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Spatial Information Systems for The Security And Military Aspects

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Abstract The use of technological inputs in collecting, storing, retrieving, displaying, manipulating, managing, and analyzing spatial information is referred to as location information system technology. It combines Remote Sensing, Geographical Information Systems, Digital Cartography, and Database Management Systems. Mapping all types of data is very important for security risk and battle filed management. The concentration will be on two fields. The first one is Security monitoring and Sensors Network applications that required the assistance with Geographical Information System (GIS). Offering the ability to modify the spatial and time data of this paper we will focus on the security risk surveillance, in accordance with GIS map elements.

The second filed is the Military assets that use GIS for a variety of purposes such as cartography and intelligence. This paper will focus on battle field management, landscape analysis, military installation management, and other topics. Interpreting, and visualizing the data that comes from those remote sensors.

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Keywords: *Spatial Information system, Geographical Information System, security risk, Battle filed Management (BMS).*

1. INTRODUCTION

Geographic data is any data that, either directly or indirectly, refers to a specific location or geographical area. Geospatial data and geographic information are other terms for spatial data [1]. A working GIS is made up of five major components: hardware, software, data, people, and methods. The equipment of a GIS is the computer on which it runs. Geospatial data can be used to successfully handle risk security by converting spatial and time data from security surveillance into geographic information, which is stored GIS map elements. Technology can aid security departments in resource allocation. Mapping technology can provide a visual representation of previous risk activities in order to determine where to establish an active presence. Geographical Information System (GIS) support is required for Security Monitoring Applications (SMA). Providing means to convert security surveillance spatial and time data into geographic information that focus on security risk [3]. Geographic Information Systems (GIS) are critical components pertaining to combat activities. The command-and-control model, Interaction, Computer, and Information (C4I) making timely decisions for tactical orders in military operations significantly depends on the availability of correct spatial information. For top generals on the ground, GIS is a great tool. The way military forces operate and perform has changed as a result of its use. Geographic information systems (GIS) are used by military forces for a number of tasks, such as intelligence battle field management and mapping will concentrate on it [4][5].

2. LITERATURE REVIEW AND BENCHMARK.

a. The use of computers in the geosciences has largely shaped the study of and applications for geographic information systems. The main tasks performed by these systems include data capture, storage, representation, manipulation, and display in both 2-D and 3-D environments. This book presents conceptual modeling techniques established in computer science that are useful tools for solving geographical problems. It addresses its subject from the perspectives of informatics and geography. Both students and professionals should read this book as a fundamental textbook. Academic geographers, computer scientists, and GIS specialists all need it [1].

b. GIS and Remote Sensing demonstrates a special integration of GIS and remote sensing technologies in Iraq. explains the most recent environmental issues Iraq is facing improves knowledge of using remotely sensed data in modeling soil properties includes case studies demonstrating the use of remote sensing and GIS to address environmental issues in Iraq [2].

c. The goal of the paper is to highlight the value of geo - information systems (GIS) in the process of providing geo topographic support to all levels of leadership as well as the requirement of creating the GIS platform concept based on geo information data as a support to decision-making. Application of Geo information Systems in the Armed Forces

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and Other Military Formations in the Republic of Kazakhstan Methods: In addition to a sample analysis and an analytical approach to various international experiences in building GIS [6].

d. The Network Centric Data Communication Platform JASMINE, the first BMS in Poland and one of the few in the world, has this as its next-generation element. The technology improves and automates military operations, command, and information flows. Its goal is to create cutting-edge, all-inclusive C4i on-board solutions at the military level [5].

3. SPATIAL INFORMATION SYSTEM.

The fundamentals of the application of Spatial Information Systems to the Spatial Information System will be discussed, also known as the Geographical Information System. The word spatial comes from the word space. It refers to features and phenomena that are spatially defined and thus have physically measurable dimensions. Recognize that the majority of data has outer world (location) today, like the address of a military base or a security station, for example. Thus, the term "spatial information technology" designates the application of technological advances in locational data collection, stockpiling, retrieval, display, deception, management, and analysis. It combines Geographic Information Systems (GIS), Digital, and Remote Sensing (RS) Cartography, and Database Management Systems (DBMS) into a single system. The last decade, information systems and planning have become inseparable. Security and military strategies necessitate the development

and deployment of customized information systems [1]. If the following conditions are met that kind of spatial information systems (which include data management systems and modeling techniques) it will have the potential to be useful planning tools. The availability of a flexible and user-friendly information systems model for strategy process planning that is reasonably robust under various developmental conditions of the spatial system under consideration. A compilation of latest software developments, especially in the area of geographic information systems (GIS) will be applied.

4. GEOGRAPHICAL INFORMATION SYSTEM.

Since the mid-1970s, advanced computing systems have made it possible to process mentioned information for the reasons of arranging and incorporating Locating specific information in individual files, doing calculations, analysis, and developing a decision support system; spatial and attribute data; and Geographic Information System (GIS) is a system that can handle all of these tasks. A spatially referenced data capture, storage, verification, integration, manipulation, analysis, and display system is described. In most cases, a spatially explicit computer database and the proper application software are needed. It is a hybrid system that uses computers to create maps and manage databases, and its theoretical and conceptual underpinnings come from both spatial and related fields like computer science, statistics, mapmaking, remote sensing, database technology, geography, geoscience, hydrology, agriculture, strategic planning, earth sciences, and public administration. Detailed Location Information Shapes, as previously discussed the geographical information is represented by two types of data. These types are: spatial and non-spatial. The position, linear, and areal characteristics of the spatial data make them distinct appearance. Geographic Information System is a database stores attributes as well as their values or classes. Because The aspects, which are the names of various states, have specific locations on a map, and the spatial data file is on the right. GIS can make use of this data. To a widely accepted and clearly defined co - ordinate system, these data formats must be geometrically documented and coded in order to be stored in GIS's internal database structure [2].

5. THE SECURITY RISK.

The Leadership refers to the ongoing process of identifying security risks and putting plans in place to address them. Security is the condition that allows citizens of a state to go about their daily lives boldly, fearlessly, and with the ability to take advantage of opportunities to advance their way of life. It includes the readiness, protection, and preservation of people, as well as both tangible and intangible property and information. Government entities, including those supporting security missions, have long used GIS technology. It has historically been a technology used by a small group of highly trained analysts and Geospatial specialists. Administrative deal with database to identify threats and Statistical Modeling, plan resource implementation, as well as map potential action and contingency plans The Sensors Network and alarm sensors shown in Figure 1 are devices that identify events that occur in the normal working environment. This will send signals to the alarm panel, which will process them. Mechanical or electronic alerting sensors must be strategically placed in order to monitor. There were meeting between Risk Data Contextual variables, Database which obtained from GIS, Crowd sourcing and Sensors Network. The purpose is to get integrated database determent risk, where using Video to display in form of Statistical database, all risk, and then print report for all data to support the Investigation in all situations, at the end, making a decision in all situations. Take applications, for example, were employed to generate data, assess data security risks, also generate paper maps on any device, wherever, staff may access basic charts for all threats and quest applications thanks to the ArcGIS platform, over any network at any time. The availability and use of GIS technology is considerably greater online, in the cloud, and generally speaking. A complete geospatial software platform that supports spatial knowledge is called ArcGIS. See Figure .1.

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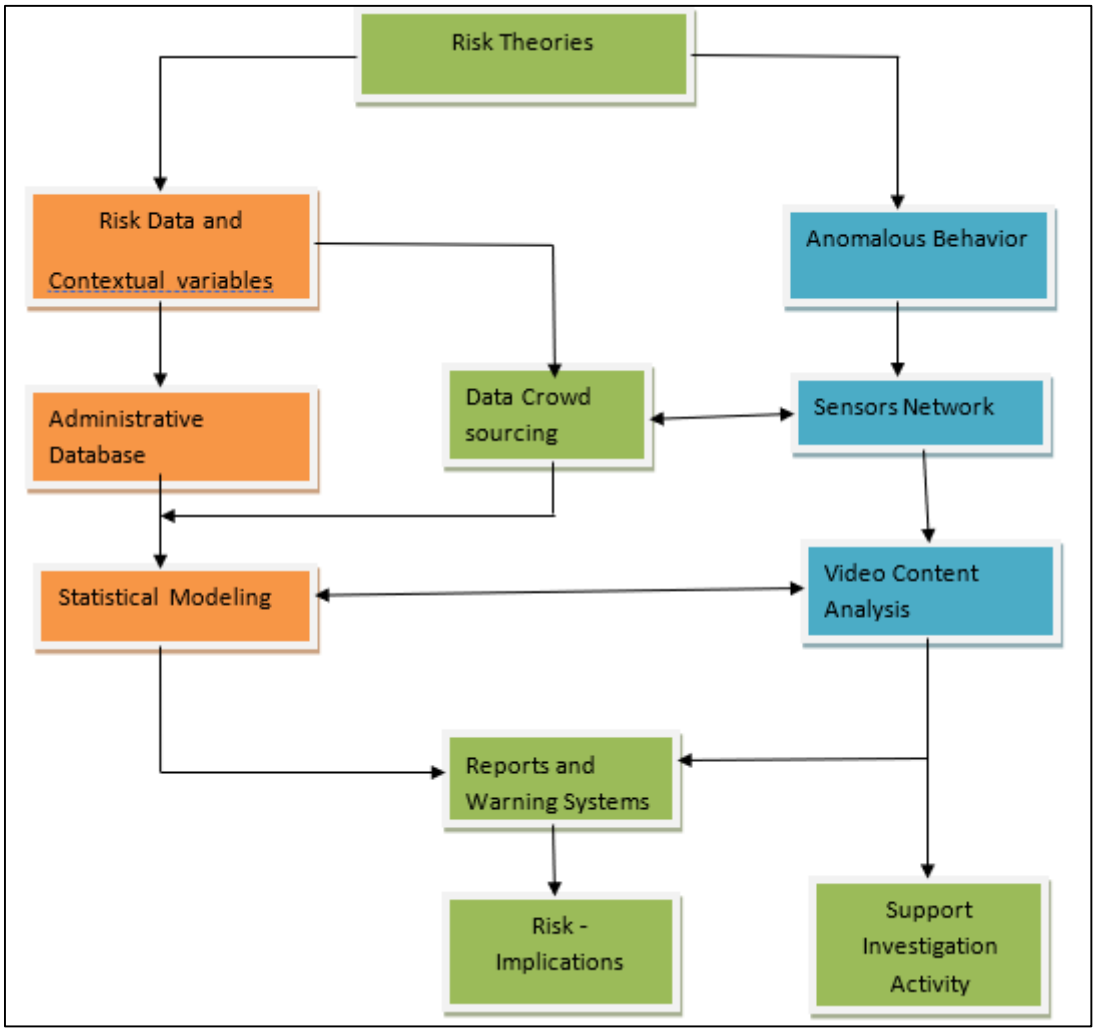

Figure 1. *Security Integrated System's Structure*

6. BATTLE FILED MANAGEMENT SYSTEM (BMS).

System designed integrates data acquisition processing in order to improve command and control of a military unit. GIS is used as a database by military forces in a variety of applications such as Command, Control, Communication, Computer & Intelligence (C4 & I), Cartographers, intelligence, administration of battle fields, topographical analysis, remote sensing, management of military installations, and surveillance of prospective enemas activities are all examples of services provided by the military. The perception and visualization of the main applications of GIS for systems is data from distant sensors. GIS specialists provide combat resource management advice and map out aspects of the planet's surface which is implemented, monitored, reviewed, and improved on a regular basis. Enterprises must develop a security plan outlining how they will manage security risks as well as how security fits into their goals and priorities. Accept or avoid the risk of information risk associated with enemies, processes, and technologies. A key component of Military exercise success is defined as the ability to transform intelligence databases obtained through GIS into an information advantage that can be used in battle field management. As a result, real-time special awareness, evaluation, planning, issuing orders, and carrying out executive action are all possible. The important elements as shown in Figure 2 and the graph Figure 5, its Database a battle field management years 2019 and 2027 in Table 1.

7. COMMAND, CONTROL, COMMUNICATION, COMPUTER & INTELLIGENCE (C4 I).

Command, control, communications, computers, and intelligence are collectively referred to as C4I. Branch recognizes, tests, and analyzes new communication and information system technologies for military use fighter. The Geographical Information System (GIS) used in the C4I army system is critical to mission success because the bespoke command and control systems ensure compatibility with the demanding requirements of modern, cross-force cooperation, and real-time interconnection between army service component commands. When deployed at the front

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lines of fight, it is an excellent tool for in-battle field management. The adoption of GIS and remote sensing implementations in military forces has transformed how they operate and function. GIS is used by military troops with a range of skills, such as those in mapping, intelligence, management of the battlefield, analysis of the terrain, remote sensing, management of military installations, and threat monitoring. A screening of applicants for the military in ground operations is provided. C4 I should be designed in accordance with military doctrine. Figure 3 depicts an example of a command-and-control system. Figure 4 shows the GIS and C4I system are mostly procedural or technical in character, such as the management of air traffic and airspace, the sharing of assisting weapons, or the management of weapon system fire.

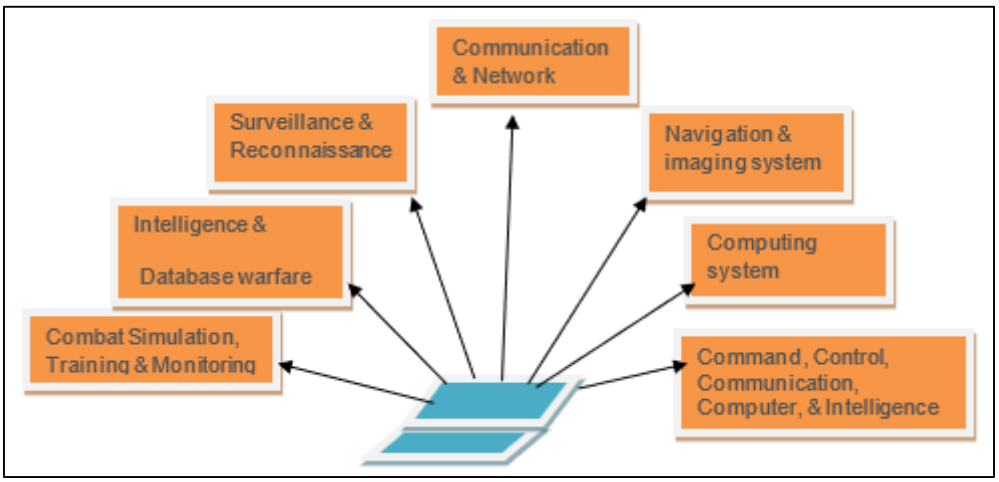

Figure 2 *Battle filed Management*

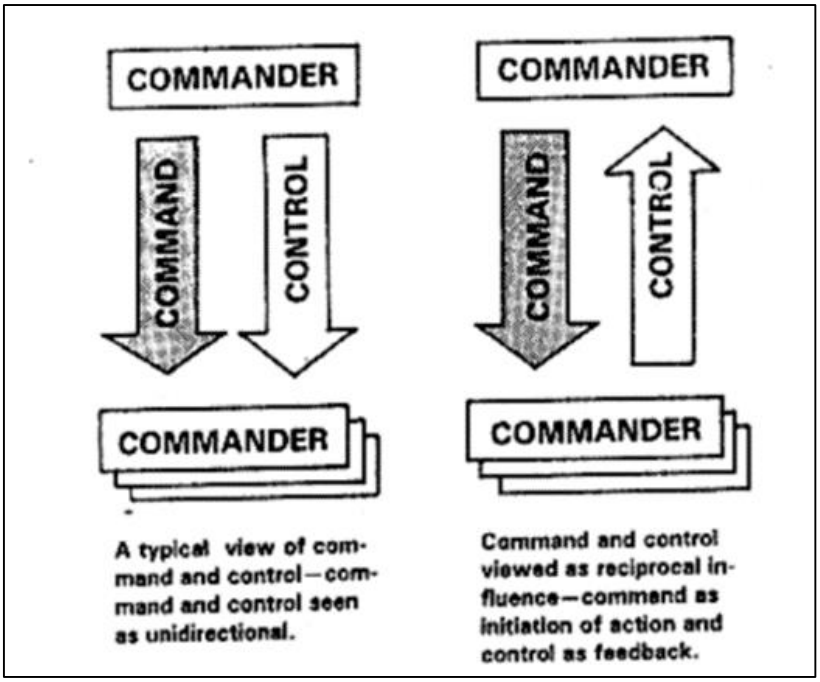

Figure 3. *Certain types of command and control*

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Figure 4. *Using GIS in C4I System*

a. Policy for battlefield management system instruction and training, modeling and training tools for system functionality. The proposed system results can be used as a form of media for implementing a BMS in the form of a battle simulation.

b. Geographic information systems (GIS), intellectual databases, and many others. Consider system features such as the statistics screen and DSS when issuing instructions to troops. Capability of transforming intelligence data into an information advantage that can be used on the battlefield.

c. Surveillance and Reconnaissance (ISR) specialists gather intelligence on the enemy by noticing their behavior and trying to track their movement patterns.

d. Communication & Network assists them in developing and maintaining It gives them the ability to lead successful teams during battle or on the job. It allows them to organize institutions into teams, such as squadrons, battalions, platoons, or military staffs, by connecting tasks with objectives.

e. Familiarized with workflow concerning the use of navigation and imaging can help to improve outcomes.

f. Computer system: Computers have been broadly used to endorse existing processes such as storing critical data, satellite imagery, creating digital maps, data processing, and so on.

g. Data into chunks called packets the act of sending packets from a source computer to a target machine. Prior to transmission, data is divided into up to 64 kb-sized packets or datagrams with a destination address stamp and forwarded to the network gateway. A router can function as a gateway to link networks.

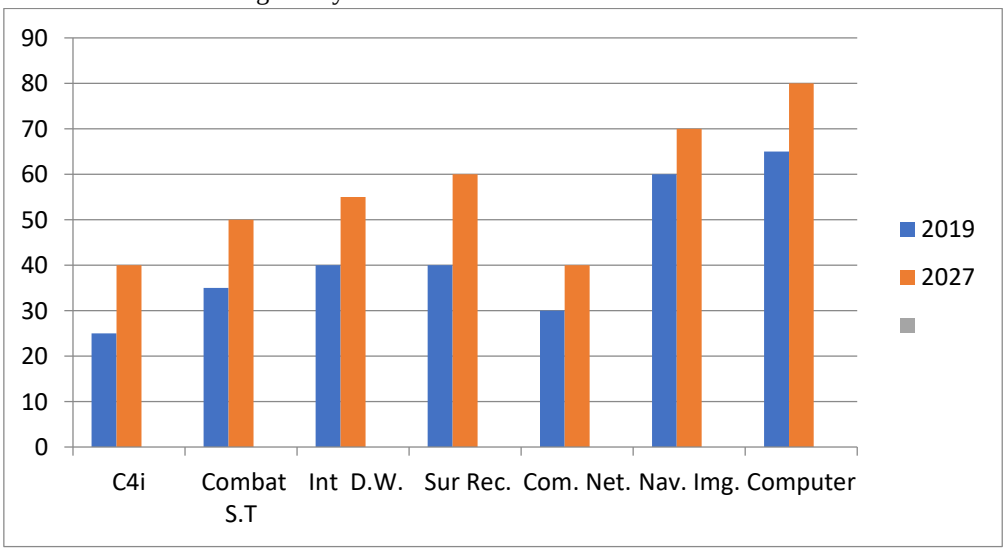

Figure 5. *A battlefield management system.*

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In graph Combat is Combat Simulation, Training & Monitoring. In. D. W. is Intelligence & Data warfare, Sur. Rec is Surveillance& Reconnaissance, Com. Net. is Communication & Network system, Image is Navigation & imaging system, Computer is computer system.

Table 1. *Database a battle field management years 2019 and 2027*

	D	C	B	A	
		2027	2019	Subjects	1
		40	25	C4i	2
		50	35	Combat S.T	3
		55	40	Int D.W.	4
		60	40	Sur Rec.	5
		40	30	Com. Net.	6
		70	60	Nav. Img.	7
		80	65	Computer	8

8. THE CHARACTERISTICS OF PROPOSED METHOD ARE THE FOLLOWING

a) The application of Spatial Information Systems also known as the Geographical Information System.
b) Since most GIS functions are either not needed at all to obtain a hard copy of the map or are used indirectly, the development of maps is far from being one of the GIS's primaries "responsibilities.
c) The GIS enables decision-making based on spatial data. As it is based on data linked to map coordinates, the GIS recognizes the idea of location unlike other types of information processing tools and enables the presentation of information in a graphical manner for understanding and management decision-making.
d) Create Security Risk Integrated System's Structure.
e) Create Battle filed Management with C4i.

9. RESULTS.

After discussing the proposed applications, it can be plan for a road map for very important applications; we will get the following results:

a. We can use what was proposed from the systems to design and improve a very important application which is the Control, Command, Communication, Computer, and Information (Intelligence) and this is what we call (C4 & I).
b. Spatial data is classified into two types based on the storing technique: raster data and vector data.
c. Geographic Information System Technology can be used in scientific research security risk assessment, battle field management, and development strategies.
d. Available in a web-based information system that allows stakeholders to develop response mechanisms and incorporate risk information into planning to meet the challenges associated with disaster risk. Determine the use of GIS and sensors to mitigate security risks in a variety of situations, as in Figure 1.
e. Determined the important elements of battle filed management, application as graph and database for 2019, 2027 see Figures 2 & 5 and Table 1.
f. The Paper presented clear method about the security Risk and Battle filed Management System.

10. CONCLUSION.

From the paper explanation and discussion, we can draw the following conclusions:

a. It can be use spatial analysis to address location-based challenges and better comprehend where and what is happening in security and battle. It goes beyond simple modeling to allow you to study the characteristics of places and their relationships. Spatial analysis broadens decision-making viewpoints.
b. Climate change has increased disaster risk in cities. The importance of effective disaster risk management and risk-informed planning, focuses on position of facts about geography and remote sensing systems risk assessments, discusses the potential general stability to other settings.
c. The battle field management, allowing for real-time insight, evaluation, planning, and the issuance of orders, as well as the execution of executive action with elements figure 3.

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