

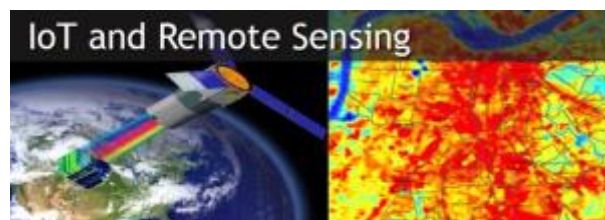
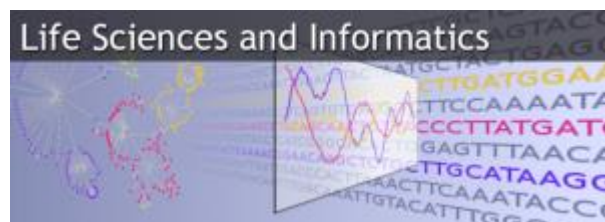
# Desert Research Institute Applied Innovation Center

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## Quarterly Progress Report

Reporting Period: July 1st to Sept 30th, 2016

October, 2016



## Table of Contents

**Project Purpose ..... 2**

**Section I: Proposal Progress ..... 3**

**Section II: Performance ..... 5**

**Table 2: Progress Toward Metrics ..... 5**

        Start-up Companies: ..... 5

        Jobs Created: ..... 5

        Intellectual Property Licenses: ..... 5

        Intellectual Property Revenue: ..... 5

        Sponsored research: ..... 5

        Impact Faculty hired: ..... 6

        Student Internships: ..... 6

**Section III: Budget ..... 6**

**Section IV: Appendices ..... 9**



## Project Purpose

The Applied Innovation Center at DRI is a Knowledge Fund sponsored start-up in the data and analytics space. We leverage the intellectual capital of more than 100 DRI faculty and 60 years of environmental science research to focus on four main areas of applied research: Climate, weather and energy nexus; Internet of things and remote sensing; Engineering and design, and; Life Sciences and informatics. From these 4 core areas we are able to: 1) Build platforms (hardware and software) for industry; 2) leverage these platforms for sponsored projects; 3) Create jobs; 4) write new and more competitive grants, and; 5) build or help build high tech companies in NV.

These activities encompass 6 of the 7 core KF Metrics and 3 of the 5 secondary KF Metrics. In Q3 2016, the AIC launched the largest community health project in the US in partnership with Renown Health and supported by the personal genetics company 23andMe. The success of the launch was due to more than a year of work between the AIC and Renown Health: building the data security infrastructure, addressing HIPAA and other compliance needs and designing a study that has tremendous potential for NV in areas of data science, population health and biotech.

In Q3, the AIC was 15 FTE strong (8 FTE with KF support). We are focusing intensively on leveraging work at DRI that we identified as having a need in industry and building a portfolio management approach to applied research development. We are building two new pieces of instrumentation and software for high throughput data collection in the climate/weather/energy nexus. In the IoT/Remote Sensing space we continue to develop technology and know-how in transportation data analytics, tracking and visualization. In the engineering and design space we are upgrading our technical capabilities around highly distributed file systems and database design and in machine learning.

In Q3 we completed our technology disclosure for our weather intelligence platform. This document now resides in the administration of DRI as it awaits approval so we can begin to commercial our technology and know-how in weather intelligence.



## Section I: Proposal Progress

During the reporting quarter, the AIC continues to make progress toward meeting proposed metrics. Major accomplishments for the current reporting period include:

### 1. Urban weather intelligence for the energy industry.

The development of the WINDS platform continues with the submission of licensing agreement terms and disclosure of the technology to DRI's administration. We hope the IP will be transferred to the DRC in Q4 and we will begin fund-raising on WINDS' industry leading accuracy in weather prediction.

### 2. Architecture improvements for data storage, parallel processing, analytics and visualization.

The AIC is becoming a northern Nevada leader in building efficient and rapid back-end computer systems for the processing of large data sets and structures. We developed a Hadoop Distributed File System (HDFS) for data storage and parallel processing of weather data. We implemented a Mongo-DB non-relational database for data analytics and visualization. All of these technologies can be used in our development of weather related and health care related business opportunities. As well, this expertise will be important in developing further collaborations with other NSHE institutions and KF projects. For example, in Q4 we will collaborate with UNSOM (Nevada School of Medicine) on dept. of health grant.

### 3. Strategic development of an applied research institute in health data science with Renown Health.

One of the major objectives of Renown Health's strategic plan is to improve population health in Northern Nevada. In part, this requires access to top care and top medical facilities. Another part is modern health data science analytics and statistics. AIC is working to leverage our expertise in data analysis and programming to improve patient outcomes. In Q3, we worked on the following:

- Launched a large population health and genetics initiative with Renown Health and 23andMe.
- Began the process of recruiting research participants in the study. The initial proposal was to recruit 5,000 people – we exceeded that target in 1 day and expanded the study to 10,000.
- Began to build national level awareness around Northern Nevada's population health research including the submission of new NIH proposals and conversations around research partnering around the US.

### 4. Strategic development of IOT sensor networks for data assimilation and smart metering.

Sensor networks are a key component for weather forecasting – especially as predictions require more granularity and all overlaid on other data sets (such as energy meters). The AIC is working on sensor networks for live weather data assimilation into models that generate more accurate weather forecasts. As well, we are supporting the development of an IOT-enabled water meter-reading device to enable real-time water usage monitoring by consumers and utility providers

### 5. Commercialization / Partnering



The AIC partnered and met with numerous companies in Q3 across the following sectors: mining, visualization, weather, energy, biotech and healthcare.

**6. Intellectual Property**

No new IP was disclosed in Q3.

**Disclosures**

The IP disclosure related to the WINDS platform

**Applications**

System for the controlled manipulation of single-celled organism physiology and bioproduct production	Grzymiski and Staub	instrumentation and method	In revision
System and method for a specific military application	Decker and Grzymiski	design and process	Application is under review

**Issued**

**7. Programmatic & Project Changes**

*[Section is reserved and will be used only if needed. Summary of material changes to project scope and mission, e.g. addition or removal of job roles, any unforeseen needs, changes in budget, or other material changes in direction]*

**8. Looking Forward**

We remain optimistic about the AIC and are growing and adding jobs to DRI and Nevada – consistent with the overall goals of the KF. We anticipate doubling the size of the AIC since it was first formed by June of 2017. We expect to meet the goals defined by Director Steve Hill to be no more than 30% reliant on state funds by the 5<sup>th</sup> year of our existence. We are accelerating our plans to implement a “Fraunhofer” style-funding model within the AIC as well as developing a new Applied Research Center with Renown Health. In Q4 we have plans to expand the Renown Health / 23andMe population health study which will add 5 new FTEs to the Northern Nevada economy.



## Section II: Performance

**Table 2: Progress Toward Metrics**

**Knowledge Fund Report Metrics**

Primary Categories	Q3 2016	Q3 2017	Q3 2018
Companies Moved to NV	N/A	0	1
Start-up companies	1	2	3
Jobs Created	3	10	20
IP Licenses	1	2	5
IP Revenue	0	\$200,000	\$330,000
Grants Received/Affiliated	0/0	\$500,000	\$1,000,000
Sponsored Research (Contracts/\$)	1/\$1,300,000	\$1,250,000	\$1,500,000
<b>Secondary Categories</b>			
Patents (Filed/Awarded)	0	2/0	2/1
Students placed with Companies	N/A	N/A	N/A
Impact Faculty Hired	0	2	2
Gifts/Donations to KF Projects	N/A	N/A	N/A
Student Internships	1	4	5

Notes: All Values are for booked amounts in Q3.

**Start-up Companies:**

**Desert Research Corporation.** In Q3 the DRC waited for DRI to complete the transfer of IP process.

Once this process is complete we will initiate a significant fund-raise (~\$3m) to meet the needs of WINDS expansion.

**Jobs Created:**

Since AIC inception there have been 13 jobs created. In Q2 we hired 2 more jobs within the AIC and are searching for 1 more.

**Intellectual Property Licenses:**

Development of 2 new instruments are on-going which will lead to IP and revenue

**Intellectual Property Revenue:**

Revenue from the WINDS platform, from logistics work and from health data science innovation is projected for Q3.

**Grants received:**

Since inception the AIC has received \$442,996 worth of research grants directly and ~\$750,000 as co-PIs or as SMEs. However, no grants were booked in Q2. We submitted more than \$1m in new grants in Q2.

**Sponsored research:**

AIC and DRI did sponsored research with EMS Genomics and Renown Health in Q3.



**Impact Faculty hired:**

We are searching for another faculty member.

**Student Internships:**

2 Student interns were working in Q3.

**Section III: Budget**

AIC General Salary in Q3 supported 9 FTE including the senior director, business development leader, 1 technical leads, 3 programmers, 2 post-docs and 1 faculty member. The Renown Health project supported approximately 3 FTE. In Q4 the expenditures will remain flat as we continue to work intensively on the Renown Health work.

Asset and faculty development increased with the push to launch WINDS and develop some new capabilities. We expanded our expertise and assets in IOT, we sponsored the building of a new spectrometer which is in the final stages of proof of concept. We contributed to the development of new techniques for modeling pollution and water usage. We built out the infrastructure necessary to launch the commercial version of WINDS and are expanding our health and genetics data storage and analysis capacity.

<b>AIC Expenditures</b>			
For Reporting Period			
July 1 – Sept 30, 2016			
	<b>Q3 actual</b> Current period	<b>To Date</b> Phase II inception to date April 1, 2016 – Sept 30, 2016	<b>Q4 estimate</b> Oct 1-Dec 31, 2016
<b>AIC General Salary</b>	\$316,654	\$645,771	\$320,000
<b>AIC Operations</b>	\$19,541	\$32,405	\$20,000
<b>Total</b>	<b>\$336,195</b>	<b>\$678,176</b>	<b>\$340,000</b>



<b>AIC INCOME</b>			
For Reporting Period			
July 1 – Sept 30, 2016			
	<b>Q3 actual</b> Current period	<b>To Date</b> Inception to Date April 1, 2016 – Sept 30, 2016	<b>Q4 estimate</b> Jul 1-Sept 30, 2016
<b>Federal Grants / Contracts</b>	\$28,000	\$447,996	\$96,000
<b>Private sector Contracts</b>	\$193,408	\$238,713	\$200,000
<b>IP Revenue</b>	\$-	\$-	\$25,000
<b>GIFTS</b>	\$-	\$-	\$-
<b>Other Contributions</b>	\$-		
<b>Knowledge Fund</b>	\$-	\$-	\$-
<b>Total</b>	<b>\$221,408</b>	<b>\$686,709</b>	<b>\$321,000</b>

## Section IV: Appendices

Monthly Reports

BD pipeline (by sector, company names removed)





## **AIC Monthly reports: July-Sept, 2016**

### **July:**

Phone conversation to discuss approaches to population health  
Teleconferenced to discuss weather forecasting

Discussed collaborative software projects (indoor geotracking)

Teleconference to discuss proposed arsenic analysis services

Met to discuss the technical capability of LoRaWAN solution

Met numerous times to discuss data quality, context issues, and strategies  
to discuss population health strategy

Teleconferenced several times to discuss collaborative agreements

Continued to work in earnest on 4.5TB Epic database queries  
SAS statistical modeling of population data and the factors affecting certain outcomes continues

GIS queries using ESRI ArcMAP implemented on geocoded database data enabling maps to be  
constructed of various population health parameters

Met team to discuss strategy for implementing unstructured text analysis of data

Finished Mom/Newborn study of 40,000 Mothers and 47,000 newborns. Includes both  
Powerpoint and supporting document detailing statistical modeling.

Discussed efforts to date to assemble proposals for workforce development collaborations

Served in an NSF panel review

### **Aug:**

Visits for potential collaboration

Discussion on soil health collaborative opportunities

Discussion on DRI collaboration, lithium processing and battery manufacture

Discussion on indoor positioning project development

Discussion on weather forecasting

Finalize pilot soil science program proposal

Met to discuss next phases of logistics platform development

Submitted several NSF EPSCoR pre-proposals

Discussion of energy monitoring pilot studies

Met with community health researchers re: proposal

Several meetings to coordinate the launch of Governor's Pop Health

Discussed compost tea and soil health program

Discussed innovation pathway and project portfolio development at DRI

Delivered an indoor localization proposal for further discussion on potential collaboration

WRF computation in a public cloud on hold until we enable AIC cluster for WINDS

Architecture decision made to use HBASE and HDFS for WINDS data storage instead of MongoDB.

WebGL technology is employed for WINDS data visualization

Discussion of launching social science outreach/science café in Las Vegas

Met with WINDS team to discuss strategic, tactical path ahead and review most recent forecast data

Met with DRI executives to argue for an unfettered Desert Research Corporation

Met to discuss a grant for helping identify underserved populations needing colorectal cancer screening

Discussion on technology alternatives for a full document indexing solution

Met and discussed discovery technology and population health risk communication

Attended ISME 2016 conference in Montreal, Canada

Participated in NSHE DRI presidential search

## **Sept:**

Met twice to discuss business collaboration and review software on indoor localization application

Discussion on business collaboration opportunity on secure and low latency fiber network which are currently not lightened up

Several meetings to develop business collaboration

Teleconferenced with science teams to discuss potential atmospheric science collaboration

Participation in DRI Foundation meeting to support DRI innovation funding

Architected HBASE solution for WINDS database solution. Software is under testing.

WRF is switched from Gridlogging to AIC cluster engine and is running smoothly.

Two WINDS pilot projects are running full steam; Improved WINDS visualization with WebGL and 3D topography; Final review of WINDS disclosure document

Established basic framework for water meter project using Raspberry Pi and Software Defined Radio (SDR)

Teleconferenced to discuss Science Café operations for 2017

Met with WINDS team to re-prioritize R&D plans to accommodate pilot programs with 2 potential customers

Discussed weather forecasting and commodities trading

Met to discuss concerning weather modification business

Met to discuss concerning desert restoration

Met to discuss ultra-low latency cloud computing/networking opportunity

Discussed DRIVE 4 and DRIVE 6 technology status

Participated in Knowledge Fund committee review meeting

Enrollment walk-through and next steps media planning completed  
Executive Summary; Planning call; presentation; potential investor meeting

Worked on MacArthur grant

Coordinated getting launch bags filled

Coordinated ensuring consent packets were correct

Coordinated poster creation, printing, hanging

Identified/purchased an Adobe plug-in to help create unique ID's for DNA consent experience

Ensured AppointmentsPlus had sufficient compute power for the onslaught on signups.

Working with the team, provided ad-hoc support for the hospital cohort launch for 7:30 a.m., 11:00 a.m., 2:30 p.m. and 5:30 p.m. cohort slots Wednesday thru Friday. Worked with the team through numerous issues to ensure a smooth operation. Functioned as a guide, greeter and consent station helper. Many enrollees had a variety of special issues needing resolution to ensure they were appropriately enrolled in the study.

Prepared for hospital cohort launch Monday and Tuesday. Discussed process and flow with the team to ensure a smooth operation.

Met to discuss ideas for ensuring population health professionals in Nevada are in the loop with respect to project.

Company Type	Opportunity Type	Notes (Progression and Next Step)
<b>Leads - Awareness (346 - 432)</b>		
Entertainment	Predictive Analytics	Follow-up email to request continued discussion
Aerospace	Engineering Visualization	Follow-up email to request continued discussion
Software	TBD	No project at this time
Software	Software	Follow-up email to request continued discussion
Architecture Design	Predictive Analytics	Follow-up email to request continued discussion
Energy	Predictive Analytics	No project at this time
Software	Software	Follow-up email to request continued discussion
Predictive Analytics	Software	Follow-up email to request continued discussion
UAS	TBD	No project at this time
UAS	Software	Follow-up email to request continued discussion
Consulting	Predictive Analytics	No project at this time
UAS	Weather Modification	Follow-up email to request continued discussion
Design	Engineering Visualization	Follow-up email to request continued discussion
PR	TBD	No project at this time
Manufacture	TBD	No project at this time
Energy	Predictive Analytics	Follow-up email to request continued discussion
Predictive Analytics	Software	Follow-up email to request continued discussion
Energy	Predictive Analytics	Follow-up email to request continued discussion
Water Energy	Predictive Analytics	Follow-up email to request continued discussion
Consulting	TBD	No project at this time
Architecture Design	TBD	No project at this time
Geology	Data Science	Follow-up email to request continued discussion
Architecture Design	TBD	No project at this time
Software	TBD	No project at this time
Predictive Analytics	None	No project at this time
Consulting	TBD	No project at this time
Software	Software	Follow-up email to request continued discussion
IoT	IoT	Follow-up email to request continued discussion
Governance	IoT	Follow-up email to request continued discussion
Governance	IoT	Follow-up email to request continued discussion
Governance	IoT	Follow-up email to request continued discussion
Predictive Analytics	Software	Follow-up email to request continued discussion
Predictive Analytics	Software	Follow-up email to request continued discussion
Consulting	Predictive Analytics	Follow-up email to request continued discussion
Software	TBD	No project at this time
Supply Chain	None	No project at this time
Entrepreneurship	None	No project at this time
Predictive Analytics	TBD	No project at this time
Data Science	TBD	No project at this time
Predictive Analytics	Software	Follow-up email to request continued discussion
Data Science	TBD	No project at this time
Science Education	Education	Follow-up email to request continued discussion
Agriculture	Soil Science	Follow-up email to request continued discussion
Energy	Engineering	Follow-up email to request continued discussion
UAS	UAS	No project at this time
Marketing Brand Developmt	TBD	No project at this time
Energy	Predictive Analytics	Follow-up email to request continued discussion
Predictive Analytics	TBD	No project at this time
Mining	Mining	Follow-up email to request continued discussion
Sensors	TBD	No project at this time
Mining	Mining	Follow-up email to request continued discussion
Water Technology	TBD	Follow-up email to request continued discussion
Virtual Reality	TBD	Follow-up email to request continued discussion
Software	Software	No project at this time
Software	Predictive Analytics	No project at this time
Predictive Analytics	TBD	Follow-up email to request continued discussion
Life Sciences	TBD	Follow-up email to request continued discussion
Energy	Predictive Analytics	Follow-up email to request continued discussion
Food Science	None	No project at this time
Predictive Analytics	TBD	No project at this time
Public Television	None	No project at this time
Global Industry	Software	Follow-up email to request continued discussion

Sensors	IoT	Follow-up email to request continued discussion
Energy	Predictive Analytics	Follow-up email to request continued discussion
Broadcasting	None	No project at this time
Software	None	No project at this time
Venture Capital	Software	Follow-up email to request continued discussion
Agriculture	IoT	Follow-up email to request continued discussion
Architecture Design	Engineering Visualization	Follow-up email to request continued discussion
Architecture Design	None	No project at this time
Life Sciences	TBD	No project at this time
Entrepreneurship	None	No project at this time
Architecture Design	Software	No project at this time
Energy	Predictive Analytics	Follow-up email to request continued discussion
Predictive Analytics	Software	Follow-up email to request continued discussion
Energy	Predictive Analytics	Follow-up email to request continued discussion
Global Industry	TBD	No project at this time
Consulting	None	No project at this time
Energy	Software	Follow-up email to request continued discussion
Energy	Predictive Analytics	Follow-up email to request continued discussion
Computing Services	Cloud Computing	Follow-up email to request continued discussion
Mining	TBD	Follow-up email to request continued discussion
Transportation	None	No project at this time
Healthcare	Software	Follow-up email to request continued discussion
Transportation	IoT	Follow-up email to request continued discussion
Energy	Predictive Analytics	Follow-up email to request continued discussion
Computing Services	Cloud Computing	Follow-up email to request continued discussion
Energy	Engineering	No project at this time
Data Science	Predictive Analytics	Follow-up email to request continued discussion
Healthcare	Predictive Analytics	Follow-up email to request continued discussion
Engineering	Predictive Analytics	Follow-up email to request continued discussion
UAS	UAS	Follow-up email to request continued discussion
Energy	Predictive Analytics	No project at this time
Data Science	Predictive Analytics	Follow-up email to request continued discussion
Data Science	TBD	Follow-up email to request continued discussion
Software	Software	Follow-up email to request continued discussion
Manufacture	Manufacture	Follow-up email to request continued discussion
Manufacture	Engineering Visualization	Follow-up email to request continued discussion
Regional Planning	Predictive Analytics	Follow-up email to request continued discussion
Predictive Analytics	Predictive Analytics	Follow-up email to request continued discussion
Regional Planning	IoT	Follow-up email to request continued discussion
Venture Capital	Software	Follow-up email to request continued discussion
Energy	Predictive Analytics	Follow-up email to request continued discussion
Predictive Analytics	Software	Follow-up email to request continued discussion
Architecture Design	Engineering Visualization	Follow-up email to request continued discussion
Water Technology	Predictive Analytics	Follow-up email to request continued discussion
Architecture Design	IoT	No project at this time
Computing Services	Software	No project at this time
Architecture Design	Engineering Visualization	No project at this time
Energy	Predictive Analytics	No project at this time
Virtual Reality	Visualization	No project at this time
Consulting	Software	No project at this time

112 LEADS

Prospects - Interest (56 - 79)

Venture Capital	Software	Follow-up email to request continued discussion
Data Science	Predictive Analytics	Follow-up email to request continued discussion
Data Science	Predictive Analytics	Discuss collaborative agreement
Manufacture	Engineering Visualization	Discuss collaborative agreement
Venture Capital	Software	Follow-up email to request continued discussion

5 PROSPECTS

Qualified - Desire (19 - 26)

Predictive Analytics	Software	Collaborative agreement discussions ongoing
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Predictive Analytics  
Predictive Analytics

Software  
Software

WINDS Pilot Program discussion ongoing  
WINDS Pilot Program discussion ongoing  
Cloud Computing discssion ongoing

**4 QUALIFIED**

**Negotiation - Action (7 - 5)**

Predictive Analytics

Software

Terms of collaboration ongoing

**1 NEGOTIATION**

**Won or Lost (2 - 4)**

Mining  
Healthcare  
Logistics

Mining  
Software  
Software

Work order sent for review, negotiated, signed. Work secured.  
Phase 1 begun  
Route optimizer project initiated

**5 WON**