inside the firm who can interact effectively with others across the enterprise, and who possess the necessary skill sets to commercialise on the innovation rather than the unique expertise to build it. These champions are crucial to integrating external technologies into the existing product development phase-gate process. These

champions do not create new processes; rather, they layer an open innovation perspective onto the existing internal processes.

Spithoven, Clarysse. and Knockaert (2011) explain that with inbound open innovation, firms must internalise the external knowledge obtained from the search process. This requires that firms have the absorptive capacity mentioned above (Cohen and Levinthal, 1990). It is clear that this absorptive capacity must be situated in the internal environment of the firm. However, Spithoven, Clarysse. and Knockaert (2011) suggest that increased absorptive capacity can be achieved through either internal research or by sending employees away for learning events so that they can gain the necessary skills.

In effect, the internal environment is still central to the firm's success. There is a greater interaction with the external environment, such that there are more purposive inflows and outflows of knowledge, but the aim of open innovation is to accelerate internal innovation (Chesbrough, 2006). Huizingh (2011) explains that external commercialisation is done in place of internal commercialisation or in addition to it; however, internal skills and resources are still necessary, albeit a different set of skills and resources than are needed for closed innovation.

2.2.4 Open Innovation Processes

Gassmann and Enkel (2004) explain that there are three types of core open innovation processes, namely the outside-in process, the inside-out process and the coupled process. Figure 2 below illustrates this.

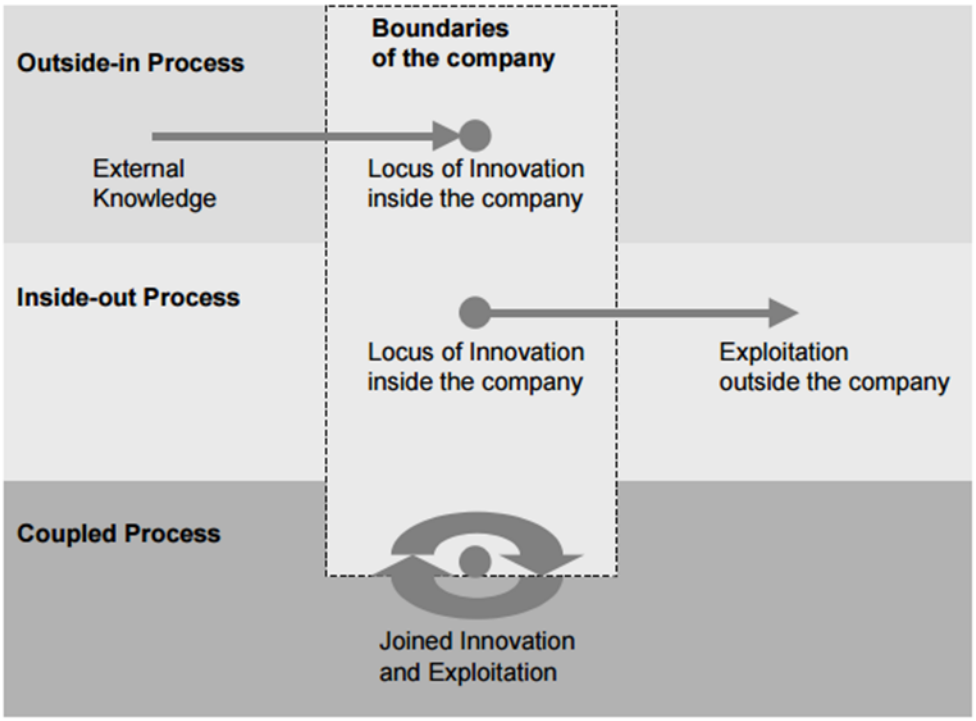

Figure 2: Decoupling of the locus of innovation (Gassmann and Enkel, 2004)

The key point made by Gassmann and Enkel (2004) about the various types of processes is that the locus of innovation (applying the idea and transforming it into an innovation), the locus of knowledge creation (invention or research), the locus of commercialisation (product development or exploitation of the innovation) have been decoupled from the processes they are conventionally connected to in closed innovation. The locus of exploitation is also decoupled from the other processes. Although all the three processes are still part of an open innovation strategy, not all are equally important. Most companies choose one primary process and integrate elements of the others.

2.2.4.1 Outside-In process

The outside-in process involves enrichment of the organisation's own knowledge base through integration of customers, suppliers, and external knowledge

sourcing, which results in an increase in the organisation's innovativeness. Bughin, Chui and Johnson. (2008) suggest that organisations that have adopted the outside-in process effectively view suppliers and independent specialists as co-creators; this results in firms delegating more of the innovation management to these external networks or communities. Some common approaches to the outside-in process are internal R&D, non-equity alliances, licencing, joint research, and development and equity alliances (Chesbrough, 2003a).

2.2.4.2 Inside-Out process

The inside-out process is the act of bringing internal ideas to the market, selling IP, and multiplying technology by transferring internally generated ideas to the external environment. This is the part of the process that allows the organisation to make a profit. Whilst inside-out processes may seem like the traditional approach to innovation, within the framework of open innovation they take on an added importance because unexploited discoveries will sooner or later spill out into the external environment since they cannot be kept secret or remain unexploited for long. Some of the approaches adopted in the inside-out process are out-licensing, spin-offs, and alliance (Chesbrough, 2003a).

2.2.4.3 The Coupled Process

The coupled process is a combination of the outside-in and inside-out processes. Here, the organisation works with complementary partners in areas where their interests are aligned. It involves some give and take for both partners in order to succeed. Some of the key activities that have been identified as part of the coupled process are technology exploration and technology exploitation (Van de

Vrande *et al*., 2009). Technology exploration essentially describes the activities that help the firm access external sources of knowledge to enhance internal innovation and technology, while technology exploitation refers to activities undertaken by the firm that capture value from technology existing outside the boundaries of the organisation.

2.2.5 Open Innovation Enablers and Challenges

2.2.5.1 Open Innovation Governance/Business Model

Chesbrough's concept of open innovation presents a convincing case for organisations to open up their innovation processes to leverage external sources of knowledge, technology, and innovation. In describing one of the driving forces of open innovation, Chesbrough (2003a) asserts that while 'most of the world's really smart people do not work for your organisation,' through open innovation, they become inherently more accessible. Whilst the idea of open innovation is great, it requires tapping into technology provided by external partners (West and Bogers, 2011). Chesbrough (2006) argues that organisations need to innovate with regards to their business model, as a way to create value and capture a portion of that value for themselves. Chesbrough describes the development of a business model as involving three main functions: 1) the articulation of the value proposition and target market segment; 2) the establishment of a value chain structure and value network position that allows the value proposition to be delivered; and 3) the development of an economic model that enables the organisation to extract the necessary value to succeed (Chesbrough, 2006). The central idea is that 'companies must develop more open business models if they are to make the most of the opportunities offered

by open innovation' (Chesbrough, 2006, p.107). This requires that organisations have a clearly defined technology and innovation strategy.

Chandler (1962) defines strategy as the act of determining both the short-term and long-term goals and objectives of an organisation. It is also the adoption of courses of action and the allocation of the resources needed to implement those actions. For Hofer (1973), strategy is concerned with matching opportunities in the external environment with an organisation's resources and its capabilities for tapping those opportunities. Empirical evidence suggests that strategies encouraging linkages with external partners lead to improved innovation outcomes (Fey and Birkinshaw, 2005). Likewise, Chesbrough and Appleyard (2007) argue that to make strategic sense and benefit from an innovation ecosystem, organisations need a new approach to strategy, something they refer to as 'open strategy.' Open strategy balances the promise of open innovation with traditional business strategy; it 'embraces the benefits of openness as a means of expanding value creation for organisations' (Chesbrough and Appleyard, 2007). A strong internal R&D unit is also critical for the governance of open innovation.

2.2.5.2 Open Innovation Leadership and Culture

Organisational leadership can significantly influence creativity, innovation and change (Amabile, 1998; Jung, 2001; Palmer, Dunford, and Akin, 2006). Tushman and O'Reilly (2002) suggest that leaders can influence organisational culture, structure and resources—factors that are all likely to affect the implementation of new ideas in an organisation. The existing literature on open innovation tends to stress the importance of leadership support for innovation. However, few of the papers reviewed actually analysed the implications of leadership in open innovation.

In a discussion on leadership in open communities, Fleming and Waguespack (2007) argue that, consistent with the standards of engineering culture, future open innovation leaders must first make changes that can bind the community together. However, Witzeman (2006) argues that open innovation needs to take place beyond the realm of technological systems. Thus, the greater the degree of openness required by the organisation, the greater the need to change its processes, systems, values and culture (Laursen and Salter, 2006).

Numerous definitions of organisational culture exist within the 'culture' literature. However, these definitions share the common idea that organisational culture refers to a set of shared values, attitudes, beliefs, and practices, which guide the organisation's operations and help shape the behaviour of its staff (Schein, 2004). Deal and Kennedy (1982) define organisational culture as 'the way we do things around here,' whereas Schein (1984,) defines it as:

> the pattern of basic assumptions that a given group has invented, discovered or developed in learning to cope with its problems of external adaptation and internal integration and that have worked well enough to be considered valid and, therefore, to be taught to new embers as the correct way to perceive, think and feel in relation to those problems.

Tushman and O'Reilly (2002) argue that the effective management of culture is critical in fostering organisational creativity and innovation. Moreover, for creativity and innovation to be sustained, it has to occur at the cultural level (Flynn and Chatman, 2004). Therefore, the components of organisational culture (shared values, beliefs, and behavioural norms) are key in promoting a culture of innovation (Andriopoulos and Dawson, 2009). Creating a culture that is accepting of open innovation is essential for its successful implementation.

2.2.6 Knowledge/Relationship Management

2.2.6.1 Internal Knowledge Management

Walling and Kreogh (2010) suggest that both explicit and tacit knowledge are important for innovation. Innovation tends to involve the intense cooperation of people and teams with different knowledge based on their experiences and expertise in various domains. In order to ensure the presence of effective knowledge management within the firm, managers need to be able to identify the locus of knowledge, and identify the principles that will allow them to integrate knowledge. Walling and Kreogh (2010) explain that it is often difficult to determine innovation-relevant knowledge at the outset of planning the innovation process. Furthermore, once the relevant people, teams, and databases are identified, managers need to ensure that the domain knowledge is integrated into the innovation process.

Huizingh (2011) explains that one of the main questions in open innovation is how it should be done; open innovation requires managers to make decisions about how to develop approaches and how to exploit assets to create innovation. Some of the decisions include when to conduct particular activities, how to conduct them, and which areas to focus on in terms of cooperation with external suppliers, customers, competitors, etc. These managers require new decision-making tools in order to be able to identify which decisions need to be made, to determine which factors need to be taken into consideration, and to allow them to respond quickly and efficiently. Chiaroni, Chiesa and Frattini (2010) explain that firms need to make changes to their knowledge management systems in order to embrace open innovation. Ihl, Piller and Wagner (2012) suggest that the structural changes required for an organisation to engage in open innovation depend on the firm's R&D intensity; firms with a high internal R&D intensity require lower specialisation in order for open innovation to

bring complementary assets and resources; firms with low internal R&D intensity require higher formalisation and decentralisation to enhance the effect of open innovation.

2.2.6.2 External Relationship Management

Relationship management is very important in the open innovation framework; Gassmann and Enkel (2004) explain that the integration of suppliers and customers is not new. There is a consensus in the current literature that inter-firm collaboration in general, and supplier relationship management in particular, allow firms to gain a competitive advantage if they can establish differentiated relationships with suppliers. Given the shifting locus of innovation and commercialisation that is characteristic of open innovation, it is clear that firms need the necessary relationship management skills in order to integrate internal organisational resources with the critical resources of other entities in the supply chain. In particular, the firm needs to learn to work across organisational boundaries, an aspect that makes relationship management very important.

Suppliers in this value chain actually enhance their own value by working with the various competing organisations; they are privy to knowledge and experiences that make them more valuable to everyone. Some of the identified benefits of effective relationship management include operational benefits, such as earlier identification of technical problems; and strategic benefits, such as better utilization of internal resources, access to new or supplementary resources, and reduced risk. Furthermore, one of the key factors in relationship management appears to be the ability to identify suppliers with innovative capabilities, as these are a major determinant of successful collaborative development (Boutellier and Wagner, 2003).

2.3 Summary

Thus far, the current literature on open innovation has been reviewed. Whilst the study of innovation is itself not new—having always been a fundamental way by which organisations adapt to change and prosper—it is observed that there has been a change in the way organisations innovate. They have opened up their processes to include a wider range of stakeholders, resulting in cross-boundary collaborations where anyone—either within or outside the organisation—can contribute to the innovation process. This represents a paradigm shift and has resulted in major changes in the internal and external environments of organisations and the way they operate.

Much of the current research has focused on the study of the outside-in and coupled processes of innovation. These alternative innovation processes can be seen as generating the phenomenon of open innovation, which was first articulated by Chesbrough (2003a) as a departure from the old virtuous circle of innovation. The present work has examined the differences between closed and open innovation; the context of open innovation, and its processes, enablers and challenges; and the changes in knowledge management and relationship management necessitated by open innovation. Significant recent interest in the subject has been observed.,. Most of the studies have thus far concentrated on identifying why and which changes to the concepts, processes, theories, etc. are needed to explain and further explore open innovation. Given the commercial importance of open innovation, the amount of research activity concentrated in this area is not surprising. It can be reasonably expected that this field will experience significant growth in the near future as a result of the attention it is garnering.

Chapter 3: Research Methodology

The way researchers conduct research may be viewed in terms of the research philosophy subscribed to, the research approaches adopted, the methods chosen, the strategies employed, and the data collection and analysis techniques used (Saunders, Lewis, and Thornhill, 2012). A review of the literature on open innovation has revealed established and accepted views regarding open innovation. As noted by Remenyi *et al.* (1998), this has allowed the researcher to develop an understanding of the theories and models used by past investigators.

The goal of this study is to investigate the innovation opportunities and challenges faced by organisations when adopting an open innovation strategy. Specifically, the objectives of this research are as follows:

- to understand the key success factors, challenges, and approaches involved in adopting an open innovation strategy,
- to investigate opportunities available to improve the operational efficiency of military, police, and civilian functions in peacekeeping by identifying, adapting, and scaling geospatial solutions through an open innovation framework, and
- to determine the feasibility of, and offer recommendations for, developing a strategic approach to collaboration and open innovation framework in peacekeeping.

It is relevant to note that this study places emphasis on internal issues (such as governance and leadership), and primarily focuses on how to set up the peacekeeping geospatial function in order to reap the benefits of open innovation. The aim is to use a phenomenological method to explore the research questions.

3.1 Research Philosophy

The research philosophy is the researcher's beliefs about the way in which the world operates. In the context of business and management research, there are two major ways of thinking about research philosophy that encompass the various philosophies of research: ontology (the nature of reality or being) and epistemology (what constitutes acceptable knowledge) (Saunders, Lewis, and Thornhill, 2012). There are four distinctive research philosophies, which have been identified in business and management research, namely pragmatism, positivism, realism and interpretivism (Saunders, Lewis, and Thornhill, 2012).

In the context of this research, the philosophical position adopted by the researcher is the epistemology of interpretivism. That is because the researcher needs to make sense of the subjective meanings expressed about the phenomenon being studied (Bogdan and Biklen, 2003). By adopting the interpretivist philosophy, the researcher is of the belief that only through the subjective interpretation of the phenomenon can the reality be fully understood.

3.2 Research Strategies

The debate about which research methodology to adopt is often expressed in terms of the choice between two main research methods—quantitative (such as questionnaire survey) and qualitative (such as case study)—or some combination of the two (Saunders, Lewis, and Thornhill, 2012). One way to distinguish between quantitative research and qualitative research is that the former generates or uses numerical data (numbers) while the latter deals with non-numerical data (such as words or observations). Qualitative research is a subjective and naturalistic approach used when the researcher is observes and interprets reality with the aim of

explaining what was experienced. In contrast, quantitative research is an objective method used to collect quantitative data in the form of numbers in order to confirm or disconfirm a theory or hypothesis (Saunders, Lewis, and Thornhill, 2012).

Influenced by the research philosophy adopted, this study followed a qualitative research methodology, guided McMillan and Schumacher's definition of qualitative research as 'primarily an inductive process of organising data into categories and identifying patterns (relationships) among categories' (McMillan and Schumacher, 1993, p. 479). This definition suggests that data and insights develop naturally during the investigation. Methods for coding and analysing data were adopted from the work of Braun and Clarke (2006), who suggest the following six iterative processes for qualitative thematic analysis:

1. Familiarisation with the data
2. Coding
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Writing up

The goal of this study is to develop an understanding of the usefulness and effectiveness of implementing an open innovation initiative, as well as the challenges associated with adopting such a strategy, in order to make recommendations regarding its adoption in UN peacekeeping. Apparently, this type of understanding can best be arrived at by investigating the experiences of individuals who have had direct involvement with open innovation practices. In light of this, the qualitative research method was selected as the most appropriate method of inquiry.

Adopting an inductive approach to qualitative inquiry, the goal of the research was to uncover the theories and patterns that would help the researcher understand the key factors of success in implementing and managing an open innovation initiative (Yin, 2009). In addition, since this is an exploratory study, a further benefit of adopting a qualitative research approach is that it gave the researcher the opportunity to ask open-ended questions in order to discover and gain insights about open innovation. This type of approach provided the researcher with the means to gather a significant quantity of rich and in-depth data, which offered insights into the nuances of individual perception that quantitative techniques such as questionnaires or surveys would not have been able to provide.

By investigating the perception of people who have had experience with open innovation, it was possible to obtain multiple perspectives, which further developed the researcher's understanding of the challenges and opportunities of open innovation. Although the qualitative approach applied in this study offers a high level of internal validity in terms of the data collected, it is not possible with this method to generalise the findings to the broader population of individuals who have experienced open innovation; however, this was not the intent of the research (Saunders, Lewis, and Thornhill, 2012).

Phenomenological Research

The theoretical perspective frequently associated with qualitative research is phenomenology (Bogdan and Biklen, 2003). Following the phenomenological approach, researchers attempt to understand people's perceptions and understanding (based on their subjective experience) of a particular phenomenon. This approach requires the researcher to attempt to achieve a sense of the meaning

that others give to their own situations (Husserl, 1970). It is concerned with people's perceptions or accounts of a situation, as opposed to an attempt to produce an objective statement regarding the situation Creswell (1998).

Guided by themes established from the review of the literature, a single unstructured interviewwas conducted with each of the 13 participants between August and October 2015. Non-directive and open-ended questions were used to allow the participants to elaborate freely on their “lived experience” of open innovation or open collaborative working. This approach encourages the kind of flexibility that allows the researcher to learn from the participants and then redirect the inquiry based on what has been learnt (Guest, MacQueen, and Namey, 2011).

Sampling and Setting

This study was carried out between July and December 2015 and the participants were selected using purposive sampling followed by snowball sampling, in which, at the completion of every interview, the researcher asked the participants to recommend any potential candidates who could add further insight to the study. The researcher was based in London between July and November 2015. A total of 13 participants with varying levels of expertise and experience in open innovation, open collaborative working, and geospatial technology were interviewed for this study. Of these, 9 were from six different organisations, and 4 were UN geospatial information staff. Eight interviews were conducted with UK-based participants, and one additional interview was conducted via Microsoft Lync with a participant in China. The UN participants were interviewed via WebEx and telephone. All eight UK-based interviews were conducted face to face. The researcher also participated in a

series of casual conversational talks with a number of people who had an interest in, and understanding of, open innovation and collaborative working.

3.3 Research Techniques and Procedures

3.3.1 Data Collection

Document Review

A thorough review of the literature on open innovation was conducted by consulting books, academic articles, journals, libraries and related databases. This literature search provided insights and direction that allowed the researcher to develop a list of themes to guide the interview protocol employed during primary data collection. The following themes emerged, as addressed in the literature review section:

- The concept and context of open innovation
- Open innovation processes
- Open innovation governance/business model
- Implications of leadership and culture
- Knowledge management
- Relationship management

Subsequently, the websites of companies that have implemented open innovation initiatives were reviewed. This revealed significant information related to the question of how organisations implement and manage their open innovation initiatives. A comparative review of these companies provided valuable insights into the research questions in this study. Table 3.1 below provides a list of the companies studied along with a description of their open innovation initiatives.

Table 1: Example global open innovation initiatives

Organisation	Website	Description
NASA	https://open.nasa.gov https://www.nasa.gov/solve	open.NASA and NASA Solve are NASA's open innovation initiatives that seek innovative solutions from members of the public—not just big companies and organisations—to participate in solving its trickiest problems.
Ordnance Survey	http://www.ordnancesurvey.co.uk/innovate/geovation	GeoVation aims to apply geospatial technology to help improve and develop communities. GeoVation addresses specific societal needs that may be satisfied, in part, through the use of geospatial technology
Procter & Gambler	http://www.pgconnectdevelop.com	Connect + Develop is P&G's open innovation initiative that seeks innovative ideas from outside the company and brings them in to enhance and capitalise on internal capabilities
UNHCR Innovation	http://innovation.unhcr.org	

Interviews

For this study, in-depth, unstructured individual interviews were conducted. Although the in-depth, one-on-one interview sessions were time-consuming and costly, this was the most appropriate data collection strategy due to the need to investigate the usefulness, effectiveness, and challenges of open innovation and develop a deeper understanding of the practice from the perspective of the individuals. For an exploratory study with a fairly homogenous group such as this one, many authors—for example, Saunders, Lewis and Thornhill (2012)—have suggested between 5 and 25 in-depth interviews as an adequate number for a study. For this study, interviews were conducted with 13 individuals. Nine of the participants, who came from six different organisations, had experience with open innovation or worked in an open collaborative environment. The remaining 4 participants were UN geospatial staff members (at both the managerial and technical

levels) who had experience working on field missions and/or at headquarters. The participants determined the time and venue of the meeting, and each interview lasted from 45 minutes to an hour.

Ninety per cent of the UK-based interviews were conducted at the participant's place of work. In all of the cases, the researcher was given a tour of the work environment; this gave the researcher the opportunity to witness and observe first-hand the working environment of the participating organisations. During the interviews, participants were asked about their reasons for adopting an open approach, their experiences with open innovation, their perceptions of the key success factors for open innovation, and the internal challenges faced in implementing an open innovation initiative. The UN interviews were conducted through telephone and WebEx, and the main objective was to identify, from the perspective of the participants, any sources of organisational resistance to adopting this kind of strategy. Several themes emerged and were documented.

3.3.2 Data Analysis

Through thematic analysis, themes and patterns within qualitative data can be identified using either an inductive or 'bottom-up' approach, or a deductive or 'top-down' approach (Braun and Clarke, 2006). In an inductive approach, the themes identified are strongly linked to the data themselves (Patton, 1990), whereas the deductive method of thematic analysis is more driven by the researcher's theoretical interest in the area of study (Braun and Clarke, 2006). The deductive approach was employed for this study; the data were analysed for themes and patterns as the participants described their experiences. Because of the interrelated and interactive nature of the qualitative data collection and analysis, the inquiry was planned as a

correlated process, in which data were collected, analysed and interpreted as each interview was completed (Saunders, Lewis, and Thornhill, 2012).

As Saunders, Lewis and Thornhill (2012) suggest, the data were immediately transcribed following each interview and analysed for trends and emerging themes based on the perspectives and experiences of the participant. This process was repeated for all data. The simultaneous data collection and analysis was an iterative process, which was repeated until enough interviews had been conducted to draw a number of significant conclusions (Saunders, Lewis, and Thornhill, 2012).

3.4 Ethical considerations

In order to aid the analysis of the data, whenever appropriate—and with the consent of the participant—interviews were recorded using the SuperNote application on an iPhone and iPad and later transcribed and coded. To ensure confidentiality and anonymity, the names of the respondents have been withheld (see appendix).

Chapter 4: Results

The main research objective of this project was to identify the key challenges, approaches, and success factors involved in adopting an open innovation strategy. To determine the critical issues in open innovation, participants were interviewed with respect to the following aspects within their organisations: their motivation for adopting an open approach; their working experiences with open innovation; their perception of the key success factors for implementing an open innovation strategy; and the internal challenges experienced. Several themes emerged and were documented. However, in order to maintain a focus on the objectives of this research, an emphasis was placed on themes relating to critical factors and challenges in the implementation of open innovation. The results are presented in Tables 2 and 3; the number of checkmarks indicates the corresponding number of participants who cited a given theme. The factors were grouped around the following main themes: culture, people, governance structure, and strategy.

Table 2: Key Success Factors

Coding	Themes	Frequency of occurrence
Key Success Factors		
Senior management support	Culture	☑☑☑☑☑☑☑☑☑
Ability to embrace a culture of innovation	Culture	☑☑☑☑☑☑
Structures and mechanisms	Governance	☑☑☑☑☑☑☑
Continuous open communication	Governance	☑☑☑☑☑
Control and coordination	Governance	☑☑☑
Strong internal promoters	People	☑☑☑☑☑☑
Internal knowledge of the organisation's challenges	People	☑☑☑☑☑☑
Willingness to learn new skills	People	☑☑☑☑☑
Understanding the nature of collaboration	People	☑☑☑☑
Commitment and motivation	People	☑☑
Alignment of open innovation and organisational strategy	Strategy	☑☑☑☑☑

Table 3: Challenges\Barriers

Coding	Themes	Frequency of occurrence
Challenges/Barriers		
Lack of internal commitment	Culture	☑☑☑☑☑☑
Insufficient senior management support	Culture	☑☑☑☑☑☑☑
Lack of efficient internal structure	Governance	☑☑☑☑☑☑☑☑
Poor idea filtration processes	Governance	☑☑☑☑☑☑
Communication barriers	Governance	☑☑☑☑☑
Insufficient skills/resources	People	☑☑☑☑☑☑
Operational issues	People	☑☑☑☑

It can be observed from the key success factors and barriers identified in the above tables that a number issues related to cultural change, governance structure and the involvement of internal staff in the open innovation process are crucial to the

successful implementation of open innovation. With respect to cultural change, senior management support is a crucial element, as well as a strong internal commitment to both innovation and changing the mind-set of individuals within the organisation. This is not surprising, as adopting open innovation may mean doing things differently from how they have traditionally been done. Indeed, previous studies (e.g., Mortara *et al*., 2009) have identified cultural change as a crucial issue in the successful implementation of open innovation. Laursen and Salter (2006) suggest that cultural change is a major factor that organisations need to consider when considering a shift towards an open approach to innovation. About seventy per cent of the participants in this study underlined the importance of senior management support for the successful implementation of open innovation. Senior management support was also a crucial concern of the UN participants. According to the interviewees, support from senior management is often translated into a cultural change, whereby working with different organisations becomes acknowledged and supported throughout the organisation.

The emphasis on governance suggests that the open innovation process benefits from structures and mechanisms, such as a control and coordination system, that are specifically developed to address the open innovation activities. Furthermore, the governance structure adopted to support open innovation activities has direct implications for the results of major open innovation processes, such as idea filtration. The notion of idea filtration is important because one decision-making issue that arises in the adoption of open innovation presents a new dilemma (Boudreau, Lacetera, and Lakhani, 2011): how should the organisation filter and select the best ideas and determine which strategies are worth trying? The process of open innovation generates huge idea corpuses, some of which are superfluous

and of varying quality. Therefore, it is crucial to have an efficient and effective filtering process to select the best and most practical ideas, so that only the most appropriate and rational ideas and solutions are further pursued. All of the UN participants identified a lack of continuous internal communication and staff member commitment as potential barriers to successfully adopting this kind of strategy.

Regarding the importance of the people involved in open innovation, the findings of this research suggest that their motivation and commitment to open innovation are crucial. Moreover, the open innovation team should have the necessary skills and competencies (or the willingness to learn those skills and competencies) to allow them to collaborate with actors from both within and outside the organisation. Previous research on this topic (Piller *et al*., 2012) suggests three categories of internal organisational champions for the successful implementation of open innovation: (1) the power promoter, who has sufficient influence on senior management to drive the initiative forward, to obtain the necessary resources and to help overcome the bureaucratic barriers that may arise; (2) the expert promoter, who has the technical know-how and knowledge to guide the technical aspect of the organisational innovation; and (3) the process promoter, who has the organisational know-how and intra-organisational social network to encourage the process within the organisation's culture. Furthermore, the need for an open innovation strategy that is aligned with the overall organisational strategy was highlighted by some of the participants. In other words, open innovation efforts should focus on areas of specific need identified by the organisation, and seek to integrate and align innovation with the organisation's long-term goals.

Chapter 5: Discussion and Analysis

The purpose of this research was to investigate the feasibility of developing an open innovation strategy at the UN to improve its operational effectiveness in peacekeeping. This section will synthesise the findings to answer the study's main research questions:

1. ***Which internal factors are crucial for the successful implementation of an open innovation initiative in peacekeeping?***

When attempting to create an environment conducive to open innovation, several factors need to be taken into consideration. The study found that establishing a team dedicated to open innovation management, understanding the importance of organisational culture in the change process, and developing an effective governance process are crucial to the success of open innovation. These findings are consistent with previous research on open innovation, suggesting the importance of these components in terms the UN's potential to successfully adopt an open approach to geospatial innovation in peacekeeping operations. Figure 3 below summarises the relationship between the three variables mentioned above.

Figure 3: The relationship of the key driving factors

- **The Open Geospatial Innovation Implementation Team**

A dedicated implementation team is essential for championing collaborative innovation and motivating others regarding the importance of change. Researchers (e.g., Chesbrough, 2003a; Lichtenthaler, 2008) often relate the concept of open innovation with technology. However, although technology is important to the process, open innovation also requires the right internal people with the requisite skills, capabilities and mindset. This finding is consistent with the suggestions of Chesbrough and Crowther, (2006); Spithoven, Clarysse and Knockaert (2011); and Huizingh (2011). The insights of the respondents in this study suggest that an effective open innovation team is the linchpin to successful open innovation.

> 'We have a dedicated team that is responsible for this [open innovation] initiative, because if you don't have a dedicated team, people are going to be busy doing their other jobs and they are not going to have time to drive the initiative forward.' (Respondent 7)

At Respondent 7's organisation, the open innovation team has helped develop an ecosystem of innovators who bring in complementary resources and capabilities to fast-track the innovation process. The UN would need an open geospatial implementation team that possesses the required skills to enable successful internal integration (getting all staff to work in tandem) and external adaptation (enabling staff to adjust to changing environmental conditions) in order to attain the organisation's open innovation goals (Denison Haaland and Goelzner, 2004).

> 'When introducing new solutions, we have always needed people who understand it and can train [other] people and make them understand the solution in order to enable them to use it to its maximum, as required.' (Respondent 11)

- **The Importance of Organisational Culture**

In order for open innovation to succeed, organisational culture matters. In alignment with previous research, the findings of this research suggest that the UN may not be able to leverage the power of open innovation by simply adopting an open innovation strategy. Rather, it would need to promote values that encourage a collaborative working culture among its staff members. Some participants from UN peacekeeping agreed that the peacekeeping geospatial community needs to overcome inherited behavioural norms in order to work effectively in an open innovation environment.

> 'From my experience, the first issue that came to mind is the poor attitude [of some staff members] towards open communication and collaboration in peacekeeping. Some people feel that information is power and they can become stronger by keeping it to themselves, so they tend to be less interested in open collaboration... '(Respondent 9)

This is consistent with Tushman and O'Reilly's (2002) suggestion that effective management of culture is of critical importance for innovation to thrive. For open geospatial innovation to be useful, the mind-set of UN peacekeeping staff needs to change. Moreover, as shown in previous research, the initiative must to be firmly driven by senior management, who have the ability to establish and support an open innovation implementation team tasked with promoting innovation throughout the organisation. Consequently, the commitment of senior management to embrace a culture of innovation can help drive the top-down and bottom-up cultural and structural changes necessary for open innovation to thrive.

> 'The big challenge for us was the change process…you know the bigger the organisation, the less receptive it is to change and the harder it is to make change happen internally, but thankfully top management played a key role to make it happen...' (Respondent 8)
>
> '…if we take the success of...] as an example, you can see it came from the very top of the organisation.' (Respondent 11)

- **Governance Process**

Similar to reports made by previous studies, the insights of the participants in this study suggest that an appropriate governance process is an essential component in adopting an open innovation practice. Appropriate infrastructure and networking platforms should in place to support the open innovation initiative.

> 'It is very important to develop a platform that would enable those at the top to have easy access to a shorter version [top-level overview] of what is going on.' (Respondent 2)
>
> 'One important bit [to our success] is the mix of online and offline connectivity. An essential part to this is an [online] ideation platform, we have a very good Community Manager who maintains engagements on that platform …the second part, which is just as important, we don't rely on the online community alone, we try to get people together on a 2 day boot camp where we meet and try to select the best ideas for further implementation...' (Respondent 8)

This is in line with current practices at successful open innovation organisations such as Ordnance Survey, NASA and P&G, all of whom have an IT platform that allows them to share innovation briefs and interact with their external collaborators. Findings from the research also suggested that, as with any organisational change, implementation of open innovation practices will impact the UN geospatial staff. Their attitudes towards the change will likely be influenced by various factors, including individual inclination, employment history, and employment trajectory (Tushman and O'Reilly, 2002).

> '…for this to work, it would depend on the level of acceptance of the missions, that is, their capacity to accept and change.' (Respondent 10)

Fear of failure may also impact the degree to which staff members are willing to accept the change; this can be countered by encouraging staff members to take and embrace risk, and by rewarding success.

'Most people fear change, let's take…for example, even with the huge effort that has been put into it, you can see some people resisting the change, some fearing the change because they are fearing for their jobs because they are not capable of reprofiling themselves to adapt to the change...' (Respondent 11)

'One of the key challenges that we face is to get people to buy in to new ideas.' (Respondent 10)

However, positive outcomes are possible, as people may embrace the changes if they feel they are part of a larger process of positive organisational evolution.

'Since my arrival at [the company] I have always tried to get people from the field to get involved in whatever project we are doing because, from my experience, people are more willing to cooperate when they feel that they are part of the process.' (Respondent 11)

2. Is open innovation a potential enabler of more rapid adoption of new geospatial technology in peacekeeping?

The majority of respondents were convinced that open innovation would thrive at the UN.

'…you would get so many people signing in because the course is good.' (Respondent 1)

'I think open innovation would thrive in the UN because it's a brand that is well known and one that people pretty much respect, and they can identify with some good been done from it.' (Respondent 7)

'It would be very interesting to collaborate with people from outside the organisation in order to enhance our capabilities. The geospatial industry is developing at a rapid pace and I believe that we are currently missing out on opportunities to implement the latest geospatial innovations.' (Respondent 9)

'It's [open innovation] is a good idea. A classic example is our current situation here, where there is a lot of work to be done, especially relating to security management within the mission, but the problem is that because of the insecure environment and limited resources we are incapable to go out and collect vital information. However, through [active] collaboration we could get these required data from organisations such as NATO who have all the GIS capabilities and are well deployed around the country. But there is no formal relationship in place that would enable us to exploit those readily available information.' (Respondent 13)

Open innovation may play a crucial role in boosting the geospatial capabilities of UN peacekeeping through adopting existing external innovations. However, as previous research has shown, a positive attitude at the organisational level is critical for open innovation to thrive (Monday Morning Ltd, 2007). Findings from the present research suggest that smaller organisations tend to be more open to external collaboration than larger organisations.

> '…the biggest challenge is working with an oil tanker when you want to be a speedboat. You know, the bigger the organisation [like ours], the slower it changes, the less receptive [it is] to change and the harder it is to make change happen internally.' (Respondent 8)

Chapter 6: Conclusions and Recommendations

The UN has a global reputation for maintaining international peace and security. Its peacekeeping efforts—which currently include 16 operations across four continents—are one of the most effective global tools for resolving conflict. The UN has a proud record of peacekeeping, including missions in areas such as Sierra Leone (1999 to 2005) and Timor-Leste (2006 to 2012). With an annual budget of around 8.27 billion US dollars, UN Member States are committed to continuing to invest in and strengthen UN peacekeeping efforts. However, the challenges faced by the UN in its 21st century peacekeeping efforts are great. These include both long-standing commitments, such as the need to protect civilians and UN personnel, and newer initiatives. To overcome these challenges, UN peacekeeping needs to utilise modern technology and innovative ways of doing things.

Informed by the in-depth qualitative interviews and thematic analysis on open innovation undertaken in this research, it is obvious that the first step to adopting open innovation is to establish a mutually understandable meaning of '*open*', both internally and externally. *What is open geospatial technology innovation in the peacekeeping context?* Open geospatial innovation in the context of peacekeeping is not about novelty or invention; it is about searching for ideas and solutions that may exist in certain contexts in the private, public and third sectors, and adapting this knowledge to particular problems or challenges in peacekeeping.

This research examined the key success factors, challenges and approaches to adopting an open innovation strategy. Additionally, it investigates the opportunities for improving geospatial innovation in supporting peacekeeping. As discussed in chapters 4 and 5, these two objectives have been met. Overall, the findings indicate that building a strong implementation team, instituting an effective governance

process and managing organisational culture are strategic imperatives for the successful adoption of an open innovation strategy in UN peacekeeping.

Consequently, to succeed in the global innovation economy, the UN must strengthen its ability to search for innovative solutions that may exist in certain contexts—especially the private sector—and seek to adapt these solutions to the particular needs of peacekeeping operations. Therefore, it is time for the UN peacekeeping to adopt a strategically driven, centralised, and open collaborative approach to its geospatial innovation.

Accordingly, this research puts forward the following recommendations:

- **Establishing a dedicated open geospatial innovation team:** Open innovation can be promoted by establishing a dedicated open innovation team at a centralised location that can serve all peacekeeping missions. This team should be composed of staff members with the skills and capabilities required to drive the initiative forward.

  The open innovation teams should be made up of individuals who possess the following skills and qualities:

  - Excellent network building skills; open innovation teams should be made up of individuals who enthusiastically look for opportunities to make connections across the geospatial industry, as well as the private, public and third sectors
  - Strategic thinking; team members should include individuals who can see the big picture and keep focused on the long-term goal

- Appetite for collaboration; team members should have the ability to thrive in collaborative environments in which their role is to work with others to find collective solutions to problems
- Infectious enthusiasm and strong interpersonal skills; open innovation leaders should have the ability to inspire ideas and enthusiasm in others and to communicate with a broad range of different audiences

♦ **Developing effective networking platforms to manage innovation**: The UN peacekeeping geospatial team should develop an efficient networking platform that makes it easy to foster collaboration, both internally and externally. Furthermore, it is essential to provide opportunities for face-to-face networking between staff and external actors.

♦ **Fostering intra-mission (intra-departmental) and inter-organisational collaboration at the local level**: Intra-mission and local inter-organisational collaboration involves encouraging local geospatial units to work closely with the military, police and civilian components to better understand their work processes and identify their needs, thereby leading to solutions that better serve them. As Henry Ford once suggested, 'If I asked people what they wanted, they would have said faster horses.' This is true for the geospatial function in peacekeeping. Peacekeepers and other geospatial clients do not usually know what geospatial technology can do for their jobs, so it is incumbent upon the geospatial staff to work collaboratively with the various mission components to identify needs and address them accordingly. This bottom-up approach could ignite the creativity of the peacekeepers and other beneficiaries of geospatial information services in peacekeeping.

Figure 4: Intra-mission and local collaboration

- **Opening up to inter-mission collaboration**: Open innovation is most effective when internal and external resources are effectively integrated in a collaborative effort. However, it is crucial that the mind-set of collaboration starts internally. Ensuring the geospatial function is able to cooperate and collaborate across its mission is as important as collaboration with external actors. Staff members should have a wide network of contacts within the organisation. This would effect knowledge transfer by enabling staff from different missions to learn from each other while drawing on the best ideas and rapidly overcoming barriers in idea development. Furthermore, collaboration can lead to positive-sum gains in inter-mission activities. That is, missions can work together in mutually beneficial ways to bring about what they could not necessarily achieve independently.

- **Fostering global collaboration**: Open innovation means encouraging ideas from everywhere. Therefore, once a culture of collaborative innovation and cooperation has been developed internally, the open innovation process can be scaled up to include external actors. The peacekeeping geospatial team should forge a collaborative relationship with the private sector, governments, academia, other UN institutions, the non-profit sector, and the blue skies.

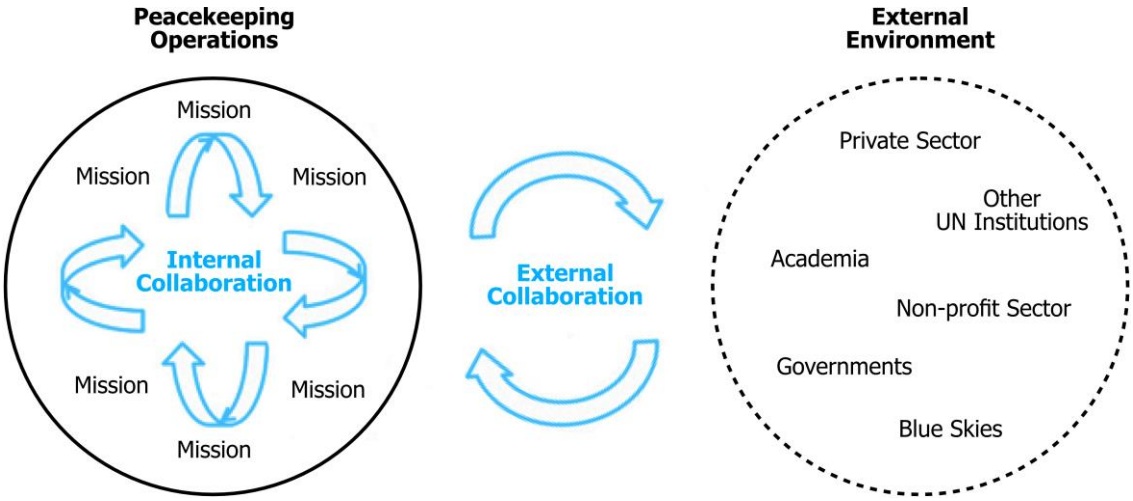

Figure 5: Framework for implementing open innovation in peacekeeping

- **Approaches**: In terms of the approach to open geospatial innovation in peacekeeping, a dual approach is suggested.

i) The direct approach

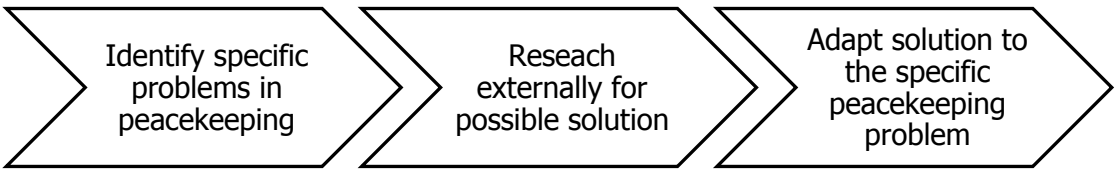

Figure 6: Direct open geospatial innovation approach

In this scenario, problems and challenges within the peacekeeping environment are identified. Possible external solutions are then expertly sourced and adapted to solve the specific problem or issue.

ii) The indirect approach

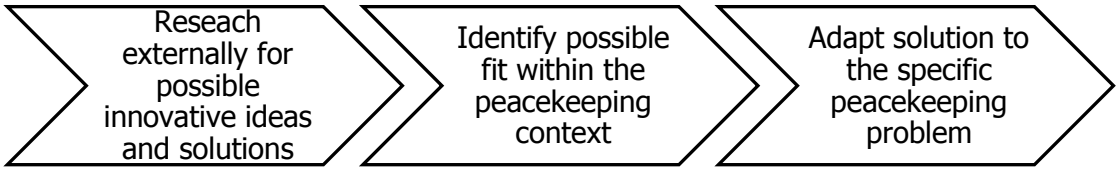

Figure 7: Indirect open geospatial innovation approach

In what is termed the indirect approach, members of the open innovation team who act as 'technology scouts' would regularly scan the external environment to identify innovative geospatial ideas and solutions that could potentially be adapted to challenges in the peacekeeping environment.

Recommendations for future research

This study was restricted by limitations that are common to qualitative methods, such as the small number of participants that does not allow for generalisation to a wider population with the same degree of certainty, and the distinct characteristics of each participant (Silverman, 2013). Further research could be carried out with a larger sample population to investigate whether the results of this study could be replicated.

References

Amabile, T.M. (1996) *Creativity in Context*. Boulder, Co: Westview Press.

Andriopoulos, C. and Dawson, P. (2009) *Managing Change, Creativity & Innovation*. Sage Publication Ltd.

Bogdan, R.C. and Biklen, S.K. (2003) *Qualitative Research for Education: An introduction to Theories and Methods*. 4th edn. New York: Pearson Education Group

Boudreau, K. J., Lacetera, N., and Lakhani, K.R. (2011) 'Incentives and problem uncertainty in innovation contests: an empirical analysis', *Management Science*, 57(5), pp. 843-863.

Boutellier, R. and Wagner, S.M. (2003) 'Sourcing concepts: Matching product architecture, task interface, supplier competence and supplier relationship', in Österle, H. and Winter, R. (eds.), *Business Engineering* (2nd edn.). Berlin: Springer, pp. 223−248).

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp. 77-101.

Brennan, A. and Dooley, L. (2005) 'Networked creativity: a structured management framework for stimulating innovation', *Technovation*, 25, pp. 1388–1399.

Bughin, J.R., Chui, M. and Johnson, B. (2008) 'The next step in open innovation'. *McKinsey Quarterly*

Chandler, A. D. (1962). *Strategy and Structure*. Cambridge, MA: MIT Press.

Chesbrough, H. (2003a) *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Boston, MA: Harvard Business School Press.

Chesbrough, H. (2003b) 'The era of open innovation', *MIT Sloan Management Review*. 44(3), pp. 35-41.

Chesbrough, H. (2003c) 'The logic of open innovation: managing intellectual property', *California Management Review*, 45(3), pp. 33-58.

Chesbrough, H. (2006) *Open Business Models: How to Thrive in the New Innovation Landscape.* Boston: Harvard Business School Press.

Chesbrough, H. (2007) 'Why Companies Should Have Open Business Models', *MIT Sloan Management Review*, 48 (2).

Chesbrough, H. and Crowther, A. K. (2006) 'Beyond high tech: early adopters of open innovation in other industries', *R&D Management,* 36(3), pp. 229–236.

Chesbrough, H., Vanhaverbeke, W. and West, J. (2006) *Open Innovation: Researching a New Paradigm*. London: Oxford University Press.

Chesbrough, H. and Appleyard, M. M. (2007) 'Open Innovation and Strategy'. *California Management Review*, 50(1), pp. 57-76

Chiaroni, D., Chiesa, V., and Frattini, F. (2010) 'Unravelling the process from closed to open innovation: evidence from mature, asset-intensive industries', *R&D Management*, 40(3), pp. 222–245.

Christensen, C. M. (1997). *The Innovator's Dilemma*. Boston: Harvard Business Review Press.

Cohen, W.M. and Levinthal, D.A (1990) 'Absorptive Capacity: A New Perspective on Learning and Innovation', *Administrative Science Quarterly*, 35(1), pp. 128-152.

Cobbenhagen, J. (2000). *Successful Innovation: Towards a New Theory for the Management of Small and Medium-Sized Enterprises*. Cheltenham, Gloucester: Edward Elgar Publishing.

Collins, J. and Porras, J.I. (1994) *Built to Last: Successful Habits of Visionary Companies.* 3th edn. New York: Harper Business.

Convergne, E., and Snyder, M. (2015) 'Geospatial Technology as a Conflict Prevention and Management Tool in UN Peacekeeping', [Online] Available at: https://s3.amazonaws.com/ipi-pdf-document-store/observatory/technology-geospatial.pdf (Accessed: 20 September 2015).

Cousins, P. (2006) 'Developing Collaboratively Competitive Inter-Firm Business Relationships', *University of Manchester*

Creswell, J. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks: CA: Sage

Deal T.E. and Kennedy, A.A. (1982, 2000) *Corporate Cultures: The Rites and Rituals of Corporate Life*. Harmondsworth: Penguin Books, 1982; reissue Perseus Books, 2000.

Dahlander, L. and Gann, D.M. (2010) 'How open is innovation?', *Research Policy*, 39(6), pp. 699-709.

Denison, D.R., Haaland, S. and Goelzner, P. (2004) 'Corporate culture and organizational reflectiveness: is Asia different from the rest of the world?', *Organizational Dynamics*. 33(1), pp.98-109.

Dess, G.G. and Picken, J.C. (2000) 'Changing roles: leadership in the 21st century', *Organizational Dynamics*, 28(3), pp. 18–34.

Drucker, P.F. (1988) 'The Coming of the New Organization', *Harvard Business Review*, 66(1), pp. 45-53.

Enkel, E., Gassmann, O., and Chesbrough, H. (2009) 'Open R&D and Open Innovation: Exploring the Phenomenon', *R&D Management*, 39(4), pp. 311-316.

Fey C.F. and Birkinshaw J. (2005) 'External sources of knowledge, governance mode and R&D performance', *Journal of Management*, 31(4), pp. 597-621

Fleming, L. and Waguespack, D.M. (2007) 'Brokerage, boundary spanning, and leadership in open innovation communities', *Organization Science*, 18(2), pp. 165-184.

Flynn, F.J. and Chatman, J.A. (2004) 'Strong cultures and innovation: oxymoron or opportunity?', in Tushman, M.L and Anderson, P. (2nd edn). *Managing Strategic Innovation and Change: A Collection of Readings*. Oxford University Press, pp. 234-251.

Fortna, V.P (2008) Does Peackeeping Works? *Shaping Belligerents' Choices after Civil War.* Princeton University Press

Gassmann, O. and Enkel, E. (2004) 'Towards a theory of open innovation: three core process archetypes. In: *R&D Management Conference* (6, pp. 1–18). [Online]. Available at: http://www.alexandria.unisg.ch/export/DL/20417.pdf (Accessed: 20 September 2015)

Gassmann, O., Enkel, E. and Chesbrough, H. (2010) 'The future of open innovation', *R&D Management*, 40(3), pp. 213–221

Guest, G.S., MacQueen, K.M., and Namey, E. (2011) *Applied Thematic Analysis*. Sage Publications Ltd.

Hofer, C.W (1973) 'Some preliminary research on patterns of strategic behavior', *Academy of Management Proceedings* 1973. 46-59

Howard, M.L. (2007) *UN Peacekeeping in Civil Wars*. Cambridge University Press

Huizingh, E.K.R.E (2011). 'Open innovation: State of the art and future perspectives', *Technovation*, 31(1), pp. 2–9

Husserl, E. (1970) *Logical Investigations.* New York: Humanities Press.

Jung, D.I., (2001) 'Transformational and transactional leadership and their effect on creativity in groups', *Creativity Research Journal*, 13(2), pp.185-195

Ihl, C., Piller, F. and Wagner, P. (2012) 'Organizing for Open Innovation: Aligning Internal Structure with External Knowledge Search', [Online]. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2164766 (Accessed: 15 October 2015).

Ladsous, H. (2014) 'New Challenges and Priorities for UN Peacekeeping' Washington, D.C: Brookings Institute. [Online]. Available at: http://www.un.org/en/peacekeeping/documents/HL-remarks-brookings.pdf (Accessed: 18 September 2015)

Laursen, K. and Salter, A. (2006) 'Open for Innovation: The Role of Openness in Explaining Innovation Performance Among U.K. Manufacturing Firms', *Strategic Management Journal*, 27(1), pp. 131-150.

Lichtenthaler, U. (2008) 'Open innovation in practice: an analysis of strategic approaches to technology transactions'. *IEEE Transactions on Engineering Management,* 55(1), pp. 148–157.

Lindegaard, S. (2010) *The Open Innovation Revolution: Essentials, Roadblocks, and Leadership Skills*. Hoboken, New Jersey: Wiley & Sons.

Lute, J. H., Bager, I. J., Dorn, W., Fryer, M., Guha, A., and McDougall, S. (2014) 'Final Report of the Expert Panel on Technology and Innovation in UN Peacekeeping', *United Nations Report*. [Online]. Available at: http://www.un.org/en/peacekeeping/resources/reports.shtml. (Accessed: 15 September 2015)

McMillan, J. H. and Schumacher, S. (1993) *Research in Education: A Conceptual Understanding*. New York: HarperCollins.

Martins, E. C. and Terblanche, F. (2003) 'Building organisational culture that stimulates creativity and innovation', *European Journal of Innovation Management*, 6(1), pp. 64-74.

Monday Morning Ltd (2007) Open Innovation: Case Studies from Denmark. *Danish Ministry of Science*, Technology and Innovation

Mortara, L., Napp, J.J, Slacik, I and Minshall, T. (2009) *How to implement open innovation:Lessons from studying large multinational companies*. University of Cambridge, Institute for Manufacturing

Nonaka, I., Keigo, S., and Ahmed, M. (2003) 'Continuous innovation: the power of tacit knowledge', in K. Shavinina (eds.) *International Handbook of Innovation.* New York: Elsevier.

Patton, M. Q. (1990) *Qualitative Evaluation and Research Methods.* 2nd edn. Newbury Park, CA: Sage.

Palmer, I., Dunford, R. and Akin, G. (2006) *Managing Organizational Change: A Multiple Perspectives Approach*. Boston, MA: McGraw-Hill.

Piller, F., Pollok, P., Antons, D. and Lüttgens, D. (2012). 'Hack: Global Solutions, Local Failure – Overcoming Barriers in Implementing Open Innovation'. [Online]. Available at: http://www.mixprize.org/hack/global-solutions-local-

failure-overcoming-barriers-implementing-open-innovation?challenge=161 (Accessed: 15 September 2015).

Perkmann, M. (2007) 'University-industry relationships and open innovation: towards a research agenda', *International Journal of Management Reviews*, 9(4), pp. 259-280

Powell, W.W., and Grodal, S. (2004) 'Networks of Innovators', in J. Fagerberg, D. C. Mowery, and R.R. Nelson (eds.) *The Oxford handbook of innovation.* Oxford, UK: Oxford University Press, pp. 56-85.

Remenyi, D., Williams, B., Money, A. and Swartz, E. (1998) *Doing Research in Business and Management: An Introduction to Process and Method*. London: Sage Publications

Saunders, M.N.K, Lewis, P. and Thornhill, A. (2012*) Research Methods for Business Students*. 6th edn. Pearson Education Limited.

Schein, E.H. (1984) 'Coming to a New Awareness of Organizational Culture', *Sloan School of Management, MIT*

Schein, E.H. (2004) *Organizational Culture and Leadership*. 3rd edn. John Wiley & Sons.

Scholten, V. and Temel, S. (2014) *Global Innovation Science Handbook*. McGraw Hill Professional.

Sieber J. Planning (1992) *Ethically responsible research: A guide for students and internal review boards*. Newbury Park: Sage.

Smith, J.A. (2012) *Qualitative Psychology: A Practical Guide to Research Methods*. Sage Publications Ltd.

Silverman, D. (2013) *Doing Qualitative Research: A Practical Handbook*, Sage Publications Ltd

Spithoven, A., Clarysse, B. and Knockaert, M. (2011). 'Building absorptive capacity to organise inbound open innovation in traditional industries', *Technovation*, 31(1), 10–21.

Thomke, S. (2001) 'Enlightened Experimentation – The New Imperative for Innovation', *Harvard Business Review*, 79(2), pp. 66-75.

Teece, D.J. (1992) 'Competition, cooperation, and innovation', *Journal of Economic Behavior & Organization*, 18(1), pp. 1-25.

Tidd, J., and Bessant J. (2013) *Managing Innovation, Integrating Technological, Market and Organizational Change*. 5th edn. Chichester, UK: John Wiley & Sons.

Tidd, J., Bessant, J., and Pavitt, K. (2005) *Managing Innovation: Integrating Technological, Market and Organizational Change.* Chichester, UK: Wiley

Tushman, M.L. and O'Reilly, C. (2002) *Winning through Innovation: A Practical Guide Guide to Leading Organizational Change and Renewal*. Boston, MA: Harvard Bussiness School Press.

United Nations (2014) *Basic Facts about the United Nations*. United Nations Press UN General Assembly (2014). [Online] Available at: http://www.un.org/ga/search/view_doc.asp?symbol=A/68/782/Add.8 (Accessed: 15 September 2015)

Van de Vrande, V., De Jong, J.P.J., Vanhaverbeke, W. and De Rochemont, M. (2009) 'Open innovation in SME's: trends, motives and management challenges', *Technovation*. 29(6-7), pp. 423 - 437.

Walling, M.W. and Kroegh, V.G. (2010) 'Organising for open innovation: focus on the integration of knowledge', *Organizational Dynamics*, *39*(2), 145–154.

West J. and Bogers M. (2011) *Profiting from external innovation: a review of research on open innovation*. 9th International Open and User Innovation Workshop, 4-6 July, Vienna, Austria.

Witzeman, S., Slowinski, G., Dirkx, R., Gollob, L., Tao, J., Ward, S. and Miraglia, S. (2006) 'Harnessing external technology for innovation', *Research-Technology Management*, 49(3): pp. 19-27.

Yin, R.K. (2009) *Doing case study research*. 4th edn. Thousand Oaks, CA: Sage

Zlatanova, S. and Li, J. (2008) *Geospatial Information Technology for Emergency Response*. London: Taylor & Francis Group.

Appendix

Participants' profile

In order to ensure confidentiality, all participants' identifying characteristics have been changed (Sieber, 1992).

Participant	Company	Position	Location	Mode of interview
Respondent 1	Company A	Technical	UK	Face-to-face
Respondent 2	Company A	Managerial	UK	Face-to-face
Respondent 3	Company A	Technical	UK	Face-to-face
Respondent 4	Company B	Managerial	UK	Face-to-face
Respondent 5	Company C	Managerial	China	Microsoft Lync
Respondent 6	Company D	Technical	UK	Face-to-face
Respondent 7	Company E	Managerial	UK	Face-to-face
Respondent 8	Company E	Managerial	UK	Face-to-face
Respondent 9	UN	Technical	Field Mission	Telephone
Respondent 10	UN	Managerial	Field Mission	WebEx
Respondent 11	UN	Managerial	Field Mission	Telephone
Respondent 12	Company F	Managerial	UK	Face-to-face
Respondent 13	UN	Technical	Field Mission	Telephone