Bridging the Gap in Communications in Emergency Services to Help Reduce/Prevent Disasters and Save Lives

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Abstract

To explain altruistic behavior in emergencies, we argue that there is correlation between intuitive decision-making and personality traits of a rescue person under stress situation in disasters and emergencies and between high level and unified communication equipment to reduce/prevent disasters and save lives. Bridging the gap in communication of emergency services to help reduce/prevent disasters and save lives has a need to better understand judgment and decision-making under stress, which stems from high-risk occasions and emergency situations. The problem could be resolved through creation of new ways and methods for development of a new system which creates cooperation between rescue organizations with high level communication equipment. Rescue forces perform an analytical decision when a decision is simple and conscious, and they have examined it. However, they make an intuitive decision when the decision is complex and unconscious.

Key words: *Amateur radio,Save Lives, Natural disasters, terrorism, disparate communication systems, disaster management plan, gap in communications, decision-making and personality traits, high level and unified communication equipment.*

Introduction

Amateur radio History. The origins of amateur radio can be traced to the late 19th century, and have significantly contributed to science, engineering, industry, and social services,and founded new industries,empowered nations, and saved lives in times of emergency. Ham radio can also be used in the classroom to teach English, map skills, geography, math, science, and computer skills.

Amateur radio is officially represented and coordinated by the International Amateur Radio Union (IARU).Amateur radio, also known as ham radio, is the use of radio frequency spectrum for purposes of non-commercial exchange of messages, wireless experimentation, self-training, private recreation, radiosport, contesting, and emergency communication. The term "amateur" is used to specify "a duly authorised person interested in radioelectric practice with a purely personal aim and

without pecuniary interest;"[1] It not means commercial broadcasting, public safety radio services such as aviation,etc.

The amateur radio service (amateur service and amateur-satellite service) is *established by the International Telecommunication Union (ITU)* through the Radio Regulations. Amateur operators must hold an amateur radio license which is obtained by passing a government test demonstrating adequate technical radio knowledge and legal knowledge of the host government's radio regulations.

Radio amateurs are limited to the use of small frequency bands, the amateur radio bands, allocated throughout the radio spectrum. This enables communication across a city, region, country, continent, the world, or even into space. They can send, receive, or relay radio communications between computers and private networks on the Internet.

Estimation from 2011 shows two million people throughout the world are regularly involved with amateur radio. There are about two million amateur radio stations which located in Americas,South and East Asia and the Pacific Ocean and Europe, Middle East, CIS, Africa.

A major disaster occurs almost daily in some part of the world. Natural and man-made disasters – terrorism, earthquakes, floods, volcanic eruptions, industrial crises and many others – have claimed more than 3 million lives during the years 1976-1996 .The problem that most public service agencies cannot talk to one another at times of crisis due to disparate communication systems, lack of integration between these systems and the funding to put interoperability in place. Most nations have a national disaster management plan. Managers of a large number of organizational and spontaneous rescue volunteers/workers, who make decisions by situations of a gap in communication to help prevent disasters and save lives in emergency situations, is a missing part in science. Bridging the gap in communications in emergency services to help reduce/prevent disasters and save lives, has the need to better understand the judgment, decision-making and personality traits under stress stems from high-risk occasions and emergency situations. The problem could be resolved through creation of new ways and methods for development of a new system which creates cooperation between rescue organizations with high level communication equipment. There is a correlation between intuitive decision-making under stress situation and personality traits in disasters and emergency, and between high level and unified communication equipment. Lack of understanding of these elements will cause damage to populations with injuries and casualties as well.[1] ***Emergency definition.*** According to

[1]"General Regulations Annexed to the International Radiotelegraph Convention" (PDF). International Radiotelegraph Convention of Washington, 1927. London: His Majesty's Stationery Office. 1928. pp. 29–172. Archived from the original (PDF) on 28 July 2017. Retrieved 4 June 2017.

Sumner, David (August 2011). "How Many Hams?". QST. American Radio Relay League. p. 9.

Sena (2006) Emergency definition is as follows: "Emergency is “a state in which normal procedures are suspended and extra-ordinary measures are taken in order to avert a disaster. An emergency can be defined in the context of the social, political and epidemiological circumstances in which it occurs; hazard is a rare or extreme event in the natural or human made environment that adversely affects human life, property or activity to the extent of causing a disaster”.[2]

In our opinion, conflict situations arising from political factors such as chemical, biological, radiological or nuclear events and terrorist attacks, are cruel disasters for human beings**.** Terrorist activities exist in 50 core terrorism areas in the world while 10 terrorist groups threaten population of more than one billion people in the world.

Emergencies as result of terrorism events caused the biggest disasters in the world. Rub and Gîrla (2016)[3] argue that terrorism is a third world war while existence of terrorist attacks threatens over a billion people of the world. Terrorism is a form of a violent struggle, aimed mainly against

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Gernsback, H (May 1909). First Annual Official Wireless Blue Book of the Wireless Association of America (PDF). New York: Modern Electrics Publication. Archived (PDF) from the original on 6 July 2010. Retrieved 19 June 2009.

Brown, Patrick R. J. (1996). The Influence of Amateur Radio on the Development of the Commercial Market for Quartz Piezoelectric Resonators in the United States. 1996 IEEE International Frequency Control Symposium. 5–7 June 1996. Honolulu, Hawaii.doi:10.1109/FREQ.1996.559819. Archived from the original on 13 January 2013. Retrieved22 December 2008.

"Inventor of IC 'chip', Nobel Prize Winner Jack S. Kilby Credits Amateur Radio for His Start in Electronics". Nobelprize.org. 20 June 2005.Archived from the original on 5 November 2012. Retrieved 22 November 2012.

"Role of Amateur Radio in Development Communication of Bangladesh. Information & Communication Technology for Development. By Bazlur Rahman" (PDF). Archived from the original (PDF) on 18 May 2015. Retrieved11 May 2015.

Jim Taylor. "Canadian Amateur Radio Bulletin,Amateur Radio "Saved Lives" in South Asia (2004-12-29)". Hfradio.net. Archived from the originalon 6 March 2012. Retrieved 22 November 2012.

"What is Ham Radio?". American Radio Relay League. Archived from the original on 4 May 2010. Retrieved 1 June 2010.

Weaver, Bruce D. (January 2003). "On the Air Learning". Teaching Pre K-8. **33** (4): 50–51. ISSN 0891-4508

[2] Sena, L. (2006). Disaster prevention and preparedness. Jimma University, in collaboration with the Ethiopia Public Health Training Initiative, The Carter Center, the Ethiopia Ministry of Health, and the Ethiopia Ministry of Education, p. 2,3,5. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_extension_trainees/DisasterPreventionPreparedness.pdf

[3] Rub, J., Gîrla L. (2016). Fight against terrorism poses especially challenging questions for democratic countries. Revista Națională de Drept 3(185)/2016. ISSN 1811-0770.

civilians, for a purpose of achieving political and social aims such as getting countries to change policy and even overthrow and collapse regimes (Rub, 2015)[4].

Evil has never left us, it seems. So, there is no need for it to return. It is here, it is now and it is since hidden in human historical memory. Terrorism knows no limits (Rub, 2017)[5]. Types of emergency service volunteers are in rescue organizations the likes of police, firefighters, EMS (for example paramedics), etc. Terrorism poses difficult questions for any country and especially challenging questions for democratic countries, as not every effective means are legal means. The armed conflict against terrorism is an armed conflict of a country and less of the law against those who seek to destroy the country. Therefore, the author has demonstrated that a country fights while upholding the law, whereas its enemies fight while violating the law. Terrorists fight against and in defiance of the law (Rub & Gîrla, 2016).[6]

Very dangerous terrorism is the lone wolf terrorism. A 2003 study identified 30 cases of lone wolf terrorism in the United States between 1955 and 1999. Although these cases account for 2% of all terrorist events, they caused 15% of terrorist damage. The prevalence of lethal terrorist activity in the United States increased from 7% of all victims of terrorism to 26%. Studies show that lone wolf terrorism is on a rise in the Western world (Rub, 2018)[7].

VERIZON (2010) argue that catastrophic events need interoperability of emergency services, in order to bridge the gap in communications to help prevent disasters and save lives (not using a disparate communication system). Catastrophic events such as terrorism, airplane crashes or forest fires require tactical communications. For example, before the second tower of World Trade Center collapsed, the police received radio message of the collapse, but the firefighters never did, due to their using different radio communication systems. An ability to communicate across state and local rescue agencies, is to support decision-making on an individual level or as a collective group.

The problem. Most public service agencies cannot talk to one another at times of crisis due to disparate communication systems, lack of integration between these systems and the funding to put interoperability in place.

[4] Rub, J. (2015). Global risk of terrorism: a criminological review. Revista Naţională de Drept 12(182)/2016. ISSN 1811-0770.

[5]Rub, J. (2017). Evil has never left us, it seems. So there is no need for it to return. It is here, it is now, and it is since hidden in the human historical memory. Revista Naţională de Drept 2(196)/2017. ISSN 1811-0770.

[6]Rub, J. Gîrla, L. (2016). Terror attacks: ring around the existence threatens of over a billion people of the world. Revista Naţională de Drept 5(187). ISSN 1811-0770.

[7]Rub, J. (2018). Model of prediction of probability for increase lone wolfs of terrorism attacks- Israel as a test case. https://www.articles.co.il/article/183008

***Disparate Communication Systems*.** Historically, first responder communication has been significantly hampered by incompatible radio systems that include disparate networks, equipment, functions, procedures, applications and skill sets. Some rescue forces as police, firefighters and medical units have to deal with multiple different radios systems with different frequencies, unable to transmit and receive in all public safety frequencies as well due to incompatible systems throughout any given local jurisdiction.

Problems with interoperable communications systems. *According*VERIZON (2010) reports, 100,000 US emergency response agencies cannot easily communicate with one another or the public in real time. Using cell-phones, personal digital assistants (PDAs) and other commercial wireless devices in emergency situations, is not well-suited for mission-critical communications with Emergency Communications Plan.[8]

Channa and Ahmed claim that security requirements for emergency response communications include privacy, data integrity, authentication, key management, access control and availability. Various ad hoc communication frameworks have been proposed for emergency response situations. The majority is not with secure information exchange, and do not provide reliable and secure information exchange during emergency situations.[9]

Importance of Communications in Emergency Services to Save Lives. In this part of the article, we represent some emergency events as follows, from the aspect of our experiences:

"Orange Lightning" is a radio system, based on ASTRO 25 series equipment of Motorola Solutions Israel[10], which was founded in Israel for purpose of communication between all emergency and rescue entities in Israel.

Following the Carmel fire disaster in December 2010, in which deficiencies in communication were revealed between the different rescue and emergency entities, while there was use of separate frequencies and different communication systems, the Government decided on improvement of preparedness of the rear for emergency and disaster events and examination of alternatives to emergency national communication and control system [11] –establishing of a "national radio system that is mutual and uniform for all emergency and rescue entities, would allow continuous

[8] VERIZON (2010). Emergency Services, Interoperability for Emergency Services. https://nic-us.org/wp-content/uploads/2018/03/WP14760-Emergency-Services-Interoperability.pdf

[9] Channa1, M.I., Kazi M.A. Emergency response communications and associated security challenges. Information and Communication Technologies, Asian Institute of Technology, Thailandhttps://arxiv.org/ftp/arxiv/papers/1010/1010.4887.pdf

[10] Motorola Solutions Israel. https://www.motorolasolutions.com/he_il/products/project-25-systems/astro-25-site-equipment.html

[11] Governmental Decision 2699, from 9 January 2011. Improvement of preparedness of the rear for emergency events and setting budgetary sources for implementation of this decision.

communication between the organizations in state of emergency and in a mass disaster event, and without dependency upon communication system of cellular companies".

Ministry of Environmental Protection, Fire and Rescue Authority, Israel Nature and Parks Authority, the Knesset Guard, Israel Electric Corporation[12] and security officers in Local Authorities[13] - connected to the "Orange Lightning" system. *As of May 2021, connection of Magen David Adom (the leader of medicine organization in Israel which parallel to the International Red Cross) rescue to this network was yet to be completed and it serves only the top command and the operations room of the organization, but not the rescue personnel in the field*. State Comptroller's Report for 2016 criticized the fact that Magen David Adom was not connected to the system[14] .

Ziv (10/05/2021) makes claims about failures in communication between emergency and rescue entities that use different frequencies and separate communication system. This fact raises the question of how many disasters will occur in Israel until all the emergency and rescue entities will be connected to one network?

The disaster in the religious celebration in Meron mountain in Israel on 30/04/2021 in which 45 people were killed, put once again on the agenda the subject of national communication network system that Magen Dabid Adom (that uses cellular network that is liable to collapse in real time) is not connected to. The cellular networks collapsed which shut down a large part of the Magen David Adom communication system, that from 2019 is part of the communication of a private firm based on 4th generation cellular communication of Celcom network and in addition analogue communication systems in ambulances[15].

In 2009, was proposed to Haifa Area Cities Union – Fire Services, an emergency communication project for the community, voluntarily by the project managers Shlomo Feldheimer and Naftali Balaban-Oberhand, with tens of years of experience in the field, one of the founders of fist relay stations of amateurs in Israel, one of the founders of digital communication Packet Radio in Israel in 1986, former employee of Intel Israel and among the planning team of "Techsat" satellite of Technion in Haifa, who managed the technology center of "Beit Miller" in Haifa.

[12] IEC. (21/01/2015). For the first time: the electric company implemented the communication system orange lightning during the storm events. https://www.iec.co.il/spokesman/pages/21012015.aspx

[13] State Comptroller's report 68c. Security components in conflict settlements in regional commands, p. 1886-1889. https://www.mevaker.gov.il/he/Reports/Report_627/348ea340-3d3f-4524-bb58-dfbd8cdedff9/501-bitahon.pdf?AspxAutoDetectCookieSupport=1#page=30

[14] Wikipedia. State comptroller's office. https://he.wikipedia.org/wiki/%D7%9E%D7%91%D7%A7%D7%A8_%D7%94%D7%9E%D7%93%D7%99%D7%A0%D7%94

[15] Ziv, A. (10/05/2021). How many disasters will take place in Israel until all emergency and rescue entities will be connected to one communication network. https://www.themarker.com/news/health/.premium-1.9788189

In an initial proposal for integrating amateur radio fans in the emergency communication array, prior history and experience of the amateur radio fans in Israel and abroad were emphasized, who are real professionals and experienced in communicating in particularly difficult conditions of communication in disconnected areas. They participated in hundreds of rescue operations in sea and land over the years like in Mexico City earthquake in 1986, in collapse of the twin towers in which 80 amateur radio fans were recruited and who were of great help, in Israel in 1982 in Lebanon war. In the US about half a million licensees of amateur radio operators are registered, there are networks that are ready for any incident in multiple areas. These networks are very active in nature disasters. In Europe there is an organizing in several countries, and in Israel there is an activity that is organized upon need, and there are about 100 volunteers.

The proposal is for a new plan of action, in the field to be realized according to international rules and laws, according to communication treaties of ITU (the United Nations specialized agency for information and communication technologies) as well as according to IARU area 2 recommendations (International Amateur Radio Union, Asia, Africa and Europe area). The operation team will be comprised of Israeli/international licensed amateur radio fans as well as accompanying by professional emergency teams.

Realization of the proposal will allow for communication nearly everywhere and to anywhere and in any frequency range, with VHF and UHF. All that without a need to require companies like Bezeq, Cellular companies and Electricity Corporation. Multirange, multifrequency communication equipment will be built and constructed in a car for emergency communication, for communication in the country and outside of it, in sea, land and air for range of thousands of kilometers. In the mobile unit will be communication equipment of receiver-transmitter for VHF for amateur range and Fire Department range, emergency light equipment as well as energy supply equipment – emergency accumulators and generators, folding multirange antennas and connection to electrical grid, Bezeq and internet (if it exists) for facilitation of operation[16].

Balaban-Oberhand (17/2/2003) manager of Beit Miller in Haifa in the past, applied for operation of national emergency network in Beit Miller where exists a sophisticated amateur radio station which participated in the past in operating emergency communication in events, as stated. Mr. Balaban maintained that the necessity in operating emergency communication in Haifa is not questionable in the sensitive area of Haifa Bay and the chemical factories in it[17].

Balaban-Oberhand (28.5.2016) describes the rescue operations through amateur radio fans who transmitted by radio in Israel regarding the devastating earthquake in Mexico City that took place on 19.9.1985, in a city that numbered at that time about 18 million residents, that in that morning over

[16] Balaban-Oberhand, N. (2009). Letter to Haifa Area Cities Union- Fire Services.

[17] Balaban-Oberhand, N. (17/02/2003). Letter to Beit Miller Haifa Chairman.

10,000 people were killed with an estimate of 60,000 injured, this huge city remained disconnected from rest of the world and in that period about 10,000 immigrants from this city lived in Israel.

For over a year, dozens of amateur radio fans joined the attempts of computerized communication using computers by Commodore VIC-20. One of the leading radio amateurs in the field, Jim Stone, assembled in his home in Herzliya a system that operated by short waves, that was connected through radio waves to the national system in Haifa. This communication operated only in Israel through ultra-short waves. The combination of the two systems let the amateurs in Israel a possibility to send short texts mainly in English to many countries around the world in which similar systems were assembled as well, that were a sort of ancient internet, however exclusive.

Amateur radio fans in the world and particularly in the US attempted and succeeded in establishing radio connection between Miami and Mexico City. And a Jewish amateur radio fan from Mexico City, loaded his radio equipment onto his car and went to an open area in which might be good radio connection. He operated the transmitter from his car accumulator and could transmit all the while he had fuel. A connection was established between him and amateur radio fans in Miami, and from Miami to Herzliya and from Herzliya to Haifa and from there to dozens of amateur radio fans in Israel.

Mr. Balaban-Oberhand describes that his name and the names of others who assisted in the emergency communication were presented on CH-1 of the Israeli National Television at the end of the night news broadcast. A flood of phone calls came from concerned family members[18].

Naftali Balaban-Oberhand wrote about the contribution of emergency radio fans (existing for over 100 years), transferring regards from soldiers to the family which assisted to morale during First Lebanon War, 1982. The article was dedicated to a departed friend Arie Kertz, who was active at that time in Arad club station.

Surprisingly, in 1982, when the First Lebanon Was erupted, a decision was made to cancel the ban for transmissions at time of war, in which was forbidden for amateur radio fans to transmit out of confidentiality reasons, and radio silence prevailed. Many an amateur radio fan that was recruited for reserve military service, took with them their miniatured transmitters.

In mid-1970's, the Haifa amateur fans established a "relay station for increase of transmission range" on roof of University tower in Haifa that allowed for communicating to a lager distance of over 200 kilometers, and even to Cyprus and that is through a small personal communication device. One

[18] Balaban-Oberhand, N. (28/05/2016). Outline of rescue operations through amateur radio fans as broadcasted in program of Moshe Timor, in relation to the earthquake in Mexico City in 19.09.1985.

of the most active people in the field, was late amateur radio fan Yoram Kizler, who worked day and night in radio transfer[19].

Solution – Technologies for support communications and associated security challenges for mobile ad hoc networks in emergency response.

Chipara, Plymoth, Liu, Huang, Evans, Johansson, Rao and Griswold argue that emergency and disaster response which makes use of ambient intelligence (AmI) technologies are to support communications among participating rescue teams such as police, fire fighters and ambulance services.

The ambient intelligence technologies provide adaptive and assistive services to users by assuming a great number of interoperating devices such as sensors, actuators and other devices performing storage, processing and communication of data. Hospitals, police cars, ambulances, fire fighters and medical teams are integrated into a single virtual team performing disaster management operations. The system uses body area network (BAN), personal area network (PAN), mesh network, ad hoc network, sensor network, cellular network, terrestrial trunked radio (TETRA) network and global network as communication means.

A project had been initiated in Romania to develop a disaster response communication system to provide services such as quick information and alert dissemination to people, collaboration and coordination among rescue teams, information aggregation and personal assistance in emergency situations.

An ***emergency communication system***, called digital ubiquitous mobile broadband OLSR network (DUMBONET) is proposed for exchanging real time multimedia information in search and rescue operations in disaster affected areas. It connects various disaster affected areas and a command center through long delay satellite links. Every site has its own mobile ad hoc network for communications among first responders. The mobile node in DUMBONET may be a light-weight laptop computer or a personal digital assistant (PDA). The system communicates the aggregate information from rescue teams to decision-makers for efficient and timely decision-making. Chipara, Plymoth, Liu, Huang, Evans, Johansson, Rao and Griswold proposed that WIISARD is a system designed to facilitate the collection of medical information and its reliable dissemination during emergency responses. Empirical studies show that compared to the initial WIISARD system, the

[19] Balaban-Oberhand, N. Article on contribution of amateur radio fans. Transmitting regards from soldiers during First Lebanon War, 1982.

redesigned system improves reliability by as much as 37% while reducing the number of transmitted packets by 23%.[20]

In our opinion, the etiology of rescue in emergency situations originates from the persons who are empowered to adopt altruism acts, as well as from persons who want to put this subject into life for multiple reasons. Not all rescue persons and managers understand the level of risk in emergency situations such as comprehensive war, regional war, firing, missile launching, terrorist attacks, earthquakes, floods and more**.** As a result, in field of rescue activities not only high-level and effective technology equipment is important, but rather an emergency perception can be a problem while rescue managers can cause damage by wrong decision-making under stress occasions.

Therefore, a basic question is how to deal with and how to create effective communication between rescue organizations and entities, under emergency situations with an inventive and resourceful attitude, to improve potential rescue organizations activities?

The fact is that death inevitably creates a conflict with the will to live. Shorek (2008) in his study from 2008 about the theory of dealing with terrorism and defending the worldview regarding the theory of dealing with terrorism found that there is a mechanism in actions, continuously and unconsciously, to keep thoughts about death not last long in awareness. According to the theory of dealing with terrorism, the fact of death leads to an encounter between instinct and life, and awareness of the fact that death is inevitable creates the potential for paralyzing terror. However, there are processes that make people refrain from thoughts of death. It is true that people not often think about their death as there is a mechanism of good self-esteem which stems from a cultural worldview that is immortal after physical death, in a symbolic or explicit way, unconscious of holding thoughts of death.[21]

Therefore, the following passage of our scientific background is dedicated to psychological risk-taking irrational theory and dealing with taking risks.

Following groups of theories which are considered to be opposite to the irrational theory are Rational Choice Theories. They combine elements of classic theory and economic theory to explain rescue behavior. From a classic perspective, humans are considered to be inherently rational who logically calculate the potential cost and benefits of a given act. The theory of Thaler (1985) [22], integrating economics with psychology, received the Nobel Prize in Economics.

[20] Chipara , O., Plymoth, A.N. Liu, F., Huang, R., Evans, B., Johansson, P., Rao, R., Griswold, W.G. Affiliations expand Achieving reliable communication in dynamic emergency responses. https://pubmed.ncbi.nlm.nih.gov/22195075/

[21] Shorek, S. (2008). Theory of coping with horror and defense of world view: effect of prominence of death on appreciation of famous figures. Essay for M.A. in Humanities and Society. Ben-Gurion University. http://aranne5.bgu.ac.il/others/SorekShai.pdf

[22] Thaler, R. (1985). Mental accounting and consumer choice. *Marketing Science, 4*(3), 199-214. http://bear.warrington.ufl.edu/brenner/mar7588/Papers/thaler-mktsci1985.pdf

Communication in disasters. We agree that the conclusion formulated by Kahneman and Tversky in "Prospect theory" (1973; 1974)[23], according to whom the problem of decision-making according to communication equipment lies in the essence of psychological processes which are in the basis of human decision-making.

Decisions are not necessarily rational, gathering of information is occasionally done in an incomplete manner and data analysis is performed subjectively.

Intuitive decision-making model integrates, as well, a pattern or a rational consideration in a pattern of irrational decisions making. The irrational (intuitive) "Prospect Theory" model by Kahneman and Tversky is an advanced development of Rational Utility Theory developed by Von Neumann and Oskar Morgenstern, according to which rational people, while making decisions under risk, are supposed to choose the highest expectancy alternative. As opposed to Utility Theory which explains how people should behave and make decisions, it explains how people actually make decisions.

"Prospect theory" is intended to explain how people actually make decisions. Kahneman and Tversky conducted experiments which revealed that people not necessarily behave according to this theory, and their choices are not necessarily rational. In a world of loss, people do not like certainty and try to escape from it. Presenting the same problem in terms of profit or in terms of loss causes a reversal of preference. In the positive area (profit), rescue people prefer certainty (avoiding risk). In the negative field (loss) people prefer risk (avoidance of certainty). Thus, the arguments that people always prefer certainty, is not true.

Lieberman and Tversky (1996)[24] and Rub (2014)[25] on matter of decision behavior, argue that Psychological mechanisms that govern thought patterns evaluate outcomes intuitively, with errors in calculation; faulty judgment and miscalculation are very common in practically any walk of life.

However, we must remember, that rescue personalities evaluate risk cognitively according to level of communication equipment in disaster events. However simultaneously, they as well react to it emotionally, with minimal cognitive processing. These emotional or intuitive reactions depend upon contextual factors like immediacy of risk; vividness with which consequences can be imagined; previous experiences with consequences; visceral states; background mood.

[23] Kahneman, D., Tversky, A. (1973). Availability: a heuristic for judging frequency and probability. Cognitive Psychology, 5, 207-232; Kahneman, D., Tversky, A. (1974). Judgment under uncertainty: heuristics and biases. Science, New Series, 185(4157), 1124-1131.

[24] Lieberman V., Tversky A. (1996). Critical Thinking: Statistical Reasoning and Intuitive Judgment. Tel-Aviv: The Open University. (In Hebrew).
https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferencesPapers.aspx?ReferenceID=1434441

[25] Rub, J. (2014). Decision theory – renewing the empirical study of economic behavior. Studia Universitatis, Moldaviae (Seria Științe sociale), 8(78), 176-183. ISSN 1814-3199/ISSNe 2345-1017

In this direction, the given ***personality traits*** could have a great weight of rescue managers and organizations decision making in emergencies. It was found that paramedics with lower scores of neuroticism, had higher levels of resilience and they could similarly exhibit better compliance with their work conditions in stressful situations and consequently maintain their mental health. It was found that all volunteer populations have positive and high personality traits of Conscientiousness, Agreeableness, Extraversion and Openness and low level of Neuroticism trait. Individuals with high levels of Neuroticism had greater tendency to not commit acts of high altruism than those with low levels of Neuroticism. Volunteers in rescue organizations are highly persistent and goal-oriented, thus, the high Conscientiousness scores of those volunteers are in fact in accordance with the picture of a motive to enter rescue positions.[26]

In short, we have understood till now that ***only a successful combination and matching of emergency communication equipment and disasters with an optimal rescue personality, is the common denominator to save casualties in activity of many rescue forces that must function under a uniform communication system. In the field of disaster planning or emergency response, emergency professionals must possess ideal personality traits.***

Emergency Management (2017)[27] argues about the ideal personality traits for emergency management professionals**.** Some of the main characteristics in emergency management were found to be important qualities needed for an emergency professional: 1) Leadership Ability – to be unwavering in ability to take charge of an emergency situation. To guide with clear instructions by having a strong character to accomplish it. 2) To effectively create emergency management in order to give respect to colleagues, subordinates and the public for correct implementation of safety protocols, to allocate resources properly and to prioritize their task lists. 3) When leading others through real emergency situations – clear, direct oral communication skills are mandatory. 4) An ability to be understood by many different personality types, to get along with others well when disagreements arise as well. 5) An ability to make quick and definitive decisions under pressure. 6) Analytical abilities of being able to anticipate problems and apply logic to solve them as efficiently as possible. They need to have the ability to choose the ideal solution, be ready for the unexpected and when no clear plan of action had been formulated for that particular type of disaster in advance.

In conclusion, in our opinion, with respect to reviewing available literature and knowledge – bridging the gap in communications in emergency services to help reduce/prevent disasters and save lives has the need to better understand judgment and decision-making under stress, that stem from

[26] Rub, J. (2021). Aspects in National Security for upgrading emergency rescue behavior by rescue organizations: integrative hybrid multi-category volunteerism theory.

[27] Emergency Management (2017). What personality traits are idea for emergency management professionals? https://www.emergency-management-degree.org/faq/what-personality-traits-are-ideal-for-emergency-management-professionals/

high-risk occasions and emergency situations. The problem could be resolved through creation of new ways and methods for development of a new system which creates cooperation between rescue organizations with high level communication equipment. Rescue forces perform an analytical decision when a decision is simple and conscious and they have examined it. However, they make an intuitive decision when the decision is complex and unconscious.

There is a correlation between intuitive decision-making under stress situation in disasters and emergencies and between high-level and unified communication equipment.

There are notable failures resulting from decisions under stress in emergency, with one or more errors in judgment. At any moment under risk situations, there are reasons influencing a rescue personality's ability to solve complex problems within limited time. We argue that the best method to explain altruistic behavior in emergencies, is as well based on personality traits that will determine acts of a high-level of risk by a rescue person or organization. We insist that in fact, communication in emergency services to help reduce/prevent disasters and save lives, depends on the inherent feature of only one high-level communication equipment for all rescue organizations.

According to our viewpoint, lack of those elements will cause damages to populations injuries and casualties as well.

We refuted the common assumption according to which individuals who serve in rescue organizations are rational decision-makers. The decision to take risks in emergency events in order to save people is an irrational one, meaning that it is based on intuition rather than on rational choice. Intuition is considered to be the core of irrational decisions in taking risks in emergency events to save people, and it is based on the social experience accumulated throughout one's life. Therefore, decisions to take risks in emergency events in order to save people become particularly challenging under conditions of uncertainty, when it is difficult to foresee the consequences or outcomes of events with clarity.

Finally, bridging the gap in communication in emergency services to help reduce/prevent disasters and save lives is a great need, which has connection to decision-making and personality traits of rescue personnel and organizations.