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[Project Reports](#)  
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[Manage Financials](#)  
[Program Income Reporting](#)  
[Grantee Cash Management Section Contacts](#)  
[Administration](#)  
[Lookup NSF ID](#)

## Preview of Award 1925494 - Annual Project Report

[Cover](#) |  
[Accomplishments](#) |  
[Products](#) |  
[Participants/Organizations](#) |  
[Impacts](#) |  
[Changes/Problems](#)

### Cover

Federal Agency and Organization Element to Which Report is Submitted:	4900
Federal Grant or Other Identifying Number Assigned by Agency:	1925494
Project Title:	CCRI: Planning: Development of a Community Resource for Digital Image Research
PD/PI Name:	Iyad Obeid, Principal Investigator Joseph Picone, Co-Principal Investigator
Recipient Organization:	Temple University
Project/Grant Period:	01/01/2020 - 06/30/2021
Reporting Period:	01/01/2020 - 12/31/2020
Submitting Official (if other than PD\PI):	N/A
Submission Date:	N/A
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	N/A

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### Accomplishments

#### \* What are the major goals of the project?

This goal of this work is a community planning effort for digital pathology. Specifically, it is focused on planning the data and evaluation resources that will enable high performance, automated interpretation of pathology images using machine learning. Digital pathology is a discipline in which slides of biological tissue are automatically interpreted using a combination of extremely high-resolution digital imaging and machine learning. The high resolution of these images, coupled with the complex nature of the artifacts that must be disambiguated for successful diagnoses, pose serious challenges for state-of-the-art deep learning technology.

The field has been limited by a lack of high-quality data (for training machine learning and deep learning engines) as well as standardized community tools and performance metrics, without which competing approaches cannot be compared. To address these issues, we are pursuing a community-building effort around digital pathology. The intellectual merit of this work is that it will create a diverse community of digital pathology researchers. This group will contribute data, software tools, and expertise with the communal goal of improving healthcare outcomes through enhanced analysis of biological tissue. The merit to the medical community will be improved patient outcomes (fewer mistakes, shorter analysis wait-time, reduced costs), whereas the merit to the data science community will be innovative deep learning architectures that are well-suited to the specific problem of biomedical tissue and fluid analysis.

**\* What was accomplished under these goals and objectives (you must provide information for at least one of the 4 categories below)?**

Major Activities:

Our group has been meeting with prospective partners who are active in pathology, digital pathology, or machine learning image processing. Owing to travel restrictions, these meetings have all been remote via video chat. Our originally stated goals of traveling to conferences and workshops to solicit partners has been derailed for now, although we expect to resume this to some extent later in 2021.

We have met with the following groups / companies / teams to discuss our plans for a digital pathology consortium:

- Drs. Yuri Persidsky and Nirag Jhala, pathologists at Temple University Hospital
- David West, CEO of Proscia
- Denise Connolly and Hong Wu, research pathologists at Fox Chase Cancer Center
- Profs Bojana Gligorijevic and Erkan Tuzel, cancer and genetic cancer investigators, Temple University Department of Biomedical Engineering
- Predrag Bakic, Lund University
- Waheed Bajwa, Rutgers University
- Anil Parwani and team at Translational Data Analytics Institute, Ohio State University

Our feedback so far has been that there is indeed a strong need for the type of consortium that we have envisioned. There has also been a strong interest in collaboration on individual digital pathology projects, which was not the focus of the proposed work but is a strong ancillary outcome regardless. The principal common thread has been a desire for a framework in which slides can be searched and extracted for machine learning research with relative simplicity. Users seek tools in which custom research corpora can be compiled through a simple search engine. Other users have expressed interest in hand-curated corpora that are custom tailored for addressing specific research questions. We are continuing to understand and develop these ideas through follow up meetings and continued outreach.

Specific Objectives:

Significant Results:

Key outcomes or

Other achievements:

**\* What opportunities for training and professional development has the project provided?**

Nothing to report.

**\* Have the results been disseminated to communities of interest? If so, please provide details.**

Nothing to report.

**\* What do you plan to do during the next reporting period to accomplish the goals?**

During the next reporting period, we will continue to identify and reach out to potential partners, identify their needs, and

assess how to best include them in a consortium effort in the future.

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## Products

### Books

Nothing to report.

### Book Chapters

Nothing to report.

### Inventions

Nothing to report.

### Journals or Juried Conference Papers

View all journal publications currently available in the [NSF Public Access Repository](#) for this award.

The results in the NSF Public Access Repository will include a comprehensive listing of all journal publications recorded to date that are associated with this award.

Nothing to report.

### Licenses

Nothing to report.

### Other Conference Presentations / Papers

Nothing to report.

### Other Products

Nothing to report.

### Other Publications

Nothing to report.

### Patent Applications

Nothing to report.

### Technologies or Techniques

Nothing to report.

### Thesis/Dissertations

Nothing to report.

### Websites or Other Internet Sites

Nothing to report.

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## Participants/Organizations

### What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Obeid, Iyad	PD/PI	1
Picone, Joseph	Co PD/PI	1

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Full details of individuals who have worked on the project:

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**Iyad Obeid****Email:** iobeid@temple.edu**Most Senior Project Role:** PD/PI**Nearest Person Month Worked:** 1**Contribution to the Project:** Identifying, communicating with, and interviewing consortium stakeholders.**Funding Support:** NSF 1925494**Change in active other support:** No**International Collaboration:** No**International Travel:** No

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**Joseph Picone****Email:** joseph.picone@gmail.com**Most Senior Project Role:** Co PD/PI**Nearest Person Month Worked:** 1**Contribution to the Project:** Identifying, communicating with, and interviewing consortium stakeholders.**Funding Support:** 1925494**Change in active other support:** No**International Collaboration:** No**International Travel:** No

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**What other organizations have been involved as partners?**

Nothing to report.

**Were other collaborators or contacts involved? If so, please provide details.**

Nothing to report

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**Impacts****What is the impact on the development of the principal discipline(s) of the project?**

Nothing to report.

**What is the impact on other disciplines?**

Nothing to report.

**What is the impact on the development of human resources?**

Nothing to report.

**What was the impact on teaching and educational experiences?**

Nothing to report.

**What is the impact on physical resources that form infrastructure?**

Nothing to report.

**What is the impact on institutional resources that form infrastructure?**

Nothing to report.

**What is the impact on information resources that form infrastructure?**

Nothing to report.

**What is the impact on technology transfer?**

Nothing to report.

**What is the impact on society beyond science and technology?**

Nothing to report.

**What percentage of the award's budget was spent in a foreign country?**

Nothing to report.

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## Changes/Problems

**Changes in approach and reason for change**

Nothing to report.

**Actual or Anticipated problems or delays and actions or plans to resolve them**

Travel restrictions in response to COVID-19 have complicated the execution of the proposed work. Originally, we had intended to travel extensively to conferences and workshops, and host in-person workshops of our own, in order to raise awareness, identify stakeholders, and generally work towards the common goal of a community consortium. Predictably, the inability to travel has complicated these efforts. We have, of course, continued to reach out to partners by email and video conference to the extent possible.

Our expectation is to resume travel and in-person meetings as soon as possible in 2021. This may necessitate a no-cost-extension in order to make funds available for travel after the original grant close date. Beyond that, we will continue to conduct consortium-building interviews as best as possible through remote conferencing. With this in mind, we have every expectation that the originally stated goals of the project can be met.

**Changes that have a significant impact on expenditures**

Nothing to report.

**Significant changes in use or care of human subjects**

Nothing to report.

**Significant changes in use or care of vertebrate animals**

Nothing to report.

**Significant changes in use or care of biohazards**

Nothing to report.

**Change in primary performance site location**

Nothing to report.