Giving credit where it is due
how to make more meaningful connections between people, their roles, their work and impacts.

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Force2018
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- OpenVIVO collaborators
- Force11 Attribution WG
- NISO
- Cathy Sarli & Becker Library

Biomedical research exists on a continuum from early discovery to human trials to population health. These phases inform and influence one another, and each phase poses unique challenges and requirements. NUCATS resources and experts are available to support all of our partners across the continuum.
What IS impact?
More than papers and grants – driving toward improved health and wellbeing

IMPROVEMENTS IN HEALTH THROUGH TREATMENT AND PREVENTION

CONTRIBUTIONS TO SOCIETY THROUGH ECONOMIC GROWTH AND PRODUCTIVITY

EXPANSION OF THE BIOMEDICAL KNOWLEDGE BASE THROUGH CUTTING-EDGE RESEARCH

CULTIVATION OF THE BIOMEDICAL WORKFORCE OF TODAY AND TOMORROW

For effective translation of knowledge and discoveries into the improved health of our communities, it is essential to incorporate evaluation strategies that enable investigators and teams to measure, monitor, and communicate the impact of their work.

https://www.nih.gov/about-nih/what-we-do/impact-nih-research
Attribution

– Past work – it takes a village!
– Current work
  • What’s next?
  • Research, more broadly
  • A social justice issue

Requirement: technology + data + culture
CRediT is high-level taxonomy, including 14 roles, that can be used to represent the roles typically played by contributors to scientific scholarly output. The roles describe each contributor’s specific contribution to the scholarly output.
A journey with the FORCE11 community!


Measuring success through improved attribution panel, #VIVO15, Austin. Aug 2015

Using contributions and outputs to understand the scholarly ecosystem. In the OpenRIF Workshop, #Force2016, Portland. April 2016.

OpenVIVO implementation at #FORCE2016
And other communities, too

NISO Alternative Assessment Metrics (Altmetrics) Initiative

In June 2013, the Alfred P. Sloan Foundation awarded NISO a grant to undertake a two-phase initiative to explore, identify, and advance standards and/or best practices related to a new suite of potential metrics in the community. This initiative was a direct outgrowth of a breakout discussion group during the altmetrics 0.5 meeting in Chicago, IL. This project, which was accomplished in two phases, is seen as an important step in the development and adoption of new assessment metrics, which include usage-based metrics, social media references, and network behavioral analysis. The NISO Altmetrics Initiative also explored potential assessment criteria for non-traditional research outputs, such as data sets, visualizations, software, and other applications. The first phase, which took place from 2013-2014, exposed areas for potential standardization and the community collectively prioritized those potential projects. The second phase, which took place from 2014-2018, advanced work in several areas and developed those into recommended practices prioritized by the community and approved by the membership.

Phase 2 Projects
NISO Voting Members reviewed and approved a proposal to develop several standards or recommended practices during Phase 2 of the Altmetrics Initiative. Areas/topics to be addressed are:
- Development of specific definitions for alternative assessment metrics – This working group will come up with specific definitions for the terms commonly used in alternative assessment metrics, enabling different stakeholders to talk about the same thing. This work will also lay the groundwork for the other working groups.
- Definitions for appropriate metrics and calculation methodologies for specific output

- NISO Alternative Metrics Working Group – Output types and persistent identifiers
  - Co-chaired w/ Mike Taylor
  - Public comment (data citation, persistent identifiers, & alternative output types) followed by a recommended practice

- Other related projects
  - ACUMEN: Academic Careers Understood through Measurements and Norms
  - Research impact frameworks, assessment exercises, etc.

Super classes of output types
- Publications
- Code and Software
- Publications
- Grey Literature
- Standards
- Basic Sciences
- Data
- Images, Diagrams, and Video
- Methodologies
- Event
- Education and Training
- Instruments, devices, inventions
- Regulatory, Compliance, and Legislation
- Industry
- Communications
- Capacity
- Other

Recommended Practice
NISO RP-25-2016 Outputs of the NISO Alternative Assessment Metrics Project
September 14, 2016

Great benefits to be realized by building on this work!
OpenVIVO
Implementation of a community-driven concept of credit.

1. Provide a VIVO experience for everyone, a demonstration of VIVO, a platform for experimentation, and an ownership experience for the VIVO team
2. Use persistent identifiers for all entities – people (ORCiD), works (DOI and PMID), organizations (GRID), journals (ISSN), concepts (FAST)
3. Automatic, real-time ingest of metadata from identifiers via public APIs
4. Publication of data
5. Consumption and reuse of data
6. Attribution of works by scholars to indicate roles in works

My own profile was completed entirely with publicly available data via ORCID and DOIs and it took about 15 minutes to complete from start to finish.

http://openvivo.org/

—Mike Conlon, VIVO Project Director
OpenVIVO: Transparency in Scholarship

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2University of Florida, Gainesville, FL, United States
3Duraspace, Beaverton, OR, United States

OpenVIVO: Transforming Scientific Data Management and Analysis
Attribution

- Past work
- Current work - what’s next?
  - Research, more broadly
  - A social justice issue

Requirement: technology + data + culture
Research evolves and opens
What’s needed to facilitate this and understand the impact?
Involved diverse contributor roles and output types

OPEN SCIENCE IMPROVES:
• SPEED: The research process becomes faster
• EFFICIENCY: Data collection can be funded once, and used many times for a variety of purposes
• ACCESSIBILITY: Anyone can access and build upon research resources with minimal barriers to access
• IMPACT & LONGEVITY: Open publications and data are more discoverable and receive more citations long-term
• TRANSPARENCY & QUALITY: The evidence that underpins research can be made open for anyone to scrutinize and replicate findings, leading to a more robust scholarly record

http://www.slideshare.net/martindonnelly/winning-horizon-2020-with-open-science
National Center for Data to Health (CD2H)
https://ctsa.ncats.nih.gov/cd2h/
Informatics in healthcare and clinical research are rapidly evolving to keep pace with technology advancements and new policies.

**Old Way**
- Siloed data
- Unimodal data
- Static or slowly evolving methods
- Bespoke tools

**New Way**
- Data sharing
- Integrated, multimodal data
- Social coding & collaborative development
- Distributed & cloud computing
Better attribution: extending credit beyond the publication to give credit where credit is due (researchers, communities, citizens, infrastructure, etc.)

What work is being done, who is doing it, and what outputs are being created?
1. Understand deeply the requirements for a computable attribution system from a large diversity of stakeholders;
2. Build model(s) to meet these requirements (CRO, ROO);
3. Evaluate the models in real pilot systems with real data.

By using contribution roles & research outputs to develop infrastructure to understand the scholarly ecosystem, we can better understand, leverage, and credit a diverse translational community.
Why now & how do we get there?

http://www.nmbreakthroughs.org/medical-advances/the-scientists-behind-better-care
Academic writes 270 Wikipedia pages in a year to get female scientists noticed

Researcher Jess Wade says efforts to attract girls into science are not evidence-based – and are not working

Jess Wade is a scientist on a mission. She wants every woman who has achieved something impressive in science to get the prominence and recognition they deserve – starting with a Wikipedia entry.
Celebrate the mathematics of Emmy Noether

An algebra pioneer who faced discrimination deserves wider recognition on the centenary of her namesake theorem.

Noether devoted her career to algebra and came to see it in a striking new light. “All of us like to rely on figures and formulas,” wrote Bartel van der Waerden, her former student, in his obituary of Noether. “She was concerned with concepts only, not with visualization or calculation.”

Noether saw maths as what are now called structures. To her, the characteristics of a structure’s components — be they numbers, polynomials or something else — mattered less than the networks of relations among an entire set of objects. This enabled her to give proofs that applied to more general structures than the original ones, and which revealed unseen connections.

It was a new and elegant approach that changed the face of algebra. And Noether realized that it could influence other parts of maths. One was topology, a field in which “she published half a sentence and has an everlasting effect”, one mathematician wrote. Before Noether, topologists had been counting holes in doughnuts; she brought to bear the full power of her structures to create something called algebraic topology.

https://www.nature.com/articles/d41586-018-06658-w
Requires

- tri-institutional partnership and a focus on cancer health equity.
- collaborations with the community on cancer health equity issues.
It takes technology & culture.
A next-gen integrated repository infrastructure

**GUIDING PRINCIPLES**
- Distribution of control
- Inclusiveness and diversity
- Public good
- Intelligent openness and accessibility
- Sustainability
- Interoperability

**VISION**
A foundation for a distributed, globally networked infrastructure on top of which layers of value added services can be deployed, making it more research-centric, open to and supportive of innovation, while also collectively managed by the scholarly community.

Make the **resource, rather than the repository, the focus of services and infrastructure**

http://ngr.coar-repositories.org/
Team Scientists

The Team Scientist track is for non-clinical faculty who make substantial contributions to the research and/or educational missions of the medical school. Faculty members whose primary activity is in research will typically engage in team science. Their skills, expertise and/or effort play a vital role in obtaining, sustaining and implementing programmatic research.

Faculty on this track often have expertise in epidemiology, clinical trials, biostatistics, biomedical informatics, outcomes research or other qualitative and quantitative research methodologies and generally contribute to clinical studies, patient-oriented clinical outcomes research, community-engaged research, population-based studies and/or basic science research. Typically, such faculty provide critical expertise to a program or group of research teams as a co-investigator with contributions that do not necessarily require or result in independent grant funding, but some faculty on this track may serve as principal investigator on related research. Faculty on this track do not perform clinical work but do contribute to the education and service missions of the medical school.

While most members of this track make research the major focus of their activity, for some members of this track education may be the major focus of their activity. Faculty focusing on education are typically recognized as outstanding educators and contribute to course development, degree program leadership and other innovative educational products.

For more information, view the Information Guide for Appointments, Promotion and Tenure (PDF).

Team Scientist Ranks
Institutional perspectives & new models
Northwestern’s Team Scientist Faculty Track

- 2015: a new “Team Scientist” track was established within our regular faculty lines to better value such scientists’ contributions.
- Collaborative effort between NUCATS (Lloyd-Jones), Vice Dean for Faculty Affairs at Feinberg (Lowe), and relevant stakeholders.
- Enthusiasm on campus by collaborative scientists, successful promotion pathway
- Collaborative scientists who span content disciplines at NU now have several distinct pathways for promotion with clear metrics through our tenure-eligible, non-tenure-eligible, and research faculty lines.

### Team Scientist Faculty Track Survey Results

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<th>SATISFIED</th>
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<tbody>
<tr>
<td>Overall satisfaction with current position</td>
<td>74%</td>
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<tr>
<td>Opportunity to collaborate with other faculty</td>
<td>90%</td>
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<tr>
<td>Sense of contributing to important research</td>
<td>83%</td>
</tr>
<tr>
<td>Contributions are acknowledged via co-authorships</td>
<td>80%</td>
</tr>
<tr>
<td>Promotion process is clear and transparent</td>
<td>68%</td>
</tr>
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Fall, 2017 survey response rate: 81%
Promotes discovery, knowledge transfer, inclusion, and local organizational intelligence and strategy
acknowledgements

• Teams
  – Galter Library, NUCATS, ChicagoCHEC, FIRST DailyLife, Health for All, CD2H

• NIH Support
  – UL1TR001422 (NCATS)
  – U54CA202995, U54CA202997, and U54CA203000 (NCI)
  – P30AR072579 (NIAMS)
  – G08LM012688 (NLM)
  – U24TR002306 (NCATS)
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition (CRediT)</th>
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<tbody>
<tr>
<td>Conceptualization</td>
<td>Ideas; formulation or evolution of overarching research goals and aims.</td>
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<tr>
<td>Methodology</td>
<td>Development or design of methodology; creation of models.</td>
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<tr>
<td>Software</td>
<td>Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components.</td>
</tr>
<tr>
<td>Validation</td>
<td>Verification, whether as a part of the activity or separate, of the overall replication/reproducibility of results/experiments and other research outputs.</td>
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<tr>
<td>Formal Analysis</td>
<td>Application of statistical, mathematical, computational, or other formal techniques to analyse or synthesize study data.</td>
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<tr>
<td>Investigation</td>
<td>Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection.</td>
</tr>
<tr>
<td>Resources</td>
<td>Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools.</td>
</tr>
<tr>
<td>Data Curation</td>
<td>Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later re-use.</td>
</tr>
<tr>
<td>Writing – Original Draft</td>
<td>Preparation, creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation).</td>
</tr>
<tr>
<td>Writing – Review &amp; Editing</td>
<td>Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre- or post-publication stages.</td>
</tr>
<tr>
<td>Visualization</td>
<td>Preparation, creation and/or presentation of the published work, specifically visualization/data presentation.</td>
</tr>
<tr>
<td>Supervision</td>
<td>Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team.</td>
</tr>
<tr>
<td>Project Administration</td>
<td>Management and coordination responsibility for the research activity planning and execution.</td>
</tr>
<tr>
<td>Funding Acquisition</td>
<td>Acquisition of the financial support for the project leading to this publication.</td>
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Links to selected resources and projects

- National Center for Advancing Translational Sciences: https://ncats.nih.gov/
- Clinical and Translational Science Award (CTSA) Program: https://ctsacentral.org/
- Northwestern University Clinical and Translational Sciences Institute: https://nucats.northwestern.edu/
- CD2H: https://ctsa.ncats.nih.gov/cd2h/ and https://github.com/data2health
- FORCE11 Attribution Working Group: https://www.force11.org/group/attributionwg
- COAR: https://www.coar-repositories.org/
- NGR: http://ngr.coar-repositories.org/