Decisions under Uncertainty

Prepared by: Fadi Micaelian

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EXECUTIVE SUMMARY

As the world faces new challenges of catastrophic dimension, the need to make the right decision, in a timely manner, when facing situations marred with uncertainty, becomes ever more essential. The alternative is not an option.

The solution pivots around an innovative decision technology with **humanlike intelligence**, capable of :

- Optimizing the decision by **trading off** conflicting factors (e.g. a decision to quarantine a population will negatively impact the economy while reducing the health risks. Balancing these two conflicting elements yields the optimal solution).
- Operating with **small or incomplete data sets** that are associated with various level of **uncertainty**
- Integrating people, processes, economical impacts and managing **scarce resources**

CHALLENGE

One of the daunting challenges facing organizations that deal with emergency situations is the ability to respond in a timely manner. The problem gets compounded when the goal is to deploy the “best” resources in the most efficient fashion. Fortunately, the continuous technological progress in humanlike intelligence opens up the door to address these challenges. The solution involves the integration of people, process, and technology in order to enhance an organization’s capability to address their needs in a proactive and timely manner.

ANALYSIS

Emergency Situations such as Pandemics, Wars or “Acts of God” are characterized by:

- Overwhelming Uncertainty
- Being highly disruptive. i.e. any action -including status quo- that favor one facet of the problem will have repercussions on the other facets.
- Severe lack of data or inaccurate data.
- Need to make immediate and imminent decisions with drastic implications where time is of the essence.
- Need to optimize the deployment of scarce resources which compounds the complexity of the decisions

The solution will need to meet these requirements.

SOLUTION

Our technology breakthrough enables a five prong approach to tackle the problem:

- **A methodical approach to optimize EVERY decision:** Whether deciding on the course of action such as a choice between issuing a “shelter in place” command or directing the population to gather at key centers, we can optimize the decision by taking into account all factors involved and trade them off (or expressing their relative importance) in a dynamic manner as the data materializes and crystallizes. The decision solution takes into account the level of confidence in the data and operates when data is incomplete. The decisions change dynamically as new data is captured or as the importance of influencing factor are modified.
- **A more efficient use and allocation of the existing (scarce) resources:** This is achieved by a better allocation and distribution of the existing resources across the various projects. The optimization tools suggested will take into account the knowledge, skills and experience of the employee population and trade them off against the various requirements for each project. For example, when facing a decision related to triage, the system recommends the order in which patients gets treated in order to optimize the use of the doctors and maximize the value for the community.
- **Capture, retention and sharing expert’s knowledge:** Experts knowledge that is required foo make a decision is captured and shared. By doing so organizations achieve two major benefits;

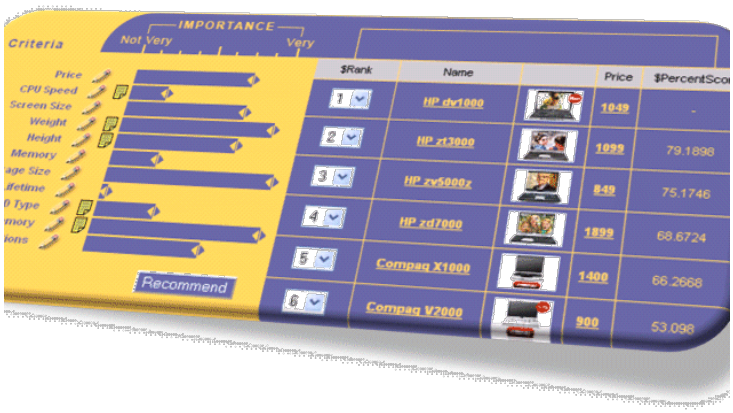
  (i) they raise the level of expertise of the entire organization to that of the expert while reducing the training needs to build up a smarter employee population, and

  (ii) by storing the expert’s knowledge in the system, organization will not be depleted of this critical asset as their experts depart the organization or retire.
- **Planning, acquisition, assessment, and development of talent:** The third prong is to leverage state-of-the art technology to better assess the needs of an organization, acquire the right type of skills and accelerate their development process so organizations are “up and running” right off the bat.
- **Work prioritization:** As resources shrink and the amount of work increases, it becomes paramount to prioritize the tasks or projects at stake. This is done by understanding the overall goal, and trading off the various elements that affect the ability to achieve the set objectives.

TYPE OF PROBLEMS ADDRESSED

- Should we quarantine a population in their shelters or congregate them in public places (e.g. stadiums, shelters)?
- What solution is the least “painful humanly and economically” and yields the highest overall value to society?
- Who should be saved first? (Triage)
- What route should the doctor take to optimize the overall objective.
- How can we optimize the use of our scarce resources such as first responders, nurses, medical equipment etc.?
- What is the best plan to return to normalcy after the spread of smallpox?

CASE STUDY



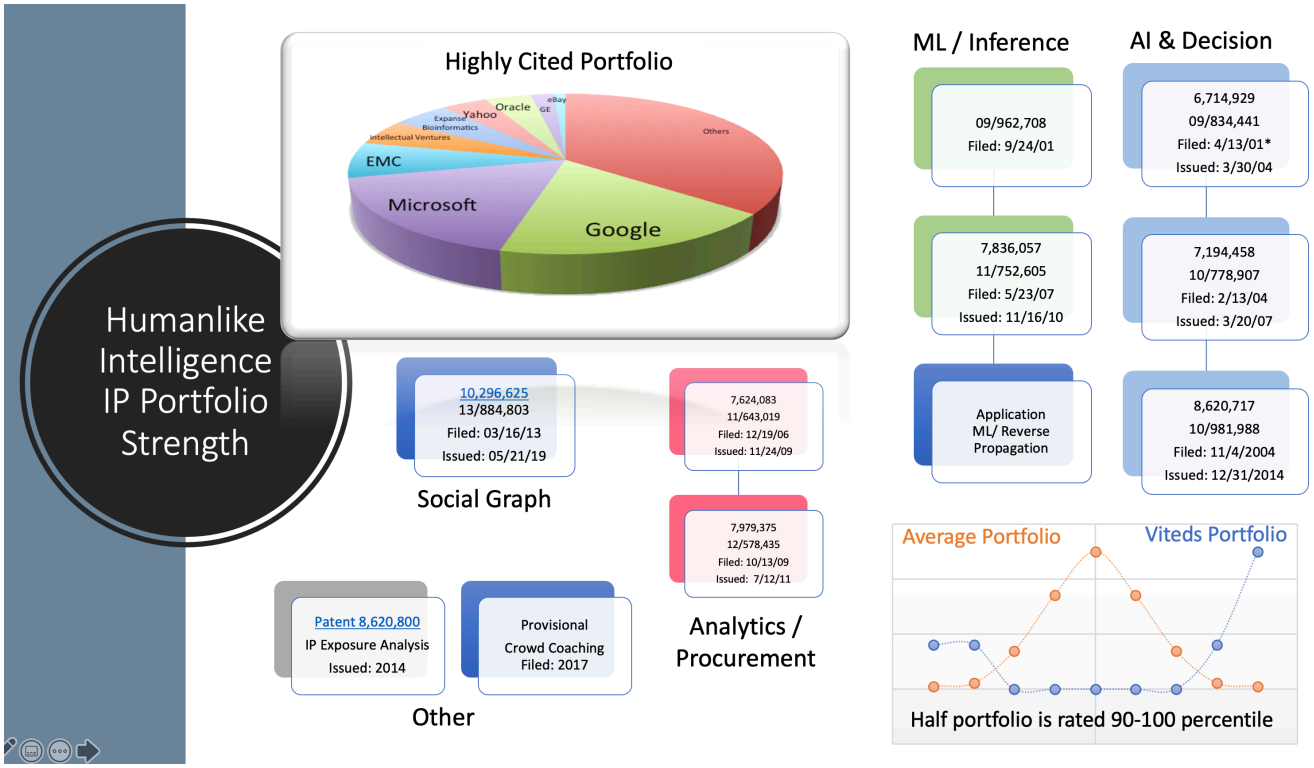
The U.N. WFP is responsible for responding to famine and hunger across the globe. They typically need to deliver the right food and dispatch the appropriate personnel to manage the process. The selection of the right staff depends on many criteria such as food expertise, language, nationality, religion, route (or terrain) knowledge, political connections, distance to destination, status (employee, contractor, volunteer) etc... So for example, if in responding to emergency in Sudan the U.N. faced a situation where the world authority on wheat was in Chicago, and it would take him a few days to get to his destination, while a more junior expert was available in Cairo and could be dispatched in a couple of hours. The U.N. has to tradeoff the urgency of the situation with the importance of getting high level expertise in wheat. Traditional solutions were incapable of addressing the situation. Rule based solutions required programming for every possible situation that the U.N. faced and thus were inefficient and costly. As a result, the U.N. had to rely on the rapidity of development of its IT staff to select the best human resources to be dispatched in each situation. The solution eliminates the on-going development costs while optimizing the human resource selection. By separating the part of the decision that is knowledge based from the component that is situational, superior savings are achieved. Clearly the relative importance of factors is highly dependent on the situation. For example, in a war torn situation, political connections, and route expertise are significantly more important than language or even food expertise, while in other situations, such as a cheese shortage in Switzerland, the food expertise takes precedence over other

selection criteria. With he solution, the U.N. has been able to reduce its development costs while optimizing the efficiency of its operations.

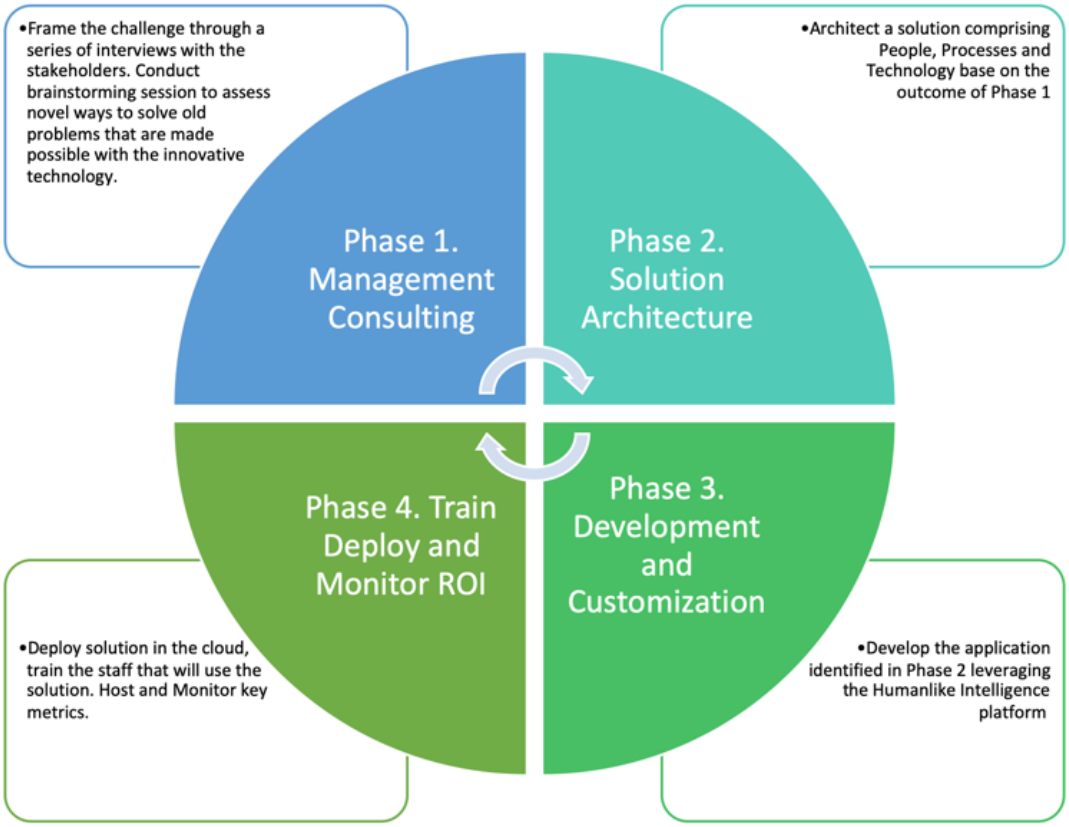
When responding to a distress calls triggered by a weather change, the Coast Guard needs to optimize their response. For example, a call is received from the Queen Elizabeth with 2000 passengers on board and a low distress level (leaking skull) and another call from a small catamaran with 12 person on board with a high distress level (sinking). Our solution is the only one that would allow the Cost Guard to tradeoff the level of distress with the number of lives at risk. To compound the problem if you know that the catamaran is 2 miles away from shore while the Queen Elizabeth is 30 miles out at sea and that the chances of success of the operation is 95% for the catamaran and 56% for the Queen Elizabeth, the necessity of a sophisticated real time, cloud based decision and prioritization solution becomes very clear.

INTELLECTUAL PROPERTY

The technology is covered by a rich, diversified, high quality portfolio of patents.



DEPLOYMENT & IMPLEMENTATION



A sample project takes on average 1 to 9 months, depending on its complexity, the wealth in functionality of the application as well as the number of people it is intended to serve. The costs vary from US$100K to several Million US$.

CONTACT

gotDecisions a division of VITEDS, LLC
P.O.Box 4183,
Menlo Park, CA 94026

info@viteds.com