Auto-generated Plans and Decisions as an Instrument of Crisis Management

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Abstract – **Auto-generated plans and decisions are generated without human input. Machine learning algorithms or other automated decision-making systems develop them based on present criteria and rules. An automated system might create a reaction plan for a natural disaster or cyberattack. The system may assess historical occurrences, discover patterns and trends, and create a reaction plan based on specified parameters. An organisation may employ an automated decision-making technology to choose resources or actions in a crisis. The tool may evaluate data and make a judgement automatically using specified rules and criteria. In urgent circumstances, auto-generated strategies and choices may help. They may also help businesses react consistently to emergencies using objective criteria and data analysis, decreasing human error. This work aims to provide an overview of crisis management and the role of auto-generated plans and decisions in its deployment. The case study of one company is presented to illustrate the usage of auto-generated plans and decisions, taking care that they shouldn't replace human decision-making. To be current and successful, they should be evaluated and updated often.**

Keywords – crisis management, auto-generated plans, machine learning, chatbots

I. INTRODUCTION

Crisis management is a systematic attempt by organisation members to cooperate with stakeholder groups to avoid and prevent or successfully overcome emerging crises [1].

The three fundamental goals of crisis management are [2]: prevention, protection, and mitigation of the crisis. Crisis management often involves a range of companies' activities focused on crisis: from pre-crisis preventive and preparation activities through managing during the crisis and to post-crisis activities of learning new ways of thinking, conducting and revising activities for better future crisis response [3].

Effective crisis management is characterised by the ability to make correct and swift decisions under pressure [4], while attaining organisational tactical and strategic goals [5], and maintaining business continuity along with key competitive advantages [1]. Organisations with effective crisis management are better prepared to anticipate, detect and manage crises [6].

Therefore, organisations should accept crisis prevention and crisis management activities as a formal part of business planning. Accordingly, before a crisis occurs, preventive activities are necessary. The focal point is creating a crisis plan that includes all activities for managing a crisis in the event of its occurrence, emphasising scenario planning in crisis management [7].

This paper aims to present a case study using auto-generated plans and decisions as a crisis management tool in a Croatian company "X". Company "X" is a global leading IT and telecommunications company in omnichannel communication that enables advanced customer engagement and support through use of various communication channels, including chatbots. Data for the case study was collected through an in-depth interview and document analysis. The results showed that the company successfully uses the artificial intelligence tool chatbot as a crisis management instrument.

II. CRISIS MANAGEMENT

A. Traditional approaches to crisis management

Traditional approaches to crisis management are [7]: an event-based (reactive measures) approach that can be defined in comparison to the process-oriented (dynamic approach), which is oriented to improving the efficiency of companies' preparedness for crises. Although the mentioned activities are necessary for crisis management, they are often insufficient for proper crisis response [9]. The traditional event-based and process-based (holistic) approaches that consider crisis preparedness, planning and learning are needed for effective crisis management [10]. Once the crisis has passed, the crisis management team should audit and evaluate the conducted crisis management activities and crisis effects, to increase organisational resilience and crisis preparedness [11].

B. Scenario planning

With crisis management and business continuity, access to crisis preparedness, crisis identification, crisis response, and recovery is easier. Without the abovementioned measures, management will react instinctively in a crisis and often make mistakes instead of a pre-planned strategic response in crisis and conflict situations [6].

Accordingly, scenarios are useful crisis management tools that enable companies to better prepare for the unexpected [12]. Scenario planning helps organisations better anticipate and appropriately prepare for crises and changes and identify threats and opportunities [13]. Crisis management and its core crisis preparedness activity, crisis plan, and within it scenario planning help the organisation improve strategic thinking and external analysis of the environment, as well as better prepare for an uncertain, complex future and provide appropriate, future-oriented strategic thinking and response measures for potential future crises [7].

They are particularly helpful due to the following three features [12]: i) increase organisational preparedness through expanding crisis team members' thinking and insights, ii) help uncover the foreseeable future, iii) enable employees to freely state their opinions and challenge dominant thinking in the organisation.

A potential downside to scenarios is that they might not include all key variables and have a low probability of unforeseen events, such as a pandemic, which can leave organisations exposed to risks. In addition, scenarios should be kept updated with changes in the environment and organisation, and organisations should have at least 4 scenarios in place [12]. Compared to contingency planning, scenario planning has more uncertainties, is more difficult to model, enables employees' creativity, helps identify difficulties and provides several possibilities for interaction and outcome [7]. Using scenario planning improves the detection of organisational and environmental risks and strategic opportunities detection, resilience, crisis preparedness and decision-making [13].

C. Use of chatbots for crisis management

"The conversational agent is a broadly encompassing term for an information system that can communicate with human users through using and processing natural language. It includes chatbots, digital, virtual, or voice assistants" [14]. Chatbot is "a computer program designed to converse with a human being, especially over the internet" [15].

Furthermore, Gartner defines a chatbot as "a domain-specific conversational interface that uses an app, messaging platform, social network or chat solution for its conversation" [16]. Chatbot is software that enables conversation in human form to respond to customers' queries. It can usually help provide routine answers, while human agents are necessary for more complex problem-solving [17]. It has become prevalent in many industries, especially in public relations [18], digital media [19], and human resources management [20] for its digital transformation [21], emergency management [14], [22], widely supporting digital transformation [23], [24].

Key to effective crisis management is timely and thorough crisis preparation, which includes crisis scenario development and communication strategy in times of crisis. In that regard, crisis chatbots can be useful for crisis management. However, they require proper design and training based on certain scenarios. Furthermore, chatbots can also serve as an early warning system through monitoring communication (through analysis of keywords, questions asked, and public sentiment) and enable on-time and adequate crisis communication and response while also alleviating the stress and burden that members of crisis team may have, along with company's customer support agents [25].

IT technologies and AI can advance crisis response, emergency management, and decision-making [14]. Information technologies such as chatbots can improve crisis management, especially in crisis communication and can be used as another communication channel. Their advantages are that they are visible in times of crisis when many people need fast responses to common questions and information [26]. Besides chatbots' benefits for customer service, they enable time savings, cost reduction, 24/7 availability, and better environmental awareness [17].

Chatbots can support emergency management activities through social media, whereas potential activities that chatbots can do in emergency management include [27]: i) Automated responses to FAQ; ii) Additional channels for gathering emergency information; iii) Responding to inquiries regarding ongoing disaster; and iv) Asking for feedback on emergency organisations during the crisis.

Besides the chatbots, several other possible bot types can be applied in emergency management, each with its function: news bot, social bot, monitoring bot and public dissemination bot, whereas social bots can analyse information and respond to inquiries on the crisis, as well as send emergency warnings through social media [27].

D. Auto-generated plans and decisions

Auto-generated plans and decisions are generated automatically, without direct human intervention. They are typically based on predefined criteria and rules and are often generated using machine learning algorithms or other automated decision-making tools like chatbots [28].

For example, an organisation may use an automated system to generate a response plan for a specific type of crisis, such as a natural disaster or cyberattack [28]. The system may analyse data from past incidents, identify patterns and trends, and use this information to generate a response plan based on predefined criteria.

Auto-generated plans and decisions in the form of personal assistant, can be useful when time is critical, and decisions must be made quickly and efficiently [29]. They can also help organisations respond consistently to crises, reducing the risk of human error and ensuring that responses are based on objective criteria and data analysis. One example of such an auto-generated chatbot was developed during the Covid-19 crisis [30].

Similarly, an organisation may use an automated decision-making tool to decide during a crisis, such as

which resources to allocate or actions to take. The tool may use predefined rules and criteria to analyse data and generate a decision automatically, although criticism is expressed concerning such tools [31].

Auto-generated plans and decisions can be useful in crisis management because they can help organisations respond quickly and effectively to unexpected events. Here are a few ways they could be used:

• Rapid response: Time is of the essence when a crisis occurs. Auto-generated plans and decisions can be used to quickly assess the situation and generate a response plan based on predefined criteria. This can help organisations respond faster and more effectively than relying on human decision-making alone.

• Consistency: Decisions must be made quickly and consistently in a crisis. Auto-generated plans and decisions can help ensure that decisions are made consistently, even in high-pressure situations where human decision-making may be affected by stress, emotions, or other factors.

• Scalability: Demand for resources and services can increase rapidly during a crisis. Auto-generated plans and decisions can help organisations scale their response quickly and efficiently without relying solely on human resources.

• Data-driven decision-making: Auto-generated plans and decisions can be based on data analysis and machine learning algorithms that can quickly process large amounts of data. This can enable organisations to make better informed decisions based on real-time data and analysis during a crisis.

• Reducing human error: In high-pressure situations, human decision-making can be affected by stress, fatigue, and other factors. Auto-generated plans and decisions can help reduce the risk of human error, ensuring that decisions are made based on predefined criteria rather than subjective factors.

Overall, auto-generated plans and decisions can be valuable in crisis management, helping organisations respond rapidly, consistently, and effectively in unexpected situations. One example of the application of automated response is autoamted detection of fake news regarding Covid-19 pandemics [32]. However, it's important to note that they should be used to complement human decision-making rather than replace it. Recent surge in use of autogenerative text bot, ChatGPT has revealed that it cannot be used freely, since it is prone to errors [33], and it should be trained for a specific purpose [34].

III.   CASE STUDY OF CRISIS MANAGEMENT USING A MODERN APPROACH

A.   *Application of communication channels for crisis management*

Modern companies develop an infrastructure that is highly adaptable to a dynamic market characterised by continuous changes in communication trends, speed and levels of accuracy, reliability and security that the work of today's companies requires. To achieve this, they use the so-called hybrid cloud model, which is coordinated with local services and locally stored data so that they can never run out of resources.

For example, an analysed software company (from now on, company "X") that uses modern communication channels and, in addition to customer support, provides consulting services, suggests the best forms of integration and offers the most effective solutions and decisions based on best practices, especially if there are unwanted, unknown or unusual activities in everyday business.

The use of such communication channels on the example of one contact centre, whereas for each of the channels advantages of communication with clients are as follows:

• Instagram Business - The Contact Center helps manage all communication on Instagram, one of the main channels for product discovery. It offers the connection through direct messages, comments, mentions in stories and replies with the contact centre on the "cloud" to simultaneously enable a conversation with several clients.

• WhatsApp Business - Offers a connection with customers on a global level, promoting the creation of personalised campaigns and engaging customers with interactive messages and constant reporting on promotions, in-stock items or offers, and must-have activities. This reduces costs and increases agents' productivity.

• SMS API - Easy integration of SMS messaging into business workflows is encouraged using a single messaging API. Over 650 direct operator connections in 190 countries are available, enabling low-latency, high-reliability interactions that cover every possible case – from SMS alerts on unusual work activity to two-factor authentication solutions. Also, real-time campaign performance analytics and reports are available.

• Web Push - Web push notifications are a quick and easy way to bring site content to visitors without the need to log in or leave personal information.

• Live Chat - Live chat provides continuous customer support with a combination of chatbots and live conversations with an agent, which increases the likelihood that one-time visitors will become valuable long-term clients, given that their questions are answered from the very beginning of their activity and support is provided when it is most needed. By using channels, the time to solve and eliminate problems is reduced, costs are

reduced, productivity is increased, and customer satisfaction is preserved.

• Viber for Business - Enables the delivery of personalised messages "one on one", establishing a relationship with customers based on trust. The main advantage is that if WIFI is unavailable, Viber automatically switches to SMS, ensuring that every message is delivered on time.

Any unusual occurrence in the business process can trigger a crisis in the company. That's why every problem or difficulty in the business chain should be taken seriously and not avoided but instead eliminated. Companies should react appropriately and effectively and learn from the conducted procedures. For companies or certain departments within the company to resolve unusual difficulties in work as painlessly as possible, it is necessary to collect and process all data in an orderly and up-to-date manner and use reports as indicators of the state of the company and business results.

trends, which affect all industries, it is necessary to survive in the market by applying and implementing all available tools.

Chatbots that promptly provide solutions and decisions to emerging crises are an important resource for the company. In addition to providing a competitive advantage, they ensure easier overcoming of crises and simpler implementation of the necessary activities because the system remembers and constantly learns, collects, processes and serves the necessary information and notifications based on which decisions are made. It also suggests an action plan for the implementation of certain crises and challenges that arise.

Plans and decisions must be made in response to the challenges companies face and become a common, but powerful engine that drives various data systems and implements a wide range of content into business, aiming to optimise and implement the strategy.
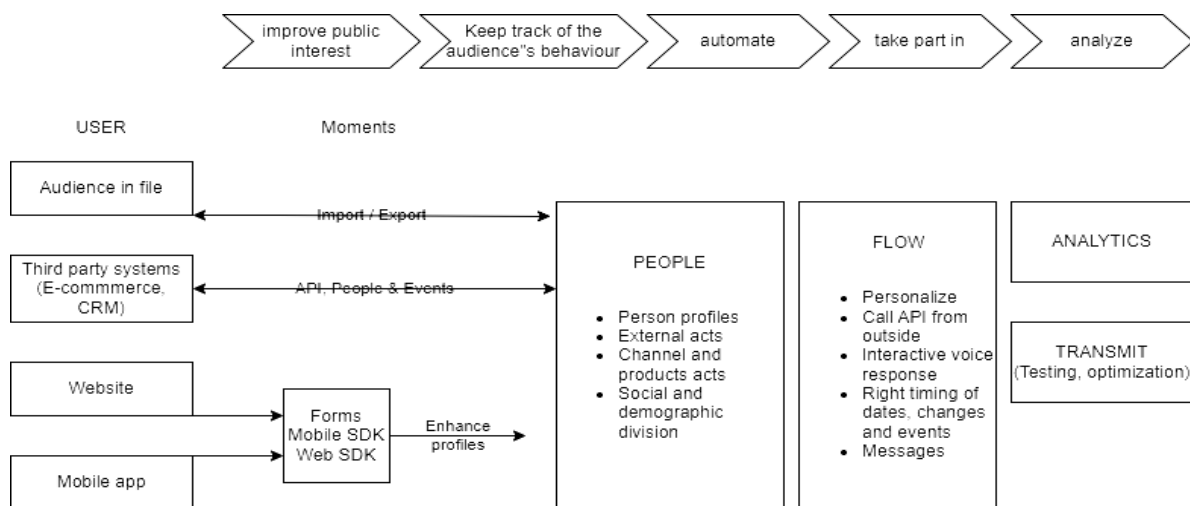

Fig. 1. Platform of analyzed company; Source: Internal materials, adapted by authors

Fig. 1 shows the way the "Platform" of the analysed company "X" works - i.e. the way the client data is collected and processed, how the system reacts to activities by sending an automated message to get a report on the changes that occurred finally, followed with a template on the next actions that need to be taken.

The "Platform" of the analysed company "X" shows the detection of changes in the business process and the sending of auto-messages and responses.

B. Case study of using automated plans and decisions in the form of a chatbot for crisis management

Automating standardised decisions that must be made daily in everyday business activities makes reaching established plans for implementing decisions easier, saving resources and time.

In addition to being exposed to less stress, employees are more agile and productive. Given that today's companies are constantly under the influence of various

Given that auto-generated plans and decisions are based on a large set of data that the system processes and proposes as a solution, it is necessary to adhere to certain principles for the implementation and success of the plan or decision to be valid:

• All proposed decisions should have approximately equal samples and variables.

• If two (or more) decisions are very similar, one can be made more likely by providing more samples for that decision or activity plan, or they can be combined into one and then branched out using attributes (for example, increasing or decreasing the allowable inventory level in the warehouse).

• To achieve maximum utility, decisions should not be similar.

• There must be a certain number of complete sentences that clearly define the intention. The better the bot is trained with complete sentences and data, the better

it will offer solutions and decisions and propose plans with the necessary activities.

• The same keywords or their exact synonyms must not be used in two different decisions.

not compare the importance of each word across all decisions and intentions. Still, it assigns importance according to the intention in which it appears.
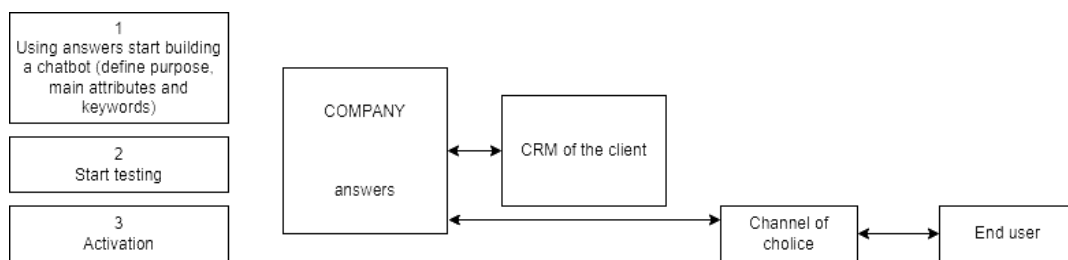

Fig. 2 Chatbot communication with client; Source: Internal materials adapted by authors

The analysed company "X" (provider of cloud communication platform service) has continuous support 24/7 for its clients. To solve clients' problems as efficiently as possible and offer solutions and help them when unusual activities occur in business processes, company "X" uses and follows auto-generated decisions and plans as one of the instruments in preventing crises.

Such a way of conducting business and communicating with clients is facilitated by many platforms, one of which is "Platform" of company "X", which is a platform that is used to activate automatic messages in such a way that the platform is connected to the system. If the system crashes, automatic messages are activated, and supervisors and those responsible are informed about the changes. In this way, it is possible to react to the problem promptly and quickly to eliminate the difficulty/s that hinders the normal functioning of the system and work processes. The "Platform" of company "X" contains all relevant information about clients, which is saved in the database so that all unusual changes and activities can be detected. Communication is based on providing and offering solutions from previous practices; important and special dates, deadlines and other significant moments are monitored. The user is informed by automatic messages by the available data and analytics. Integration is possible through the Call API. Information can be requested from the system or database to prepare decisions and plans for the same or similar business situations more easily and quickly.

To properly implement the plan of necessary business activities when solving problems during crises, it is required to incorporate into the bot words mentioned very often and of great importance. For example, to make a template of an action plan for solving a financial crisis, the word "liquidity" may appear 7/10 times, which makes the word very important for the decision, while the word "In contrast" may appear only once, which is considered to be less important word and a smaller number of activities that are recommended to be undertaken when solving challenges will be directed towards it. For the model used, the word importance weighting scheme does

For the system to send auto-generated messages, i.e. the system for proposing decisions and plans to function, the following three steps must be executed (Fig. 2): Prepare all data and links that the bot will use, Check API integration with the CRM system, and design the dialogue flow. Also, it is necessary to create an intention for each property offered to direct users to the correct report of an error or disturbance, with all available and collected data for processing, thereby directing the system to propose the correct decision or plan.

IV. CONCLUSION

The paper aims to present an overview of auto-generated plans and decisions as an instrument of crisis management. The paper provides an overview of the literature regarding crisis management, considering traditional approaches, scenario planning and chatbots. As literature review and analyzed case study in this paper shows, chatbots are useful for crisis management, especially for advanced communication with clients through various communication channels. In addition, chatbots enable use of previous business practices and can serve as an early warning to prepare decisions and plans simply and swiftly and accordingly help prevent or better manage during crisis. Analyzed case study illustratrates the approach, resulting in easy, fast and customised communication between agents and clients successfully realised, demonstrating the company's ability to provide timely, cost effective and personalised service to its customers as an addition to the development path of the company's digital transformation. However, human intervention and predefined criteria are needed for seamless integration and successful use of automated decision- making tools in crisis management such as chatbots (where it is necessary to define purpose, main attributes and keywords), implying that they are still complementary tools to human decision- making in crisis management.

With expected increase in use of chatbots and other automated decisions making systems, future research could focus on: i) areas and specifics of chatbot use

besides customer service and crisis management, such as healthcare and education; ii) use of AI and natural language understanding in order to improve the existing automated decision making systems; iii) comparative analysis of companies that used chatboes and its effectiveness, as well as evaluation of user satisfaction and areas for improvement.

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