## Customer Opportunity Overview - NASA

Overview of the Advanced Concepts TAPP Pilot Project

The Advance Concepts Office (ACO) at Marshall Space Flight Center (MSFC) is developing and refining methods and processes for performing Information Based Decisions for Strategic Technology Investments. This system is currently referred to as TAPP, Technology Alignment & Prioritization Process.   This process supports the evaluation of the technologies for investment by NASA and MSFC to insure alignment with NASA mission plans, technology area priorities and strategic knowledge gaps.

TAPP seeks to create an interactive system for exploring the almost mind boggling complexity of planning for multiple missions using over 400 technologies (many still in basic research) and hundreds of interrelated elements/sub-elements over 30 year planning horizons.
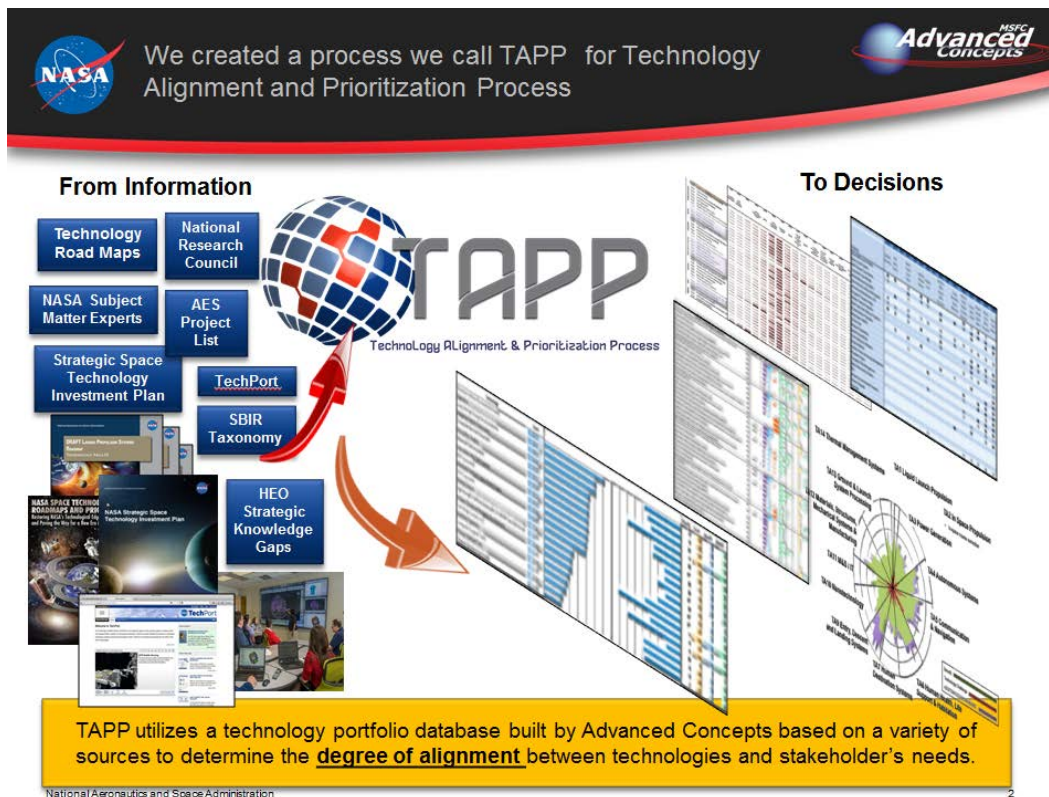
ai-one's BrainDocs will provide NASA the capability to have data mining agents parse and score unstructured content against the nearly 400 technologies identified in the 14 Technology Roadmaps. This ability to score proposals with data mining agents will allow ACO to perform statistical analysis within the Information Based Decision framework for Strategic Investments.

The immediate benefit to ACO is increased productivity and consistent analysis. The long-term benefit is an ability to perform quicker, more informed technology assessments, feasibility analysis, and concept studies that align with NASA evolving strategic goals and multiple mission objectives.

Goal for the Pilot Project - ACO was recently been tasked to perform a technology assessment of wireless sensors to help MSFC leadership determine where best to focus resources to support future missions. ai-one is partnering with ISC Consulting and ACO in modifying the ai-one BrainDocs application to demonstrate an ability to build and use intelligent agents that align and improve ACO's Technology Assessment process by evaluating and assessing over 400 papers and projects that describe the current state of Wireless Sensors.

Relevance - The ai-one proposal provides the capability to harvest applicable technology information from the proliferation of information sources, often referred to as "big data," by autonomously analyzing, scoring and filtering technology data in a way not currently practical.

Today, ACO's Technology Assessment process is a labor-intensive process used to determine the current Technology Readiness Level (TRL) of a technology, determine the difficulty associated with moving a technology from one TRL to the next or determine technology alignment with strategic goals. Performing a TRL assessment requires 1) a set of well-defined terminologies, 2) a group of individuals to describe the state of the art and 3) a means for assessing (measuring) the validity of that description. Evaluators "do not need to be discipline experts," they only need to "understand the current state of the art."

Some of the insight developed with BrainDocs in the first week is shown in the following figures.
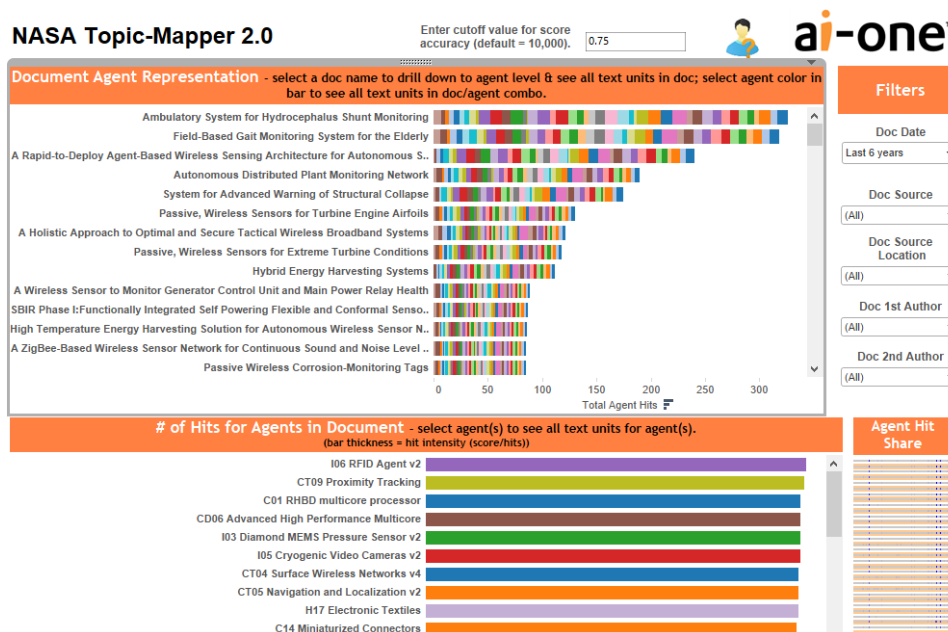

Figure 1 Answers Question: Which research addresses NASA's top priorities?

ISC/ai-one is using intelligent agents as the "evaluators" and assisting ACO perform the Technology Assessment of Wireless Sensors. ISC/ai-one has a unique ability to support ACO with this task. We have been collaborating with ACO for the past 18 months to understand better the problems ACO faces and believe this partnership will lead to an entirely new approach and capability within MSFC.
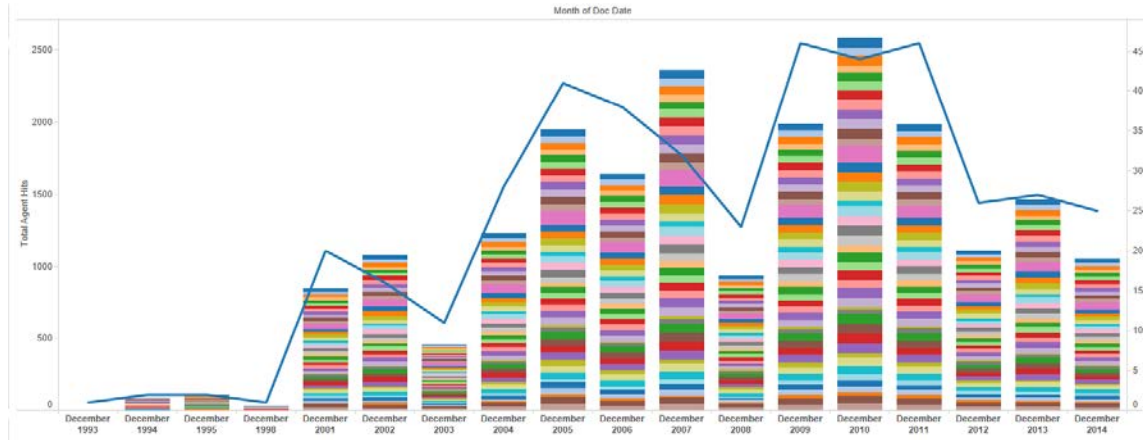
Figure 2 Answers Question: How current is the research for these technologies?

The guidance provided in NASA's System Engineering Handbook states that performing a technology assessment requires 1) a set of well-defined terminologies, 2) a means for determining the state of the art and 3) a means for assessing (measuring) the validity of that description. Evaluators "do not need to be discipline experts," they only need to be able to "understand the current state of the art." In this proposal the evaluators will be intelligent software agents.
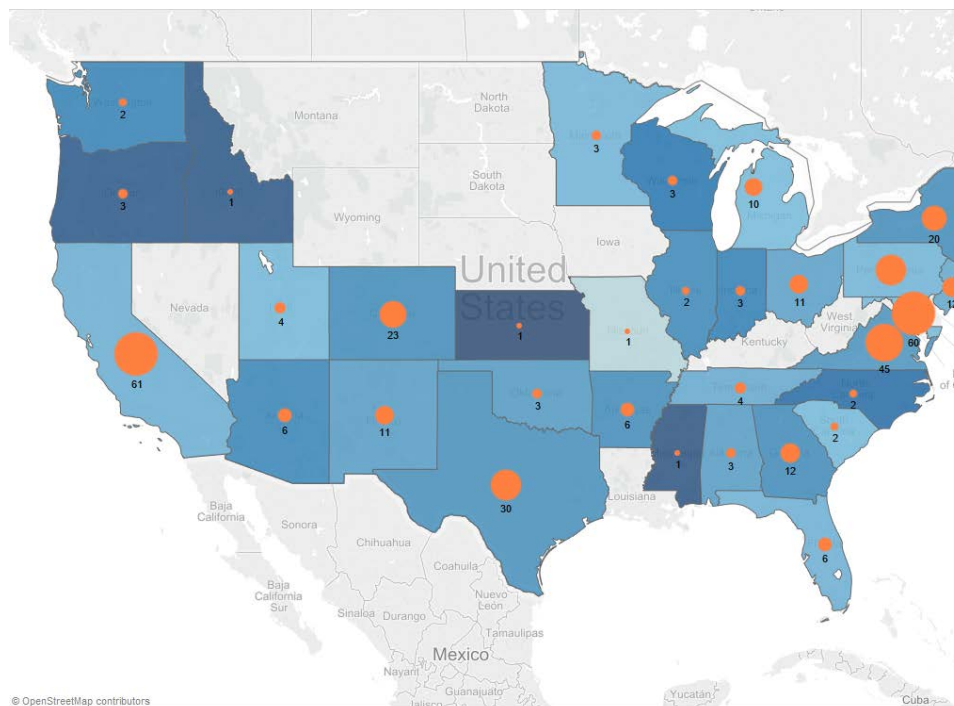

Figure 3 Answers Question: Where is the research being done?

In order to achieve the goals of the pilot, we are working with ACO to create a NASA Topic-Mapper to extract and process *semantic fingerprints* within a set of documents (textual corpora). The NASA Topic-

Mapper will use the ability BrainDocs, powered by Nathan ICE to discern patterns in the words and associations that are central to the meaning of all or a portion of wireless sensor text documents. Nathan ICE learns the keywords and associations, filtering out the noise to create a fingerprint array of the concepts within.

The first step is to provide BrainDocs a set of terminologies and textual corpora that describe Technology Readiness Levels and Advanced Degrees of Difficulty for state of the art, wireless sensor technologies. The second step is to provide the agents trained on the initial set of text, a different set of text describing the current work being performed with wireless sensor for classification and further learning by the agents.

Final Analysis - Once the intelligent agents have scored the similarity to each paragraph of content, the software provides the ability to categorize and display results pulled from the core data. Paragraphs can be evaluated and traced back to their source document for reporting and distribution. This information is stored in MongoDB and exported to other databases for access by the TAPP application or used directly by the user to support a workflow. Scheduled for completion in September, the final report for the Pilot (wireless sensor roadmap outline) will be generated from over 600 documents and the scores from the agents created during the project.

Commercialization Plan

We are underway with the pilot project with NASA MSFC. Other use cases and opportunities are being pursued with NASA management and we will continue to support our partner ISC in the sales effort.

Future potential for licenses and consulting services to multiple NASA teams are estimated for 2016 revenue of $300,000. ISC will use this successful use case to market to DoD a similar system for their missile command and intelligence operations related to space. We estimate $1m in 2017 growing to $10 million per year with sales to intelligence analysts in NASA, space, Mission Planning and the aerospace industry.

ISC/ai-one also plans to expand this application to offer universities an ability to identify and analyze future needs in science, technology engineering and mathematics (STEM). We feel that NASA's technology roadmaps and their 20-year plan provide researchers a framework for space and aeronautics innovation. We plan to offer the platform to academic students and researchers at a nominal cost to aid them in mapping their work to NASA's priorities.

Summary

The Pilot and related work with NASA will be completed in the 4th quarter of this year with prospective projects with NASA and other commercial customers under development now. The combination of our technology platform and the incorporation of agents for the NASA domain taxonomy for space exploration will provide the foundation for sustained growth in this market.