Broader Impacts and Engagement in the Institution for the Next Century:
TRUCEN Workgroup Session, 2016

“Its hard to accomplish high-quality broader impacts without engagement and its hard to facilitate and institutionalize high-quality engagement without broader impacts”

MICHAEL THOMPSON, PHD
DIRECTOR OF BROADER IMPACTS IN RESEARCH (BIR): HTTP://BIR.OU.EDU/
OFFICE OF THE VICE-PRESIDENT FOR RESEARCH (OVPR)
Overview of This Seminar:

1. Setting the stage and the Broader Impacts in Research (BIR) initiative

2. Moving forward and providing a way to institutionalize BI and engagement: Bringing the BI and the engagement community together

3. Practical applications of broader impacts identity (BII) using the National Science Foundation (NSF) as an example, *Everyone has a BI identity and this identity is not just for NSF, a faculty example included*

4. Brainstorming: Next steps for TRUCEN and the engagement community
Part 1: The BIR initiative...
THE CHRONICLE OF HIGHER EDUCATION

Data Could Help Scholars Persuade, if Only They Were Willing to Use It

By Paul Basken

Companies that exploit personal information could offer a model for researchers who seek to turn their work into meaningful policy. But many scholars are wary.

RESEARCH
What It Might Take to Tackle the Most Important Problems

Here’s a sampling of experts’ suggestions of what universities, governments, journals, and private funders of research could do to ensure that they’re making the greatest possible efforts toward solving society’s most pressing issues.

Climate Change Is a Social Issue

By Karin Marie Norgaard

Too many efforts to stem global warming focus exclusively on the hard sciences.
Why Should You Care About BI!!!

1. You typically are not trained to think, write, and develop your BI, BIA’s and BI identity in graduate school but you will have to if you become tenure-track faculty- so get a head start.

2. BI can be the difference between you getting funding or not, especially from NSF.

3. BI will help you get known in the world (develop, discover, disseminate knowledge and change learning, change behavior and change conditions).

4. BI will help you be a better teacher, researcher, provide better service as well become a more well-rounded and functioning faculty in today’s current environment.

5. All money is public money so BI is part of your professional and ethical responsibility

6. BI will help you to develop and leave a legacy.

7. You will be able to train your graduate students in BI when you become faculty. You will be their mentor and therefore it will really be your responsibility to make sure they are also successful.

8. Developing BI will help you learn how to develop successful partnerships for your research and in general.

9. BI will help you as faculty align yourself with the culture and identity of your institution.

10. Benefitting society through your research is an INTERNATIONAL ISSUE so no matter where you go it will be required of you.
Broader Impacts (BI) is an International Issue !!!

- Research Excellence Framework
- Value Creation
- Responsible Research and Innovation
- Broader Impacts
- Societal benefit
- Equity in development
- Valorisation
- Significance

National Natural Science Foundation of China (NSFC)
The Broader Impacts in Research (BIR) Initiative:

American Competes Act 2010
Congress mandates BI and encourages IHEs to assist PIs in achieving the BI criterion and requires PIs to provide evidence of institutional (BI) resources.

2011
We are keeping BI and IHEs should provide support for PIs because there is confusion about it.

2012 & 2013
Three BI Offices Developed and National Alliance for Broader Impacts (NABI)

2014
Broader Impacts in Research (BIR)
Proof of Concept (POC):

Develop a frictionless organization that creates, promotes, embodies, and implements BI through the development and institutionalization of a broader impacts (BI) culture.
## Broader Impacts in Research (BIR): Services

<table>
<thead>
<tr>
<th>Current Services:</th>
<th>Future Services:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI faculty, post-doc, and graduate student website development</td>
<td>BI database</td>
</tr>
<tr>
<td>BI faculty roundtable discussions</td>
<td>BI individual start to finish consultations</td>
</tr>
<tr>
<td>BI review of proposals</td>
<td>BI faculty training seminar series</td>
</tr>
<tr>
<td>BI identity development</td>
<td>BI identity institutional infrastructure</td>
</tr>
<tr>
<td>BI development</td>
<td>BI specific faculty training, i.e. CAREER, Centers, etc.</td>
</tr>
<tr>
<td>BI resources</td>
<td>BI faculty institutional manual</td>
</tr>
<tr>
<td>BI general consultations (planning and writing)</td>
<td>BI boilerplate language, i.e. FEOR, DMP, in proposal, etc.</td>
</tr>
<tr>
<td>BI and BI identity graduate student training and GRFP help</td>
<td>BI and BI identity sets of examples on file</td>
</tr>
<tr>
<td>BI Post-Doc Training</td>
<td>BI literature (references) for proposals</td>
</tr>
<tr>
<td>BI cooperation and collaboration development</td>
<td>BI faculty recognition</td>
</tr>
<tr>
<td>BI analysis in different proposals</td>
<td>BI service evaluation of BIR (i.e. how was the service?)</td>
</tr>
<tr>
<td>BI institutionalization consultations</td>
<td>BI graduate student and GRFP institutionalized development</td>
</tr>
</tbody>
</table>
Part 2: Moving forward...
What are the Key Barriers:

1. Lack of Specific Conceptual/Theoretical Framework/s for broader impacts that provides a way to think about BI, understand BI, provides a common BI language, and guides practice and methodological approaches

2. Not knowing if BI is important for the entire institution which goes beyond the criterion of one Agency

3. The disconnect or lack of formalized connections between the engagement community and broader impacts community
Conceptually Understanding the Term Broader Impacts (BI):

Broader Impacts (BI) - is defined as encompassing the ability to benefit society and contribute to achievement of specific, desired societal outcomes (NSF-16-1).
What Does Broader Impacts (BI) Really Mean?: A Cross Case Analysis

Broader Impacts (BI) is defined as encompassing the ability to benefit society and contribute to achievement of specific, desired societal outcomes.

EU - Davis and Laas, 2014

So read, we may identify three important similarities between RRI and the criterion of broader impacts:

1. **Societally desirable**. NSF apparently has a conception of science, technology, engineering, and mathematics as working to achieve “societally relevant outcomes”—presumably outcomes “relevant” in a positive way, that is, outcomes society should desire (even if it does not). Both RRI and broader impacts seek science and innovation that serve society.

2. **Process**. There is in both criteria the idea of a process by which researchers in academia (and other research institutions) might work with industry and others to achieve societally desirable outcomes. Admittedly, the part played by process in the NSF criterion (“partnerships” and “participation”) seems far less central than in RRI (more about that below).

3. **Specific goals**. The list of societally desirable outcomes that the broader impacts criterion aims at is at least partially the same as that Europe has or might be expected to put together. For example, Europe wants its research and innovation to increase its economic competitiveness just as the US wants its research and innovation to do (see, for example, Directorate-General 2013).

England, Scotland, Wales, and Northern Ireland, 2014

**Impact: 20 per cent of the overall results**

**Definition for the REF**

‘Impact’ is any effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia.

**Information provided in submissions**

Each submission included:

- **Impact case studies**. These four-page documents described impacts that had occurred between January 2008 and July 2013. The submitting university must have produced high quality research since 1993 that contributed to the impacts. Each submission included one case study; plus an additional case study for every 10 staff.

- **An impact template**. This document explained how the submitted unit had enabled impact from its research during the period from 2008 to 2013, and its future strategy for impact.

**Assessment criteria**

Impact case studies were assessed in terms of the ‘reach and significance’ of the impacts.

Impact templates were assessed in terms of how far the approach and strategy are conducive to achieving impacts.

Netherlands, 2014

What is valorisation?

Over the last decade there is an ongoing debate about the societal impact and utilisation of academic research. This is also called ‘valorisation of knowledge’ or ‘technology transfer’ and can be defined as:

The process of value-creation out of knowledge, by making this knowledge suitable and available for economic or societal utilisation and to translate this into high-potential products, services, processes and industrial activity.

Broader Impacts (BI): **Process with stakeholders/people for Achieving a specified goal that is societally beneficial in a Finite time that is measured** (BICF Lexicon and SBT&P, 2014).

Reference: Davis M. & Laas K., (2014), Sci Eng Ethics. A Comparison of Criteria...
Providing a common language:

Broader Impacts defined as encompassing the ability to benefit society and contribute to achievement of specific, desired societal outcomes. (NSF 16-1)

What's Your Broader Impact?

Broader Impacts Plan (BIP) - a detailed proposal for attending, deciding, doing, or advocating on broader impacts activities, broader impact programs, and/or broader impacts portfolio that supports our BI identity.

Broader Impacts Portfolio (BIP) - all the tracking, collection, grouping of BI activities with, but not limited to the people, services, programs, departments, schools, colleges, universities involved. This is one way to show the results of one or many or a culmination of BI identity/ies.

Broader Impacts Program (BIP) - the culmination of one or more impacts, outputs, or outputs, and the resulting outcomes that allows one to explain, demonstrate, share provide proof to others of one's or many's development or developing BI identity.

Broader Impacts Strategy (BIS) - a high-level, thought-out, constructed BI plan or method of action, policy, and access to accomplish a specific, long-term BI goal. Typically fitting into a developing, highly developed, or mature BI identity.

Engagement - to acquire, attract, involve, get someone's attention or attention, gain, capture, capture, cause someone to be involved in, enter into an agreement, recruit, participate in, take part in, join in, become involved in, go in for, participate in, share in, and fill a part role in a particular event's.

Impact - to have a strong effect on someone or something and/or the action of something coming into contact with another, resulting in a benefit which can happen in an infinite amount of time. This does not have to be planned.

Indirect Broader Impacts (IBI) - a process with stakeholders/people to achieve a societal benefit in a finite amount of time. IBI is part of our BI program, it is, and also evidence of our BI identity. IBI outputs should be measured.

Narrower Impacts (NI) - the opposite of BI. A process of going away from stakeholders/people to achieve self-benefit without measuring wider trended consequences. A result of those who refuse to seclude, devote, or are trying to minimize and/or narrow our BI identity.

Negative Impacts (NI) - the opposite of impact. To have a strong effect on someone or something and/or the action of something coming into contact with another, resulting in a detrimental, harm, loss, improvement, or destruction which can happen in an infinite amount of time. This does not have to be planned. This typically can result from one or more reasons and seeking to minimize one’s BI identity.

Outcomes - are benefits for stakeholders/people resulting from the broader impacts inputs, activities, and outcomes that may not be limited, deal with charges or outcomes, knowledge, learning, skills, attitudes, norms, behaviors, decision-making, motivations, beliefs; values, capacities, belief, or conditions of individuals, groups, organizations, systems, or communities. These can be short term, intermediate, and/or long term outcomes.

Outcomes are measurable and measured and happen in a finite amount of time. These outcomes are evidence of someone's or many's development or developing BI identity.

Outreach - to reach out, extend, to reach out, instead, an act or instance of reaching out, length or extent of reach, the act of extending services, benefits, etc., to a wide section of the population. Outreach is just one type of way to engage.
Providing a common language contd…

QUESTION 1
What is the potential for the proposed activity to benefit society and contribute to achievement of specific desired societal outcomes?

Guiding Principles
- The target of the proposed activity should be taken into consideration. For many BI activities, their target audience is not clear. While the literature and experience of other similar successful activities can be employed to gain a clearer understanding of the intended audience and the type of societal benefits that may be achieved, it is important to keep in mind that the intended audience may not be the same as those who benefit from the activity. Therefore, the potential societal benefits should be evaluated with the target audience in mind.
- Certain characteristics are clearly not of potential societal benefit to all, either during the funding period or beyond, and sustainability of the activity beyond the grant period.
- Previous experience may be included in the design of the BI activity. It is not necessary to include all parameters described, and it is not necessary to include them in this way. However, all parameters are necessary inputs in determining whether a particular parameter is important.

Guiding Questions
- Are the BI activities being proposed clearly described?
- In the absence of tangible benefits described, can the rationale for engaging them clearly justified?
- Is the target engaged of specific societal benefit clearly described?
- How will the audience be engaged?
- Where is the line of engagement between the activities described or between the activities versus partnerships, which will help them reach each audience?
- Are the benefits to the target audience(s) clearly described?
- If appropriate, is a path for deploying beneficial techniques or practices clearly mapped out?

QUESTION 2
To what extent do the proposed activities suggest or explore creative, original, or potentially transformative concepts?

Guiding Principles
- Are the BI activities based on emerging scientific approaches/technologies or trends?
- Are the ideas that are proposed and implemented unique to STEM or education-research?
- What new concepts will be introduced to the audience?
- How might new proposed activity transform the existing practice?
- Is the proposed BI activity leveraging other activities?
- What is the value added by the proposed activity?
- How will the grantee be invited to the relevant literatures, or what is a known about research and practice in the field that is new or novel?

Guiding Questions
- Is new in the area being proposed?
- What are the creative/logical elements of the proposed activity?
- What is the proposed activity, in terms of process, result, model, etc., for the benefit of the audience or for the benefit of society?
- What other partners or collaborators are proposed in the project?
- How does the project leverage (STEM or education-research)?

- How does the grantee intend to be in the relevant literatures, or what is known about research and practice in the field that is new or novel?

QUESTION 3
Is the plan for carrying out the proposed activities well-developed, realistic, and based on sound rationale? Does the plan implement mechanisms to assess success?

Guiding Principles
- What are the goals and what would be contributed to the activity for the proposed biotarget impact (BIP) project? At what level of detail and description should be aligned with other similar activities?
- Methods for measuring engagement of specific parts of the audience and how should the activity likely be implemented to achieve the stated outcomes.
- If the PFI has no prior BI experience, it should include a partner or team member with BI experience, either from within higher ed or collaboration with other educational agencies such as the National Science Foundation’s STEM education programs.
- The plan should include a clear description of the methods and how the BIP activity will be measured.

Guiding Questions
- Is there a measurable milestone or intermediate step to the proposed activity?
- How will you describe the BIP and what are the next steps?
- Is the plan for the BIP impact the core of the project and not just an add-on?
- Can the BIP be described in the project description in sufficient detail?

QUESTION 4
How well qualified is the individual, team, or institution to conduct the proposed activities?

Guiding Principles
- Describe the qualifications that were considered to support the statement of qualifications.
- What is the purpose of the BIP project?
- The statement should be clear and not implied or assumed.

Guiding Questions
- What are the goals and what would be contributed to the activity for the proposed biotarget impact (BIP) project? At what level of detail and description should be aligned with other similar activities?
- Methods for measuring engagement of specific parts of the audience and how should the activity likely be implemented to achieve the stated outcomes.
- If the PFI has no prior BI experience, it should include a partner or team member with BI experience, either from within higher ed or collaboration with other educational agencies such as the National Science Foundation’s STEM education programs.
- The plan should include a clear description of the methods and how the BIP activity will be measured.

QUESTION 5
Is there adequate resources available to the PI to deliver the home system and or through collaborations to carry out the proposed activities? Is the budget allocated for BI activities sufficient to successfully implement them?

Guiding Principles
- Describe the resources provided by the PI institute and partners/colleagues.
- Include a description of the resources provided in the budget justification.

Guiding Questions
- Does the budget justification support the goals and objectives for the project?
- What is the rationale for the budget request?
- What is the basis for the costs that are identified?
The Broader Impacts Conceptual Framework (BICF):

- An explicitly societal centric framework that allows for engagement from society into the institution and engagement from the institution into society

- An engagement-outcome-impact model for creating sustainable societal beneficial impacts

- A framework that is relevant for an entire institution, provides insight into how the BI community and engagement community can explicitly interact

- Provides a way to institutionalize BI and engagement, and introduces and brings together fields of study and practice - Societal Benefit Theory & Practice (SBT&P)
Formalizing a Connection between the BI and Engagement Community

Understanding, Developing, Writing, and Implementing, Your Broader Impacts Identity (BII):

**Broader Impacts Identity (BII)** - Is who you are, the way you think about yourself, the way you are viewed by the world, and the characteristics that define you based off of a process/es with stakeholders/people to achieve a societal benefit in a finite amount of time that is measured. Everyone has a BI identity. (BICF Lexicon and SBT&P, 2014).
The Five (5) Major Aspects of BI:

BI IDENTITY:

Is who you are, the way you think about yourself, the way you are viewed by the world, and the characteristics that define you based off of a process/es with stakeholders/people to achieve a societal benefit in a finite amount of time that is measured. Everyone has a BI identity.

Link to this BIR page: http://bir.ou.edu/content/how-use-bir-website

How to Use the BIR Website

Preface: The BIR website builds upon and is a culmination of best practices in BI. The BIR website was developed to provide a way for faculty, institutions, centers, organizations, departments, communities, graduate students, and etc., to get information on BI. This is whether one’s new to BI, needs a framework for thinking about BI (i.e. what is and is not BI); needs to develop a BI plan, write BI, implement BI, wants to know what is going on with BI nationally and institutionally, get connected with others for BI, or just needs to get a little more information about a specific BI topic, like policy. To start and get a quick overview of information for/on broader impacts go to:

1. http://bir.ou.edu
2. Click on the "NSF Broader Impacts" heading at the top of the page to review the NSF review principles and criteria. Go to the bottom left of this page if you need the NSF 15-1 GPG or the NSF GRFP documents. GRFP applicants note on page 10 the addition to the Broader Impacts Criterion. If you are already familiar with the criteria or need to understand about broader impacts in general go to number 3 below.
3. Next Click on the "BI Conceptual Framework" heading at the top of the page, review this page and the BICF Power Point found at the bottom left hand corner of the page. A detailed diagram version of the BICF and BICF lexicon is also located on this page. Note: all links inside a page will open in a different tab to allow easy access back to the original page without a lot of clicks.
4. Next Click on the "Create BI Program" heading at the top of the page. Read through this page, click and read the NSF Specific BI Power Point on the left hand side of this page (specifically the section entitled "4. Process: Proposal Writing on BI and bi"). Then click and read the BI Plan Review Sheet located at the top left of this page.
5. Next Click on the "Evaluation" heading at the top of the page. Click and read the "BIR Evaluation Framework," "Writing a BI Evaluation Plan Information Sheet," and "Evaluation Types and Tools Basics". These are located in the top left hand corner of the page.
6. Contact Dr. Michael Thompson, mthompson@1120@ou.edu, for a consultation, other BI resources, or with any questions you might want to ask.
The Components that Make up Your BI Identity

1. Research and/or Teaching and/or Service

2. Societally Centric Beneficial Engaged Outcomes (SCBEO)

3. Legacy in Addition to Your Field
### Developing BI Identity & High-Quality Broader Impacts...

**Step 1**
Describe Your Research in Three Sentences or Less, *note- this can be used for teaching and service also:

*Write Here -*

**Step 2**
Answer The Questions Below:
Include Here and Below if Needed Other Agency and/or Foundation BI Requirements -

*Write Here -*

**Step 3**
Describe in Three Sentences or Less What Will be Your Legacy in Addition To Your Field and Highlight Up to What Level Will It Reach "it should increase over time":

*Write Here -*

**Step 4**
Write Your BI identity by Combining Steps 1-3 in no more than 5 sentences:

*Write Here -*

**Step 5**
Proceed to BIR Logic Model: Provides Roadmap and What Needs to be Assessed to Get You There!

---

### Categories: Pick (Bold) 1-3 Items below After Considering the Above 4 Questions:
- University Community
- Local Community
- State Community
- Regional Community
- National Community
- International Community

---

### How Does All of This Fit Within Your Units BI Identity?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Outcomes (1-6 Years)</th>
<th>Outcomes (6-10 Years)</th>
<th>Beyond</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Full participation of women, persons with disabilities, and underrepresented minorities in (STEM)</td>
<td>Inputs (1-6 Years)</td>
<td>Inputs (6-10 Years)</td>
<td>Beyond</td>
</tr>
<tr>
<td>ii. Improved STEM education and educator development at any level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Increased public scientific literacy and public engagement with science and technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. Improved well-being of individuals in society</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v. Development of a diverse, globally competitive STEM workforce</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi. Increased partnerships between academia, industry, and others</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii. Improved national security</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>viii. Increased economic competitiveness of the United States</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ix. Enhanced infrastructure for research and education</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### What Are The Internal and External Assumptions and Barriers Needed for Success? Best Practices?

- How Does All of This Fit Within Your Units BI Identity?
- University Community
- Local Community
- State Community
- Regional Community
- National Community
- International Community

---

Based of the Broader Impacts Conceptual Framework (BCF) and Societal Benefit Theory & Practice (SBT&P), 2014
Institutionalized Support:
BIR Repository for Institutional and Societal BI Identity Data.

- Programs that function like departments fit into the “Dept. BI Identity” box
- Centers, Institutes, Stations, and etc., can fit into their respective departments
Part 3: Practical Applications..
Practical Applications of BI Identity Using the National Science Foundation (NSF) as an Example:

Broader Impacts (BI) - is defined as encompassing the ability to benefit society and contribute to achievement of specific, desired societal outcomes (NSF-16-1).
Process with stakeholders/people for Achieving a specified goal that is societally beneficial in a Finite time that is measured.

Aspects of Society

University Community
Local Community
State Community
Regional Community
National Community
Global / International Community (*caveat here*)

NSF Recommended areas of BI

Used to Help Achieve NSF BI Areas
Process with stakeholders/people for **Achieving a specified goal that is societally beneficial** in a **Finite time that is measured.**

**Aspects of Society**
- University Community
- Local Community
- State Community
- Regional Community
- National Community
- Global / International Community (*caveat here*)

**NSF Recommended areas of BI**
1. Full participation of women, persons with disabilities, and underrepresented minorities in STEM (specifically African Americans, Hispanics, Native Americans, Alaska Natives, and Pacific Islanders)
2. Improved STEM education and educator development at any level
3. Increased public scientific literacy and public engagement with science and technology
4. Improved well-being of individuals in society
5. Development of a diverse, globally competitive STEM workforce
6. Increased partnerships between academia, industry, and others
7. Improved national security
8. Increased economic competitiveness of the United States
9. Enhanced infrastructure for research and education

**Used to Help Achieve NSF BI Areas 1-9**
NSF Recommended areas of BI

1. Full participation of women, persons with disabilities, and underrepresented minorities in STEM (specifically African Americans, Hispanics, Native Americans, Alaska Natives, and Pacific Islanders)

2. Improved STEM education and educator development at any level

3. Increased public scientific literacy and public engagement with science and technology

4. Improved well-being of individuals in society

5. Development of a diverse, globally competitive STEM workforce

6. Increased partnerships between academia, industry, and others

7. Improved national security

8. Increased economic competitiveness of the United States

9. Enhanced infrastructure for research and education

NSF Broader Impacts Categories:

I. Broadening Participation
II. Education and Infrastructure
III. Industry and Competitiveness
IV. Everything Else
Entrepreneurial Engagement

Cross-disciplinary collaboration with the OU Price College of Business
- Co-mentorship of entrepreneurial graduate students (commercialization of scientific innovations)
- Faculty judge for entrepreneurial pitch competitions

Industrial collaborations
- Previous: Tech-Coast Angels Bristol-Meyers Squibb collaboration Scripps Research Institute
- Ongoing: Our lab is looking to establish relationships with local Oklahoma bio-tech companies and investment agencies

Academic Development

Natural product chemical probe database generation
- In collaboration with the students of CHEM 5470, we are establishing a database of natural product chemical probes that can be utilized to understand biological pathways. Freely downloadable posters will be available from the group website and eventually a publicly accessible repository website database will be established. These efforts are aimed at providing a worldwide database that facilitates the development of natural product inspired therapeutic leads.

K-12 STEM mentoring
- Previous: Career path discussions at San Diego High School
- Ongoing: Our lab is currently looking to speak with K-12 classes about science careers.

Non-Profit Foundation Involvement

Board member of Timothy Yates Heggen Foundation
- Over $10,000 donated to research
- 150,000 L rain water collection facility built in Miembeni, Africa in collaboration with (Save the Rain)
- High-school scholarship fund for students that have faced adversity

American Cancer Society
- Previous: San Diego volunteer work (walk organization, donor Gala panelist, media appearances), 2015 Special Friend Researcher Award
- Ongoing: Our lab is looking to establish a relationship with the local ACS chapter in Oklahoma

NSF Broader Impacts (BI)

Enhanced infrastructure for research and education (9)
- Increased education, public literacy, and engagement with science and technology (3)

Increased partnerships between academia, industry, and others (6)
- Development of STEM workforce (5)

Improved well beings of individuals in society (4)

Broader Impact Identity: 1st Phase

Duerfeldt Medicinal Chemistry Labs aims to establish effective and affective research, teaching, and service that altruistically impacts society at the university, local, state, and national level. Our broader impacts program integrates three platforms of measureable and sustainable contribution:
Developing your BI identity past just an Agency criterion:

BI identity is *not* dependent upon an Agency
**Academic Development (AD)**

Objectives: 1) Enhance the infrastructure for research & education and 2) increase the local K-12 literacy about STEM career paths.

Natural product chemical probe database

- In collaboration with the students of CHEM 5470, we are establishing a database of natural product chemical probes that can be utilized to understand biological pathways. Freely downloadable posters will be available from the group website and eventually a publically accessible repository will be established. These efforts are aimed at providing a worldwide database that facilitates the development of natural product inspired therapeutic leads.

K-12 STEM mentoring

- Career path discussions at local high schools (Norman High and Norman North High)
- STEMtor Program: high school mentoring for STEM careers

**Entrepreneurial Engagement (EE)**

Objectives: 1) Increase partnerships and collaboration between academia and industry and 2) bridge the gap between the business and scientific mindsets to aid in the development of the STEM workforce.

Cross-disciplinary collaboration – OU Price College of Business

- Co-mentorship of entrepreneurial graduate students (commercialization of scientific innovations)
- Judge for entrepreneurial pitch competitions

Industrial collaborations

- Participation in local bio-tech networking events, Oklahoma Venture Forum (OVF), and with Oklahoma Bioscience Association (OKBio)
- Development of an infrastructure to facilitate academia and industrial collaboration

**Non-profit Involvement (NPI)**

Objectives: 1) Improve the well-being of individuals in society and 2) increase partnerships between academia and non-profit entities.

Timothy Yates Heggen Foundation

- Over $10,000 donated to research
- 150,000 L rain water collection facility built in Miembeni, Africa in collaboration with (Save the Rain)
- High school scholarship fund for students that have overcome adversity
- www.tyhfoundation.org

American Cancer Society

- Volunteer work (walk organization, donor Gala panelist, scientific media appearances), 2015 Special Friend Researcher Award
- Involved with local and national chapters (Oklahoma and San Diego)

---

**Programmatic Outcomes**

**DRG**

- research tool development
- education & recruitment

**EE**

- partnerships/collaborations
- research advancement

**AD**

- outreach
- research tool development
- education & recruitment

**NPI**

- support
community
engagement

internships/careers/awareness

- outreach

support

Copyright © protected Adam S. Duerfeldt, 02/15/2016

Part 4: Next steps...