

SMARTER STATE CASE STUDIES

DEPARTMENT OF DEFENSE: ARISTOTLE

Making Skills and Know How More Searchable
at the Department of Defense



TALENT BANK

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We would like to thank Dr. Alok Das, Senior Scientist for Innovation Design and Rapid Response Team Lead, AFRL, for his assistance.



SMART CITIZENS SMARTER STATE



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BASIC INFORMATION

Owner

The Department of Defense

Creator

Air Force Research Laboratory (AFRL)

Project Contact

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Sector

Defense

Audience

Employees of the Department of Defense

Problem that Aristotle tried to solve

Making human expertise searchable

Project summary

Aristotle was a Department of Defense directory of employee expertise that lists people's credentials and experience, making it fast and easy to discover who knows and who has done what.

Platform

The Aristotle application was hosted on a Unix based operating system with an Apache web server to link to the Aristotle database.

Design basics

Pre-populated profiles that could be edited and augmented. Search for expertise based on people, projects, and topics as well as associated document search.

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*This is a revolutionary tool
to pull together multi-
directorate expertise to tackle
urgent warfighter needs.*

Dr. Alok Das

*Senior Scientist for Innovation Design
and Rapid Response Team Lead,
Air Force Research Laboratory.*

KEY TAKEAWAYS

What's new?

Previously, hierarchical titles masked what people know. There was no way to search employee expertise and know how.

Incentives for participation

The system pre-populated profiles for 12,000 pilot users.

Challenges

Budgetary constraints and the absence of a good user engagement strategy (including user interface design and a well-defined communications strategy to encourage use of the platform).

Anticipated impact/Metrics

Even though Aristotle had 12,000 active members in the DoD community, it was shelved in 2013 due to budgetary constraints. Due to a lack of experimental design, there were no additional metrics or systematic collection of user stories.

Why is this project interesting?

It was a first of its kind expert network to make human capital visible and searchable that overcame the challenge of building profiles by pre-populating data from existing databases.



When the Air Force was struggling with the problem of pilots and civilians dying because particular soil and dirt conditions in Afghanistan were getting into the routers and obscuring the view of the Sikorsky UH-60 helicopter pilots – what the military calls a brown out – it didn't know where to turn quickly to get help. Ironically, the policymaker tasked with addressing the problem in the Department of Defense had no way to know that the man practically sitting across from him had nine years of experience flying these Blackhawk helicopters in the field. Civil service titles such as director and assistant director reveal little about skills or experience. While over one billion people have logged on to share information about where they went to school, who their friends are, their likes and dislikes on Facebook, Facebook isn't designed as a platform for sharing expertise.

So the Air Force Laboratory teamed up with Danny Hillis. Hillis, one of the fathers of parallel supercomputing at MIT and the former head of research for Disney Imagineering, had created Freebase, a semantic data storage infrastructure for the Internet that made it possible to organize personal profiles of people quickly and automatically based on a variety of sources. (Google subsequently acquired Freebase, which is what powers the search engine's ability to give you a quick bio for George Clooney or a synopsis of a movie in the right hand margin instead of just a list of links.) For the military, the application of the Freebase project was called Aristotle. Hillis saw the possibility for “nontrivial forms of organization evolving... that are much too complicated to hold in any human mind.”



If humans could contribute their knowledge to a database that could be read by computers, then the computers could present that knowledge to humans in the time, place and format that would be most useful to them.

Danny Hillis

*Senior Scientist for Innovation Design and Rapid Response Team Lead,
Air Force Research Laboratory*

Developed by the Air Force Research Lab (AFRL) and launched in the fall of 2008, Aristotle was a Department of Defense expert network aimed at increasing expertise awareness across the Department's agencies. Aristotle was an internal directory that listed people's credentials and experience, making it fast and easy to discover who knows what and who has done what. Before the program concluded in 2013, the Aristotle pilot had 12,000 active users and 26 million links.¹

¹ “Transition: Locating and Integrating Members for Virtual Ad-hoc Teams.”



The key challenge Aristotle wanted to address was finding a single place to consolidate the expertise within the Department of Defense. Essentially, the DOD viewed the platform as a tool that would provide more information about “**What** you need to know, **when**, and **how** you need to know it.”²

The project recognized that information is most useful when associated with the people who created it and, in turn, with their skills, such as languages spoken, or experiences, such as projects completed. The original announcement of the platform described it as a “social networking system that provides government and contractor personnel with transparent, but appropriate, access to information regarding tens of thousands of science and technology projects, topics of interest, and collegial networks. Aristotle provides an interactive digital workspace where users can explore, understand, visualize, and contribute to information about—and linkages between – people, projects, topics and documents. This allows scientists, engineers, technologists and other users to perform better as individuals and in teams.”

Aristotle sought to help identify experts during the early stages of a project, leveraging the vast network found within the various branches of the DOD. Prior to Aristotle, quickly locating expertise was an ongoing challenge, and in Aristotle, the DOD sought ways to leverage technology to share expertise.

Although Aristotle was thought capable of saving the Defense Department money over the long-term³ (due to its ability to locate and use in-house expertise), near-term budgetary constraints made ongoing management of the platform untenable and the project was shelved.⁴ But in 2015 on his first day in Office, Secretary of Defense Ash Carter announced his intention to build the “force of the future” and to implement a new web-based talent management system to match the right knowledge, skills, and abilities of Service members with available assignments. He also launched a new DoD Office of People Analytics to use data-intensive tools and technologies to measure and chart how servicemembers and civilians do their jobs and help attract and retain talent to the Department.⁵

2 “Aristotle: By and For DoD Scientists and Engineers” *Docstoc.com*, October 1, 2011, <http://www.docstoc.com/docs/97361083/Aristotle-for-DTIC>.

3 A. Hoover, “Aristotle—A Social Networking Solution Designed and Built for the Air Force Research Laboratory,” in *Aerospace and Electronics Conference, 2008. NAECON 2008. IEEE National*, 2008, 36–40, doi:10.1109/NAECON.2008.4806512.

4 A. Hoover, “Aristotle—A Social Networking Solution Designed and Built for the Air Force Research Laboratory,” in *Aerospace and Electronics Conference, 2008. NAECON 2008. IEEE National*, 2008, 36–40, doi:10.1109/NAECON.2008.4806512.

5 <http://www.defense.gov/News/Speeches/Speech-View/Article/630415/remarks-on-building-the-first-link-to-the-force-of-the-future-george-washington> and http://www.defense.gov/Portals/1/features/2015/0315_force-of-the-future/documents/FotF_Fact_Sheet_-_FINAL_11.18.pdf



WHY ARISTOTLE

The guiding rationale for creating Aristotle was to design a secure professional network that would enable increased collaboration across the Department of Defense. Aristotle sought to streamline communication, knowledge sharing, and expertise identification across the entire DoD landscape, including uniformed personnel, civilian government employees, and persons contracted to work with the Department of Defense.

Prior to Aristotle, the DoD had no coordinated mechanism for identifying expertise, which led to a gap in knowledge about the existing human capital within the DoD. Dr. Alok Das, Senior Scientist for Innovation Design and Rapid Response Team Lead at the Air Force Research Laboratory (AFRL) was tasked with incubating Aristotle and piloting it within the Air Force prior to roll out with the wider Defense Department. A Das explained, “We don’t know what we don’t know.” The DoD lacked in-depth understanding of its 200,000 personnel.

DESIGN PRINCIPLES

A key design principle centered on overcoming the disincentive created by the need to input profile information manually. Hence significant investment was made in ensuring that Aristotle “talked to” existing HR systems and could scrape data from them, from other DoD databases like the Enterprise Business System (EBS), Defense Technical Information Center (DTIC) and The Global Address List (GAL) and from the Web to pre-populate profiles.⁶

For example, users logged into Aristotle using their official Common Access Card (CAC) identification card thereby automating the process of providing basic user information such as name, rank and address.⁷ Users had the option to edit, supplement or remove any of this pre-populated information. But by uploading information automatically as the default, there was a disincentive to opting out.

Beyond pre-populated information, users could self-report more detailed information such as job/position and history, professional associations, certifications, trainings, language training and education.⁸

Security was another key design element. The platform had to be, at once, open to the DoD community but not to anyone outside of it. This entailed designing a system that was flexible enough to allow for meaningful collaboration, such as document sharing even between people with different levels of security clearances, but also robust and complex enough to maintain information security by granting different access levels to DoD resources.⁹

6 “DoD Privacy Impact Assessment (PIA): Aristotle People/Project Finder (PPF).”

7 Hoover, “Aristotle—A Social Networking Solution Designed and Built for the Air Force Research Laboratory.”

8 Hoover, “Aristotle—A Social Networking Solution Designed and Built for the Air Force Research Laboratory.”

9 *Aristotle* | *The White House*, accessed December 4, 2013, <http://www.whitehouse.gov/open/innovations/Dod-Aristotle>.



Aristotle was an attempt to solve a challenge faced by every agency and organization: quickly locating credentialed, skill-based, and situational expertise to solve a problem.

Beth Simone Noveck
Founder of the GovLab

But the DoD's well established permissions system provided clear guidance on information governance. The Defense Technical Information Center, which provides technical research to support the military, had designed an existing taxonomy for describing and linking people, projects, and topics, thus allowing engineers to build upon the taxonomy. Additionally, DTIC already had a structure for tagging documents, and this system was integrated into Aristotle.

HOW IT WORKED

Aristotle had three ways of searching for expertise: People, Projects and Topics, each with its own tab on the website.¹⁰ Documentation search, another essential aspect of the platform, cut across each of the entities.

A user conducting a People search could view an overview of individuals' profiles; their contacts; expertise, both automatically populated and self-reported; associated documents. The user also had the option to directly share documents with identified individuals through Aristotle.¹¹ Additionally, Aristotle's native communication platform allowed users to create both open and closed communities to discuss projects or documents identified in their search results.¹²

Similarly, a person conducting a Project search could view an overview of projects, associated people and organizations, related projects and topic areas, project documentation and could also share content.¹³

Finally, a Topic search produced an overview of content on a particular topic housed on Aristotle, relevant documentation and the ability to share content. While the Topic search yielded the fewest streams of information points but was potentially the most useful search path given the user's ability to uncover all manner of expertise and existing knowledge with no more initial information than a keyword.¹⁴

¹⁰ "Transition: Locating and Integrating Members for Virtual Ad-hoc Teams."

¹¹ Hoover, "Aristotle—A Social Networking Solution Designed and Built for the Air Force Research Laboratory."

¹² Andrew Pedrick and Bruce Gilbert, "Aristotle Overview" (Information for the Defense Community: DTIC Boot CAMP: S&T Resources for Labs, August 2010), <http://www.dtic.mil/dtic/bootcamp/AristotleOverview.pdf>.

¹³ Hoover, "Aristotle—A Social Networking Solution Designed and Built for the Air Force Research Laboratory."

¹⁴ Hoover, "Aristotle—A Social Networking Solution Designed and Built for the Air Force Research Laboratory."



The screenshot displays the Aristotle application interface. At the top, the DTIC Online logo is visible, along with navigation links: Home, DTIC A-Z, DoDTechpedia, Aristotle, Ask a Librarian, Submit Documents, and Customer Support. Below this is a search bar and a user profile for Ralph Kohler. The main content area is divided into several sections: History, Job History, Education, Spoken Languages, Current Project(s), and Projects Responsible For. The Job History section shows a list of projects with checkboxes. The Education section lists degrees from Syracuse University and Columbia University. The Spoken Languages section shows English and Chinese. The Current Project(s) section lists projects like Marti, Tactical Information Dominance (TID), Services 7 (Services Seven), and Raven Eye. The Projects Responsible For section lists projects like Airborne Information management: Advanced Information Manag..., Advanced Information Management System (AIMS) Critical Experiment, Three Final Steps Toward Portability, Advanced Information Management System, and Force Protection with Information Management. The interface also includes a sidebar with search results and a bottom status bar with creation and update dates.

Sample profile of an employee on Aristotle

A ‘Why?’ button associated with each search result further explained the ranking.¹⁵ Second, Graph View, a social network visualization (SNA) tool, allowed users to graphically explore relationships between People, Projects and Topics in a dynamic way and get a better sense of the relationship between queried keywords.¹⁶

TECHNICAL SPECIFICATIONS

The Aristotle application was hosted on a Unix based operating system with a powerful Apache web server that interacted with the Aristotle database.¹⁷ This technical setup allowed the Aristotle application to function at high performance levels while remaining secure and accessible on the Web through the DoD intranet.

While Aristotle itself was technically advanced, the platform was especially well positioned for success due to developers’ ability to tap into the wealth of existing applications, databases and functionalities already being utilized within the DoD.

¹⁵ Hoover, “Aristotle—A Social Networking Solution Designed and Built for the Air Force Research Laboratory.”

¹⁶ Hoover, “Aristotle—A Social Networking Solution Designed and Built for the Air Force Research Laboratory.”

¹⁷ “DoD Privacy Impact Assessment (PIA): Aristotle People/Project Finder (PFF).”



To present the visual interface of the web client, Aristotle drew on DoD interface systems, namely Enterprise Business System (EBS), Defense Technical Information Center (DTIC) and Global Address List (GAL) Active Directory.¹⁸ In fact, the leveraging of the EBS and GAL not only improved the usability of the platform, it also granted Aristotle a dynamic communication module allowing for interaction between all Aristotle users.

LESSONS LEARNED

As the first “people analytics” system of its kind in the public sector, Aristotle was a revolutionary expert network platform. Yet the only analytics gathered during the projects were numbers of users. Focus groups to assess how participants wanted to use the platform existed only during the development phase and, as a result, there are no success metrics.

Nonetheless Dr. Das draws three conclusions about how the project could have been improved:

- ✓ **Design an intuitive and engaging user interface.** Dr. Das believes that it could have inspired wider adoption of Aristotle within the Department of Defense. Platforms that are cumbersome for users disincentivize engagement.
- ✓ **Develop a consistent communications strategy.** Dr. Das noted that his team used newsletters to communicate with users when, in hindsight, he should have used emails to bolster interest.
- ✓ **Tap the in-house resources of students within the Defense Academies.** Leveraging students’ skills could have improved the functionality and user experience of Aristotle.

ABOUT THE GOVLAB

The GovLab’s mission is to improve people’s lives by changing how we govern. Our goal is to strengthen the ability of institutions – including but not limited to governments – and people to work more openly, collaboratively, effectively and legitimately to make better decisions and solve public problems. For more information, please visit: www.thegovlab.org.

ABOUT SMARTER STATE

New tools—what GovLab calls technologies of expertise— are making it possible to match the supply of citizen expertise to the demand for it in government. Smarter State is a GovLab initiative to design and test how public decision-making could improve if institutions knew how to use the technologies of expertise to tap the wisdom of citizens’ and civil servants.

¹⁸ Hoover, “*Aristotle—A Social Networking Solution Designed and Built for the Air Force Research Laboratory.*”