FEATURE

Federal Government Sets Its Sights on Data

by RICHARD HUFFINE

The U.S. federal government is making a significant investment in a next-generation workforce that can take advantage of the information deluge created by data collection in every aspect of government operations today. The most important example of this investment was the White House announcement on Feb. 18, 2015, that DJ Patil was joining the Office of Science and Technology Policy as deputy CTO for data policy and the

chief data scientist for the Obama administration.

Patil is credited, along with Jeff Hammerbacher, with coining the term "data scientist." At the time, Patil and Hammerbacher

were forming data science teams at LinkedIn and Facebook, respectively. In his ebook, *Building Data Science Teams*, Patil succinctly defines

The Path to Government Funding

by WOODY EVANS

■ The U.S. Department of Education and IES (Institute of Education Sciences) awarded their 2015 Small Business Innovation Research grants to 21 educational startups this spring (ies.ed.gov/sbir/2015awards.asp). FedScoop reported that this year's grants will total more than $9 million and cover initiatives in two phases. Phase I grants run for some 6 months and help startups develop prototypes for educational products; Phase II helps them move on
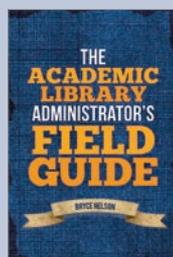
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Sweet: The New Game at Credo

by DONOVAN GRIFFIN

■ The tagline at Credo— "Building Information Skills for Lifelong Success"—is a slight variant of the one that was in use

the last time Mike Sweet, CEO, spoke with *Information Today* (see "Sweet: Building on Innovation" in the May 2013 issue). Sweet says the last 2 years have served to sharpen Credo's focus. Now, its employees are concentrating on helping students succeed in the knowledge economy, he says. "And we think that information literacy is a really foundational element of critical thinking, and we think critical thinking is key to being employable today."

Federal Government Sets Its Sights on Data

data, not a repository of study data. NIST has established an interagency technical advisory group to provide input and ensure that the NIST EDI meets the needs of a wide range of stakeholders.

The CAP that NIST is recommending will put in place a technical infrastructure and populate it with persistent identifiers and metadata for all publicly available NIST data. It will provide interoperability among datasets within NIST and potentially with data from other federal agencies. NIST will assess the long-term needs for the preservation of scientific data in fields that the agency supports and outline options for developing and sustaining repositories for scientific data in digital formats, taking into account the efforts of public- and private-sector entities. NIST expects to have the CAP operational by October 2015.

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Some key aspects of this new data revolution are considerations and concerns about the challenge of ensuring that government-funded data is used responsibly. In March 2015, Patil told *The Washington Post*, "Privacy is essential, but there's also the question of bioethics—the issue of what is the acceptable use of that data. There's a whole rich field within bioinformatics on the ethical use of data and genetics." To address that concern, the public access plans have caveats for their release of scientific data that state it will be made available "[t]o the extent feasible and consistent with applicable law

and policy; agency mission; resource constraints; [and] U.S. national, homeland, and economic security. …"

Federal libraries often provide critical support for agencies to acquire and use commercial information resources, including data. They are also one of the most accessible and helpful organizations within an agency for academic and corporate researchers who are looking to identify and access data that is collected by an agency. In many cases, however, compliance with mandates such as open data and public access to federally funded research is addressed by very different components of the organization. Establishing data science teams that integrate program specialists, information architecture and technology experts, and librarians would ensure that what is built delivers the most value to the broadest group of stakeholders.

One municipal government has determined that the most qualified organization to help the public find, get, and use its data is its public library. In January, the Knight Foundation announced that it had given Boston a $475,000 grant to hire a new team of librarians who will take the data that the city releases and make it usable and understandable for everyone. The program will include training and the development of reference materials for residents. It is unclear to what extent U.S. federal government agencies are using the skills of librarians in their efforts to make their data available and useful both internally and externally. It is clear, however, that the new staff that is leading data science within the U.S. federal government is looking for curious, clever, adept, and savvy partners to drive data science and change the way government works. Librarians are an excellent place to start to find these skills among the federal workforce today.

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to "fully scale their products over two years to be used in classrooms." Nearly one-fourth of the grantees' products focus on environment simulations through augmented and virtual realities.

Strange Loop Games' Eco, Schell Games' Happy Atoms, LifeSim by Spry Fox, StepWise Virtual Tutor by Querium, and Computer Science Curriculum for First Grade Students Using a Robot Games Platform by Play Works Studio all deal explicitly with modeling and simulation. The other projects use technology as well, and some use threads of simulation, although not as directly as these five. Zaption's video editing system, for example, pulls students and faculty members into a more immersive experience by allowing its users to cut into video lessons with exercises for students.

Virtual and Augmented Realities

Two of these, Eco and Happy Atoms, are great exemplars of two aspects of this apparent trend of government funding: simulation on the one hand, and augmented reality on the other.

Strange Loop Games intends to use its Phase II grant money to polish and expand its Eco simulation—and "eco" could stand for both ecology and economics in this complex virtual world:

Eco will be a multi-player game to teach standards in ecology and prepare middle [school] students to be environmentally literate citizens. To play the game, students will enter a shared online world featuring a simulated ecosystem of plants and animals. Students will co-create a civilization by measuring, modeling, and analyzing the underlying ecosystem. Students will advocate for proposed plans to classmates and make decisions as a group. Cooperation and science-based decision making activities will occur, in order to prevent the destruction of the environment. The game will include teacher resources to support the alignment of

game play to learning goals, and implementation.

An element that becomes clear in the YouTube presentation (youtube.com/watch?v=PsvXXII2zzw) by company founder John Krajewski is the political dynamic of environmental and economic choices. The simulation requires students to build arguments from in-world data, present coherent rationales (which are inevitably tied to their own values and biases), and argue reasonably toward a solution within the group. By going more deeply into a simulated environment, students learn skills that are relevant to today's real-world challenges.

The team at Schell Games has developed an augmented-reality educational app and will use the Phase II grant to create and pair it with a standard modeling set for atomic elements that has the potential to upend the chemistry classroom:

Happy Atoms will include a set of physical models paired with an iPad app to cover high school chemistry topics in atomic modeling. The modeling set will include individual plastic balls representing the elements of the periodic table. Students will use an iPad app to take a picture of models they create. Using computer-generated algorithms, the app will then identify the model and generate information about its physical and chemical properties and uses. The app will also inform students if a model that is created does not exist. *Happy Atoms* will replace or supplement lesson plans to enhance chemistry teaching. The app will include teacher resources suggesting how to incorporate games and activities to reinforce lesson plans and learning.

Jesse Schell, CEO of Schell Games, says in his YouTube presentation (youtube.com/watch?v=vS0XzzPl3iU) that the way chemistry is currently taught fails to excite or engage students and discourages them from experimenting and actually experiencing discovery. "The Happy Atoms system is a tangible, interactive learning tool that combines a digital app with a physical modeling set," he says. The plan is to make the system scalable in curricula from elementary school classrooms through to college chemistry labs.

Little God-Like Sponges

We see simulation as a theme in education going back well before Will Wright's "SimCity" and Sid Meier's "Civilization." In the 1970s, "The Oregon Trail" broke into a new territory by taking advantage of the advent of personal computing to teach history to children. Moving forward through simulations of battles, problem solving in tower defense, and even protein folding in the University of Washington's "Foldit," simulations and virtual environments have become increasingly popular in the classroom. Although the merits of some virtual worlds (such as "Second Life") have had critics within academia, the notion of modeling problems, social situations, and physical structures through immersive media seems to be here to stay.

With augmented-reality applications such as Project Noah, Algodoo, and many others now well-established in schools, we seem to have started down a path of blending virtual reality and the physical world to enhance learning. Kids have now had the direct experience of creating, changing, and destroying their own pretend worlds for a generation. Will that give Millennials, Gen Z-ers, and those who come after a greater sense of stewardship and responsibility as citizens? Based on their funding patterns, it seems that the folks at IES think it might.

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Winning Startups

Phase I of the 2015 Small Business Innovation Research Awards, given by the U.S. Department of Education and IES (Institute of Education Sciences), is intended to "allow teams to develop, refine, and test usability and initial feasibility of prototypes of commercially viable education technology products," according to IES' website. The following 13 educational startups were awarded up to $150,000 for 6 months:

A Comprehensive Tool Supporting Social and Emotional Learning Instruction for Students with High-Functioning Autism Spectrum Disorder
3C Institute, Debra Childress

Emotion Explorer: An Integrated Online and Mobile Emotion Literacy Program for Early Elementary School Students and Educators
3C Institute, Ashley Craig

Inq-Blotter: Revolutionizing How Teachers Identify and Support Students Needing Help During Inquiry
Apprendis, Mike Sao Pedro

Mobile Learning and Assessment-Game Based Apps With Direct Representation of Mathematics
Brainquake, Randy Weiner

Just-In-Time Contextualized Reading Assistant for ESL Students
Charmtech, Yevgen Borodin

Interactive Exploration of Real World Math
Mathalicious, Karim Kai Ani

Computer Science Curriculum for First Grade Students Using a Robot Games Platform
Play Works Studio, Adrianna Moscatelli

StepWise Virtual Tutor for Common Core Algebra I
Querium, Patti Smith

Authoring Tools for High Quality Formative Assessments for Classroom Testing
SimInsights, Rajesh Jha

LifeSim
Spry Fox, Daniel Cook

S4: A Game-Based 4th Grade Math Curriculum
Sokikom, Snehal Patel

Teachley Analytics Library: A Collection of Educational Apps Personalizing Gameplay and Reporting Insights
Teachley, Kara Carpenter

ThinkZone: A Research-Driven Gaming Portal for Transforming K-8 Teaching and Learning Practices
ThinkZone, Scott Brewster

—Donovan Griffin

Information literacy and student employment preparation are two of Credo's biggest initiatives at the moment. In January 2014, Credo launched its Information Literacy Course Module, which contains both instruction and assessment components. Instructors and students can take advantage of information literacy-based tutorials, instructional videos, learning objectives, activities, and discussion notes, all of which are aligned to ACRL standards.

When Credo first began the shift toward information literacy, Sweet says, the team had only been working with libraries to help them set up instructional tools and technologies on a custom basis. "But since then, we've started to productize that capability," he says, adding that Credo took the knowledge it gained from custom jobs for individual libraries and used it to create the comprehensive Information Literacy Course Module.

It's important, Sweet says, that information literacy instruction is consistent across the campus and that the information is presented in a consistent and scaffolded way to ensure skill development for learners. At the same time, information literacy education promotes collaboration and support among the faculty, staff, and library.

Today, Credo's Information Literacy Course Module is on its second version, featuring a student-facing view—a "true learning management system," according to Sweet—as opposed to the first release, which was designed to fit into a library's existing system or website.

Practice What You Preach

For Sweet, preparing students for employment goes hand in hand with information literacy. "Students need to be able to think critically and find creative solutions to new problems. They need to fail fast and learn quickly, and always be a student of their own career." At the same time, he says, there are growing pressures on colleges and universities to measure and demonstrate their value