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Manifold Impact Analytics

Full Documentation

This file provides full documentation for the Manifold impact analytics platform created by Steven Braun, the code for which is openly accessible at https://github.com/braunsg/manifold-impact-analytics. The author may be contacted with questions at **braunsg@gmail.com**.

LICENSING

All code in the above repository (*manifold-impact-analytics*) is protected under a GNU General Public License (v2). See LICENSE.md for more details. In subsequent modifications and distributions, full attribution must be given to the original author (Steven Braun).

A full version of the license can also be found at https://www.gnu.org/licenses/old-licenses/gpl-2.0.en.html.

OVERVIEW

Manifold is a database, system, and interface that was built to produce web-accessible profiles of scholarly impact and output for faculty in the University of Minnesota Medical School. Profiles can be generated for individual faculty, departments, and custom-defined subsets of faculty and include the following:

- A list of top-cited publications over the profiled entity's career (*i.e.,* those publications with the highest citation counts as of the last data update)
- A collection of metrics on scholarship and research impact, including
  - *h*-index, a widely adopted measure of research impact and output as described in

    Hirsch, JE. (2005). An index to quantify an individual's scientific research output. *PNAS* 102(46): 16569–16572. [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1283832/]

  - *h*(*fl*)-index, a measure of research impact and output that is calculated in the same fashion as that of the *h*-index but only considering the subset of a researcher's publications on which they are listed as first or last author
  - Total publication counts over the course of the entity's career
  - Total number of publications on which the entity is listed as first or last author
  - Total sum of citations to all publications authored by the entity
  - Total sum of citations to publications on which the entity is listed as first or last author

For individual faculty profiles, these metrics are specific to the faculty member; for departmental or custom subset profiles, these metrics are median values for the population of faculty represented. Any of these metrics can be customized to specific institutional needs.

- A list of publications authored by the entity, sorted by year of publication, that can be exported to an Excel file and transformed into citations in the required Medical School CV format
- A series of visualizations that provide contextualized graphical representations of the impact metrics described above

In addition to producing profiles of scholarly impact and output, Manifold also serves the purpose of identifying nominations for the Wall of Scholarship (http://www.med.umn.edu/research/wall-scholarship), which recognizes Medical School faculty who have published papers that have received at least 1000 citations in two out of three citation indexes (Scopus, Web of Science, and Google Scholar) **and** on which they are listed as first or last author.

Since its creation, interest in using Manifold at other institutions has increased. In pursuit of making this possible, the entire code of Manifold is presented in this repository and is open for others to use, customize, and improve.

ORIGINS/IMPETUS

Manifold grew out of emerging needs around research impact analytics in the University of Minnesota Medical School. In March 2014, the newly appointed Medical School Dean came to the University Libraries requesting a list of publications (including citation counts), *h*-index, and *j*-index (later renamed to the *h*(*fl*)-index) for all Medical School faculty. This request was tied to the Scholarship Metrics Initiative, a program to identify Medical School faculty producing highly cited research, require all Medical School faculty to publish at least one peer-reviewed publication per calendar year, and systematically assess the research impact and output of faculty through quantitative analytics. Accordingly, in anticipation of ongoing and future data requests, Manifold was built to streamline an architecture that would facilitate data update and output as requested in the Medical School.

As of July 8, 2015, the University of Minnesota instance of Manifold holds data for 2,253 faculty and over 68,000 publications.

SOURCE CODE

The full source code for Manifold is available on GitHub at https://github.com/braunsg/manifold-impact-analytics.

TECHNICAL SPECIFICATIONS

Specifications current as of	July 8, 2015
Current Manifold version	3.2.1
Language	PHP 5.3.3
Operating Server API	Apache 2.2.15
Database API	MySQL (mysqli) 5.1.73

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SYSTEM STRUCTURE

The Manifold system is built on a standard LAMP (Linux, Apache, MySQL, PHP) architecture and consists of three principal components:

1. a MySQL database that holds all of the publication and metrics data used to generate profiles;
2. a collection of PHP scripts that perform the processes and analytics necessary to pull new publication data, update stored publication data, and generate updated metrics; and
3. an outwardly visible, web-accessible interface that displays publication and metrics data in ways that can be exported and downloaded for further analysis, which includes
    a) profiles for individual faculty, departments, and custom subsets of faculty, and
    b) custom reports for internal assessment purposes, such as reports for departmental publication totals across time and lists of publications that may be eligible for the Wall of Scholarship.

Manifold functionality is distributed across a model-view-controller (MVC) design to enhance modularity and extensibility in anticipation of future data and architectural needs. Screenshots of the system in action can be found at the end of this document.

SYSTEM MODULES

Much of the functionality of Manifold is accomplished via a collection of modules that are integrated into the web interface. These include, in brief, the following:

Searching for profiles

On the Manifold landing page, users may search for profiles by autocompleted faculty/department name (*Quick Search* tab), select a departmental or faculty profile from a dropdown list (*Dropdown Search* tab), or create a custom-defined profile by selecting faculty from different departments and grouping them together, with options to filter by tenure status (*Custom Search* tab).

Reports

Some custom reports have been created for internal analytics purposes, accessible via the *Reports* tab on the Manifold landing page. Custom instances of Manifold can define their own reports in a similar fashion.

Overview

This section provides research impact analytics for the profiled faculty/department (*h*-index, *h*(*fl*)-index, total publication count, first/last author publication count, total citation count, and first/last author citation count) as well as boxplot distributions of those metrics for the department with which they are affiliated.

Top-cited journal publications

This section includes the top 10 most-cited publications authored by the profiled faculty (or department/custom subset), ranked in descending order according to Scopus citation count.

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Peer-reviewed journal publications

This section lists publications authored by the profiled faculty/department that are indexed in Scopus or have been imported manually from PubMed, sorted by a user-specified range of year of publication. Records can be exported to an Excel spreadsheet.

Import records from PubMed

Faculty have the option to import publication records directly from PubMed when those records are not (yet) indexed by Scopus. Records can be retrieved from PubMed through a search by title or PubMed ID. If a publication is imported from PubMed and is subsequently indexed by Scopus, the next full publication data update will automatically override those PubMed records with the corresponding Scopus data when a match is found.

Generate citations in required Medical School CV format

Individual faculty may generate their publication citations in the required University of Minnesota Medical School CV format, which may subsequently be copied and pasted into other documents.

Faculty summary

Profiles for departments and custom subsets of faculty include a table listing all faculty in the defined cluster along with their impact analytics. These data may be exported to an Excel spreadsheet.

Research impact visualizations

All profiles include a series of visualizations (interactive charts) that provide a visual representation of the provided research impact metrics. **For individual faculty profiles**, these include publications ranked by citation count, relative impact of publications over time, cumulative *h*-index and *h*(*fl*)-index over time, departmental/subset distribution of impact indexes, and correlation between *h*-indices and *h*-citations. **For departmental and custom profiles**, these include departmental/subset distribution of indexes and correlation between *h*-indices and *h*-citations only.

WORKFLOW OVERVIEW

Manifold integrates a variety of external systems and resources, including University HR, Medical School payroll, and the Scopus API, into a streamlined workflow, schematically described on the following page.

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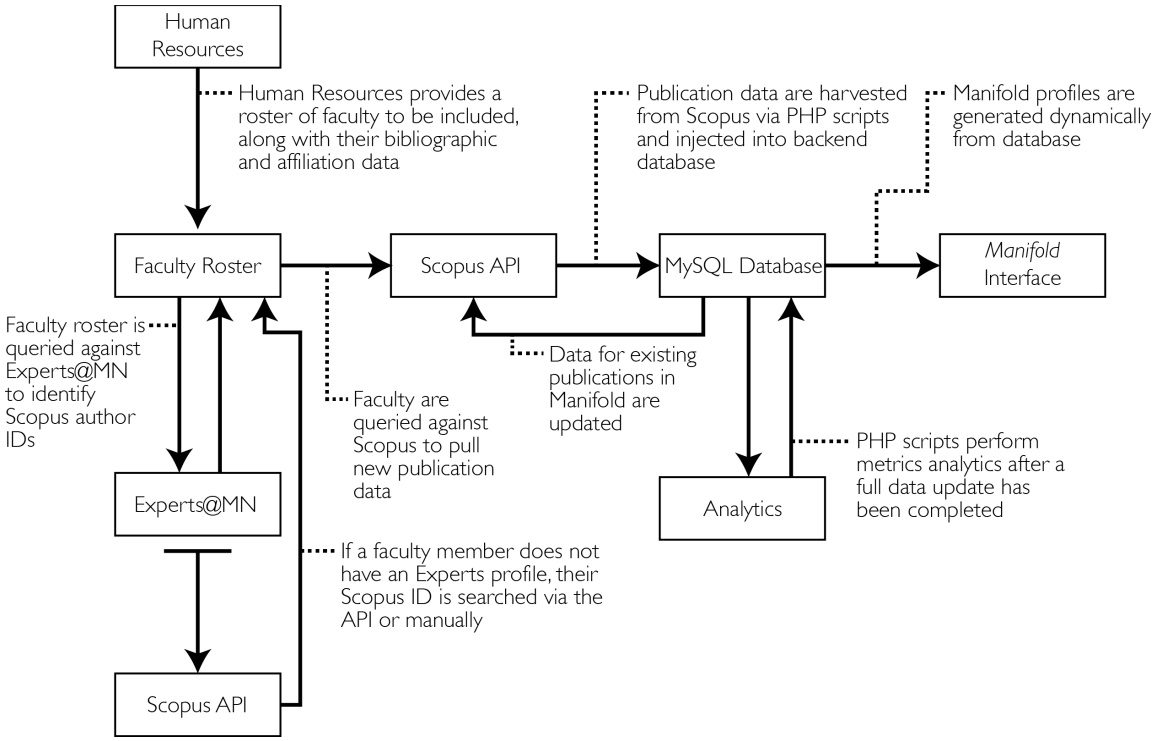

WORKFLOW: PROCESSES IN DETAIL

Frequency of updates

At any given time, profiles in Manifold only provide a *recent snapshot* of faculty publication data and analytics. At the University of Minnesota, these are updated on a regular calendar schedule. This schedule may be chosen to meet specific institutional needs.

Processes included

At the time of each data update, a series of processes (mediated by PHP scripts) add new faculty to Manifold, pull new publication data for faculty, update existing publication data, and update metrics/analytics. These processes are partially **order-dependent**, occurring in the following sequence:

Step	Process description	File name	Notes
1	Pull new publication data for all active faculty in Manifold, including new publications with a publication date before or on the final day of the previous calendar quarter	get-scopus-records.php	Before this process, all Scopus *faculty_publications*.record_valid fields are initialized to 0. For each query to the Scopus API, the script matches returned publication results to existing *faculty_publications* records and sets record_valid = 1 for all valid matches. This process is important when misattributions are removed in Scopus and need to be reflected in Manifold.

3	Update all publication data for all valid publication records already stored in Manifold database	update-pub-records.php
4	Update total and first/last author publication counts for all active faculty in Manifold	update-pubcounts.php
5	Update total and first/last author publication citation count sums for all active faculty in Manifold	update-citationcounts.php
6	Update *h*- and *h*(*fl*)-indexes for all active faculty in Manifold	update-indexes.php
7	Update data for the *h*-matrix visualization and custom reports	update-hmatrix.php update-quarterly-report.php, etc.

These processes may be run via terminal either individually or in sequence through a master controller file. In the future, these processes could be executed on the front end via a graphical interface/administrator dashboard.

Logs and errors
For each individual data process executed, Manifold generates a running log of all operations being performed through the given process. These logs are stored in a subfolder named **logs/** and are denoted by a shorthand semantic description of the process, log type (*i.e.*, **total_log**), and date/time.

Errors encountered through the course of execution of individual processes are stored in separate logs, denoted by the semantic handler **errorLog**. These logs include errors generated from MySQL, PHP, and server errors from interaction with the Scopus API.

DATABASE STRUCTURE

All Manifold data are stored in a MySQL database. The queries needed to generate this database and tables are included in the directory **inc/database-definitions**. The following provides an overview of the database table structure:

Table name	Table description
affiliation_data	Information about departments represented in Manifold
contact_messages	Data of messages sent through the Manifold contact form
data_sources	Index of data sources represented in Manifold (*i.e.,* Scopus, PubMed)
hr_field_mappings	Maps central HR system query field names to corresponding field names in the Manifold database
events_master	Data on all processes executed (*e.g.,* publication data update, calculation of metrics)
faculty_affiliations	Departmental affiliations of faculty represented in Manifold, two per faculty: one is the primary departmental affiliation according to HR,

	and the other is their functional affiliation in which they are considered faculty (which may differ from HR)
faculty_data	Bibliographic data on all faculty represented in Manifold
faculty_identifiers	Various identifiers for faculty (*e.g.,* Scopus ID)
faculty_metrics	Research metrics for all faculty, one record/row per unique faculty
faculty_publications	Collation of faculty and their authorships (linkage between faculty_data and publication_data)
publication_data	All publication data, one record per unique publication
reports	Locations/parameters for loading custom reports displayed in Manifold profiles
temp_submissions	Temporary data stored from publications imported from PubMed, before authorized confirmation is made by faculty member or proxy
visualizations	Locations/parameters for loading metrics visualizations displayed in Manifold profiles

TABLE DEFINITIONS

The following section provides more detailed notes about fields defined for each table listed above.

affiliation_data

Field name	Field description
affilID	(varchar) A unique (Manifold proprietary) identifier for the affiliation record
affilMaster	(varchar) Master affilID to which the affiliation/organization belongs (e.g., department in a college)
affilType	(varchar) Semantic descriptor of affiliation type: college, department
affilName	(varchar) Long (display) name of the affiliation
umn_affilCode	(varchar) University of Minnesota affiliation code – to be adapted to other institutional needs
umn_zdeptid	(varchar) University of Minnesota zdeptID – to be adapted to other institutional needs
umn_deptid	(varchar) University of Minnesota deptID – to be adapted to other institutional needs
display	(tinyint) A flag specifying whether or not the organization should be outwardly displayed on Manifold (0 = no, 1 = yes)

contact_messages

Field name	Field description

contact_record_no	(int) A numeric ID for the message record
contact_name	(varchar) The name of the person who sent the message through the contact form
contact_email	(varchar) The email address of the person who sent the message through the contact form
contact_message	(varchar) The content of the message

data_sources

Field name	Field description
sourceID	(int) A numeric ID for the source record
sourceName	(varchar) A short semantic descriptor of the source (e.g., "pubmed", "scopus")
sourceDescription	(varchar) A long description of the source

hr_field_mappings

Field name	Field description
hr_field_name	(varchar) The name literal of the field returned by a query to the central HR system
manifold_field_name	(varchar) The corresponding field name in Manifold that maps to the HR system field
manifold_field_table	(varchar) The name of the table of the corresponding Manifold field

events_master

Field name	Field description
eventID	(int) A numeric ID for the process/event record
eventType	(varchar) The type of process recorded (e.g., "publication_data_full_update", "all_records_full_update")
eventDescription	(varchar) A long description of the process
eventStart	(timestamp) Time stamp of when process began
eventFinish	(timestamp) Time stamp of when process ended
date_threshold	(date) Date through which the updated data are current, where applicable (i.e., for publication record updates)
processLogFile	(varchar) Full file name of process log
errorLogFile	(varchar) Full file name of the error log for the process

faculty_affiliations

Field name	Field description
recordNumber	(int) A numeric ID for the faculty affiliation record
internetID	(varchar) The internet ID (or other institutional identifier) of the faculty member
affilClass	(varchar) A flag for the type of affiliation given in the record; PRIMARY = affiliation determined by HR data, DISPLAY = faculty's functional affiliation and where they should be displayed on Manifold Each faculty member has one PRIMARY and one DISPLAY affiliation; these may not always be identical
affilID	(varchar) The ID of the affiliation match

faculty_data

Field name	Field description
internetID	(varchar) The internet ID (or other institutional identifier) of the faculty member
firstName	(varchar) The first name of the faculty member
lastName	(varchar) The last name (surname) of the faculty member
title	(varchar) The faculty member's title (e.g., "Professor", "Asst. Professor")
jobCode	(varchar) The faculty member's job code
sex	(varchar) A flag indicating the faculty member's sex as recorded in HR ("M" = male, "F" = female)
tenure_status	(varchar) A semantic descriptor of the faculty member's tenure status
class_description	(varchar) A semantic descriptor of the faculty member's job classification
percentTime	(decimal) The FTE percentage of the faculty member
status_faculty	(tinyint) A flag indicating whether the faculty member is a *full faculty member* (specific to University of Minnesota)
status_affiliate	(tinyint) A flag indicating whether the faculty member is an *affiliate faculty member* (specific to University of Minnesota)
lastUpdated	(datetime) The date and time that the faculty record was last updated
status_current	(tinyint) A flag indicating whether the faculty is of active status

faculty_identifiers

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Field name	Field description
recordNumber	(int) A numeric ID for the faculty identifier record
internetID	(varchar) The internet ID (or other institutional identifier) of the faculty member
idType	(varchar) The type of identifier (e.g., "scopus_id")
idValue	(varchar) The identifier
	Note: All active faculty have at least one record in this table; if no Scopus ID is stored, idValue is automatically assigned NULL

faculty_metrics

Field name	Field description
internetID	(varchar) The internet ID (or other institutional identifier) of the faculty member
hIndex	(int) The faculty member's *h*-index
hflIndex	(int) The faculty member's *h*(*fl*)-index
pubCount	(int) The total number of publications authored by the faculty member and stored in Manifold
flPubCount	(int) The total number of publications stored in Manifold on which the faculty member is listed as first or last author
totalCitations	(int) The total sum of citations to publications authored by the faculty member and stored in Manifold
totalflCitations	(int) The total sum of citations to publications stored in Manifold on which the faculty member is listed as first or last author
lastUpdated	(datetime) The date and time the faculty metrics record was last updated

faculty_publications

Field name	Field description
recordNumber	(int) A numeric ID for the faculty publication record
fpid	(varchar) A unique ID for the faculty publication record, of the form fpid_[index] (e.g., fpid_1)
internetID	(varchar) The internet ID (or other institutional identifier) of the faculty member
scopusID	(varchar) The Scopus ID of the faculty member linked to the publication record

mpid	(varchar) The Manifold publication ID of the publication, taken from publication_data.mpid
scopus_eid	(varchar) The Scopus eID (electronic ID) of the publication
authorPosition	(varchar) The faculty member's position in the author list
authorCount	(varchar) The total number of authors listed on the publication
record_valid	(tinyint) A flag indicating whether the faculty – publication link is valid When a full publication data update is executed, all record_valid flags are initialized to 0, and results returned by the Scopus API are matched against records in faculty_publications; all positive matches set record_valid = 1 PubMed imported records default to record_valid = 1

publication_data

Field name	Field description
recordNumber	(int) A numeric ID for the publication record
mpid	(varchar) A unique proprietary Manifold ID for the publication, of the form mpid_[index] (e.g., mpid_1)
scopus_eid	(varchar) The Scopus eID (electronic record ID) of the publication
scopus_pubid	(varchar) The Scopus proprietary ID of the publication
pmid	(varchar) The PubMed ID of the publication, where applicable
doi	(varchar) The DOI of the publication, where applicable
pubTitle	(varchar) The full title of the publication
pubName	(varchar) The full name of the publication venue (journal name)
pubDate	(date) The date of the publication record in Scopus Note: The pubDate field represents the internal Scopus record date for the publication, which is related to the date of ingest into Scopus and is used for publication record sorting purpose. pubDate is NOT a reliable indicator of when the publication was *actually* published in the journal.
displayDate	(varchar) The date of publication as displayed on the journal (e.g., July 1 2014, October 2010, Spring 2009)
authors	(mediumtext) The list of authors on the publication, delimited by pipes (|)
pageRange	(varchar) The pagination of the publication, where applicable
volume	(varchar) The volume number of the publication venue, where applicable

issue	(varchar) The issue number of the publication venue, where applicable
citedByCount	(int) The number of citations to the publication, based on Scopus citation counts
docType	(varchar) The Scopus short code of the type of publication (e.g., "ar" = article, "ip" = article-in-press)
docTypeDescription	(varchar) A longer semantic description of the type of publication
source	(varchar) The source of the publication record ("scopus", "pubmed")
lastUpdate	(datetime) The date and time that the publication record was last updated
update_error	(tinyint) Flags whether there was an error in the process of updating this record (0 = No error, 1 = Error)

reports

Field name	Field description
reportID	(varchar) A zero-padded unique (Manifold proprietary) ID for the custom report, of the form R[index(4)]
reportName	(varchar) The shorthand reference name of the custom report
reportDescription	(varchar) A longer description of the custom report, used for display on the Manifold web interface
reportURL	(varchar) The directory URL of the custom report
report_dataURL	(varchar) The URL of the data source for the custom report, where applicable

temp_submissions

Field name	Field description
recordNumber	(int) A numeric ID for the temporary submission record
mpid	(varchar) The Manifold publication ID of the publication
internetID	(varchar) The internet ID (or other institutional identifier) of the faculty member
pmid	(varchar) The PubMed ID of the publication, where applicable
doi	(varchar) The DOI of the publication, where applicable
pubTitle	(varchar) The full title of the publication
pubName	(varchar) The full name of the publication venue (journal name)
pubDate	(date) The date of the publication record in PubMed
displayDate	(varchar) The date of publication as displayed on the journal (e.g., July

	1 2014, October 2010, Spring 2009)
authors	(mediumtext) The list of authors on the publication, delimited by pipes (|)
authorPosition	(varchar) The faculty member's position in the author list of the publication
authorCount	(varchar) The total number of authors listed on the publication
pageRange	(varchar) The pagination of the publication, where applicable
volume	(varchar) The volume number of the publication venue, where applicable
issue	(varchar) The issue number of the publication venue, where applicable
source	(varchar) A flag indicating the source of the imported publication (e.g., "pubmed")
status	(varchar) A flag indicating whether or not the publication import has been verified by the faculty member
verification_code	(varchar) The verification code for the publication sent to the faculty member
date_verified	(datetime) The date and time that the publication import was verified by the faculty member

visualizations

Field name	Field description
visID	(varchar) A zero-padded unique (Manifold proprietary) ID for the visualization, of the form V[index(4)] (e.g., V0001)
visName	(varchar) The shorthand reference name of the visualization
visDescription	(varchar) A longer description of the visualization, used for display on the Manifold web interface
visURL	(varchar) The directory URL of the visualization code
vis_dataURL	(varchar) The URL of the data source for the visualization, where applicable
display_faculty	(tinyint) A flag indicating whether or not the visualization should be displayed on faculty profiles (0 = no, 1 = yes)
display_dept	(tinyint) A flag indicating whether or not the visualization should be displayed on department profiles (0 = no, 1 = yes)
display_custom	(tinyint) A flag indicating whether or not the visualization should be displayed on custom-defined profiles (0 = no, 1 = yes)

TRIGGER DEFINITIONS

The Manifold database currently has two triggers built in, as described below.

faculty_metrics_update
Updates *faculty_metrics*.lastUpdated to CURRENT_TIMESTAMP upon any change of value in a *faculty_metrics* record

faculty_update
Updates *faculty_data*.lastUpdated to CURRENT_TIMESTAMP upon any change of value in a *faculty_data* record

DATA SOURCES

Manifold pulls publication data from Scopus through automated processes via the Scopus API. Additional publication data are pulled into Manifold from PubMed via an import module built into the interface; these data are imported upon initiation by individual faculty on their profile.

Scopus API credentials

The scripts that pull data from Scopus interact with the API via a registered API key. Registration for API keys, as well as more information about the APIs themselves, can be found at http://dev.elsevier.com/. Note that the credentials attached to any API keys registered are dependent upon institutional licensing.

FACULTY ROSTER AND IDENTIFIERS

The functionality of Manifold is dependent upon a well-defined faculty population in the table *faculty_data*. The University of Minnesota Libraries have established processes of their own for populating this table and updating it when needed. Other institutions will need to establish their own processes based on differences in HR systems.

Scopus IDs

Manifold pulls publication data for faculty through the Scopus API using Scopus author IDs. At the University of Minnesota, these author IDs are aggregated partially through a local instance of Elsevier's Experts research networking platform. Scopus author IDs may be harvested other ways via automated scripts that interact with the Scopus API.

Changing display department

Manifold has a built-in feature that allows faculty to change their displayed department affiliation manually. This can be accomplished on an individual faculty profile by clicking **[Change Department]** under the name header, selecting the appropriate department from the dropdown list, and pressing the **Confirm** button. The profile will automatically reload and show the departmental change immediately, which will also be reflected in the boxplot distributions presented in the Overview module.

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TROUBLESHOOTING

Common error types with the API

When running processes that query the Scopus API, it is not uncommon to encounter errors related to failures in the query request or the API itself. The table below describes these errors and some of their causes.

Error Code	Error Description	Solution
HTTP 400	The submitted query is an invalid request to the API due to a formatting error	Check to make sure the query is properly URL-encoded; this issue may be especially common when querying the Scopus API using DOIs
HTTP 401	There was an error in the authentication of the provided API credentials	Check the API credentials; this error may also arise with an improperly URL-encoded query
HTTP 404	The API URL did not resolve correctly	Check the API URL; this error also may arise as a result of a server problem, and simply attempting the query again may resolve correctly
HTTP 500	There was a general internal server error within Scopus	Attempt the record query at a later time

Common faculty profile troubleshooting scenarios

Troubleshooting for individual faculty profiles in Manifold tends to fall in common classes with similar workflows for resolving them. The table below describes the most common profile troubleshooting issues and their typical solution.

Problem Description	Typical Solution
A misattribution is shown in Manifold (wrong publication linked to a faculty profile)	Investigate whether Scopus is the source of the problem; if so, direct the faculty member to resources explaining how to correct misattributions in Scopus
Publications are missing from a Manifold profile	Determine what publications are missing. If they are indexed in Scopus, determine why they are not linked to the faculty member in Manifold. In most cases, this issue is solved by directing a faculty member to merge their multiple Scopus author profiles into one, which resolves their distributed Scopus author IDs to a single author ID
A Manifold profile is linked to the wrong person	Determine which Scopus ID(s) is/are incorrect and why. Locate the faculty member's correct Scopus ID(s) and manually change in *faculty_identifiers*. To purge Manifold of an incorrect Scopus author ID,

the following process must occur:

1. Remove the wrong Scopus author ID from *faculty_identifiers*
2. Remove all records in *faculty_publications* linked to that Scopus author ID (*faculty_publications*.scopusID)
3. If possible, pull correct publication data for the faculty member linked to the correct Scopus author ID
4. Recalculate all faculty metrics

SCREENSHOTS

The following are screenshots highlighting the general functionality of Manifold.

Manifold landing page

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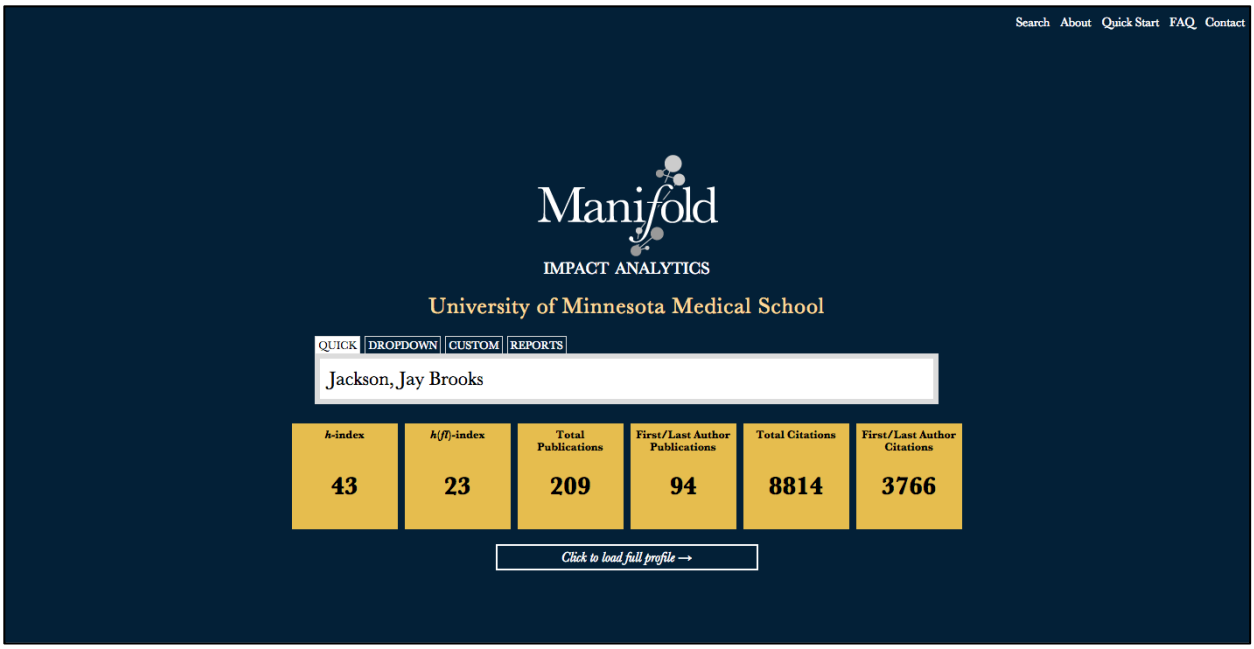
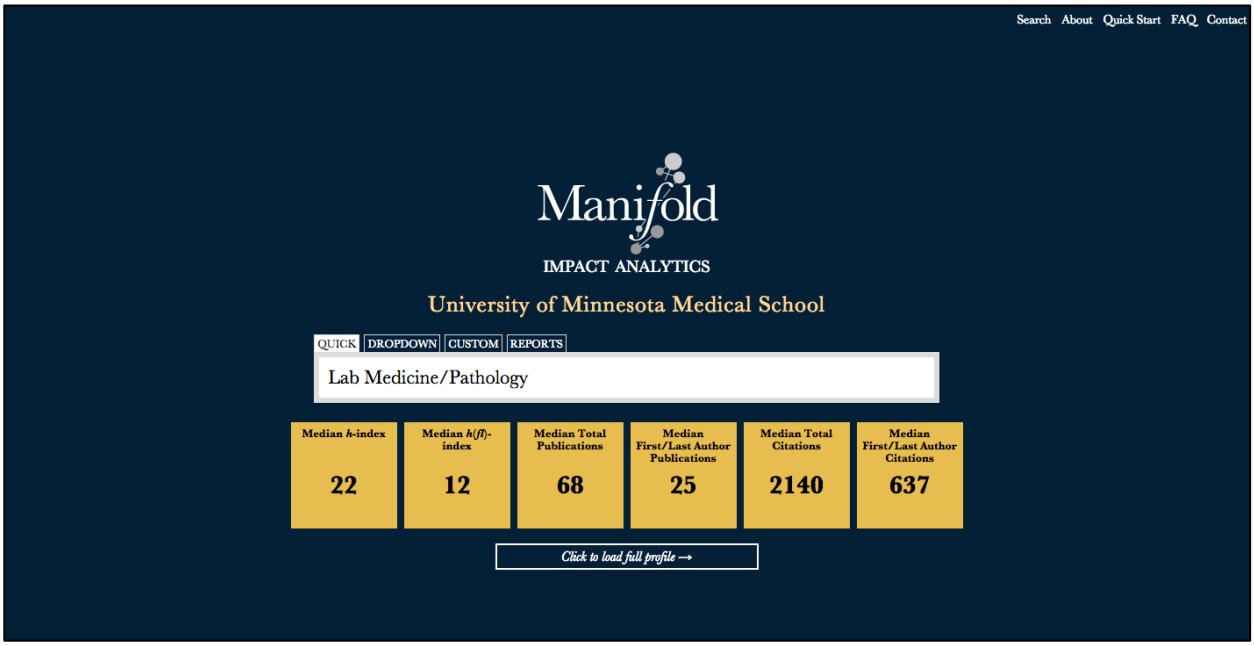
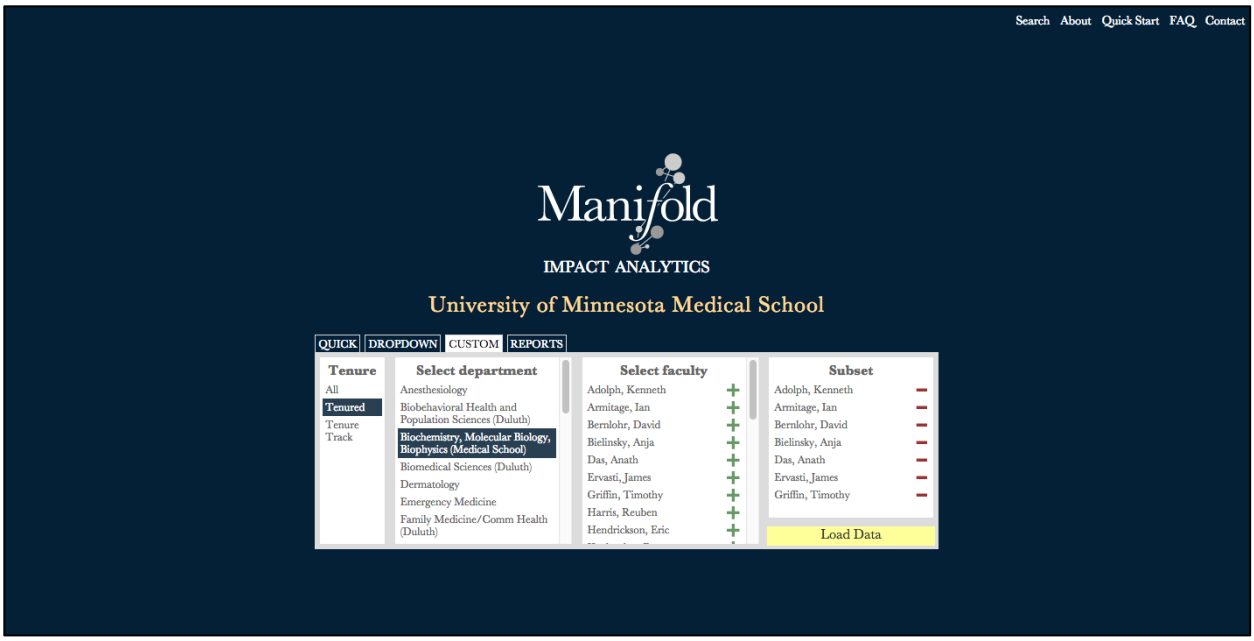


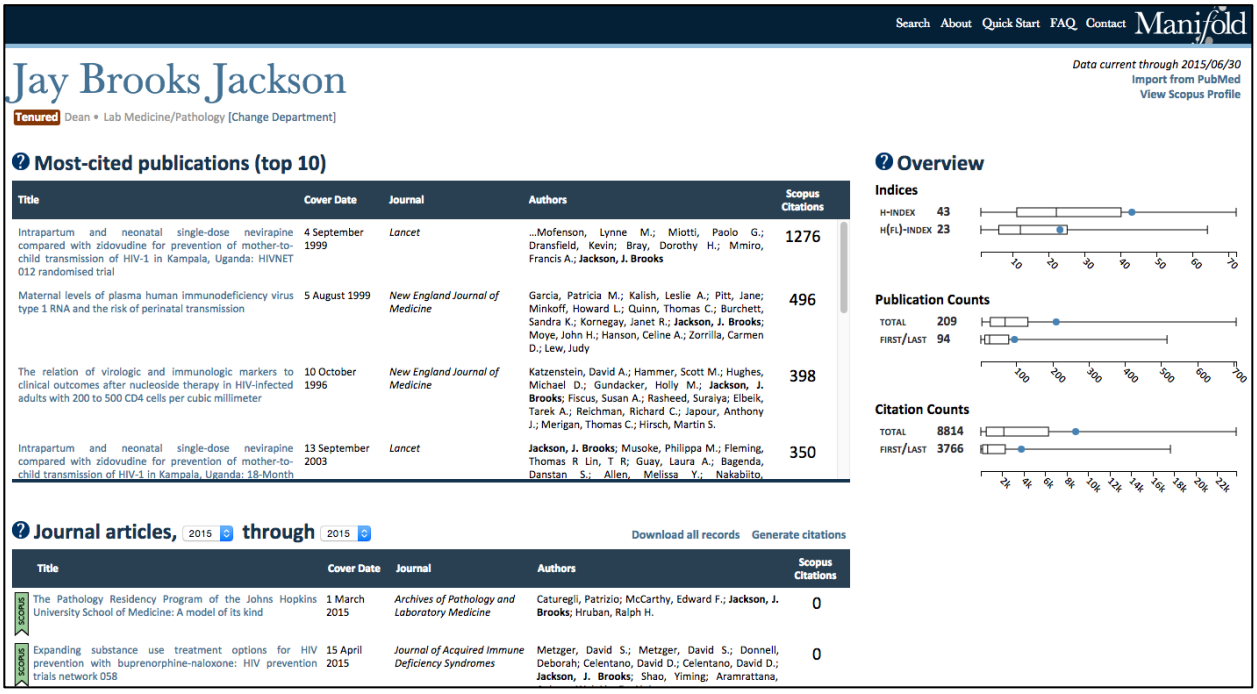
Searching for profiles by name



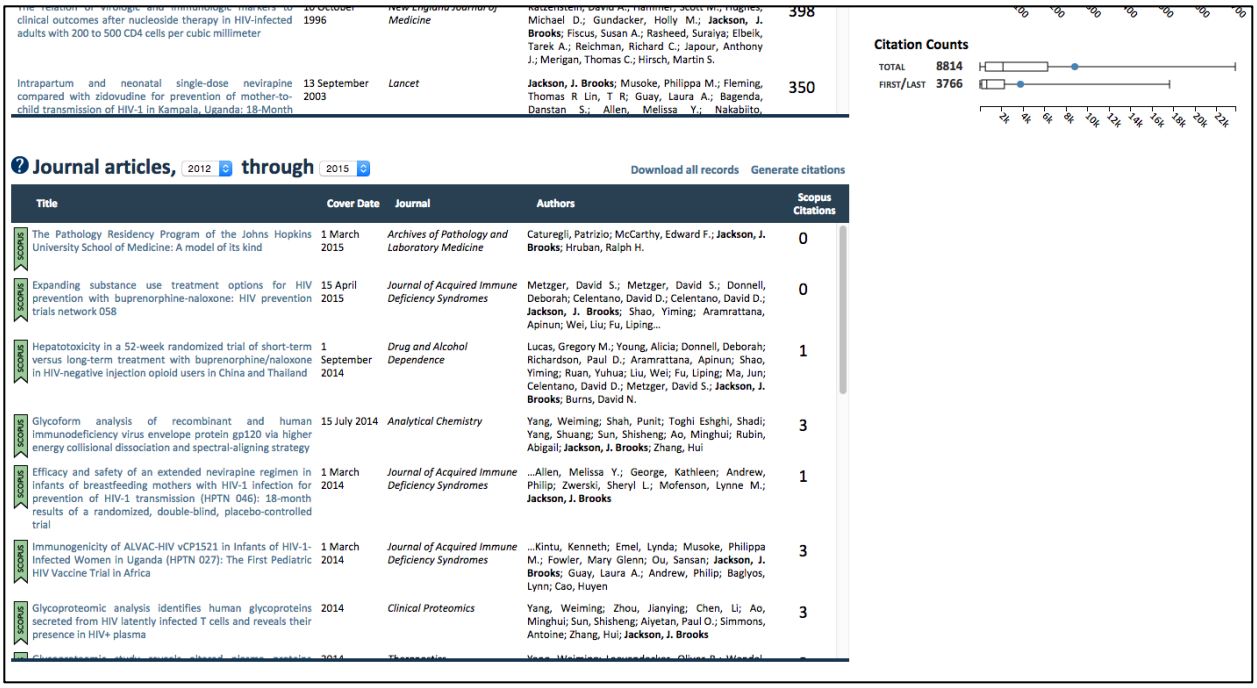
Searching by department



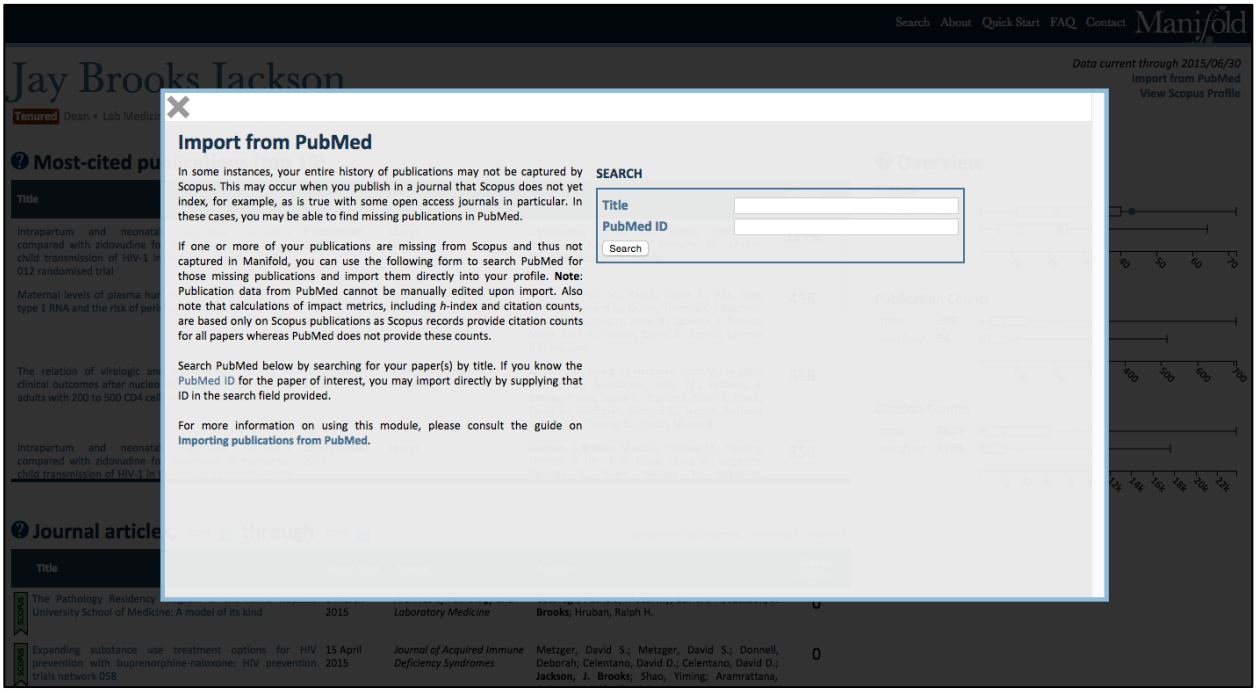
Creating a custom subset of faculty



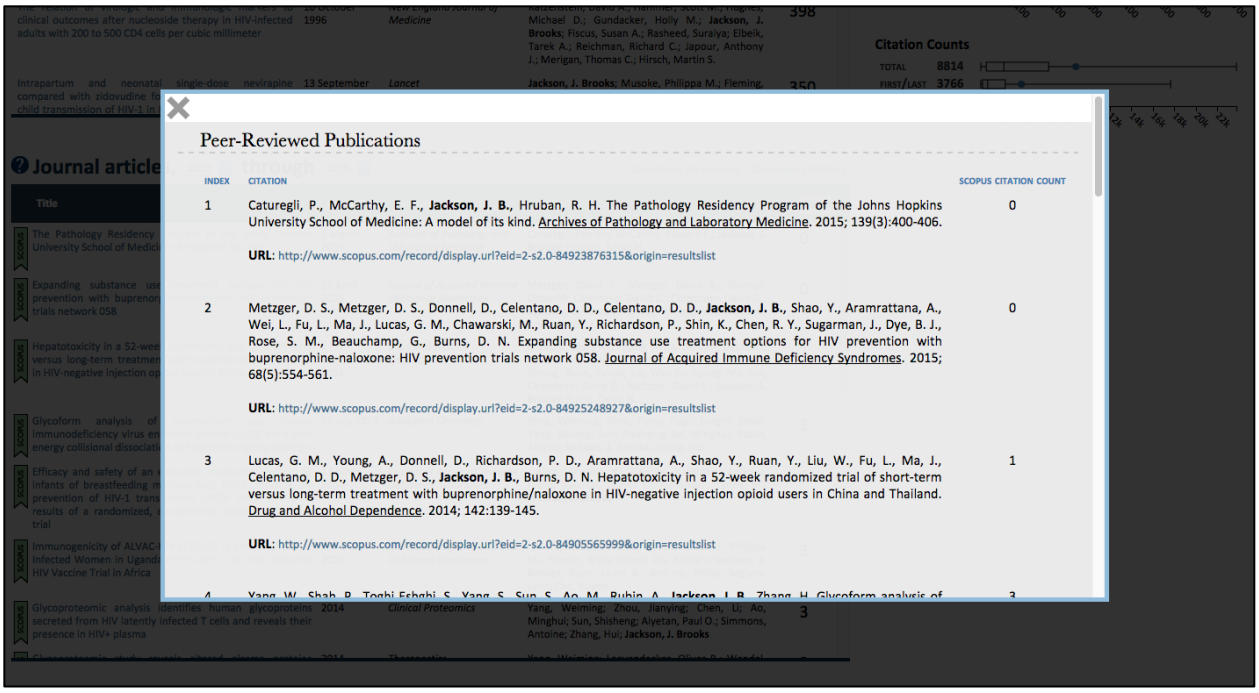
Individual faculty profile: top-cited publications and metrics



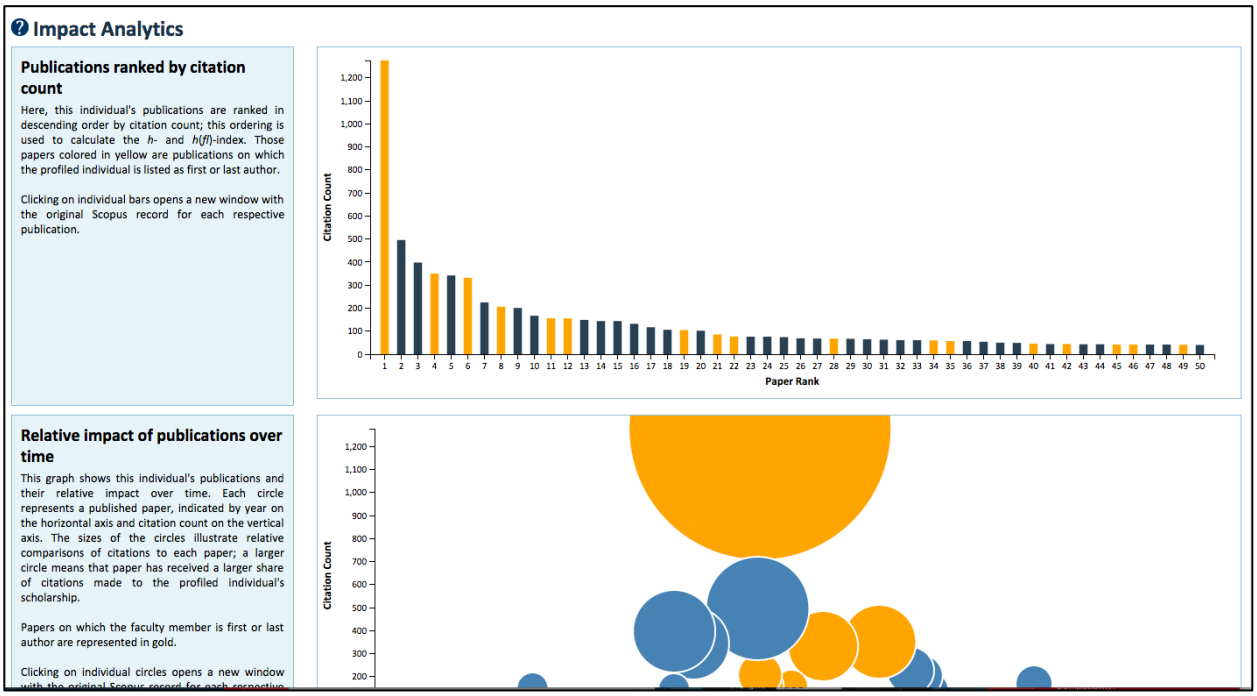
Individual faculty profile: publications list



Importing publication records from PubMed



Generating citations in the required Medical School CV format

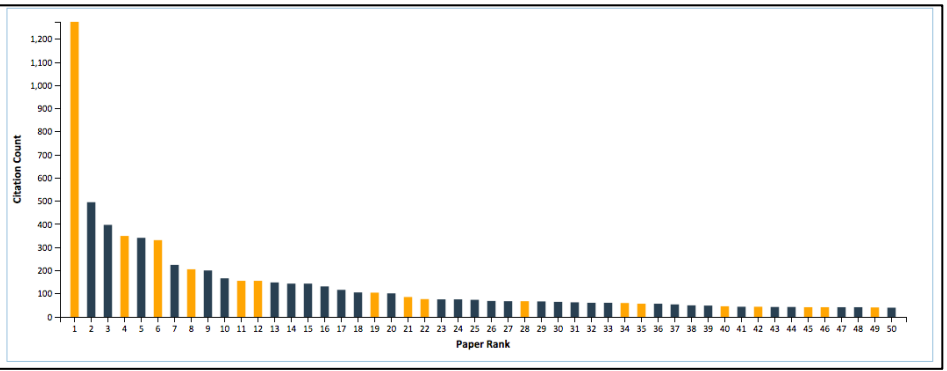


Visualizations of research impact analytics

Publications ranked by citation count

Here, this individual's publications are ranked in descending order by citation count; this ordering is used to calculate the *h*- and *h*(*fl*)-index. Those papers colored in yellow are publications on which the profiled individual is listed as first or last author.

Clicking on individual bars opens a new window with the original Scopus record for each respective publication.



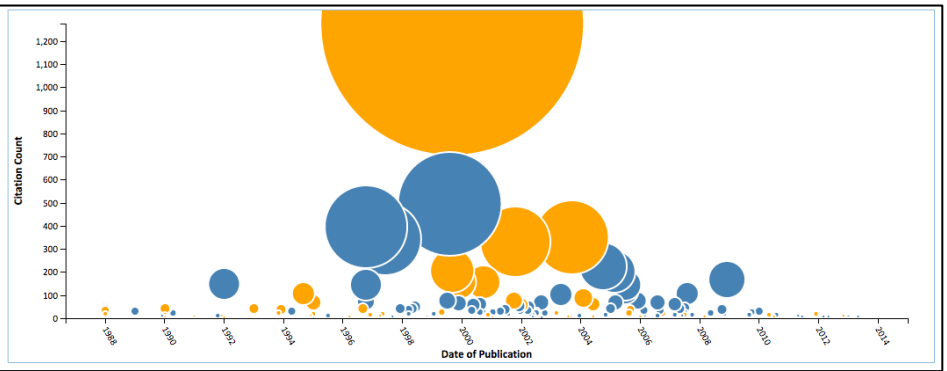
Ranking publications in descending order by Scopus citation count

Relative impact of publications over time

This graph shows this individual's publications and their relative impact over time. Each circle represents a published paper, indicated by year on the horizontal axis and citation count on the vertical axis. The sizes of the circles illustrate relative comparisons of citations to each paper; a larger circle means that paper has received a larger share of citations made to the profiled individual's scholarship.

Papers on which the faculty member is first or last author are represented in gold.

Clicking on individual circles opens a new window with the original Scopus record for each respective publication.

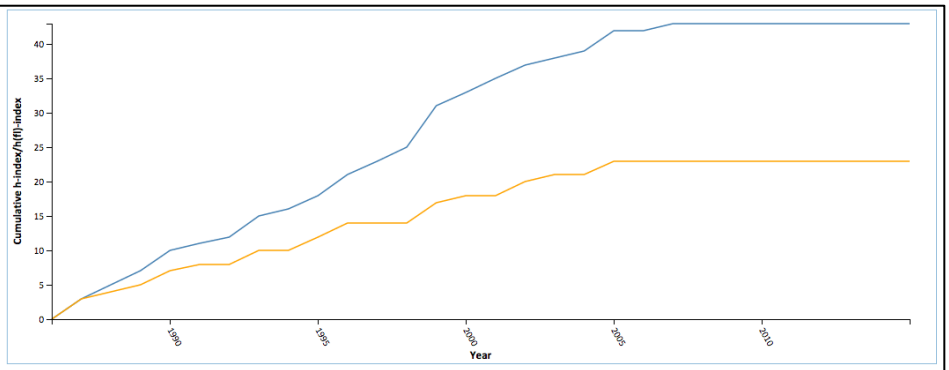


Relative citation share of publications over time

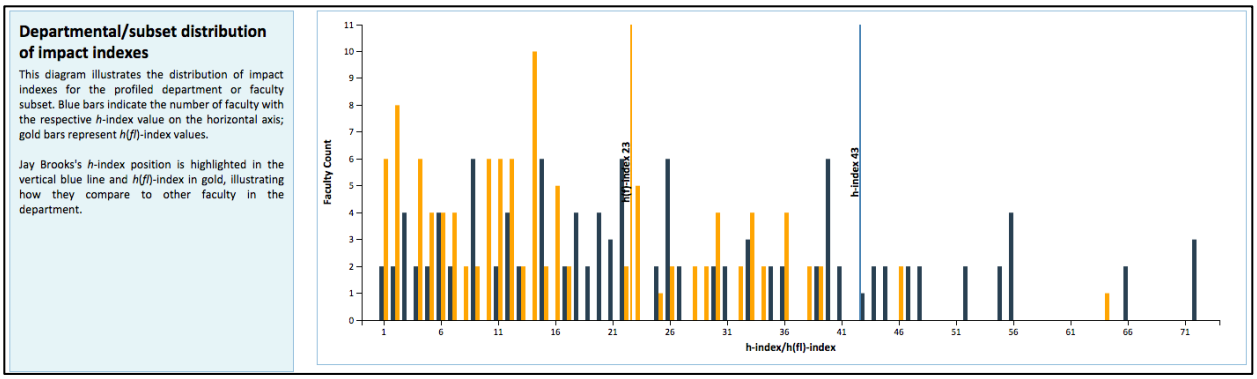
Cumulative *h*-index and *h*(*fl*)-index over time

Here, this individual's *h*-index and *h*(*fl*)-index are plotted cumulatively over time. For each year over their publication career, these indexes are recalculated considering publications and their citation counts up through that year. Note that the citation counts used to calculate yearly indices in this graph are current values, not values at those given points in time.

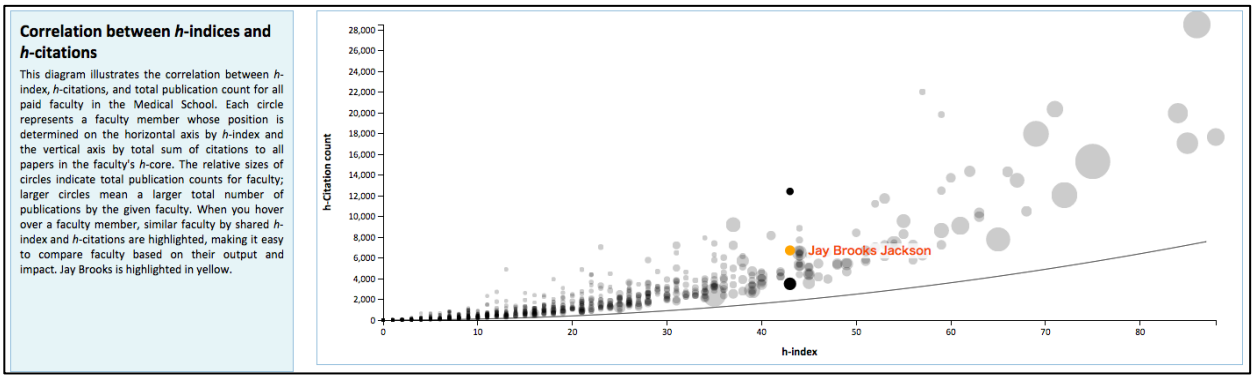
The blue line illustrates cumulative *h*-index; the gold line shows cumulative *h*(*fl*)-index.



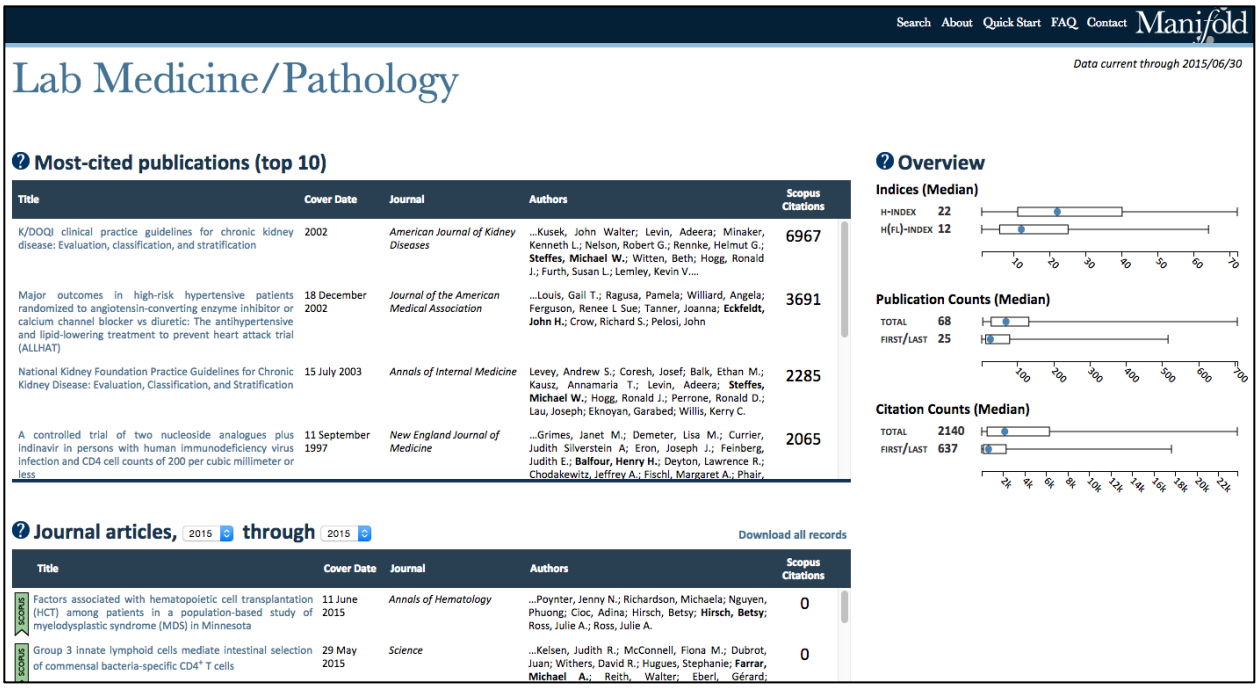
Cumulative h- and h(fl)-index over time



Histogram of departmental distribution of h-/h(fl)-index values



Correlation between h-indices and h-citations



Departmental summary profile

Elevated levels of mercapturic acids of acrolein and crotonaldehyde in the urine of Chinese women in Singapore who regularly cook at home	25 March 2015	*PLoS ONE*	**Hecht, Stephen S.**; Koh, Woon Puay; Koh, Woon Puay; Wang, Renwei; Chen, Menglan; Carmella, Steven G.; Murphy, Sharon E.; Yuan, Jian Min; Yuan, Jian Min	0
Epidemic 2014 enterovirus D68 cross-reacts with human rhinovirus on a respiratory molecular diagnostic platform	23 March 2015	*PLoS ONE*	McAllister, Shane C.; McAllister, Shane C.; Schleiss, Mark R.; Schleiss, Mark R.; **Arbefeville, Sophie**; Steiner, Marie E.; Steiner, Marie E.; Hanson, Ryan	0

Faculty Summary

Download all records

	Indices		Publications		Citation Counts	
Name	*h*	*h(fl)*	Total	First/Last	Total	First/Last
Khalid Amin	12	4	54	6	1051	43
Sophie Arbefeville	3	2	7	3	103	18
Henry Balfour	55	39	330	242	12652	5857
Mark Birkenbach	26	7	43	8	3192	637
H. Brent Clark	36	16	101	35	6864	1465
Claudia Cohn	7	6	19	9	197	112
Elizabeth Courville	2	2	9	6	18	18
John Crosson	18	10	49	20	1169	340
Scott Dehm	21	16	48	35	1554	1271
Michelle Dolan	9	5	31	10	394	96
Michael Farrar	26	16	56	28	3853	2493
Patricia Ferrieri	41	23	185	100	9606	2057
Leo Furcht	47	36	184	112	5999	3224
Lael Gatewood	15	6	68	16	1395	187
Myron Gross	48	22	211	56	7384	1305
Bartosz Grzywacz	9	4	12	5	372	164

Faculty summary table on departmental/custom profile

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Custom Filter

Data current through 2015/06/30

Most-cited publications (top 10)

Title	Cover Date	Journal	Authors	Scopus Citations
Primary structure of dystrophin-associated glycoproteins linking dystrophin to the extracellular matrix	20 February 1992	*Nature*	Ibraghimov-Beskrovnaya, Oxana; **Ervasti, James M M.**; Leveille, Cynthia J.; Slaughter, Clive A.; Sernett, Suzanne W.; Campbell, Kevin P.	855
A role for the dystrophin-glycoprotein complex as a transmembrane linker between laminin and actin	August 1993	*Journal of Cell Biology*	**Ervasti, James M M.**; Campbell, Kevin P.	851
Membrane organization of the dystrophin-glycoprotein complex	1991	*Cell*	**Ervasti, James M M.**; Campbell, Kevin P.	791
Deficiency of a glycoprotein component of the dystrophin complex in dystrophic muscle	24 May 1990	*Nature*	**Ervasti, James M M.**; Ohlendieck, Kay; Kahl, Steven D.; Gaver, Mitchell G.; Campbell, Kevin P.	536
Insulin signalling to mTOR mediated by the Akt/PKB substrate PRAS40	March 2007	*Nature Cell Biology*	Haar, Emilie Vander; Lee, Seongil; Bandhakavi, Sricharan; **Griffin, Timothy J.**; Kim, Dohyung	501
Complementary profiling of gene expression at the transcriptome and proteome levels in Saccharomyces cerevisiae.	April 2002	*Molecular & cellular proteomics : MCP*	**Griffin, Timothy J.**; Gygi, Steven P P.; Ideker, Trey G.; Rist, Beate; Eng, Jimmy; Hood, Leroy E.; Aebersold, Ruedi H.	454

Overview

Indices (Median)

H-INDEX 26
H(FL)-INDEX 23

Publication Counts (Median)

TOTAL 74
FIRST/LAST 51

Citation Counts (Median)

TOTAL 2269
FIRST/LAST 1812

Journal articles, 2015 through 2015

Download all records

Title	Cover Date	Journal	Authors	Scopus Citations
Roux-en-Y Gastric Bypass Acutely Decreases Protein Carbonylation and Increases Expression of Mitochondrial Biogenesis Genes in Subcutaneous Adipose Tissue	15 May 2015	*Obesity Surgery*	Jahansouz, Cyrus; Serrot, Federico J.; Frohnert, Brigitte I.; Foncea, Rocio E.; Dorman, Robert B.; Slusarek, Bridget; Leslie, Daniel B.; **Bernlohr, David A.**; Ikramuddin, Sayeed	0
In vitro stability of therapeutically relevant, internally truncated dystrophins	April 28, 2015	*Skeletal Muscle*	McCourt, Jackie L.; Rhett, Katrina K.; Jaeger, Michele A.; Belanto, Joseph J.; Talsness, Dana M.;	0

Profile generated from a custom user-defined subset of faculty