

100 Metrics to Assess and Communicate the Value of Biomedical Research

An Ideas Book



Susan Guthrie, Joachim Krapels,
Catherine Lichten, Steven Wooding



EUROPE



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Prepared in collaboration with the Association of American Medical Colleges

RR-1606-AAMC
November 2016



EUROPE



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Published 2016 by the RAND Corporation
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Preface

This report presents 100 ideas for metrics that can be used to assess and communicate the value of biomedical research. The list is not comprehensive, and the metrics are not fully developed, but they should serve to stimulate and broaden thinking about how academic medical centers can communicate the value of their research to patients, providers, administrators, and legislators.

The authors would like to thank Dr Ann Bonham (AAMC chief scientific officer, 2009–2015) and Dr Philip Alberti (AAMC senior director, health equity research and policy) for their project support. Dr Bonham and Dr Alberti contributed to the overall design of the report and provided substantial input on the development of the individual metrics.

In addition, the authors would like to thank Prof. Joanna Chataway and Dr Catriona Manville (RAND Europe) for their review of the document and constructive comments in their role providing Quality Assurance on this project.

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Introduction

Biomedical research affects society in many ways. It has been shown to improve health, create jobs, add to our knowledge, and foster new collaborations. Despite the complexity of modern research, many of the metrics used to evaluate the impacts of research still focus on the traditional, often academic, part of the research pathway, covering areas such as the amount of grant funding received and the number of peer-reviewed publications.

In response to increasing expectations of accountability and transparency, the Association of American Medical Colleges (AAMC), in collaboration with RAND Europe, undertook a project to help communicate the wider value of biomedical research. The initiative developed resources to support academic medical centers in evaluating the outcomes and impacts of their research using approaches relevant to various stakeholders, including patients, providers, administrators, and legislators.

This report presents 100 ideas for metrics that can be used to assess and communicate the value of biomedical research. The list is not comprehensive, and the metrics are not fully developed, but they should serve to stimulate and broaden thinking about how academic medical centers can communicate the value of their research to a broad range of stakeholders. Some metrics, such as publication numbers, are measurable in the short and medium terms. Others, such as community-level health and economic outcomes, are longer-term and appeal to audiences other than academic medical centers.

The metrics included in this study do not represent a systematic set. Rather, the metrics were identified and selected in the course of several steps as part of a larger research project. First, RAND Europe reviewed research evaluation frameworks used

internationally, along with the tools/methods these frameworks included.¹ Second, workshops were held with medical college faculty and research leaders to identify appropriate approaches for American medical colleges alongside identifying the key stakeholder audiences for the evaluation. In a third phase, three key external stakeholder groups—community members, research administrators, and state legislators—confirmed the salience of the identified metrics.² Metrics identified through these three steps, combined with the knowledge of the research team of existing metrics, formed the foundation for the current list of metrics.

Not all the metrics and areas will be of interest or applicable to all biomedical research institutions and organizations. This report, rather, provides a long list of the metrics from which a relevant subset could be selected, depending on the specific institutional context.

To help identify relevant metrics for a particular application, we have classified the metrics in three ways:

1 Stakeholders. Each metric is likely to be of interest to one or more stakeholder groups. Table 1 maps each metric against the relevant stakeholders:

- In the table, “state and local legislators” refers to policymakers. In this report, the focus is

¹ S. Guthrie, W. Wamae, S. Diepeveen, S. Wooding, and J. Grant, *Measuring Research: A Guide to Research Evaluation Frameworks and Tools*, Santa Monica, Calif.: RAND Corporation, MG-1217-AAMC, 2013.

² A. Bonham and P. M. Alberti, “From Inputs to Impacts: Assessing and Communicating the Full Value of Biomedical Research,” *Academic Medicine*, forthcoming.

on their interests as policymakers and representatives of the region and the local population. Any role that these individuals may have as funders in this context is not considered—those interests are all captured under the “funders and donors” category.

- “Funders and donors” includes any external group or individual providing funding for research, researchers, or research equipment. This includes the National Institutes of Health (NIH) as well as smaller funders and donors, both public and private.
 - “External academic stakeholders” are any academics based at another institution. These academics can be potential collaborators or people that the institution might want to recruit.
 - “Board management” (of the research institution) refers to the person or group of people responsible for oversight of all the functions of the institution, not just research.
 - “Community” refers to the local population served by the institution (which will include but is not limited to patients). Of particular interest are those who might be engaged in the research process in some way (community partners, trial participants).
 - “Research management” (within the research institution) refers to the person or group of people responsible for oversight of the research function at the institution specifically.
 - “Patients” refers to people who are being treated or have recently been treated at the institution
- 2 Sources.** Each metric draws on data collected through one or more sources. Table 2 maps the metrics against the relevant sources that could be used to collect them.
- 3 Type.** Each metric has been classified into a particular type. The nine types identified and captured in Figure 1 cover the pathway from research production to research impact. Each type represents a different aspect of this pathway. The nine types are as follows:
- Research impacts (*Research*)—metrics that capture the direct development and outputs arising from conducted research
 - Measures of prestige (*Prestige*)—metrics that reflect external recognition of quality of conducted research
 - Teaching and career development impacts (*Career*)—metrics that capture the teaching and career development of researchers
 - Research and institutional processes (*Process*)—metrics that capture the effectiveness and efficiency of the administrative and institutional processes underlying research
 - Networks and dissemination (*Network*)—metrics that capture the interactions of researchers and the academic institution with external stakeholders
 - Policy impacts (*Policy*)—metrics that capture the changes in policy to which research conducted at the institution has contributed
 - Health impacts (*Health*)—metrics that capture the changes in health outcomes to which research conducted at the institution has contributed
 - Economic impacts and commercialization (*Economics*)—metrics that capture the changes in the (local) economy to which research conducted at the institution has contributed
 - Broader metrics (*Broader*)—approaches that can capture information across a range of these categories.

Table 1. Metrics for Assessing and Communicating the Value of Biomedical Research, by Stakeholder Group

			State and local legislators	Funders and donors	External academic stakeholders	Board management	Community	Research Management	Patients
Research impacts	1	Number of journal articles published		y	y	y		y	
	2	Number of citations		y	y	y	y	y	
	3	Number of research output downloads		y	y	y		y	
	4	Mentions in social media	y	y		y		y	
	5	Number and size of grant awards	y	y	y	y		y	
	6	Number and size of awards from major funders	y	y	y	y		y	
	7	Number of different research funders supporting research	y	y	y	y		y	
	8	Success rate of applications			y	y		y	
	9	Catalogue of infrastructure	y	y	y	y		y	
	10	Use of infrastructure by other researchers	y	y	y	y		y	
Measures of prestige	11	Number of editorships of high profile journals		y	y	y		y	
	12	Number of staff on relevant boards and committees	y	y	y	y	y	y	y
	13	Number of academy members	y	y	y	y		y	
	14	Number and type of prizes	y	y	y	y		y	
	15	Number of (international) speaker invitations/conference invitations	y	y	y	y		y	
	16	Number of media mentions	y	y	y	y		y	
	17	Number of applications per open post			y	y		y	
	18	Percentage of out-of-state and international applications per research job/PhD post			y	y		y	
	19	Track record of new hires	y		y	y		y	
	20	Undergraduate applications	y		y	y	y		
	21	Grade Point Average of incoming students				y			
Teaching and career development impacts	22	Grade Point Average of graduates	y			y			
	23	Longitudinal data on career progression of students	y	y		y	y	y	
	24	Number of PhD graduates			y	y		y	
	25	Completion rate of PhD graduates			y	y		y	
	26	Number of publications per PhD graduate			y	y		y	
	27	5/10/15-year career outcomes for PhD graduates		y	y	y		y	
	28	K to R conversion rate			y	y		y	
	29	Career outcomes for researchers		y	y	y		y	
	30	Subject coverage of the professional development programme			y	y		y	
	31	Uptake of the professional development programme			y	y		y	
	32	Feedback on the professional development programme			y	y		y	
	33	Improved educational attainment/reduced drop out rate	y	y		y	y	y	

Table 1. Metrics for Assessing and Communicating the Value of Biomedical Research, by Stakeholder Group *continued*

			State and local legislators	Funders and donors	External academic stakeholders	Board management	Community	Research Management	Patients
Research and institutional processes	34	Start-up time for research projects	y	y		y	y	y	y
	35	Start-up time for clinical trials	y	y	y	y	y	y	y
	36	Average time from funding to publication	y	y		y		y	
	37	Proportion of funds spent on administration	y	y		y		y	
	38	Support staff to researcher ratio	y	y	y	y		y	
	39	Prompt payment of community partners	y	y	y	y	y	y	
	40	How hiring decisions are made			y	y		y	
	41	How decisions are made to apply for grants		y	y	y	y	y	y
	42	How publications decisions are made			y	y	y	y	y
	43	Proportion of publications that are open access	y	y	y	y	y	y	y
	44	Proportion of trials where protocol and findings are published	y	y	y	y	y	y	y
	45	Description of institution's policy on health equity in research	y	y		y	y		y
	46	Proportion of projects which consider health equity in their design and conduct	y	y	y	y	y		y
Networks and dissemination	47	Number of collaborations on grant applications and projects		y	y		y	y	
	48	Levels of co-authorship		y	y		y	y	
	49	Bibliometric networks			y		y	y	
	50	Total number of different collaborators across all projects		y	y		y	y	
	51	Description of range of collaborations		y	y		y	y	
	52	Number of research projects engaging community partners	y	y	y	y	y	y	y
	53	Number of research projects engaging community partners for the entire duration of the project	y	y		y	y	y	
	54	Number of articles co-authored with community partner	y	y			y		
	55	Existence of specifically tailored material for different community groups	y	y	y	y	y	y	y
	56	Size of communications office		y		y			
	57	Number of staff engaged in outreach		y		y	y	y	
	58	Number of people attending outreach events and their perceptions	y	y		y	y	y	
	59	Level of participation in clinical trials	y	y	y	y	y	y	y
	60	Number of projects with an industry partner	y	y	y	y		y	
	61	Industrial research funding for PhD/secondment positions in industry and PhD scholarships	y	y	y	y		y	
62	Number of policy secondments	y	y		y				
Policy impacts	63	Number of invitations from policy makers	y	y		y			
	64	Number of citations on clinical guidelines	y	y		y		y	y
	65	Number of citations in policy documents	y	y		y	y	y	y

Table 1. Metrics for Assessing and Communicating the Value of Biomedical Research, by Stakeholder Group *continued*

			State and local legislators	Funders and donors	External academic stakeholders	Board management	Community	Research Management	Patients
Health impacts	66	Improved health of patients	y	y		y	y	y	y
	67	Improved quality of care metrics	y			y	y	y	y
	68	Number of lives touched	y	y		y	y		
	69	Narrowing of health/health-care disparities	y	y		y	y		y
	70	Improved awareness of preventative measures in the community	y	y		y	y	y	y
	71	Number of treatment developed in house	y	y	y	y	y	y	y
	72	Number of new treatments available (adopted from elsewhere)		y		y	y		y
	73	Percentage, number, and range of types of clinicians on research projects		y	y	y		y	
	74	Number of uses of research infrastructure in clinical practice	y	y	y	y		y	y
Economic impacts and commercialisation	75	Level of (local) spending	y			y	y		
	76	Amount of direct employment	y			y	y		
	77	Number and type of new offices (including subsidiaries) in the area	y	y	y	y	y	y	y
	78	Size of tech transfer office	y		y	y		y	
	79	Existence of Intellectual Property policy	y	y	y	y		y	
	80	Number of patent applications	y	y	y	y		y	
	81	Number of patents awarded	y	y	y	y		y	
	82	Number of patent citations	y	y	y	y		y	
	83	Number of licensing agreements and licensing revenue	y	y	y	y		y	
	84	List/examples of know-how taken up by industry	y	y	y	y		y	
	85	Number of private sector innovations/products/devices brought to market	y	y	y	y		y	
	86	Number of spin outs	y	y	y	y		y	
	87	VC money invested in startups	y	y	y	y		y	
	88	Number and size of consultancy agreements	y	y	y	y		y	
	89	Contract funding from industry	y	y		y		y	
	90	Number of and list of new treatments	y			y	y		y
	91	Fraction of indirect costs covered		y		y		y	
	92	Cost/benefit calculations	y	y		y	y	y	y
Broader metrics	93	Perceptions of equity, quality, access	y			y	y	y	y
	94	Perceptions of staff			y	y	y	y	
	95	Perceptions of community partners	y	y	y	y	y	y	
	96	Perceptions of external experts	y	y	y	y		y	y
	97	Perceptions of people participating in research				y	y	y	y
	98	Attitudes of participants towards science and towards research	y	y		y	y	y	y
	99	Narratives of success	y	y	y	y	y	y	y
	100	Narratives of performance				y	y	y	y

NOTE: Any metric could potentially be of interest to some members of any stakeholder group. This table gives an indication of the *most likely* interests and focus of each group.

Table 2. Metrics for Assessing and Communicating the Value of Biomedical Research, by Potential Data Sources *continued*

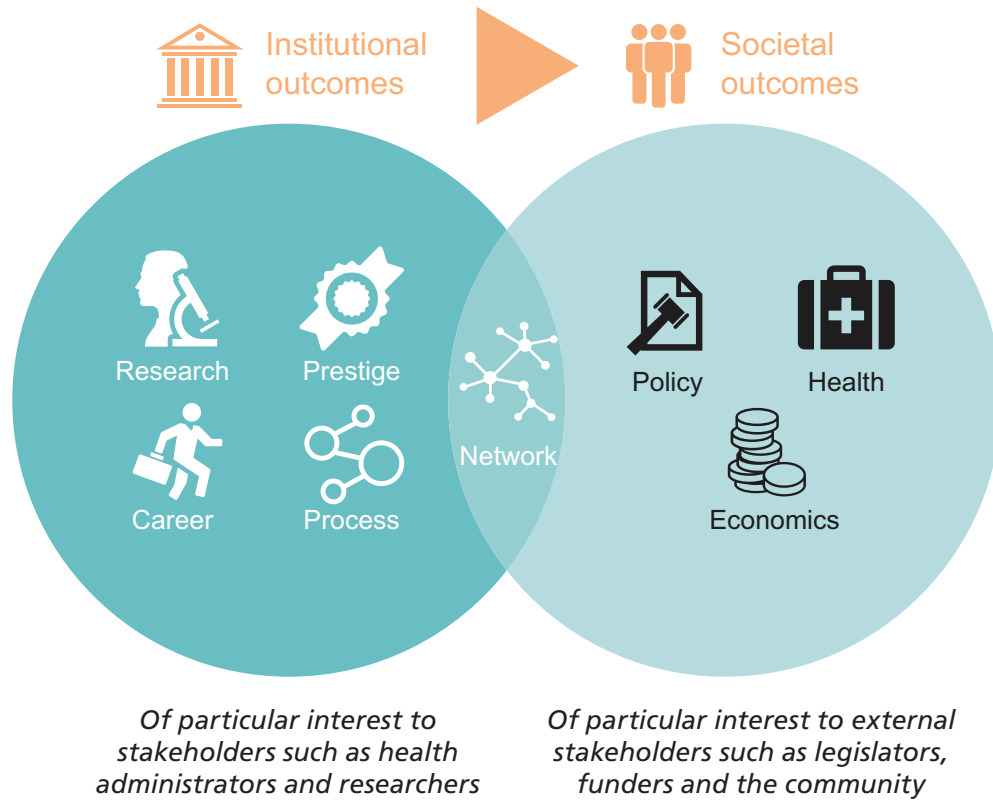
		Bibliometric analysis	Analysis of research administrative documents	Analysis of wider institutional records	Internal policy documents	Funder records	Records of external academic bodies	Educational outcomes and workforce tracking data	Quality improvement data	Public health data	Electronic health records data	StarMetrics data	Patent database	Review of key policy documents	Clippings service	Social media analysis	Feedback forms from events and courses	PI survey	Departmental secretary survey	Wider staff survey	Alumni survey	Survey or interviews with companies	Survey or interviews with research participants	Survey or interviews with community partners	PI interviews	Staff interviews	External researcher site visits or peer review	Representative case studies	High impact case studies	Labor market analysis		
Teaching and career development impacts	22	Grade point average of graduates		y				y																								
	23	Longitudinal data on career progression of students						y													y											
	24	Number of PhD graduates		y				y																								
	25	Completion rate of PhD graduates		y				y																								
	26	Number of publications per PhD graduate	y	y																												
	27	5/10/15-year career outcomes for PhD graduates							y													y										
	28	K to R conversion rate		y			y																									
	29	Career outcomes for researchers							y													y										
	30	Subject coverage of the professional development program				y																										
	31	Uptake of the professional development program		y																												
	32	Feedback on the professional development program																y														
	33	Improved educational attainment/reduced drop-out rate							y																							
	Research and institutional processes	34	Start-up time for research projects		y																											
35		Start-up time for clinical trials		y																												
36		Average time from funding to publication					y																									
37		Proportion of funds spent on administration		y																												
38		Support staff to researcher ratio		y																												
39		Prompt payment of community partners		y																					y							
40		How hiring decisions are made																							y			y				
41		How decisions are made to apply for grants																							y			y				
42		How publications decisions are made																							y			y				
43		Proportion of publications that are open access		y															y													
44		Proportion of trials where protocol and findings are published		y															y													
45		Description of institution's policy on health equity in research				y																										
46		Proportion of projects which consider health equity in their design and conduct			y														y						y							

Table 2. Metrics for Assessing and Communicating the Value of Biomedical Research, by Potential Data Sources *continued*

			Bibliometric analysis	Analysis of research administrative documents	Analysis of wider institutional records	Internal policy documents	Funder records	Records of external academic bodies	Educational outcomes and workforce tracking data	Quality improvement data	Public health data	Electronic health records data	StarMetrics data	Patent database	Review of key policy documents	Clippings service	Social media analysis	Feedback forms from events and courses	PI survey	Departmental secretary survey	Wider staff survey	Alumni survey	Survey or interviews with companies	Survey or interviews with research participants	Survey or interviews with community partners	PI interviews	Staff interviews	External researcher site visits or peer review	Representative case studies	High impact case studies	Labor market analysis	
Economic impacts and commercialisation	75	Level of (local) spending		y									y																			
	76	Amount of direct employment											y																		y	
	77	Number and type of new offices (including subsidiaries) in the area																					y								y	
	78	Size of technology transfer office		y																												
	79	Existence of intellectual property policy				y																										
	80	Number of patent applications		y			y								y					y												
	81	Number of patents awarded		y											y					y												
	82	Number of patent citations													y																	
	83	Number of licensing agreements and licensing revenue		y																												
	84	List/examples of know-how taken up by industry																		y										y		
	85	Number of private-sector innovations/products/devices brought to market																					y									
	86	Number of spin-outs		y																	y											
	87	Venture capital invested in start-ups		y																												
	88	Number and size of consultancy agreements		y																												
89	Contract funding from industry		y																													
90	Number of and list of new treatments				y																y											
91	Fraction of indirect costs covered		y																													
92	Cost-benefit calculations		y						y	y	y	y																			y	
Broader metrics	93	Perceptions of equity, quality, and access																					y	y								
	94	Perceptions of staff																	y		y				y	y						
	95	Perceptions of community partners																						y								
	96	Perceptions of external experts																									y					
	97	Perceptions of people participating in research																						y								
	98	Attitudes of participants toward science and toward research																						y								
	99	Narratives of success																													y	
	100	Narratives of performance																										y				

NOTE: This table does not represent an exhaustive list, but rather highlights the potential data sources that stand out as most appropriate for each metric.

Figure 1: Diverse Research Outcomes Appeal to Stakeholders Internal and External to an Institution



Bonham, A. and P.A. Alberti (under review) From Inputs to Impacts: Assessing and Communicating the Full Value of Biomedical Research. Academic Medicine

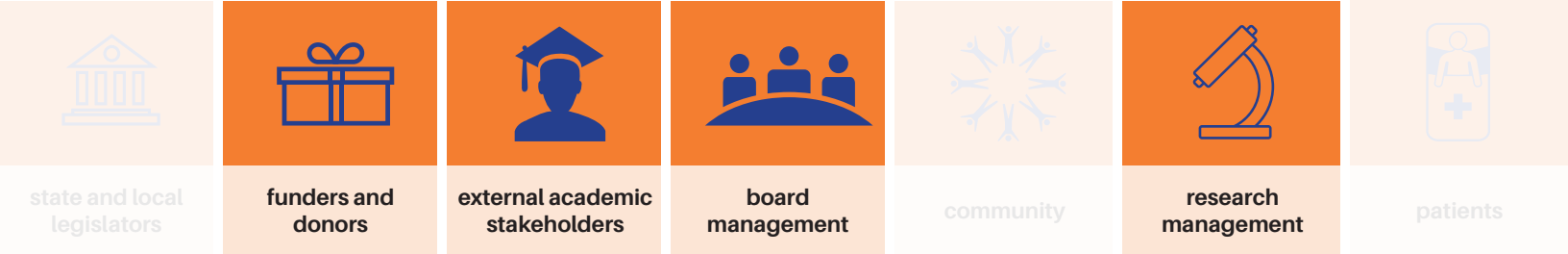
Considerations for Good Use of the Metrics

The classifications provided can be used to guide institutions as they select metrics and evaluation approaches for measuring their performance. To provide a balanced evaluation, an academic medical center is likely to want to select a range of metrics and types that cover various stakeholder groups, while also drawing on the data sources already available. The two classification tables aim to enable institutions to match metrics to their interests and available data.

It is important to note that not all metrics are appropriate to all fields of medical research. For

example, some fields are more likely to produce patents than others. In addition, metrics cannot always be compared across fields. For example, what counts as a large number of publications in one field might seem a small amount to another. Fields and their differences should therefore be given substantial consideration in the selection of metrics.

Furthermore, the maturity and stage of development of a project or institution will determine whether or not some metrics are appropriate. Newer projects or institutions may not yet have produced long-term societal impacts. Metrics capturing such impacts would be inappropriate to the early stages of development, but could be introduced later in time.



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Number of journal articles published

Description

The number of peer-reviewed journal articles published over a particular timeframe is a quantitative metric of the volume of research produced by an individual or institution.

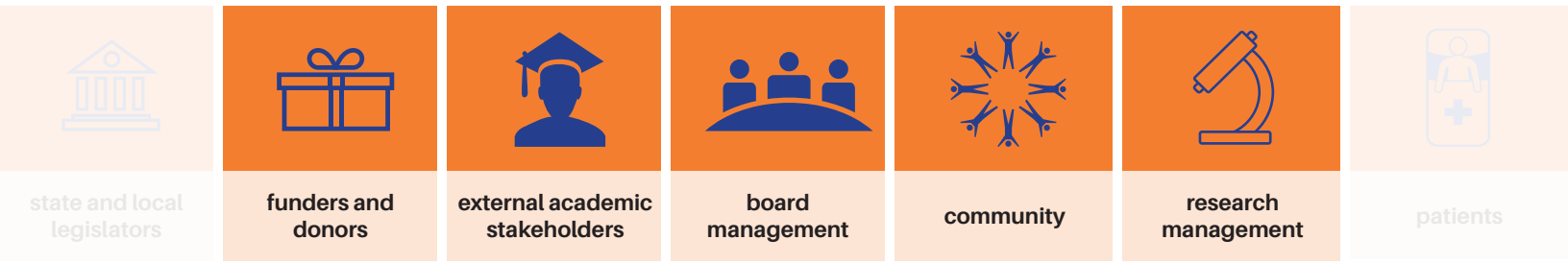
Caveats

Counting articles provides no measure of their quality. Therefore, it is important to use metrics that capture the quality of the articles alongside the number of articles—otherwise, there may be a perverse incentive to publish a higher volume of lower-quality articles.

There may also be important research outputs other than articles in peer-reviewed journals, such as patents, clinical guidance, books, book chapters, and articles in trade publications. The importance of these other types of publication varies by field. These types of outputs are typically not indexed in bibliometric databases and so would not be included in this type of analysis.

Source
Bibliometric analysis

1



RESEARCH
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Number of citations

Description

Measures of citations to published articles are used as a proxy for article quality.

One metric, Highly Cited Papers (HCP), counts the number of papers from the institution (or individual) belonging to the top 10 percent (or 5 percent or 20 percent) of all publications in the same field and year.

A second metric, the Normalized Citation Score, indicates how often the publications of a unit—an individual, group, institution, or country—are cited relative to the average for the field(s) in which they are active.

Citation measures should be normalized for field and year of publication to make them comparable, because older papers have had more time to accumulate citations, and because there are significant differences in citation behaviors between fields.¹

Caveats and Limitations

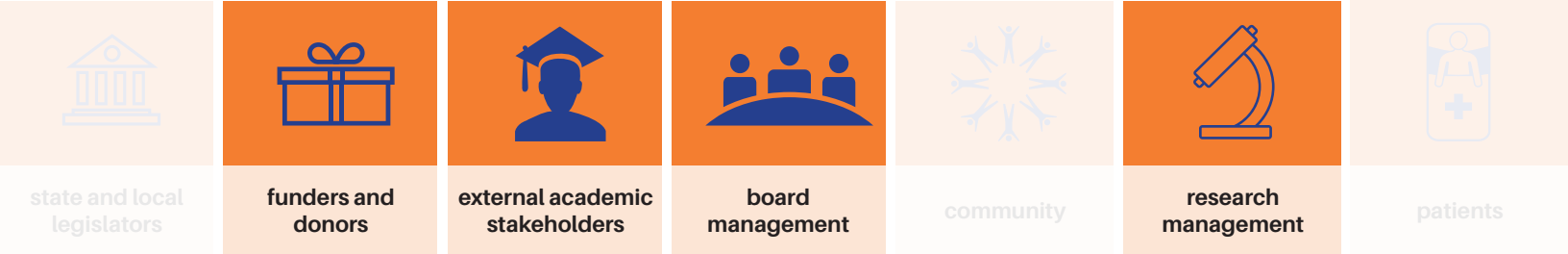
Citations generally *reflect* quality, but they are not a direct *measure* of quality. Factors other than quality can affect the number of citations a publication receives, even when differences across academic fields are taken into account. For example, work may be cited by others as an example of poor or misleading work.

A general limitation of bibliometric analysis is that it is based on published articles and covers only a marginal amount of books and book chapters, which may be important research outputs in some fields.

Source
Bibliometric analysis

1 L. Waltman, "A Review of the Literature on Citation Impact Indicators," *Journal of Informetrics*, Vol. 10, No. 2, May 2016, pp. 365–391.

2



RESEARCH
PRESTIGE
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ECONOMICS

Number of research output downloads

Description

Research outputs generally include journal articles, working papers, and reports, but outputs are increasingly taking the form of shared datasets or computer code. The number of times a research output has been downloaded gives an indication of how much it is being of use and the level of interest in it. Data on download numbers are generally available from the website hosting the research outputs—journal websites for articles, and institution websites for articles, working papers, reports, datasets, and computer code.

Caveats and Limitations

Although downloads are an indication of interest and use, not every download is representative of use—journal articles and reports may be downloaded but not read, or skimmed and discarded—so downloads are only a proxy for use. Download figures will also include internal downloads—by colleagues, or by the authors for their own reference. This could be addressed by removing downloads from the relevant IP addresses. Finally, complications can arise where documents are hosted on multiple websites, or where they are shared through peer-to-peer networks—for this reason, download figures will normally be underestimates of the total number of downloads.

Source
Wider institutional records

3



RESEARCH
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Mentions in social media

Description

Mentions of an institution, researcher, or research project on social media reflect public recognition and awareness of the institution and the research that is being undertaken.

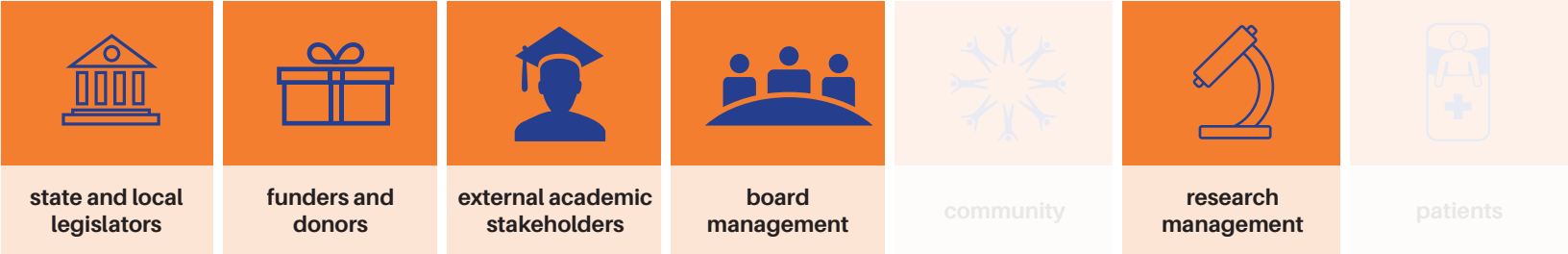
Information on who is citing the institution in social media can help identify where the influence of the medical school or teaching hospital is being felt across the sector, noting that this may be within academia.

Caveats and Limitations

This metric does not distinguish between positive and negative social media attention, so it may be necessary to collect qualitative information about the kind of attention the institution or research is receiving. It may be helpful to filter out citations made by the institution or research group itself.

Source
Social media analysis

4



- RESEARCH
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- ECONOMICS

Number and size of grant awards

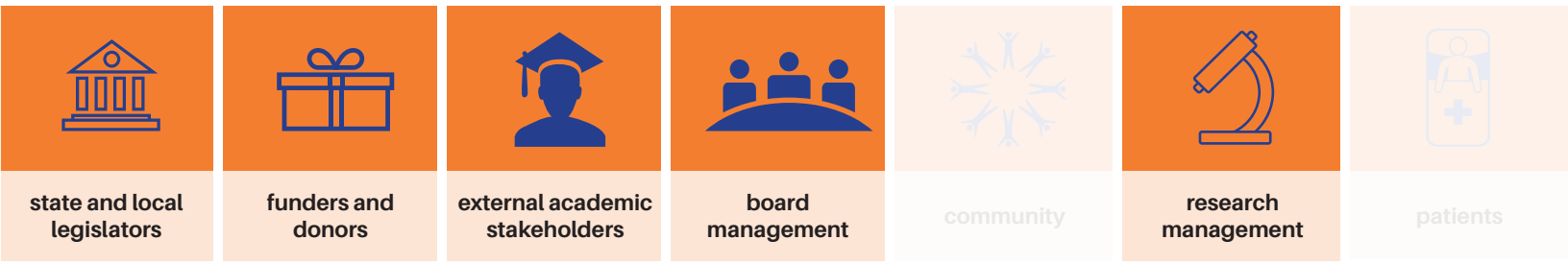
Description

This metric captures the number and total value of all research funding awards made to the institution as a measure of the overall scale of the research effort. It is also useful to understand how much of this can be considered repeat funding—e.g., continuation of a fellowship award. This metric covers funding from all research funders within the ecosystem (including donors), ranging from funding provided for research projects, infrastructure, and capacity building through supporting individual fellowships.

Caveats and Limitations

This metric should be interpreted carefully when comparing between institutions, because of the differences in the amounts of funding required for research, as well as the relative availability of funding, in different fields. Instead, this metric is better used as a measure of the size and scope of the grant portfolio, and hence of the scale and diversity of the research effort at the institution.

Source
 Analysis of research administrative documents; Funder records



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Number and size of awards from major funders

Description

The number and size of the grant awards received from major funders, such as NIH and Howard Hughes Medical Institute, provide an indication of the institution's academic excellence, as these awards are typically highly competitive. The relevant funders to be included in this measure should be determined in advance and used consistently.

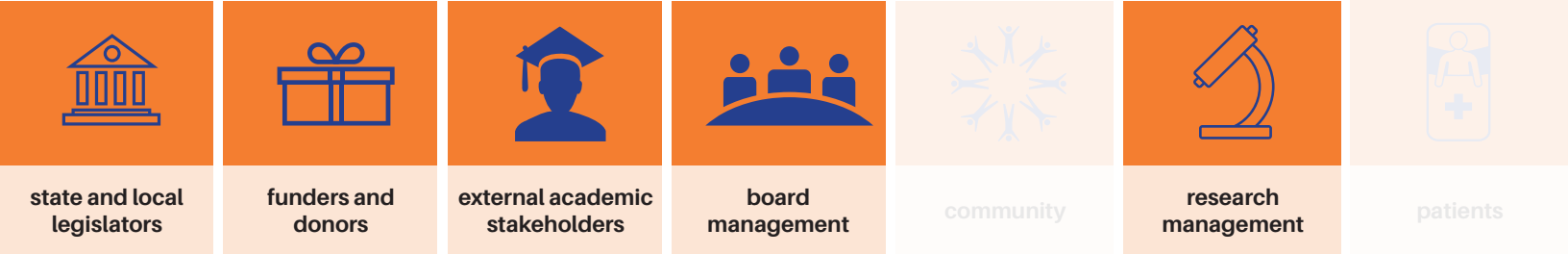
Caveats and Limitations

This metric also reflects factors other than academic excellence. One factor is the fields of research on which the institution focuses: Funders support some areas more extensively than others. Other important factors are the size of the institution and the number of researchers it employs, both of which should be taken into account when comparing between institutions.

Note that placing emphasis on funding from a subset of funders could act as a perverse incentive. For example, if researchers are encouraged to obtain grants only from major funders, they may miss promising opportunities from smaller or more niche funders that may provide potential for different research avenues.

Finally, it is important to be aware that this metric is very much dependent on the selection of major funders, which should be done carefully, taking into account the academic focus of the institution.

Source
 Analysis of research administrative documents; Funder records; PI survey



- RESEARCH
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- ECONOMICS

Number of different research funders supporting research

Description

This metric gives an indication of the diversity of funding sources accessed by the institution. It can provide an indication of the spread of research at the institution and the research's quality, and of the resilience of the institution to changes in levels of funding or strategic focus by any particular funding organization. Finally, it provides an indication of the extent to which researchers are actively searching alternative and niche sources of funding.

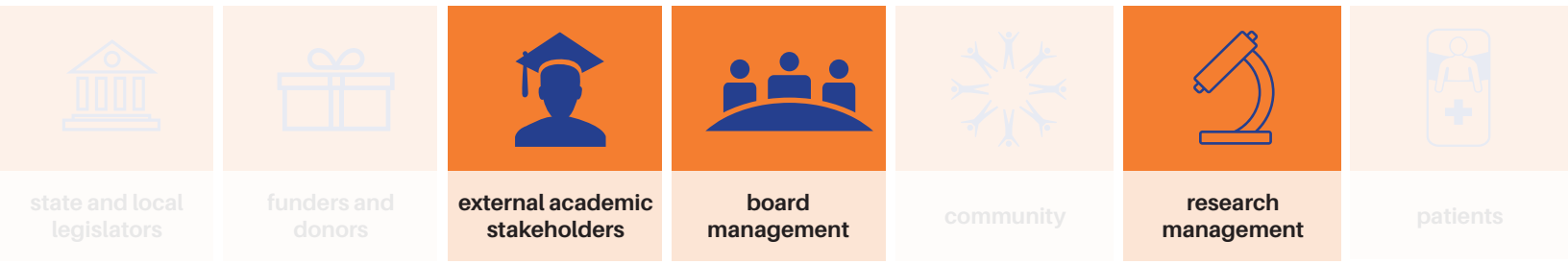
Caveats and Limitations

There may be a wider range of funding sources available in some fields than others—in some areas, the pool of potential funders might be quite limited.

Pursuing a wide range of different funding sources may not be an efficient approach to building a stable base of funding—it might be more appropriate to focus on building strong relationships with a smaller set of funders. There is a balance to be struck here between relationship building and the risks of focusing on a limited number of funders in a challenging funding environment.

Source
 Analysis of research administrative documents; Funder records; PI survey

7



- RESEARCH
- PRESTIGE
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- HEALTH
- ECONOMICS

Success rate of grant applications

Description

The metric can be defined either as the percentage of grant submitted applications that are successful, or as the percentage of funding applied for that is awarded. It captures the proportion of grant applications that are successful and gives a measure of whether opportunities are being critically selected (i.e., focused on opportunities where there is a reasonable chance of success) and whether applications are being prepared to a high standard. It also gives an indication of the amount of effort being invested in unsuccessful applications.

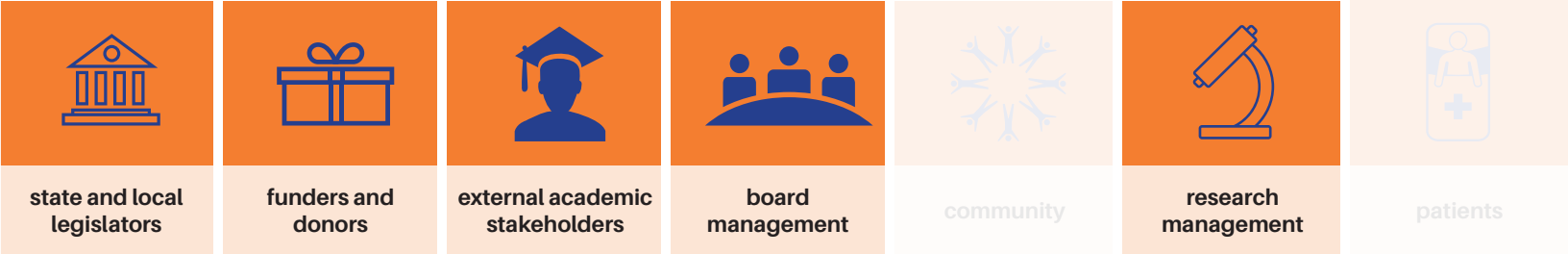
Caveats and Limitations

Measuring the percentage of funding won has advantages, as it weighs more heavily grant applications that are larger, and hence more valuable, and that typically require more time and effort to prepare. However, it may underemphasize small grants that could open up new areas or build relationships with new funders, which is why it may be important to also calculate this as an absolute number.

This metric will be influenced both by factors within the institution's control—such as the care of selection and the quality of production—and by external factors—such as the level of competition, which will differ among fields.

Source
 Source: Analysis of research administrative documents

8



- RESEARCH
- PRESTIGE
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- ECONOMICS

Catalog of infrastructure

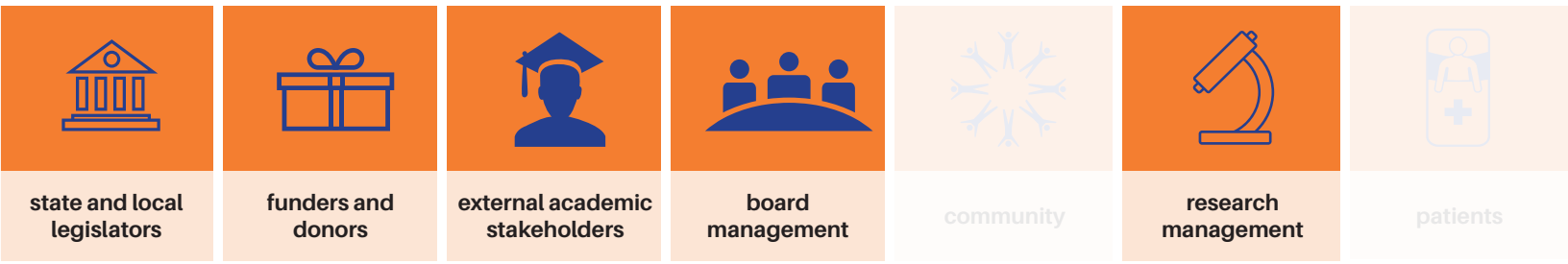
Description

A list of the large-scale infrastructure available at the institution indicates the quality of the institution's research infrastructure. Criteria for inclusion in this list need to be defined. Large, expensive pieces of equipment would be relevant for inclusion, but smaller pieces of equipment might also be worth including where they are unusual or novel.

Caveats and Limitations

Collecting this information may produce a long list, which is difficult to interpret if the inclusion criteria chosen are too wide. The list in itself does not show the quality of the infrastructure—its interpretation requires an understanding of the nature, value, and novelty of the items listed. As such, it is most likely relevant for stakeholders internal to the research system. To make it more relevant to external stakeholders, some context is needed, such as a description of the equipment and how it can be used, or some information on the level of novelty of the equipment (e.g., the only one in the state, one of only five in the United States) or the value of the equipment.

Source
 Analysis of research administrative documents; Departmental secretary survey



- RESEARCH
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- ECONOMICS

Use of infrastructure by other researchers

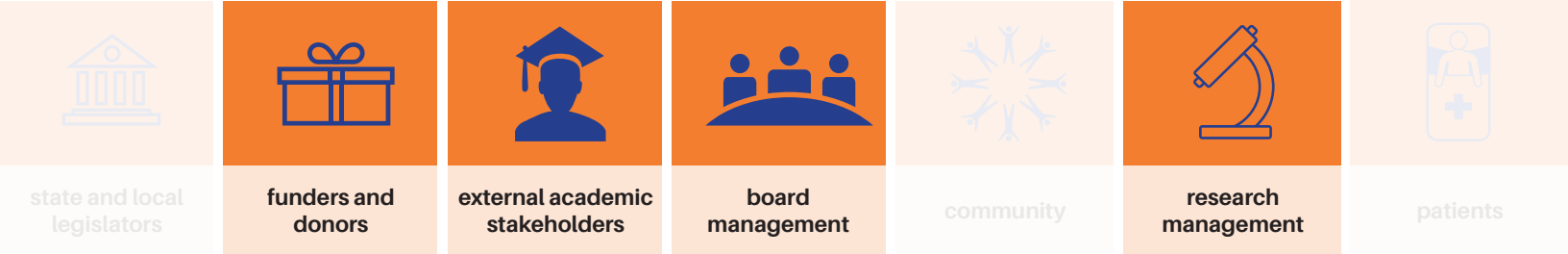
Description

This metric provides an indication of the quality of the infrastructure at the medical school or teaching hospital. It is defined as the number of times that researchers from outside the medical school use equipment housed within the medical school in the past year.

Caveats and Limitations

This metric will depend on the environment in which the medical school or teaching hospital is operating, both in terms of the number of other researchers who may wish to use equipment and the local availability of equipment elsewhere. The metric will also depend on how much the institution collaborates with peer institutions, which could be measured using some of the network indicators, and on the institution's size, as larger institutions are more likely to be able to afford and host larger pieces of equipment. This information should be taken into account if comparisons between institutions are made. Just as important, the need for such equipment will differ between research fields, which should be taken into account in any cross-field comparisons.

Source
 Departmental secretary survey; Analysis of research administrative documents



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Number of editorships of high-profile journals

Description

The metric is a measure of an institution's research excellence and prestige. It assumes that the holders of editorial positions at high-profile journals are high-performing researchers producing quality outputs. It also assumes they are well known within their field and thus contribute to the prestige of the institution.

Caveats and Limitations

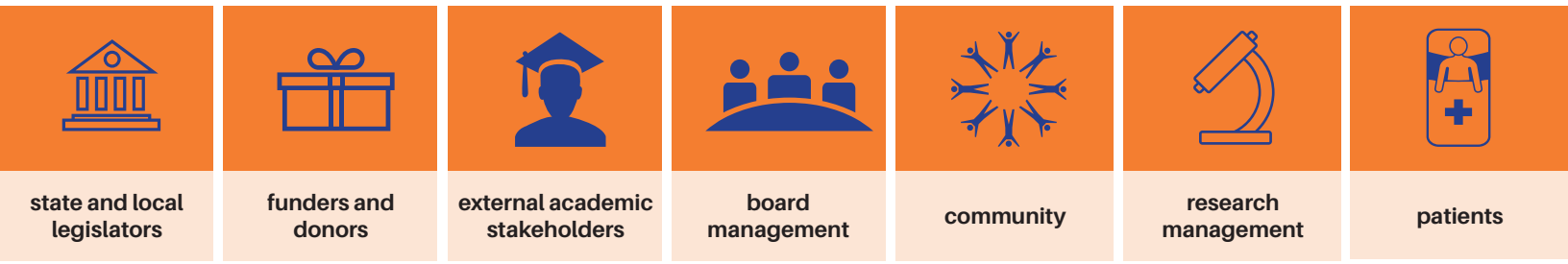
This metric is related to research excellence, but it is not a reliable measure of research quality across the institution. It could be that prestigious researchers who hold editorial positions do little research themselves, or are only involved with a very small percentage of the research at the institution.

Alternatively, individuals may be invited to join editorial boards for reasons other than research excellence, such as professional networks and relationships with other researchers.

Systematically defining what constitutes a high-profile journal is difficult. There is no perfect way to draw up a list of high-profile journals: They could be defined by the perceptions of researchers, level of citation, or even circulation. The most widely available journal based citation measure—Journal Impact Factor—has been widely criticized (for example, see the San Francisco Declaration on Research Assessment <http://www.ascb.org/dora/>).

Source
Records of external academic bodies; PI survey

11



RESEARCH
PRESTIGE
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PROCESS
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POLICY
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ECONOMICS

Number of staff on relevant boards and committees

Description

This metric measures the number of research staff at the institution with memberships on policy-relevant medical, scientific, philanthropic, or community boards and committees.

The metric is an indicator of an institution's prestige, the strength of the institution's relationships with policymakers, and the scale of the institution's likely impacts on policy. Membership on boards and committees demonstrates that researchers are highly regarded in their field by external stakeholders (assuming that those stakeholders are responsible for selection of board members). Such memberships also demonstrate dialogue between researchers at the institution and policymakers, so the metric also provides a proxy for potential impacts on the policymaking process.

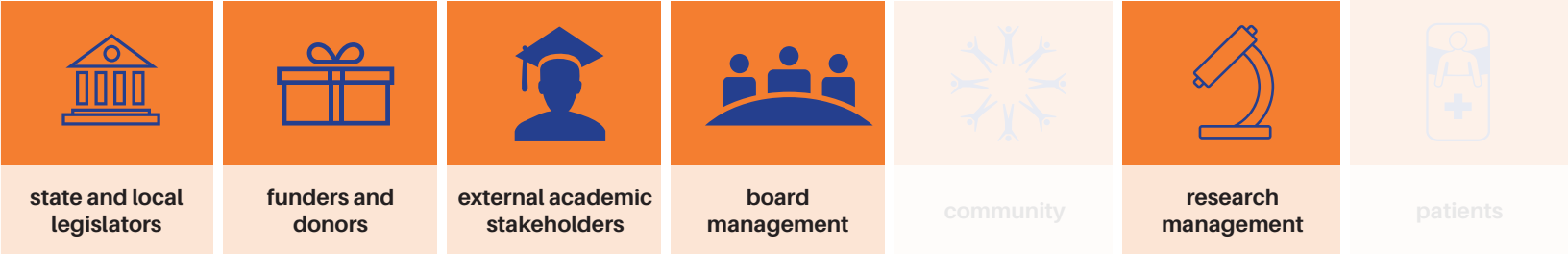
Caveats and Limitations

This metric focuses on a subset of researchers and hence may not reflect the overall research strengths or weaknesses of the full range of research at an institution.

This metric measures impacts of policy indirectly and so should ideally be used alongside other metrics. Also, board memberships are only one route to making an impact on policy or practice, and therefore may not reflect all policy-related activity occurring in an institution.

Source
Bibliometric analysis of guidelines—both citations and authorship; PI survey

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RESEARCH
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ECONOMICS

Number of academy members

Description

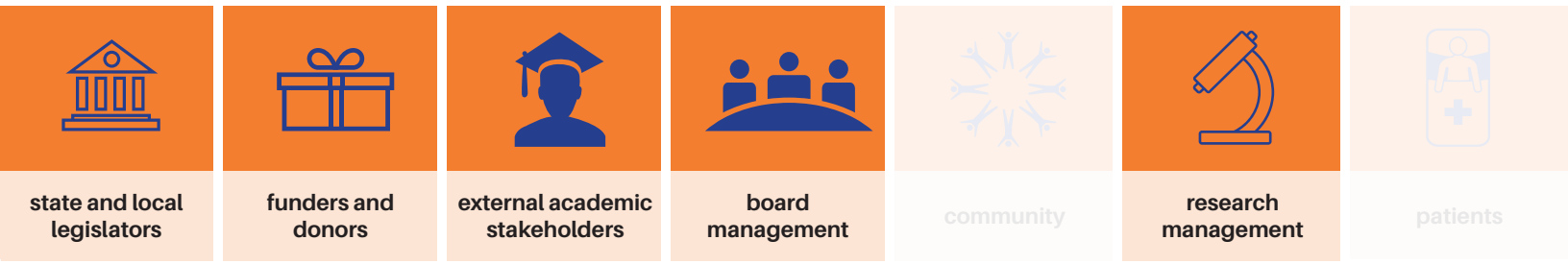
Many academies award membership based on merit, so the number of staff who have been granted membership to such academies is a reflection of the wider community's recognition of the research excellence at an institution.

Caveats and Limitations

Although many academies award membership based on merit, the processes by which they do so may not be transparent. Furthermore, because membership is often awarded by current members, there is potential for bias. Finally, because membership is generally awarded for "lifetime achievement," this measure is biased against younger researchers.

Source
Records of external academic bodies

13



RESEARCH
PRESTIGE
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ECONOMICS

Number and type of prizes

Description

Prizes are an indicator of an institution's or individual's academic research excellence and prestige. They provide an external validation of the quality of recipient's research and hence, the number and type of prizes received can act as a proxy of research quality.

In using this metric, it is necessary to decide on the various types of prizes to be tracked. This could be done by categorizing the reason for the prize (e.g., a scientific breakthrough, a long-term contribution to a field, or an innovative solution to a problem) or the form the prize took (e.g., a monetary award for the researcher or a prestige award without a monetary component). It may also be useful to separately track particularly prestigious prizes, such as Nobel Prizes, Lasker Awards, and awards from the American Association for Cancer Research, American Academy of Neuroscience research, and BioMed Central.

Caveats and Limitations

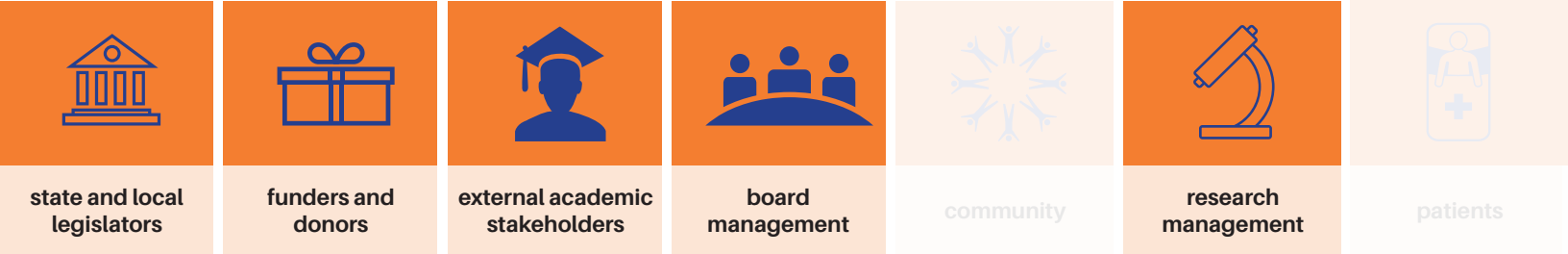
While this metric is a measure of academic research quality, it does not assess the full range of research undertaken across the institution. It could be the case that prestigious researchers who win research prizes are involved with only a very small percentage of the institution's research.

High-quality research is not necessarily recognized through prizes, so a low number of prizes received does not necessarily indicate that an institution's research is of poor quality. The likelihood of receiving prizes may also differ between different research fields.

Where prestigious prizes are separately tracked, it is necessary to define what counts as a "prestigious" prize, and consistently maintain what is included.

Source
Records of external academic bodies; PI survey

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RESEARCH
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ECONOMICS

Number of speaker invitations/conference invitations

Description

This metric reflects academic research excellence and prestige, and acts as a proxy of career development for researchers at the institution, assuming that those approached to speak at events or conferences are well known in their field for carrying out high quality research.

The metric measures the number of speaker invitations received by research staff at the medical school or teaching hospital over a given period of time. It can show how invitations increase as a researcher progresses through his or her career. It may also be of interest to break out national and international speaker invitations, with international invitations being indicative of a wider reach of the research.

Caveats and Limitations

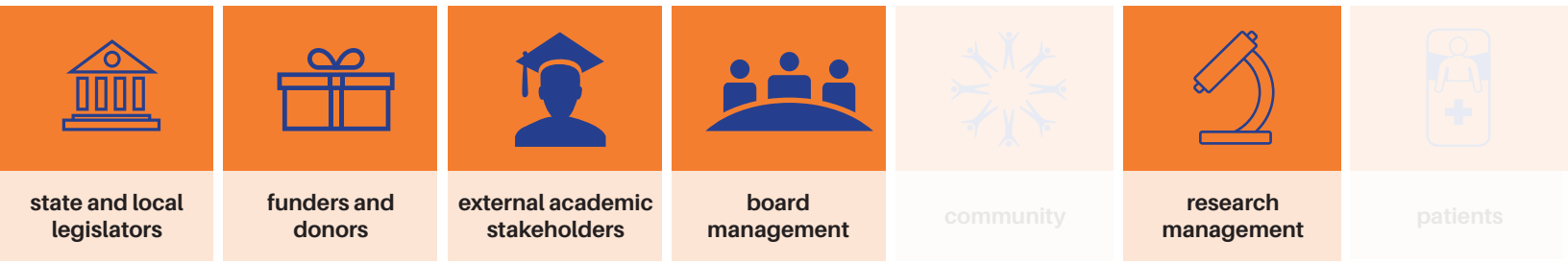
This metric does not directly assess the quality of research undertaken at the institution. Researchers who are invited to speaking events may be involved with only a small percentage of the research at the institution. Invitations may also be made for reasons other than research excellence, such as international collaborations or networks with conference organizers.

If assessing overall progress over time, it is important to account for new recruits to the institution. It should be clear which members of staff are included in the data from one period to the next (and how new members of staff may affect the numbers).

The pattern of invitations may vary across research fields. For instance, researchers in smaller fields may be more likely to receive invitations, or may have fewer conferences or opportunities to present.

Source
PI survey

15



RESEARCH
PRESTIGE
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ECONOMICS

Number of media mentions

Description

This metric is a measure of public recognition and awareness of the institution and the research undertaken. It tracks the number of times the research institution or a particular project is mentioned on media sources over a given period of time.

It is important to decide how these data will be collected and which media sources will be monitored. It may be beneficial to use a press-clippings service that continuously monitors media outlets. To monitor mentions of particular projects, rather than the institution generally, separate searches or monitoring may need to be carried out.

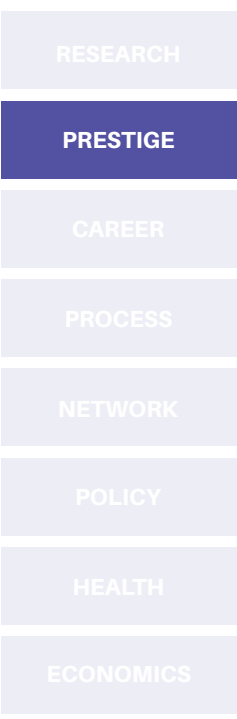
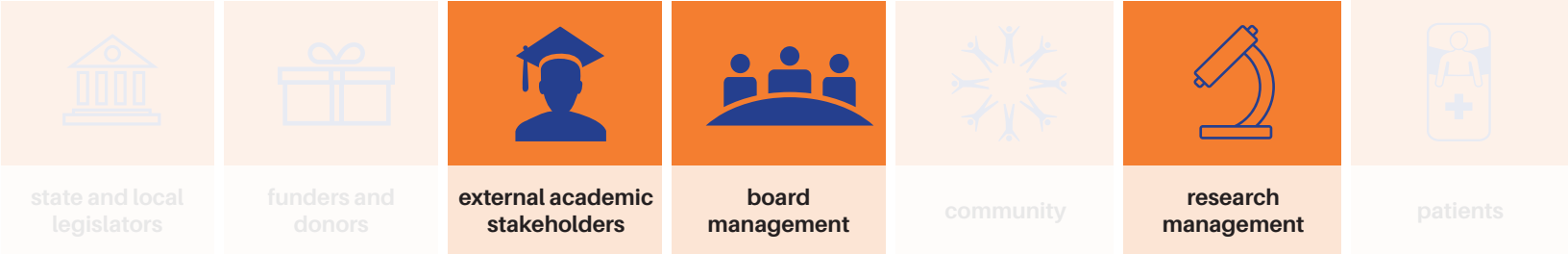
Caveats and Limitations

This metric does not account for negative media attention, so it is useful to collect qualitative information about the kind of attention the institution or research is receiving. This can be done via press-clipping services.

Not all media mentions will provide identifiable information about the specific project, or potentially even the institution/researcher in question. It can therefore be difficult to identify all media mentions, meaning that the figures collected will likely underrepresent the level of media attention received.

Source
Clippings service; PI survey

16



Number of applications per open post

Description

This metric is a measure of prestige, reflecting an institution's ability to attract talent based on its research reputation. It also acts as a proxy for the quality of incoming research students and staff, as institutions that attract high numbers of applications can be more selective in recruitment.

This metric is based on the number of applications for each position at the institution. This can be collected at two levels: (1) the overall number of applications compared with the overall number of posts and (2) the overall number of research job applications compared with the number of research job posts available.

Caveats and Limitations

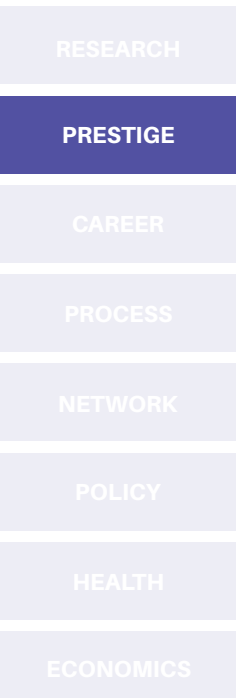
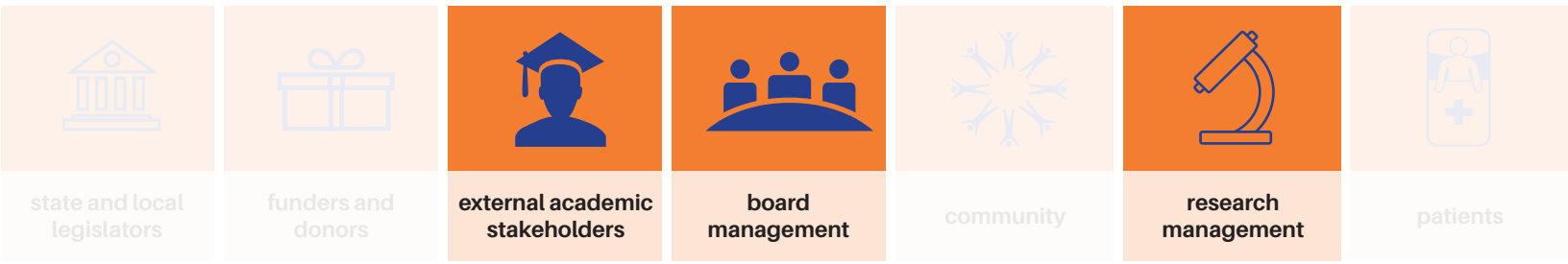
Other factors, such as salary, can also influence the number of applicants. Wider economic and geographic factors may also affect recruitment.

Although having a high number of applicants would suggest the institution can recruit more selectively, this metric does not directly measure the quality of personnel. To assess personnel quality, other measures (which can be used in conjunction with metrics about applicant numbers) are more appropriate.

It may be necessary to benchmark this metric to take into account external market conditions, where data are available.

This metric does not take into account difference between fields—for example, niche areas may have fewer applications.

Source
Analysis of research administrative documents



Percentage of out-of-state and international applications per research job/PhD post

Description

This metric assesses an institution's ability to attract talent based on its national and international research reputation. It acts as a proxy for the quality of incoming students and staff to the institution.

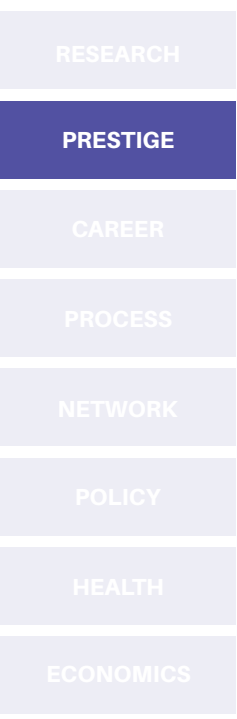
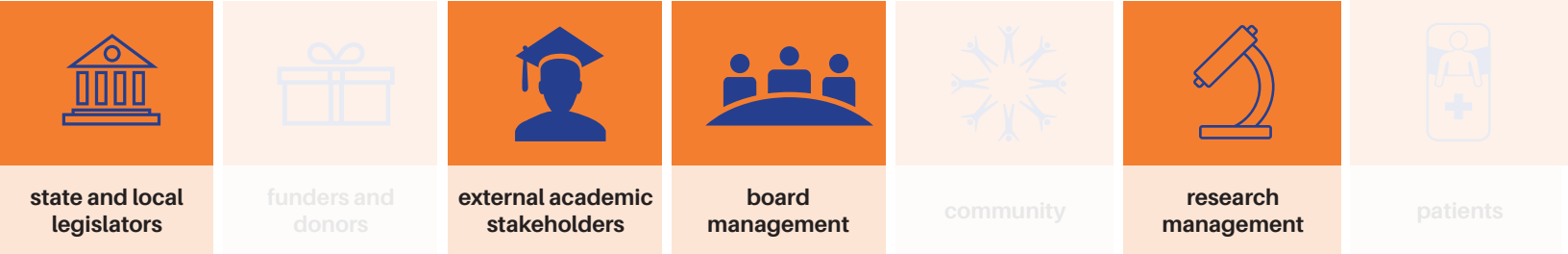
This metric consists of the percentage of applicants for each research job and PhD post who are based out-of-state or outside the United States. This information could be aggregated at the institution level to give four figures—percentage of PhD applicants coming from out of state and outside the country, and percentages of research job applicants coming from out of state or outside the country.

Caveats and Limitations

A high level of mobility on the part of the applicants does not necessarily equate to a high level of quality. And factors other than quality—such as salary—may also attract applicants. As a result, it is helpful to use this metric in combination with other measures of quality and research excellence.

It may be necessary to take into account external market conditions when using this metric and to benchmark the percentage of out-of-state and international applicants for the institution against those received by comparable institutions, where data are available.

Source
Analysis of research administrative documents



Track record of new hires

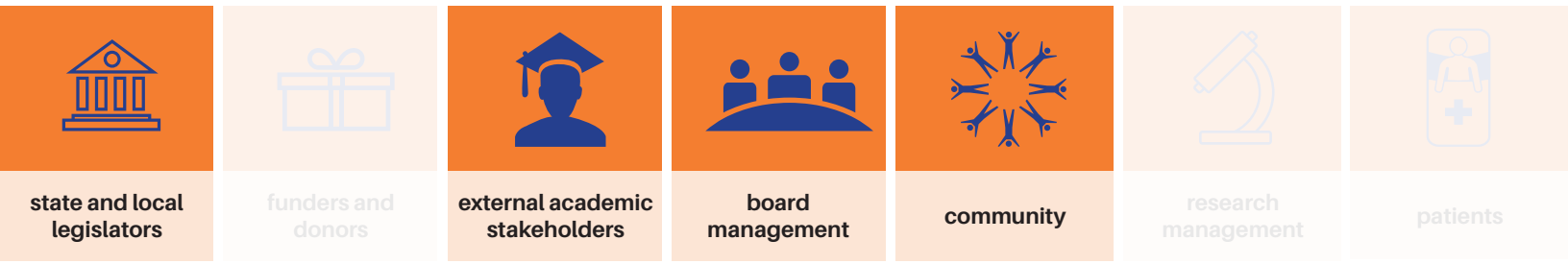
Description

The background of new hires provides an indication of the reputation and competitiveness of the academic medical center. Quality could be assessed through an individual's publication record, esteem measures (such as editorships), and/or grant track record.

Caveats and Limitations

Such measures capture only a narrow range of aspects of quality, and other skills and abilities of new hires may be equally important. In addition to quality, it is valuable to track diversity measures of new hires. Placing emphasis on the track record of new hires may bias against the hiring of early-career researchers, who are likely to have fewer publications and grants.

Source
 Wider staff survey; Analysis of research administrative documents; Staff interviews;



Undergraduate applications

Description

The number of undergraduate applications received by a medical school in the past year, and the ratio of applications to places, provides a measure of the school's attractiveness to applicants. This attractiveness will be partly determined by the quality of education and the prestige of the medical school, which are indirectly linked to the research of the institution. It may also be of interest to the community to understand the number of applicants from the local area.

Caveats and Limitations

Many factors will contribute to the attractiveness of an institution, including geographical location (e.g., the institution may be the only medical school in a region, or be located in a particularly desirable area), stringency of entrance criteria, and cost of living. Therefore, caution should be taken in directly relating this metric to research quality.

Source
 Wider institutional records



state and local legislators



funders and donors



external academic stakeholders



board management



community



research management



patients

RESEARCH

PRESTIGE

CAREER

PROCESS

NETWORK

POLICY

HEALTH

ECONOMICS

Grade point average of incoming students

Description

This metric reflects the ability of the medical school to attract talented students, by measuring the overall GPA of all students entering the medical school in a given year. Data from all students should be aggregated and presented at the institution level.

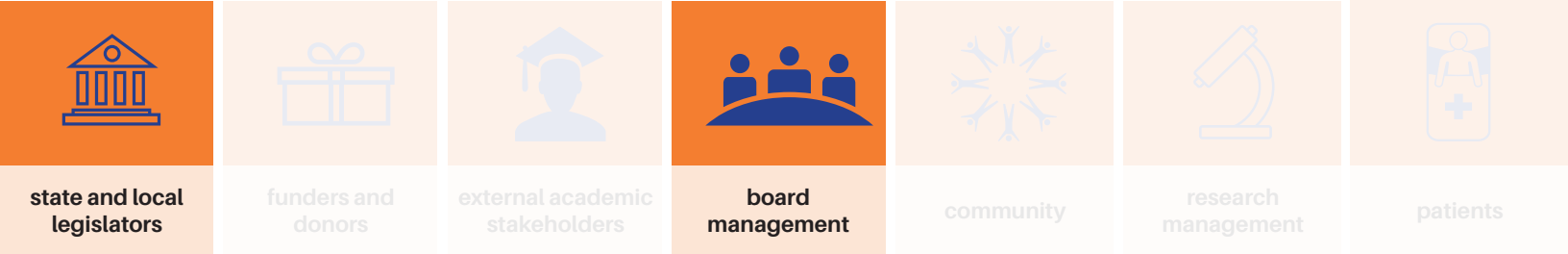
Caveats and Limitations

While GPA is a measure of the “quality” or talent of students attracted to an institution, it is a very narrow metric that assesses only one aspect of a student’s abilities. Because interviews and written tests are also often considered when assessing the quality of incoming students, GPA should be reported with caution.

GPA norms can differ from institution to institution, and this should be borne in mind when comparing across institutions.

Source

Wider institutional records



- RESEARCH
- PRESTIGE
- CAREER**
- PROCESS
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

Grade point average of graduates

Description

This metric is a measure of the quality of research-led teaching at an institution and, to some extent, the institution's prestige in attracting the best quality students (assuming that students who attain high grades are the most talented on arrival at the medical school).

This metric is based on the overall GPA of all students graduating from the medical school or teaching hospital in a given year. Data from all students should be aggregated and presented at the institution level.

It might also be possible to measure the difference between starting and leaving GPA of students, providing an indication of the quality of education provided, which may link to the quality of the research.

Caveats and Limitations

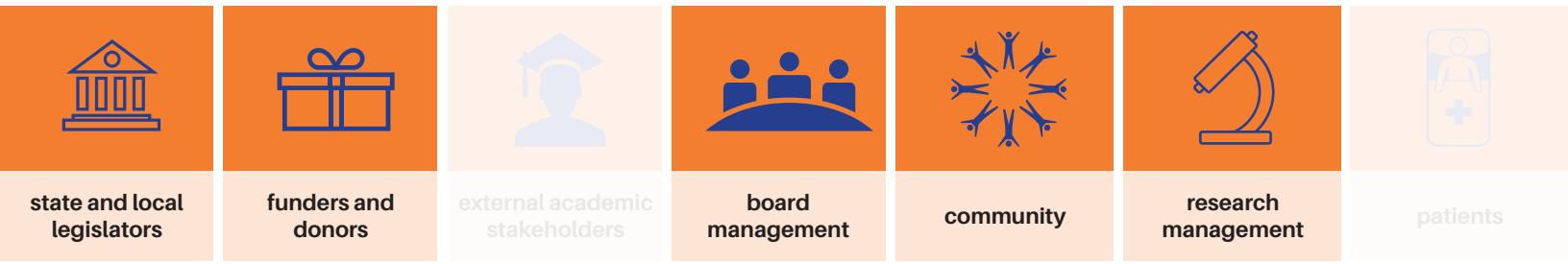
Linking this metric to research quality assumes that high-quality research feeds into high quality teaching at an institution.

It may be difficult to disentangle the extent to which high GPAs can be attributed to the quality of teaching as opposed to the quality of incoming students. Looking at the difference between starting and leaving GPA may partially address this issue.

Grading practices can differ from institution to institution; this should be borne in mind when comparing across institutions.

Source
Educational outcomes and workforce tracking data; Wider institutional records

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- RESEARCH
- PRESTIGE
- CAREER**
- PROCESS
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

Longitudinal data on career progression of students

Description

Longitudinal data on students' career progression track students after they have completed their degree. Such a metric can be used to illustrate the impact that a particular institution has had on the professional development of the workforce through the skills it has provided to its students. As such, the data can be used to measure wider, societal impacts of education in terms of workforce development.

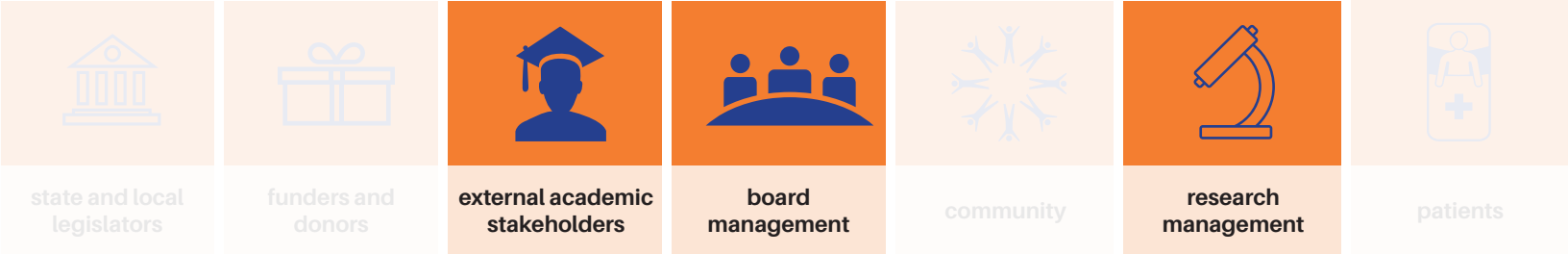
Caveats and Limitations

Many factors influence a student's career. For example, students may have acquired the skills they needed for their career at other institutions, or through other activities.

It can be difficult to keep track of alumni over the timescale required to track long-term career outcomes—though websites such as LinkedIn and Facebook have made the process considerably simpler.

Source
Educational outcomes and workforce tracking data; Alumni survey

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- RESEARCH
- PRESTIGE
- CAREER**
- PROCESS
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

Number of PhD graduates

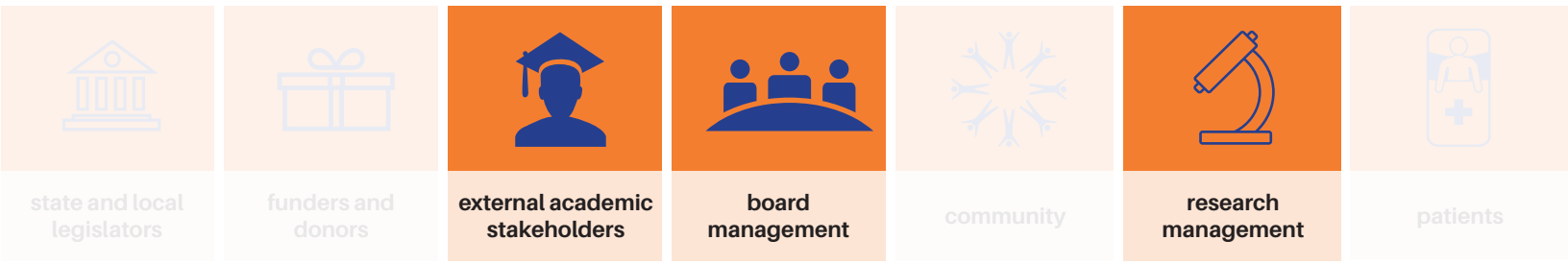
Description

This metric measures the number of PhD students graduating from the medical school or teaching hospital every year. This number is a function of both the size of research training facilities at the institution and the level of success of research students at the institution. This latter aspect is influenced both by the quality of teaching at the institution and the quality of incoming students.

Caveats and Limitations

This metric provides information on scale of the research student education at the institution. It is difficult to determine whether success or failure should be attributed to teaching, external factors, or the quality of incoming students. Therefore, these inferences should be made with caution.

Source
 Educational outcomes and workforce tracking data; Analysis of research administrative records



- RESEARCH
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- CAREER**
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- NETWORK
- POLICY
- HEALTH
- ECONOMICS

Completion rate of PhD graduates

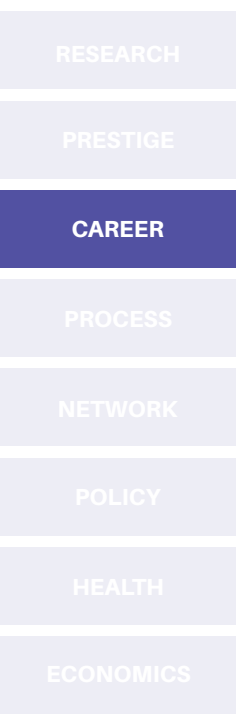
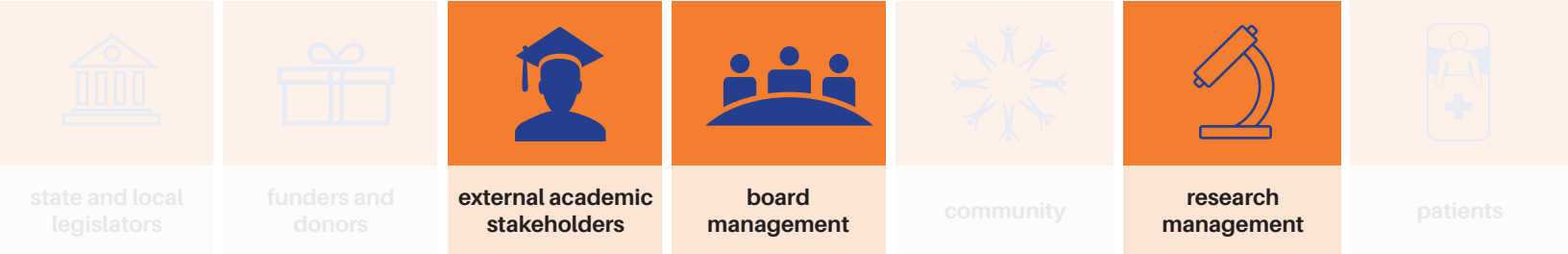
Description

This metric measures the proportion of PhD entrants completing the PhD within a given time frame (such as ten years). This gives an indication of the level of success of research students at the institution—demonstrating the quality of teaching as well as the quality of incoming students.

Caveats and Limitations

It is difficult to determine whether success or failure should be attributed to teaching, external factors, or the quality of incoming students. Therefore, these inferences should be made with caution.

Source
 Educational outcomes and workforce tracking data; Analysis of research administrative records



Number of publications per PhD

Description

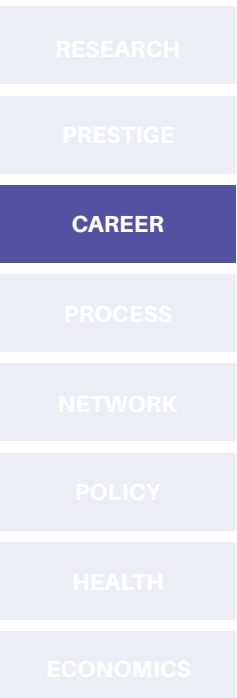
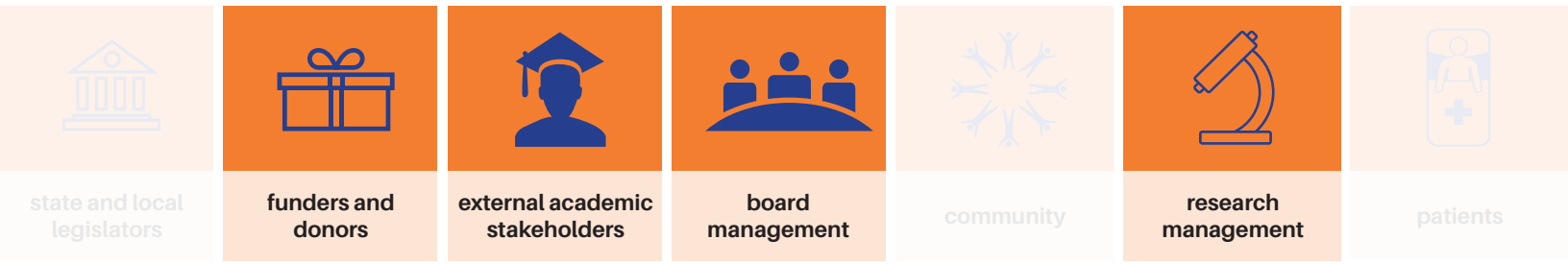
The number of publications per PhD graduate is a measure of the volume of publications produced by PhD graduates in a particular research group, unit, or institution. The number of publications per PhD graduate is based on a count of the number of publications that can be attributed to the PhD graduates of a specific research group, unit, or institution.

Caveats/Limitations

The number of publications per PhD graduate gives an overview of the volume of publications but does not provide any indication of their quality. For bibliometric measures, it is generally appropriate to include a measure of quality alongside a volume measure.

It is important to bear in mind that publication practices can differ substantially between research fields, so direct comparisons may be misleading. Bibliometric databases also focus largely on peer-reviewed journal articles and therefore often miss publications of other types, such as books and articles in trade journals; this emphasis is appropriate for much of biomedicine but is problematic for some disciplines, including nursing and other allied health professionals.

Source
 Analysis of research administrative documents; Bibliometric analysis of volume



5/10/15-year career outcomes for PhD students

Description

The metric measures an institution's ability to launch and develop careers for graduates, which may reflect the level of quality of research at the institution. It will be important for the institution to decide on when to collect these data—for example, should it measure five-, ten-, or 15-year career outcomes? Showing that graduates had favorable career outcomes in the five years following their PhD award may help make a medical school or teaching hospital more competitive in the wider job market.

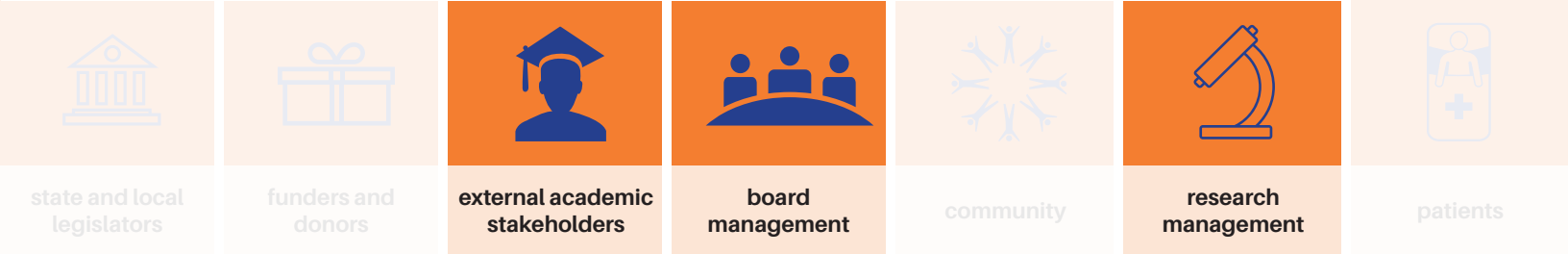
This metric can be measured through analyzing sources including alumni surveys, as well as educational outcomes and workforce tracking data.

Caveats and Limitations

Although this information demonstrates the strength of PhD graduates, it is difficult to determine whether success or failure should be attributed to research, teaching, external factors, or the quality of incoming students. Therefore, these inferences should be made with caution.

This metric may have a limited use for quantifying the impact of institutional research. However, qualitative narratives about successful PhD graduates can have significant impact and capacity to impress different audiences.

Source
 Alumni survey; Educational outcomes and workforce tracking data



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

K -> R award conversion rate

Description

This metric refers to the average time it takes researchers at the institution to mature from obtaining career-development grants to obtaining full investigator project grants. This provides an indication of the extent to which the institution hires good-quality researchers and nurtures them in their early careers.

The metric measures the average time from a researcher's first career-development award (a "K" grant if the funding is from NIH) to the first award of a full investigator project grant (an "R" grant if funding is from NIH).

Caveats and Limitations

This metric is affected by the quality of the researchers the institution is able to attract and may also depend on the fields in which the institution specializes.

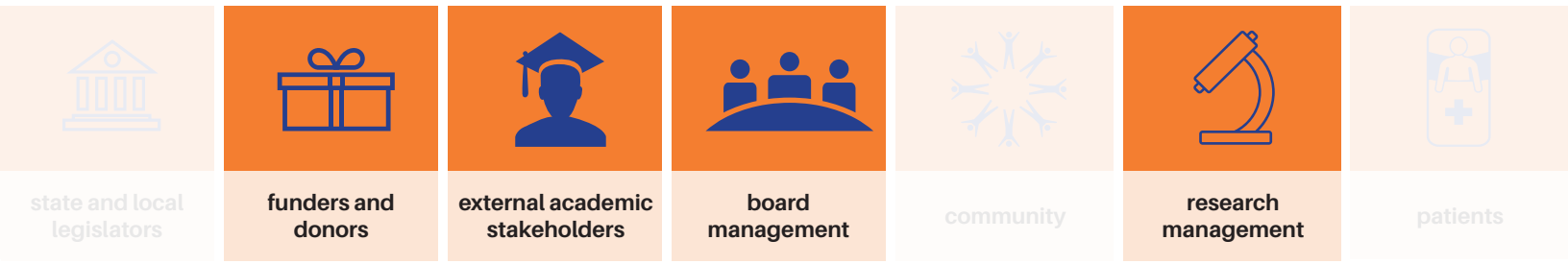
Grants from funders other than NIH may not clearly separate the early-career and mature-researcher funding streams.

It may be that this type of measure is only appropriate to some researchers, particularly if only NIH grants are considered.

Consideration also needs to be given to how to deal with researchers who leave research, or the institution, before they reach the "R" grant stage. Excluding them from the measure could bias the sample in favor of more successful researchers, but including those who leave research altogether may not be possible. For those who take up research posts elsewhere, it may still be possible to track their outcomes, but the credit for supporting those individuals must be shared with other institutions.

Source
 Analysis of research administrative documents; Funder records (including NIH REPORTER)

It should also be noted that researchers who leave academia before reaching a senior level should not be considered failures. It may be that researchers are nurtured at the institution and encouraged to consider different opportunities, such as in industry or government.



RESEARCH
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Career outcomes for researchers

Description

This metric measures career outcomes for researchers at particular intervals after their start date at the institution—five-year outcomes, ten-year outcomes, etc. To aggregate and analyze these data effectively, it will be useful aggregate across staff grades.

The metric aims to measure of the effectiveness of career development opportunities provided by the medical school or teaching hospital and the extent to which the institution seeks to promote staff internally or make them competitive in the wider job market.

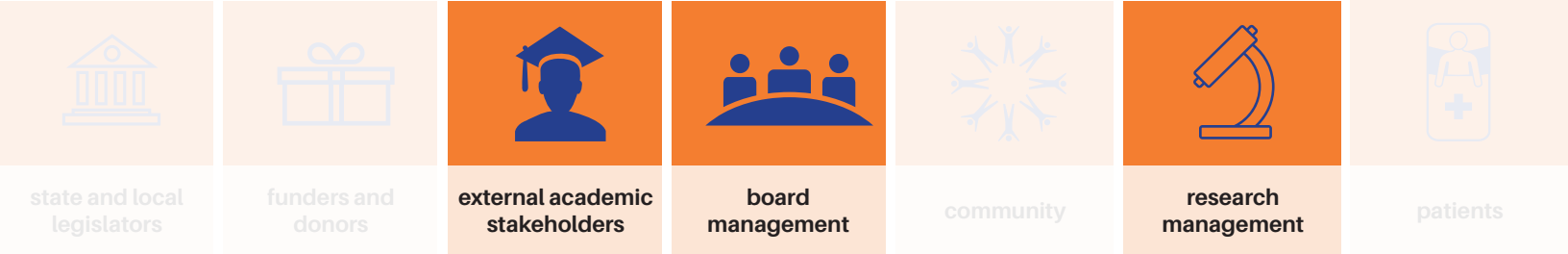
Caveats and Limitations

It may be difficult to track staff who have left the organization—though websites such as LinkedIn and researcher IDs (e.g., ORCID) now make this much easier.

It may be difficult to categorize career outcomes across institutions with different staff structures and grades.

Alongside a measure of the effectiveness of the internal support provided by the institution, staff success is also a reflection on the hiring process of the organization, in selecting the most ambitious and motivated candidates to recruit.

Source
 Alumni survey; Educational outcomes and workforce tracking data



RESEARCH
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POLICY
HEALTH
ECONOMICS

Subject coverage of the professional development program

Description

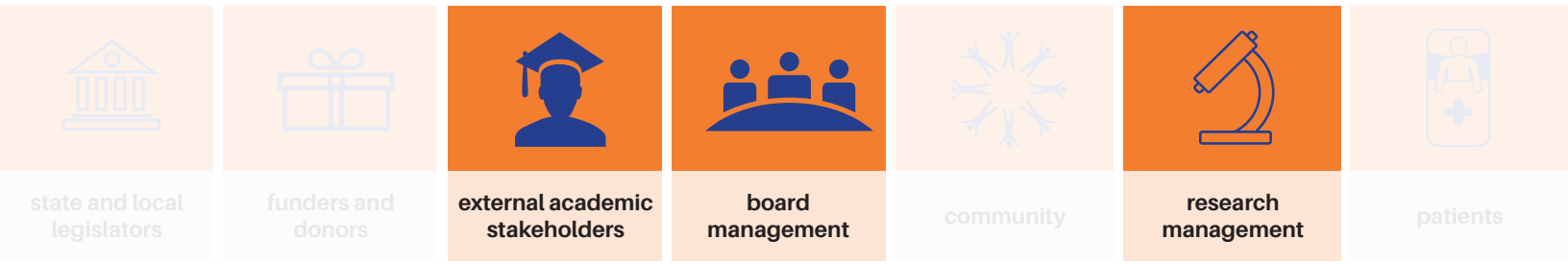
This metric consists of a summary of the content of the professional development program, the types of skills development supported, and the way in which it is delivered. It indicates the nature and quality of the professional development provided to staff.

Caveats and Limitations

A list of the areas covered by the professional development program does not, on its own, indicate the quality of the program. It does indicate whether an appropriate range of topics is covered, but such a list would be best considered alongside wider metrics about the professional development program.

Source
Internal policy documents

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RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
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ECONOMICS

Uptake of the professional development program

Description

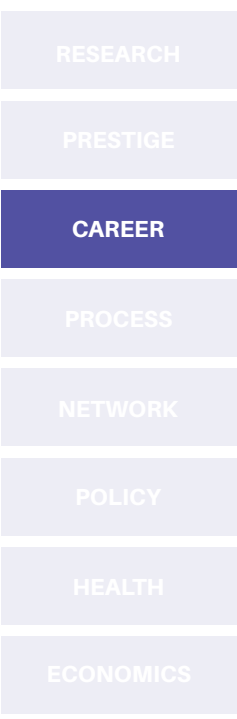
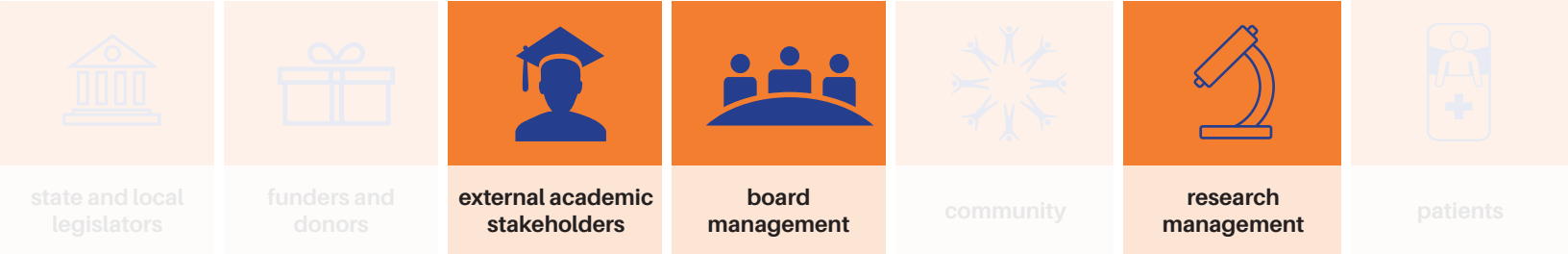
This metric provides an indication of the quality of the professional development program. It tracks the number of people participating in the professional development program over a period of time, which may be recorded as a percentage of all research staff or an absolute number of participants.

Caveats and Limitations

Uptake may depend on the profile of the staff at the institution (e.g., level of seniority), the availability of other external training opportunities, competing time pressures, and the level of importance placed on training. The size of the institution should be taken into account when comparing across institutions.

Source
Analysis of research administrative documents

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Feedback on the professional development program

Description

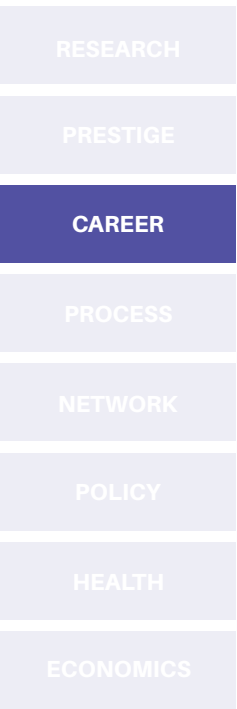
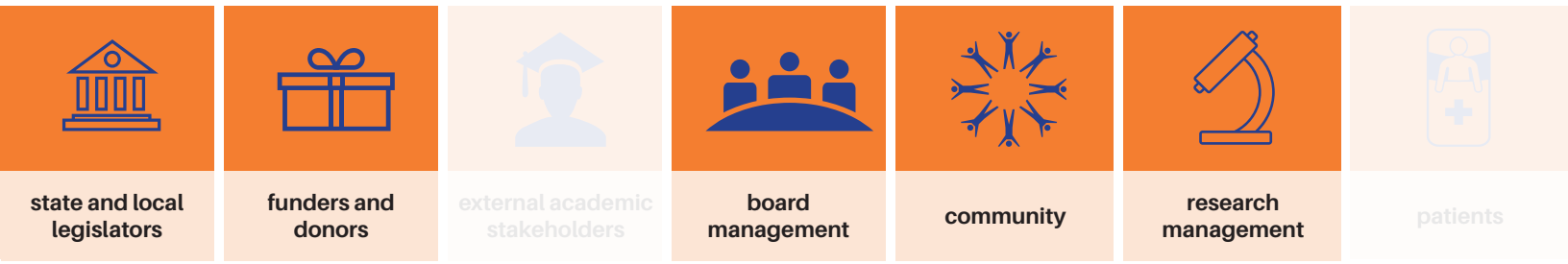
Feedback from participants in professional development programs could come from simple questionnaires given to participants at the end of courses or events, and from more general surveys of the entire staff about the program. These data provide information on the quality of the professional development program and suggest areas to change or develop.

For end-of-course questionnaires, a series of consistently used questions, such as “How useful was this course?” and “Did this course meet your expectations?” with tick box responses, supports comparability. These questions could be supplemented with space for wider comments and suggestions of ways to improve the course. A survey of all staff could follow a similar format, with questions focusing on the professional development program more broadly.

Caveats and Limitations

There are trade-offs between end-of-course questionnaires and more general staff questionnaires. End-of-course questionnaires will collect only the views of those who have chosen to attend courses, whereas a survey of the entire staff is likely to receive a lower response rate and provide less feedback specific to individual courses.

Source
Feedback forms from events and courses



Improved educational attainment/reduced drop-out rate at schools touched by outreach programs

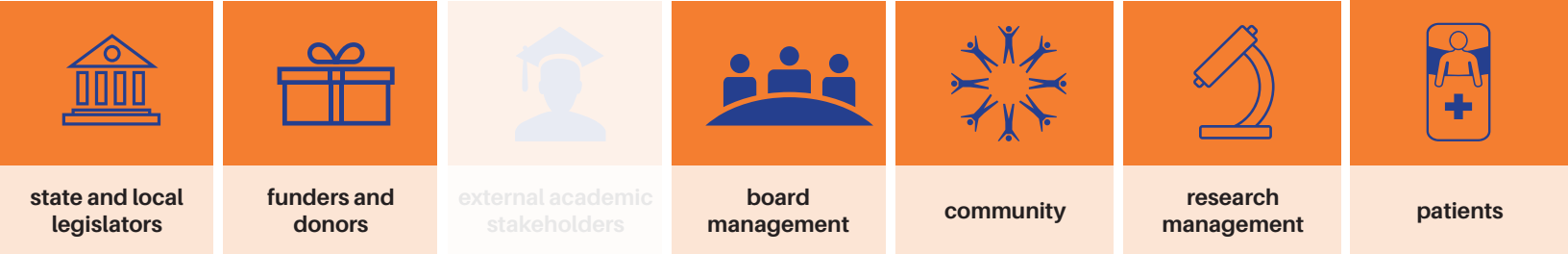
Description

This metric aims to capture the impact of the institution and its researchers on community education, through the researchers’ outreach and community-engagement activities. Two educationally important measures are changes in attainment, such as exam performance, and the drop-out rate from education at the schools (or other educational settings) engaged.

Caveats and Limitations

The key caveat with this metric is the indirect link from outreach to educational attainment—many other aspects of the educational programs will affect program outcome. The challenge is to focus the data collection to isolate the effect: For example, if researchers are working with a number of schools on a regular basis, data of interest could be the change in performance at those schools over time, and comparisons to other similar schools in the area. This could be supported by discussions with staff and pupils and the school to get their perspectives on the benefits that the outreach has provided.

Source
Educational outcomes and workforce tracking data



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS**
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

Start-up time for research projects

Description

This metric aims to measure efficiency in processing funding and preparing for the beginning of a research project—including efficiency of completing ethics reviews, interacting with community partners, recruiting patients (if applicable), and recruiting to posts directly funded by an individual project.

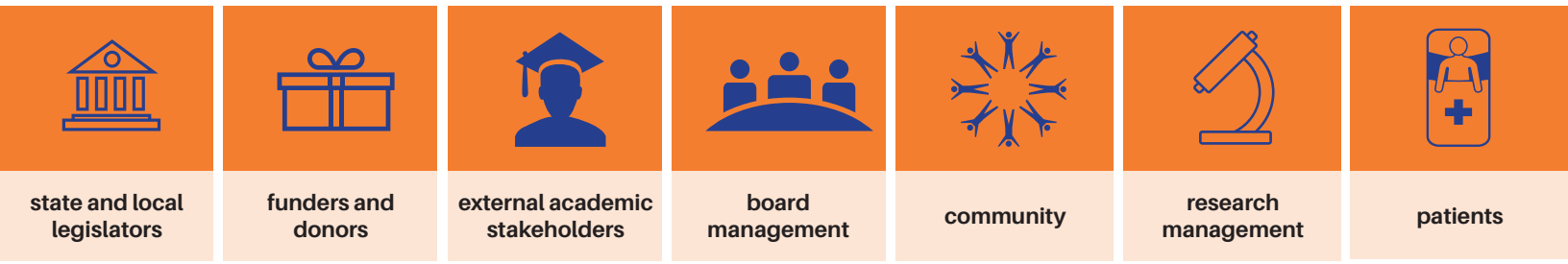
It is important to define how time will be measured (i.e., number of days, number of working days etc.) and what marks the start of a research project (this will vary depending on the nature of the project, but it could be based on the point when personnel, equipment and financial resources are in place).

Caveats and Limitations

External factors may prevent the timely start of research projects after funding has been received, and this should be accounted for when recording the information for this metric.

Placing emphasis on this metric may encourage rushing to start research projects without due care and attention to ethics requirements and important preparatory procedures. Care should be taken to ensure this does not happen.

Source
Analysis of research administrative documents



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS**
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

Start-up time for clinical trials

Description

This metric aims to measure efficiency in processing funding and starting clinical trials—including efficiency of completing ethics reviews, interacting with community partners, and recruiting patients.

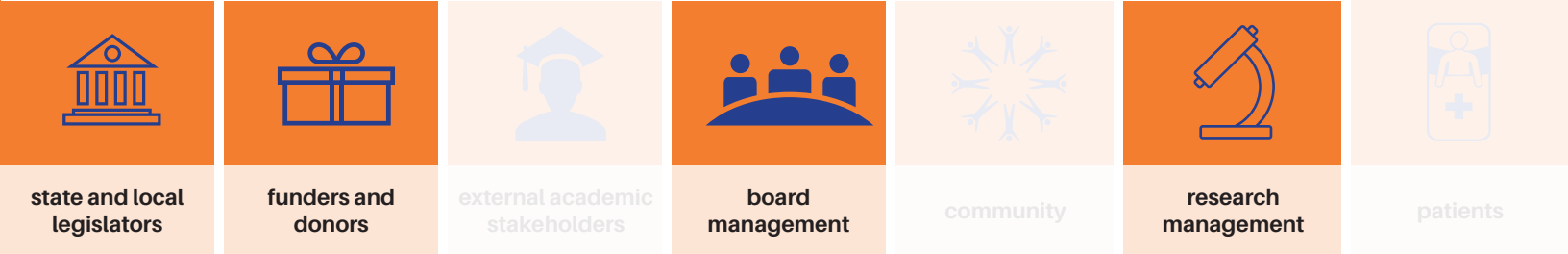
It is important to define how time will be measured (i.e., number of days, number of working days etc.) and what marks the start of a trial (e.g., the point when the patient recruitment starts or the point at which recruitment target is met).

Caveats and Limitations

This metric is appropriate only for research involving clinical trials, so it measures the efficiency of only a particular set of research processes. Other types of research will require other efficiency measures.

Placing emphasis on this metric could incentivize starting clinical trials more quickly than is desirable, without due care and attention to ethics requirements and important preparatory procedures.

Source
Analysis of research administrative documents



RESEARCH
PRESTIGE
CAREER
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NETWORK
POLICY
HEALTH
ECONOMICS

Time from funding to publications

Description

This metric tracks the average time between receipt of funding for a research project and the project's first publication. The metric aims to measure efficiency in conducting research and disseminating the findings.

Given that the metric is based on an average, it will need to draw on data across the whole research portfolio. In using this metric, it is important to define the start and end points—such as the date when the funding was actually received by the institution and the date when the publication was made available to the public (rather than when it was accepted by the journal, etc.).

Caveats and Limitations

Use of this metric could encourage researchers to rush research and publication in an attempt to improve apparent efficiency. Thus, this metric should be used alongside measures of research quality to ensure that quality is not being sacrificed for speed.

A wide range of factors, including the research field, can influence publication speed. Clinical trials, for example, take a long time to set up relative to lab-based research. These factors need to be taken into account.

Source
Funder records (including NIH REPORTER)



RESEARCH
PRESTIGE
CAREER
PROCESS
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ECONOMICS

Proportion of funds spent on administration

Description

This metric tracks the proportion of research spending devoted to administration. It is a measure of efficiency, giving an indication of whether too little or too much money is being spent on research administration.

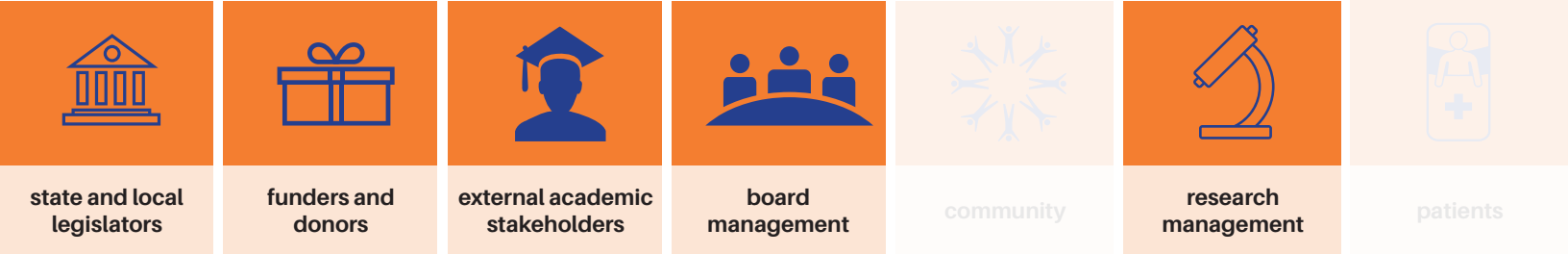
When using this metric, institutions must define which activities are research administration activities. One approach would be to consider all nonresearch activities in a research department to be administrative activities.

Caveats and Limitations

To provide meaningful information about efficiency, this metric must be interpreted in light of data from other metrics. For instance, if the proportion spent on research administration is low and research performance measures are good, it would suggest the right amount is being spent on administration. If spending is low and performance is poor, there may be a need to invest more in research management and administration.

It would be useful for this metric to have comparator data from other institutions to understand what is a “low” or “high” level of spending on research administration at an academic medical center. However, this will likely vary depending on the size of the center and the nature of the research conducted, so comparisons should be considered in the light of wider information about institutional differences.

Source
Analysis of research administrative documents



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS**
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

Support staff to researcher ratio

Description

The ratio of support staff to research staff is a measure of efficiency. It gives an indication of whether there are enough support staff for the institution (or research group or unit) to undertake research efficiently.

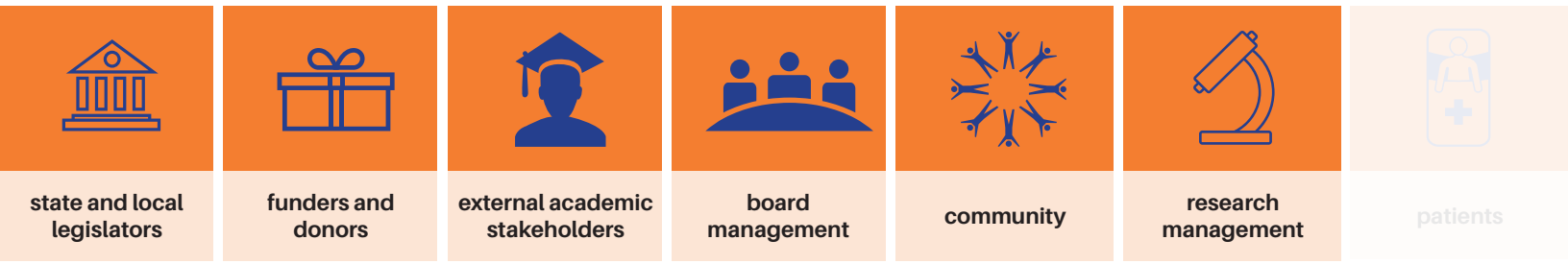
It is important to define research and nonresearch staff. One approach is to define research staff as individuals who do any tasks that are specific to research (even if they also do nonresearch tasks) and nonresearch staff as those who do no research activities at all.

Caveats and Limitations

To provide useful information about efficiency, this metric must be interpreted in light of data from other metrics. For example, if the ratio of support staff to research staff were low but research performance measures were good, it would suggest the balance of staff is appropriate. If the ratio were low and other measures of performance were poor, there may be a need for more support staff.

Source
Analysis of research administrative documents

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- RESEARCH
- PRESTIGE
- CAREER
- PROCESS**
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

Prompt payment of community partners

Description

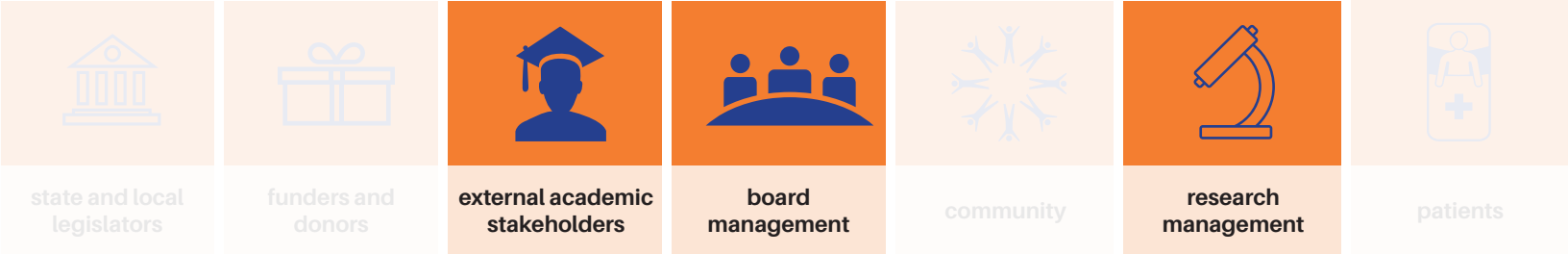
This is a measure of the quality of the interaction between the institution and community partners. Prompt payment may be very important to community partners who have a limited income and may be heavily dependent on timely payments. The metric could be defined as average time to pay community partner invoices or the fraction of invoices paid within a set time window—the choice may depend on which information can be most easily captured from the administrative system.

Caveats and Limitations

This metric captures only one element of the interaction of the community partners with the institution, and is focused on the administration rather than the research side (though this is also important).

Source
Analysis of research administrative documents; Survey of community partners

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- RESEARCH
- PRESTIGE
- CAREER
- PROCESS**
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

How hiring decisions are made

Description

This is a qualitative metric, capturing information on the way in which hiring decisions are made at the institution. It is likely to be a step-by-step description of the process, noting variations reflecting differences between grades, types of post, departments, etc. The intent is to allow reflection on the process and comparison between different options to support learning and improvement.

Caveats and limitation

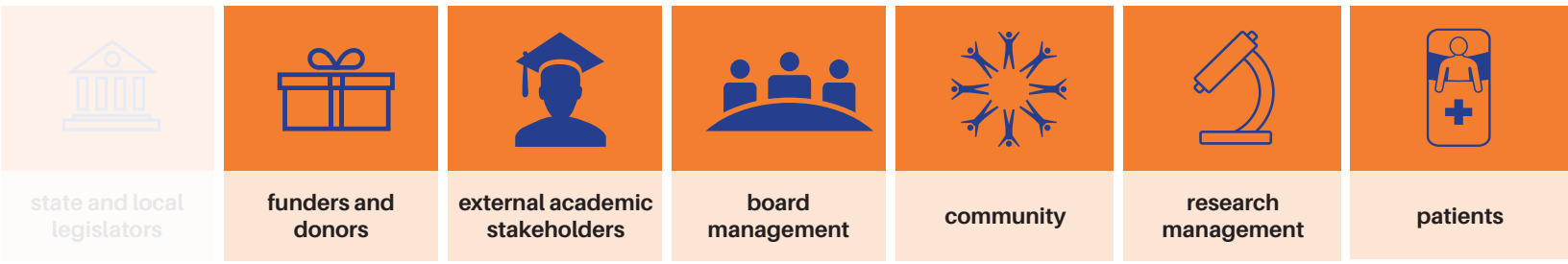
By itself, this metric may allow the identification of process flaws, but it is otherwise quite limited. The metric is more useful if considered alongside other metrics, such as staff turnover and information on the background of staff hired.

Capturing everything that is involved in a hiring decision as a step-by-step process can be challenging. There are many subjective elements within the decisionmaking process, and it may be difficult to capture these in a structured analytical way.

Source

PI interviews; Representative case studies

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- RESEARCH
- PRESTIGE
- CAREER
- PROCESS**
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

How decisions are made to apply for grants

Description

This is a qualitative metric, capturing information on how decisions are taken to apply for grants. It is likely to describe a multistep process that varies between researchers, departments, grant types etc. The intent is to allow reflection on the process and comparison between different variants to support learning and improvement.

Internal management at the board and research levels are likely to be interested in all elements of this decisionmaking process. For patients and communities, their interest will be focused particularly on the extent to which they are involved in decisionmaking and grant-writing process, and how far application decisions are based on their health needs.

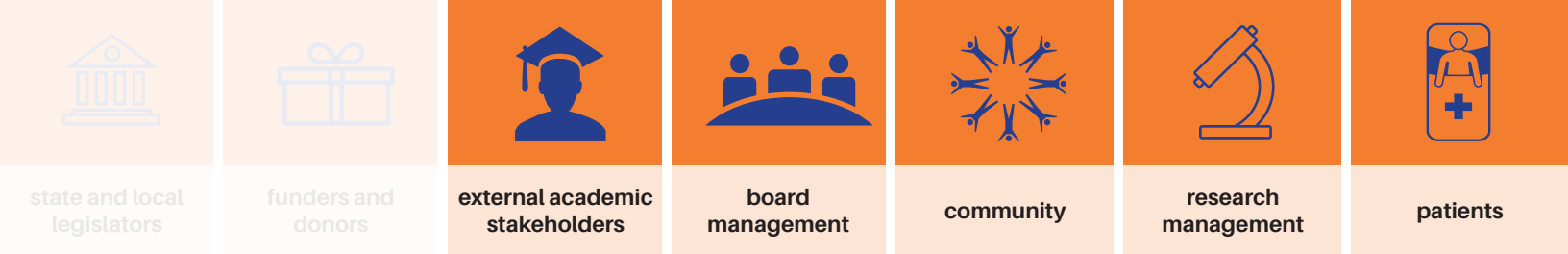
Caveats and limitation

By itself, this metric may allow the identification of process flaws, it but is otherwise quite limited. This metric is more useful if considered alongside metrics of application success rate and the resources taken to produce applications. It can also be challenging to capture the variation in the decision processes, which can be the source of much of the most valuable learning. Narratives about performance, focusing on specific examples, can be useful for this, particularly when tied to wider outcomes data, such as grant success rates.

Source

PI interviews; Representative case studies

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- RESEARCH
- PRESTIGE
- CAREER
- PROCESS**
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

How publication decisions are made

Description

This is a qualitative metric, capturing information on how publication decisions are made. It is likely to consist of a list of factors taken into account when deciding whether, where, and when to publish research results. Such a list is likely to vary by the research field. The intent of this metric is to support discussion of how publication decisions are made, what incentives drive those decisions, and how these factors align with researcher and institutional priorities.

For patients and the community, the interest here will be the extent to which they are involved in this decisionmaking process, and whether, where appropriate, they are listed as authors or their contributions acknowledged.

Caveats and limitation

This metric is most informative in the context of other publication metrics, such as acceptance rate and, potentially, bibliometric analysis of successful publication. However it is difficult to capture information on the success rate of publication efforts. Often, rejected papers are reworked and submitted elsewhere in different forms, or combined with other work and published later. However, because publication process takes up significant time and resources, making good decisions about where, when, and what to publish could improve the efficiency of the research process and ensure that research from the institution is more effectively disseminated.

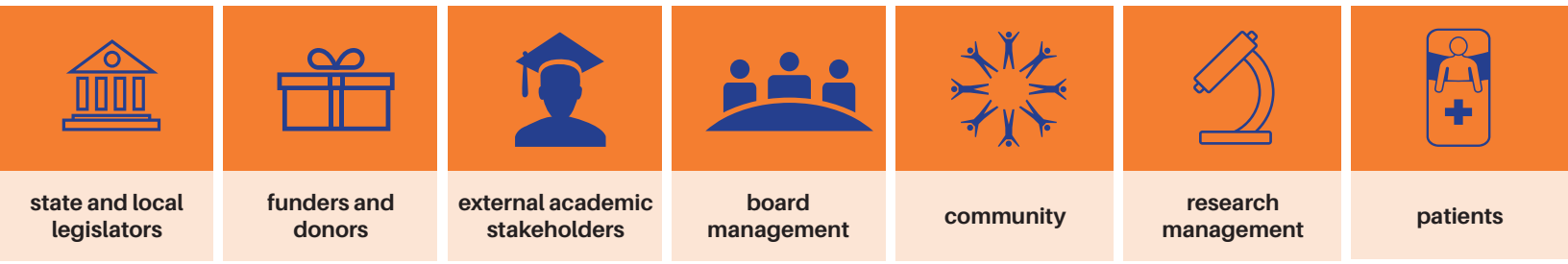
It is also important to think about how to use this metric. Because publishing decisions are often made by individual researchers, it is important to consider how any lessons learned will be communicated to staff. Involving senior researchers

in these discussions and framing them as an opportunity to share learning and good practice among staff at the institution could help ensure that the lessons are taken on board by the institution's research community.

Source

PI interviews; Representative case studies

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- RESEARCH
- PRESTIGE
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- PROCESS**
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

Proportion of publications that are open access

Description

This metric measures the proportion of publications from the academic medical center that are available through open access. Open access publication is generally divided into two types: In "Gold" open access, journals charge a fee to the authors and provide free access to the article through the publisher's website; in "Green" open access, the articles may be published by journals requiring a subscription but are also made available through an online repository, typically after some embargo period.

The metric is a measure of how far the medical college contributes to the wider (scientific) community by its making research openly available.

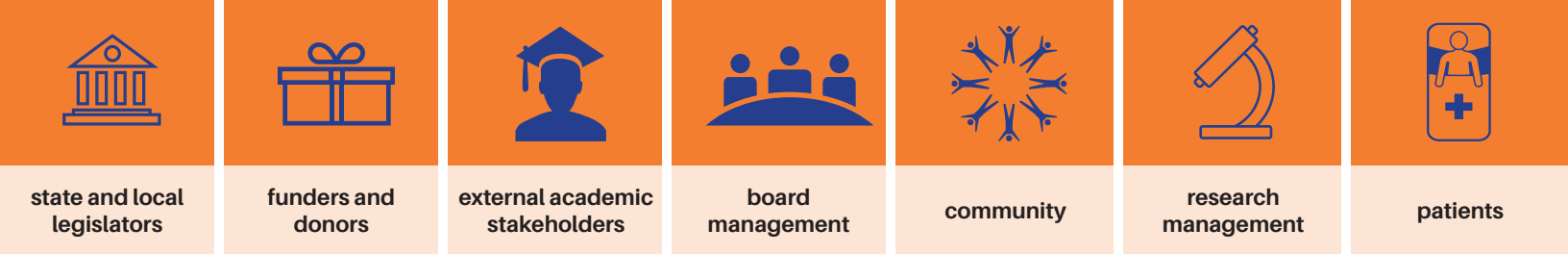
Caveats and Limitations

The extent of open access publication is not entirely within the academic medical center's control: It may be decided by the individual academics, and may also be determined by funder policy—whether the funder requires open access publishing, and whether it is willing to provide funding to cover Gold open access publication costs.

Source

Analysis of research administrative documents; Bibliometric analysis of accessibility; PI survey

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RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Proportion of trials where protocol and findings are published

Description

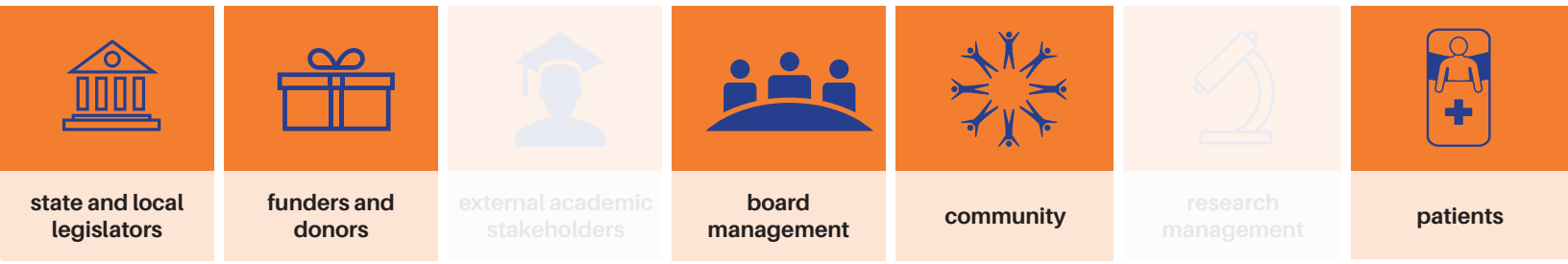
This metric measures the proportion of clinical trials for which the protocol was published before the study took place and the findings were published after the trial had finished. Publication includes publication in journals that require a subscription. The metric is a measure of how far the medical college contributes to the wider scientific community by making methods and results available for others. The community and patients prefer that this information be open and transparent; information that is limited to academic routes (e.g., publication in subscription journals) will likely not be considered beneficial from their perspective. This information could be collected through a document review of research administration documents.

Caveats and Limitations

It may be useful to include an “open access” element to this metric, as this type of publication makes the results open to the widest possible audience.

Source
Analysis of research administrative documents; PI survey

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RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Description of institution’s policy on health equity in research

Description

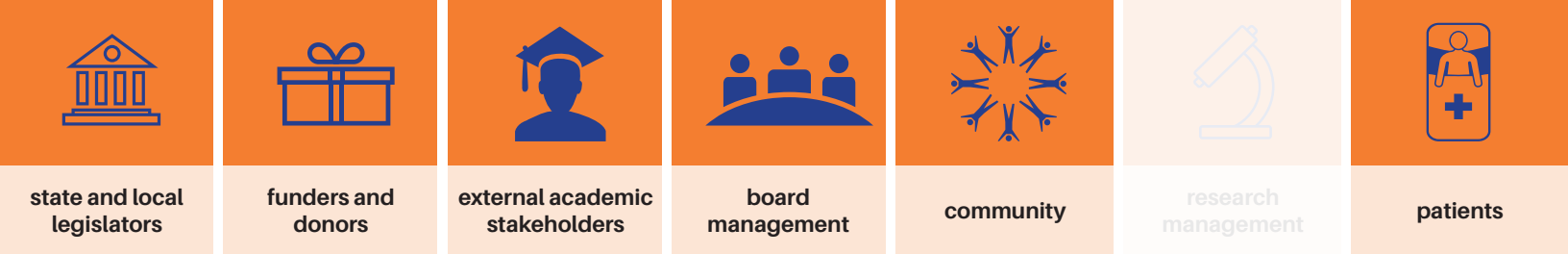
This qualitative metric collects information on institutional policy to address issues of health and health care equity through research undertaken at the academic medical center. The metric provides an indication of the emphasis placed on addressing health and health care equity issues through research, which may be of particular interest to community stakeholders. It also illustrates how health and research needs identified by the medical school or teaching hospital are viewed through an equity lens.

Caveats and Limitations

This indicator does not offer any measure of the implementation of the policy or of the policy’s quality. Alongside this indicator, it would be important to assess the extent to which the policy has been implemented. To get a sense of how the policy could be improved, it needs to be assessed alongside indicators of health and health care equity among patients, patient panels, and the broader community served by the institution.

Source
Internal policy documents

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- RESEARCH
- PRESTIGE
- CAREER
- PROCESS**
- NETWORK
- POLICY
- HEALTH
- ECONOMICS

Proportion of projects that consider health equity in their design and conduct

Description

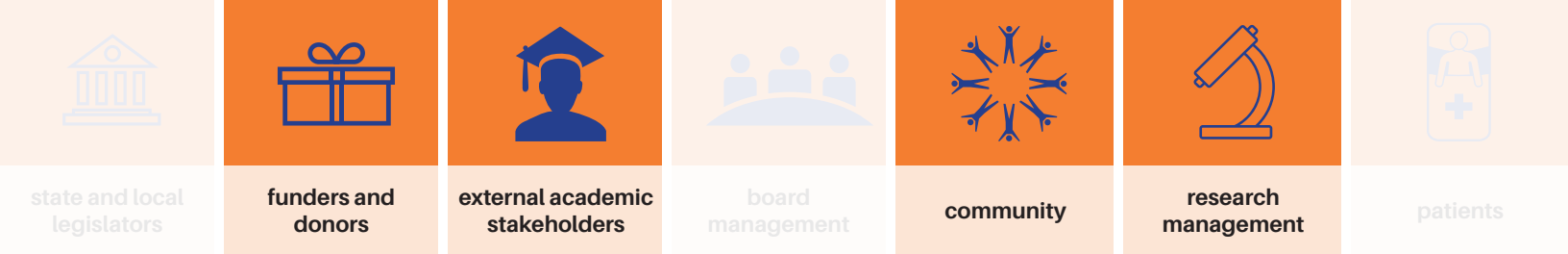
In tracking the proportion of projects that consider health equity, this metric seeks to assess how much emphasis the academic medical center places on this issue through research, an aspect that may be of particular interest to community stakeholders. It provides a way to assess how health equity concerns are balanced with the wider health and research needs identified by the medical school or teaching hospital.

Caveats and Limitations

The metric does not assess how health equity is being addressed or the outcomes achieved, so it is an upstream measure, providing an indication of the profile of health equity concerns rather than a measure of how effectively they are addressed.

Source

Analysis of research administrative documents; PI survey; PI interviews



- RESEARCH
- PRESTIGE
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- PROCESS
- NETWORK**
- POLICY
- HEALTH
- ECONOMICS

Number of collaborations on grant applications

Description

This metric measures the number of projects and grant applications undertaken by the institution in collaboration with outside groups over a given period of time (e.g., yearly intervals). It might also be valuable to look at the number of projects and grant applications with different collaborators, to see whether collaborations are with a range of other people, or with the same people many times.

The metric is a measure of the institution's external research networks and relationships. These are important because they provide opportunities for the institution to benefit from the expertise of others and for the diffusion and take up of knowledge generated at the institution. Networks with industry and the community can also be important for research translation, and may act as proxy measures for the prestige of the institution.

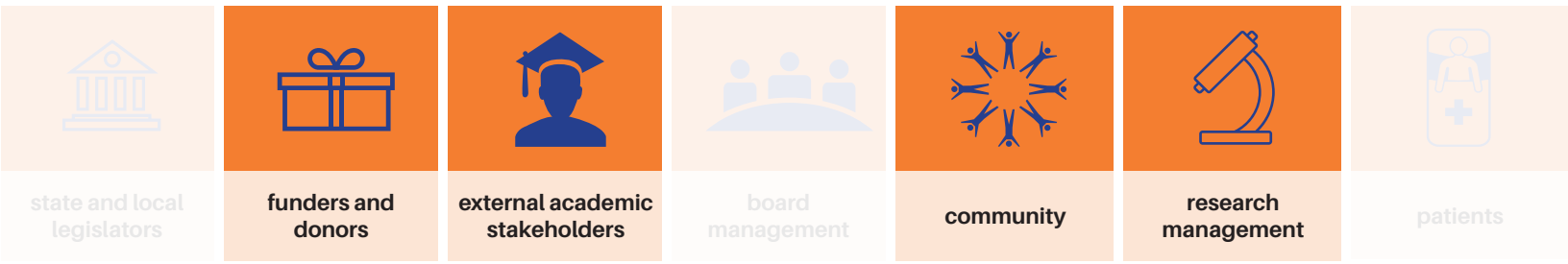
This information could be collected through a document review of internal research administration documents.

Caveats and Limitations

The existence of networks does not guarantee a high level of research translation. However, networks in and of themselves are an important mechanism of knowledge sharing and provide an indication of the level of linkage between an institution and its partners and community.

This metric does not provide information on the quality of collaborations or whether higher-quality research is resulting from the collaborations. Such information could be gathered from collaborating organizations regarding the performance of the medical college and the outcomes of the research in order to develop the metric further.

Source
 Analysis of research administrative documents; PI survey; Funder records



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS
- NETWORK**
- POLICY
- HEALTH
- ECONOMICS

Level of co-authorship

Description

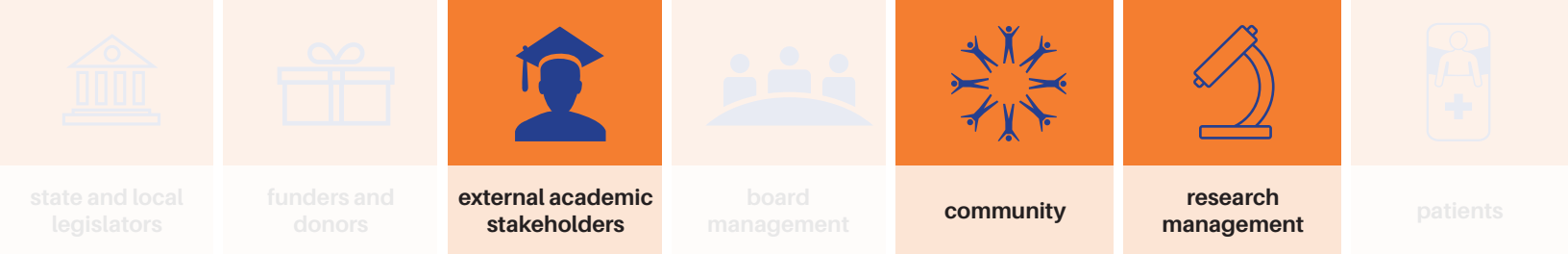
Levels of co-authorships indicate how often publications are produced through collaborations, and with whom. International collaborations in particular are often thought of as a measure of esteem.

Levels of co-authorship can be measured using bibliometric databases, as these provide details of each author's affiliation.

Caveats and Limitations

Publication practices can differ substantially between research fields, so direct comparisons may be misleading. For example, in some fields it is common practice to include large numbers of co-authors on projects (e.g., large-scale clinical trials) because of the scale of the work involved, whereas in other fields, it may be appropriate to have a smaller group of people involved in each project. Bibliometric databases also focus largely on peer-reviewed journal articles and therefore often miss publications of other types, such as books and articles in trade journals; this emphasis is appropriate for much of biomedicine but is problematic for some disciplines, including nursing and other allied health professionals.

Source
 Bibliometric measures of collaboration



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS
- NETWORK**
- POLICY
- HEALTH
- ECONOMICS

Bibliometric networks

Description

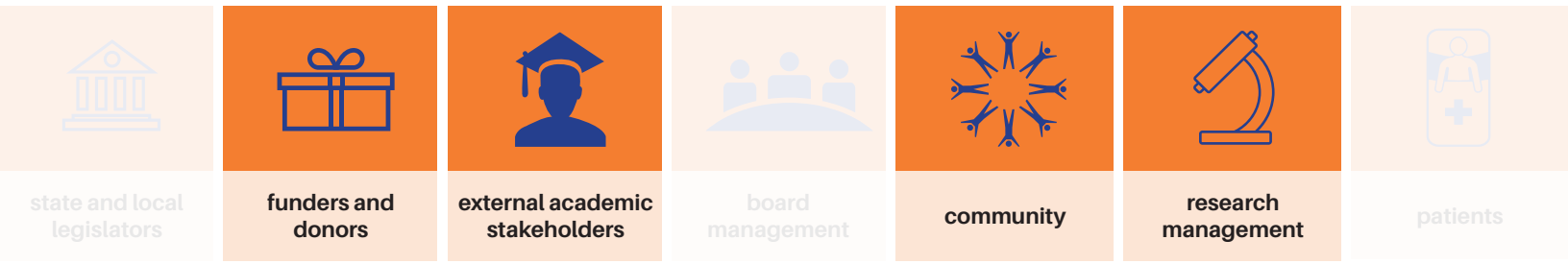
In addition to counting the number of publications produced by an academic medical center and examining measures of their quality, the links between publications can be explored. This analysis depends on building networks of publication—effectively linking researchers or their institutions through their publications. Such links can be made through co-authorship (being authors on the same paper), addresses (being based at the same institution), or funding acknowledgements (work supported by the same funder). Networks can reveal clusters of collaboration (within and between institutions) and also highlight areas where there is little communication.

Such networks can be visually striking as well as analytically valuable.

Caveats and Limitations

It is often not clear what an “ideal” level of collaboration should look like—so, in comparison to quality measures, where more is always better, researcher networks can be harder to interpret.

Source
Bibliometric analysis



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS
- NETWORK**
- POLICY
- HEALTH
- ECONOMICS

Total number of different collaborators across all projects

Description

This metric provides an indication of the medical college’s external research networks and relationships. These networks and relationships are important because they provide opportunities for the institution to benefit from the expertise of others and for the diffusion and take-up of knowledge generated at the institution. Networks with industry and the community can also be important for research translation, and may act as proxy measures for the prestige of the institution.

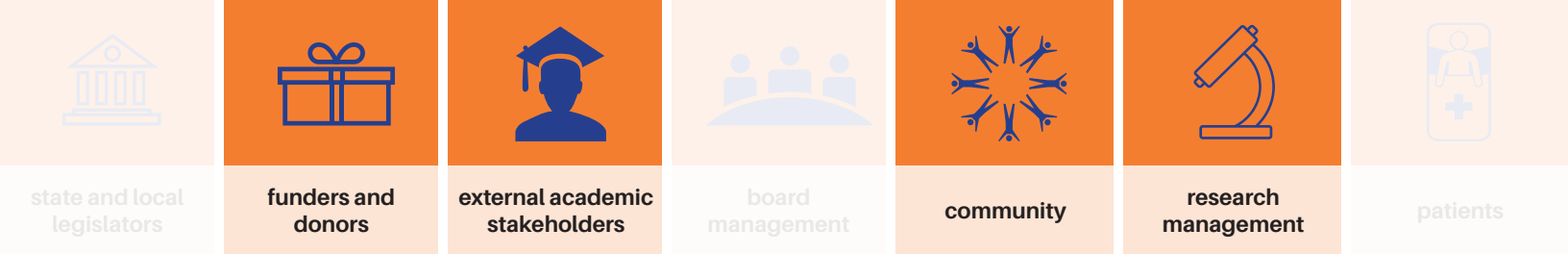
This information could be collected through a document review of internal research administration documents.

Caveats and Limitations

The existence of networks does not guarantee a high level of research translation. However, networks in and of themselves are an important mechanism of knowledge sharing and provide an indication of the level of linkage between an institution and its partners and community.

This metric does not provide information on the quality of collaborations or whether higher-quality research is resulting from the collaborations. Such information could be gathered from collaborating organizations regarding the performance of the medical college and the outcomes of the research in order to develop the metric further.

Source
Analysis of research administrative documents; PI survey; Funder records (including NIH REPORTER)



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Description of range of collaborations

Description

This is qualitative metric captures the range and type of research collaborations across the academic medical center. Collaborations may have varying levels of formality, from discussions of research questions to joint publications or commercial relationships, so a threshold for what is captured needs to be agreed upon. The description of each collaboration could include the different areas of research in which the collaborations are taking place, the types of institutions involved (e.g., community organizations, other medical schools or teaching hospitals, research institutes, industry), the size of the collaborations (i.e., how many personnel from the collaborating organization are engaged in the research project), the geographical scope of the collaborations, and the number of collaborations.

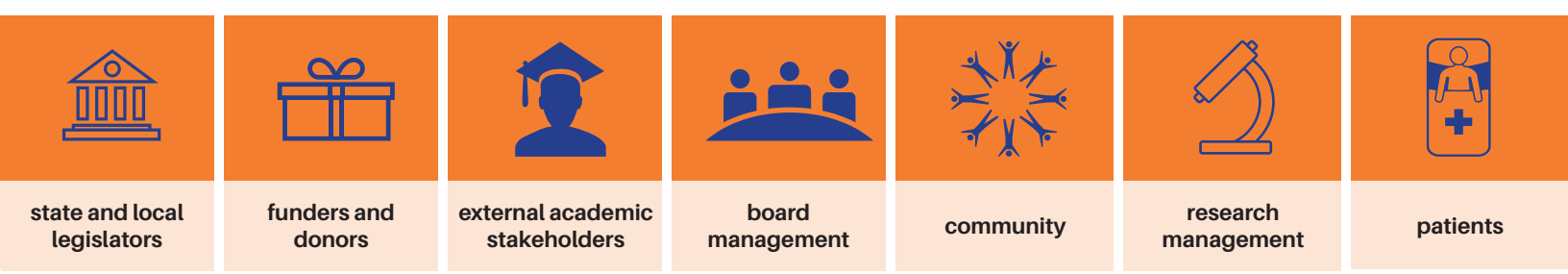
The metric provides an assessment of the academic medical center's level and kind of research network. A large network allows for a greater degree of knowledge and information sharing, enabling more efficient and effective research and creating opportunities for informal learning. Large networks with industry, policymakers, and the community may also be important for research translation.

Caveats and Limitations

This metric measures the scale and nature of collaborations—but not their productivity in terms of the research results produced or the translation of research into impact on society.

Source
Analysis of research administrative documents; PI survey

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RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Number of research projects engaging community partners

Description

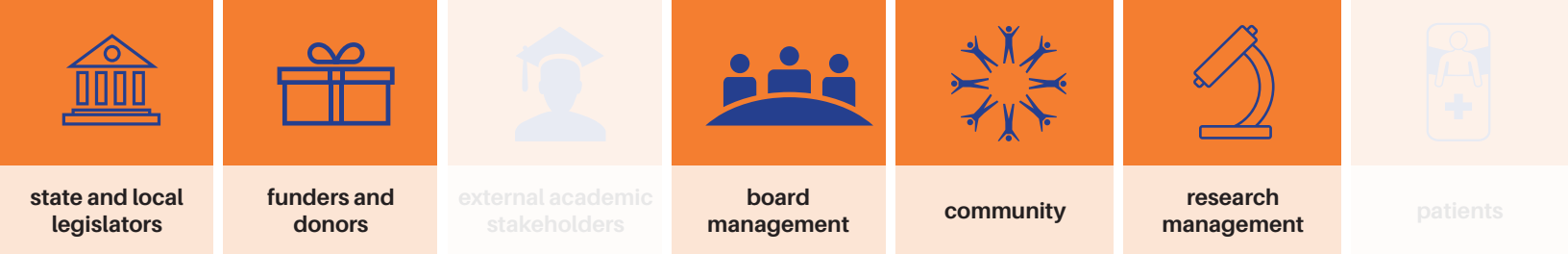
This metric captures absolute number and/or proportion of research projects at the institution that engage community organizations, either examining the entire research portfolio or the projects started in the past year. This information indicates the extent to which the institution is working collaboratively with the community.

Caveats and Limitations

This metric provides only a yes/no assessment of engagement, whereas the extent of engagement of community partners can differ significantly between projects, from a limited advisory input to full involvement and engagement in the research. This metric also only captures community engagement through formal community organization. Community members may also engage in research directly with the institution—for example, through consultation meetings, without a community organization acting as intermediary.

Source
Analysis of research administrative documents; PI survey

52



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Number of research projects engaging community partners for the entire duration of the project

Description

This metric is the absolute number and/or the proportion of research projects at the institution that engage community organizations, either examining the entire research portfolio or the projects started in the past year. Not only does this information indicate the extent to which the institution is working collaboratively with the community, but by examining engagement across the lifecycle of a research project, this metric aims to provide an indication of the degree to which community partners participate in research projects as fully engaged partners.

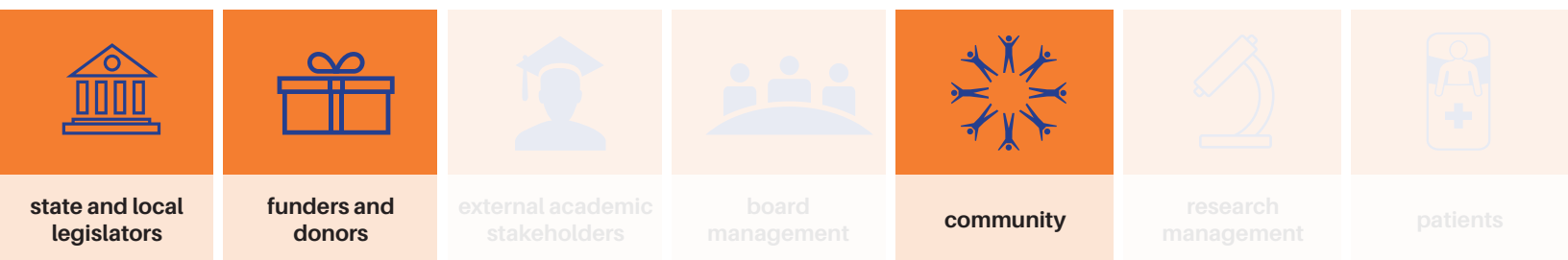
Caveats and Limitations

Counting the number of research projects in which community partners engage for the entire duration provides an overview of the number of projects working with the community, but does not provide information about the quality or extent of the engagement. While the metric specifies a minimum requirement for the engagement (i.e., the entire duration of the project), it does not provide information about how the community partner participated, how intensively they were involved, or their level of satisfaction with that engagement or the outcomes for the community.

Source

Analysis of research administrative records; PI survey

53



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Number of articles co-authored with community partner

Description

This metric provides an indication of how engaged community partners are with the research and how the researchers view them—indicating that they are thought of as part of the research team, rather than just recipients of research or advisors. The data for this metric can be collected through the use of a bibliometric database.

Combined with other metrics on community engagement in research, this metric contributes to an overview of the collaborations of an academic institution with community partners.

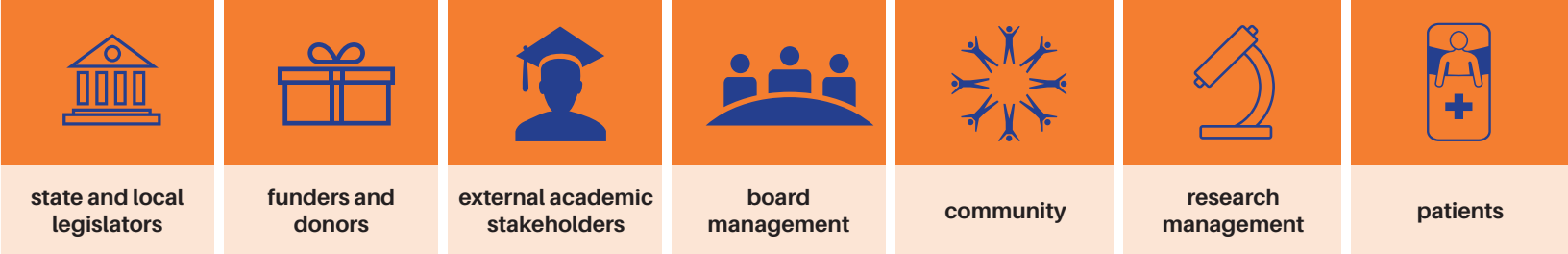
Caveats and Limitations

Co-authorship provides one measure of engagement; for a fuller picture, it may also be useful to check for the acknowledgement of community partners on articles or to explore such collaborations in more detail through survey or interviews. It should also be noted that some collaborations may not lead to publications, and these instances of collaboration would not be captured.

Source

Bibliometric analysis

54



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS
- NETWORK**
- POLICY
- HEALTH
- ECONOMICS

Existence of specifically tailored material for different community groups

Description

Tailoring research materials to the needs of different audiences can increase their engagement with and understanding of research materials. Being sensitive to the audience can contribute to research itself as well as dissemination. Research materials range from materials that directly support research, such as questionnaires and interview protocols, to dissemination materials, such as journal articles and other publications. One way to measure whether tailored research materials exist and are used is by counting the varieties of dissemination channels used by an institution. For example, are different types of publications used to reach academics and (lay) community members? In addition, the extent to which an institution is successful at tailoring research materials can be assessed by consulting the relevant audiences. For example, a survey of community members could be used to explore the appropriateness of research materials.

Caveats and Limitations

Tailoring research materials is a first step in ensuring that researchers are sensitive to the different audiences and stakeholders with whom they interact. It is not the only step that they can take, as sensitivity can also be expressed in the way researchers engage on a day-to-day basis with their audiences and stakeholders—for example, the communities that they study. Sensitivity in these wider engagements is not captured by this metric.

Source

Analysis of research administrative records; Internal policy documents; PI survey



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS
- NETWORK**
- POLICY
- HEALTH
- ECONOMICS

Size of communications office

Description

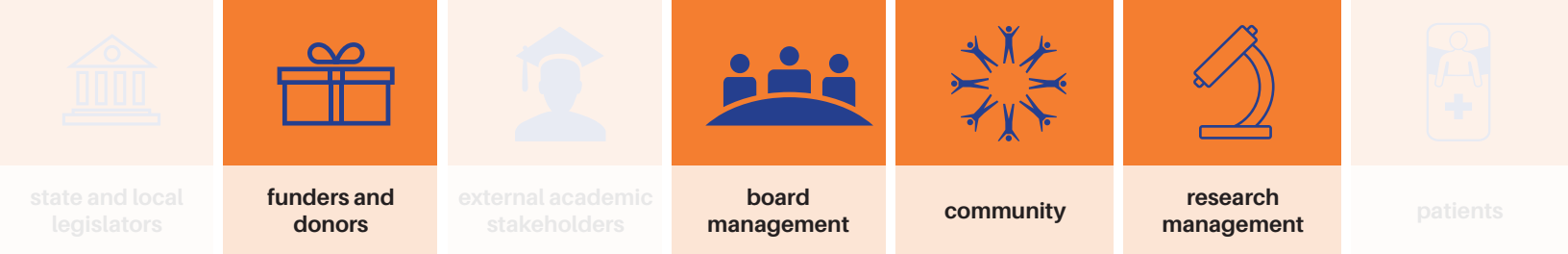
This metric provides an indication of the scale of a medical college's communications activities. For a meaningful analysis, it is best considered in conjunction with related metrics on communications, such as "media appearances/mentions." Size can be measured through the number of full-time equivalent (FTE) staff the office employs or the amount of funding committed to running the office.

Caveats and Limitations

Different institutions may have different needs and optimal sizes for their communications office. This may in part depend on the nature of their research activities.

Source

Analysis of research administrative documents



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS
- NETWORK**
- POLICY
- HEALTH
- ECONOMICS

Number of staff engaged in outreach

Description

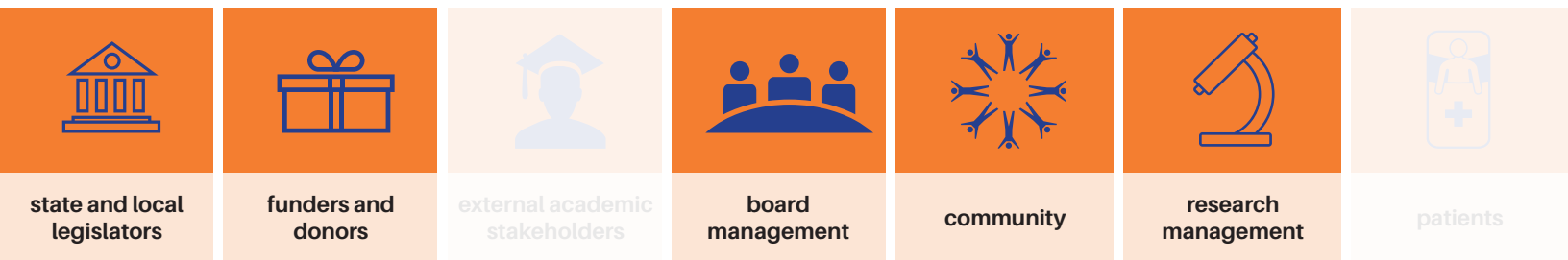
This metric gives an indication of the resources dedicated to outreach, and hence the importance that the academic medical center attaches to this aspect of its work. To compile the metric, it is necessary to define the boundaries of outreach work (e.g., are open days at the medical school or teaching hospital included?) and the whether there is a threshold level of activity for a staff member to be counted. For example, one member of staff may participate in a single open day at the academic medical center, while another may provide teaching support at a school every week.

Caveats and Limitations

This metric provides an indication of the scale of outreach work and the number of staff who participate, but does not provide information on the quality of that work or its impact. As such, it should be used in combination with other metrics.

Source
Analysis of research administrative documents; PI survey

57



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS
- NETWORK**
- POLICY
- HEALTH
- ECONOMICS

Number of people attending outreach events and their perceptions

Description

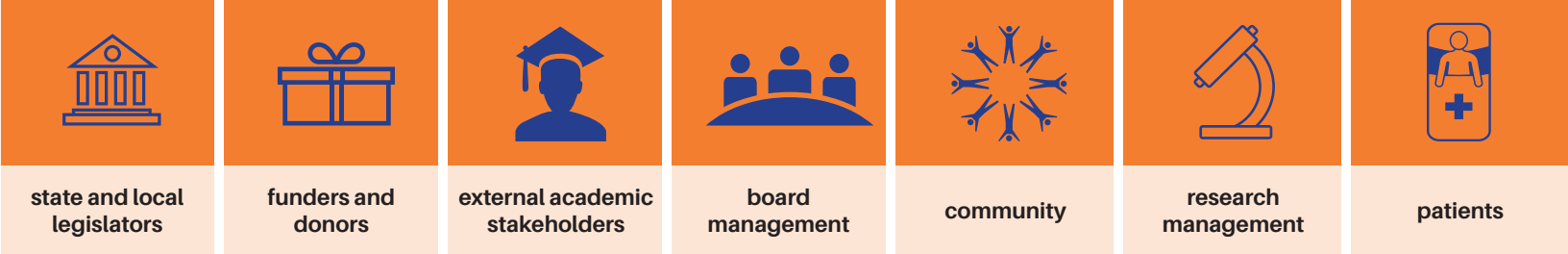
This provides an indication of the reach and quality of outreach events. Attendee perceptions give a qualitative measure that could include their impressions of the quality of the event, what they learned, the impact of the event on their views of science and scientists, and their likelihood of their attending future events or otherwise engaging with the academic medical center or science more widely.

Caveats and Limitations

Gathering data in this way provides valuable information about the outreach events and their impact, but does not provide information about why others did not attend the events. Asking people about how an event is going to change their behaviors requires them to predict their future behavior, which is often difficult.

Source
Feedback forms from events and courses; Wider institutional records

58



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS
- NETWORK**
- POLICY
- HEALTH
- ECONOMICS

Level of participation in clinical trials

Description

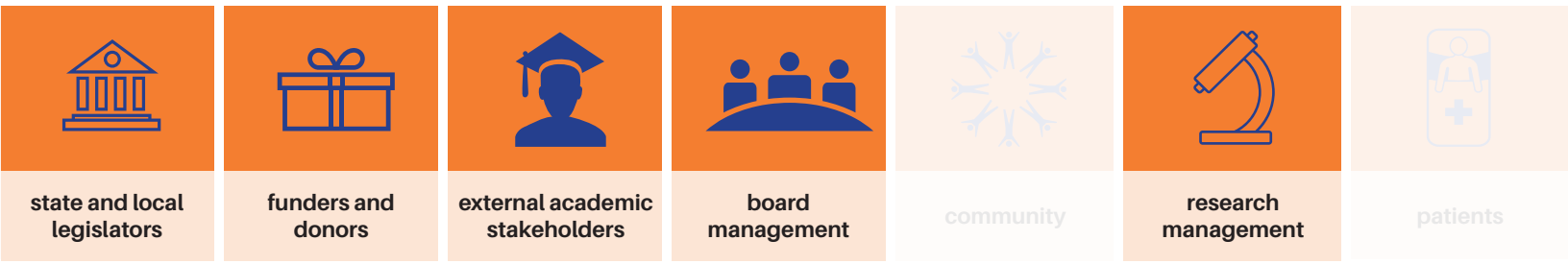
This metric measures the fraction of patients who have participated in clinical trials across the academic medical center, which could be broken down by disease area, for example. To use this as a measure of participation, it should be deduplicated at the individual level—i.e., one patient enrolled in two trials should only count once. It may also be useful to think about the different groups within research participants and patients. It might also be useful to compare this to the level of awareness of patients about opportunities to participate in clinical trials, if relevant data are available.

The metric measures how many patients take up the opportunity to join research studies. Given the differences between the patient populations of different academic medical centers, it may be hard to benchmark this figure against other institutions, but data for the individual institution can be compared year over year. It is also valuable to measure whether the patients who participate in clinical trials are representative of the wider population of patients and the community served.

Caveats and Limitations

Although there is some evidence that participants in research studies have better outcomes than those that receive standard care, not all patients will want to participate in research, and not all areas of health care delivery will be carrying out research within a given institution.

Source
Analysis of research administrative documents



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS
- NETWORK**
- POLICY
- HEALTH
- ECONOMICS

Number of projects with an industry partner

Description

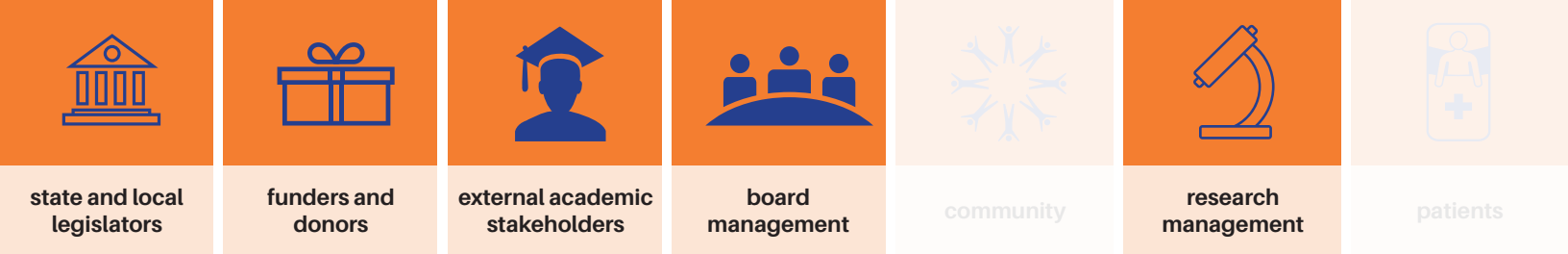
This metric provides an indication of the strength of links and networks with industry. It measures the number of projects with an industry partner over a given period of time (e.g., yearly intervals). Links with industry are an important route for research to be translated to societal benefit. Collaborations also provide an external validation of the quality and relevance of the research.

This information could be collected through a document review of internal research administration documents.

Caveats and Limitations

The existence of research collaborations does not guarantee the successful translation of research to societal impact, so this should be viewed as a process measure.

Source
PI survey; Analysis of research administrative record



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Industry research funding for PhD fellowship positions in industry and PhD scholarships

Description

This metric measures the number of PhD students at the institution in receipt of a scholarship from an industrial body, as well as the number of PhD students being funded to work in industry positions. These data should be collected for certain periods of time (e.g., yearly intervals) in order to see changes over time.

The metric assesses the institution's relationships with industry. A large number of students funded by industry implies that the institution has a large industrial network and that it is well regarded by industry. Industrial relationships can facilitate the translation of research and advances brought about through sharing knowledge across sectors.

Caveats and Limitations

The existence of industry networks does not guarantee a high level of research translation. However, networks in and of themselves are an important mechanism of knowledge sharing and provide an indication of the relevance of an institutions research to wider applications.

Source
 Departmental secretary survey; Analysis of research administrative records

61



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Number of appointments to policy groups

Description

This metric aims to assess the institution's relationships with external bodies and policymakers, as a measure of the networks of the institution and how it is regarded by others. A large number of researchers appointed to policy task groups or working groups implies that the institution has a well-developed policy network, and that it is held in high regard by others.

This information could be collected through a document review of internal research administration documents.

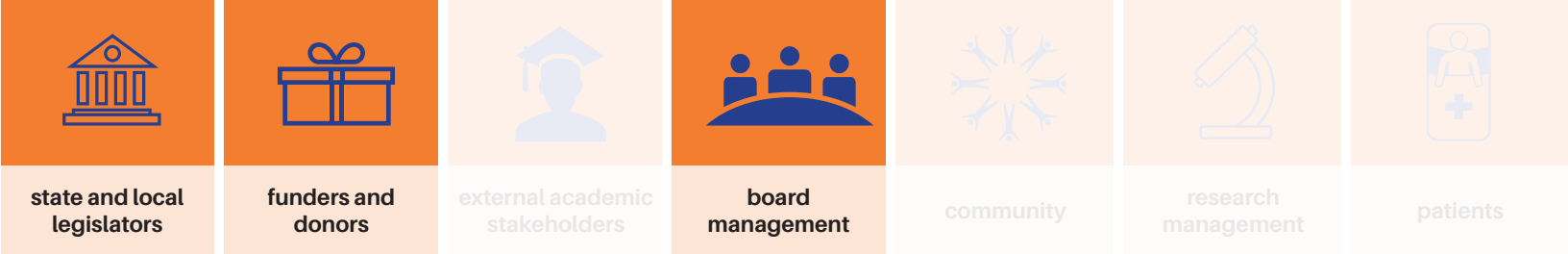
Caveats and Limitations

Appointments to policy-oriented groups may not always be available, and institutions may seek influence through other measures, such as performing advisory roles and sitting on advisory boards and committees. Therefore, this metric should be taken in conjunction with others measuring influence.

Taken alone, this metric does not directly measure impacts on policy. This is because it does not capture actual policy change or change in practice—rather the relationships of the institution with external organizations.

Source
 Departmental secretary survey; Analysis of research administrative documents

62



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Number of invitations from policymakers

Description

This metric aims to measure the impact of the institution's research on policy through the institution's relationship with policymakers. It tracks the number of times policymakers seek information or advice from researchers at a medical school or teaching hospital over a given period of time. This information could be collected through a survey of researchers.

Caveats and Limitations

Taken alone, this metric does not directly capture changes in policy or practice. Instead, it is a proxy, capturing information on researchers' relationships with policymakers, and on the reputations of researchers or institutions among policy and decisionmakers. This information can complement other evidence about how research has influenced policy change, such as research citations in clinical guidelines and policy documents (though policy documents do not always cite research, particularly in nonmedical areas).

Relying on a survey of researchers for information has the limitation that it depends on researchers keeping records of their interactions. Also, if a researcher has good long-standing relationships with policymakers, it may be difficult to identify which interactions brought about impacts on policy and to document those impacts.

Source
PI survey

63



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Number of citations in clinical guidelines

Description

Similar to citations in journal articles, citations in clinical guidelines reflect the utility and quality of a research output. They also indicate that research has had an impact on health policy.

This metric quantifies the references made in clinical guidelines to research outputs (generally journal articles) produced by an institution, research group, or researcher. Clinical guidelines are based on research evidence and usually have thorough bibliographies, from which citations can be assessed (many clinical guidelines are indexed in bibliometric databases, which facilitates analysis).

Caveats and Limitations

A caveat to citations in clinical guidelines relates to the limitations of bibliometric databases. While bibliometric databases do contain clinical guidelines, the coverage is not complete and may vary by discipline. Furthermore, guidelines published by some agencies or countries may be missed due to language or other constraints.

While citations in policy documents signal public recognition of the outputs cited, they do not yet indicate whether the outputs are actually being implemented or having an impact. It is also possible that research has influenced a guideline without being directly cited, notably where it has contributed to the evidence summarized in a review paper that is cited in the guideline.

This metric could be used in combination with other policy impact metrics, such as "Number of citations in policy documents" and "Number of invitations from policymakers," to provide a more complete picture of recognition and uptake of research in policy.

Source
Bibliometric analysis of guidelines—both citation and authorship; Review of key policy documents

64



state and local legislators



funders and donors



external academic stakeholders



board management



community



research management



patients

RESEARCH

PRESTIGE

CAREER

PROCESS

NETWORK

POLICY

HEALTH

ECONOMICS

Number of citations in policy documents

Description

Similar to citations in journal articles, citations in policy documents reflect the utility and quality of a research output. They also indicate when research has impacted policy. A high number of citations in policy documents can thereby be seen to reflect greater recognition of the work being produced by a specific institution, research group or researcher.

Though similar to article citations, citations in policy documents can be more difficult to collect, as they are generally not indexed in bibliometric databases. Approaches to collect them include (1) manual review of key policy documents (which can be time-consuming), (2) services that systematically track citations in policy documents (e.g., Altmetric), and (3) surveys of researchers, who may be aware of where their work has been cited.

Caveats and Limitations

While citations in policy documents signal public recognition of the outputs cited, they do not yet indicate whether the outputs are actually being implemented or having a wider impact.

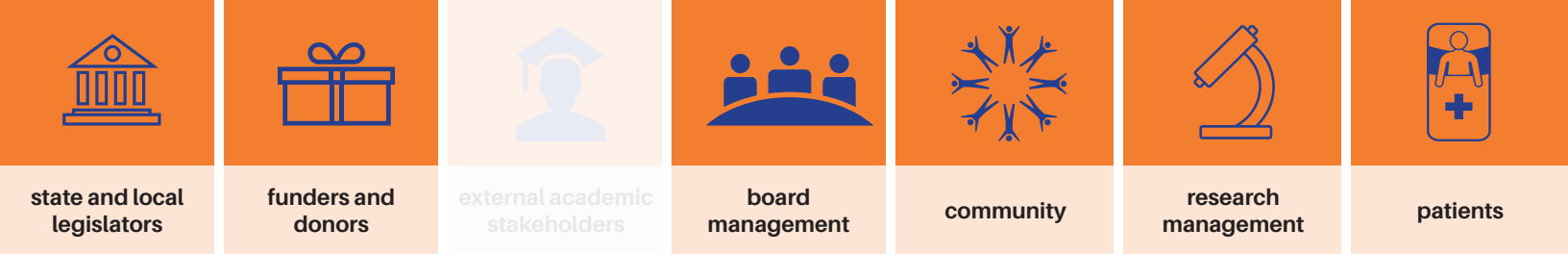
It is also possible that research has influenced a policy document without being directly cited, notably where it has contributed to the evidence summarized in a review paper that is cited in the document.

This metric could be used in combination with other policy impact metrics, such as "Number of citations in clinical guidelines" and "Number of invitations from policymakers," to provide a more complete picture of the recognition and uptake of a body of research in policy.

Source

PI survey; Review of key policy documents

65



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Improved health of patients

Description

This metric aims to capture the impact of the institution and its researchers on the community and patients it serves. It does this by measuring health status and/or life expectancy. The specific metric used will depend on the type of research and care offered by the institution, and on the data already collected in the region.

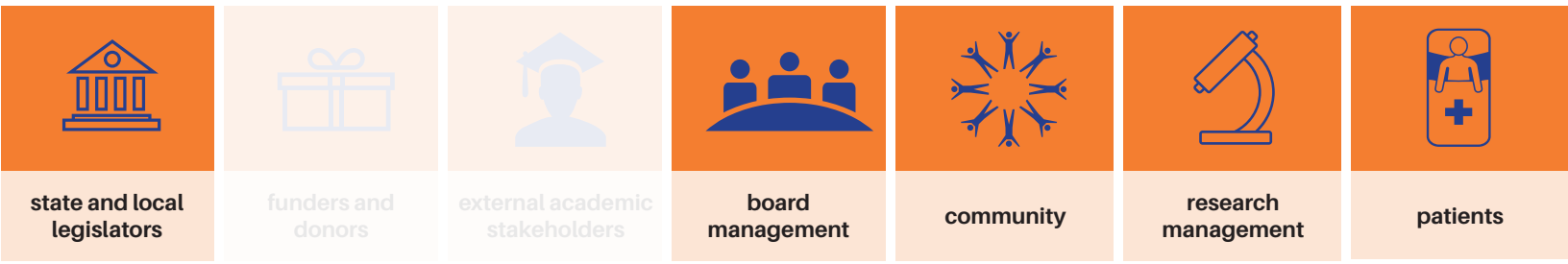
Caveats and Limitations

Whichever specific metric is selected, careful thought needs to be given to attribution. A wide set of factors can contribute to changes in health status and life expectancy, and there needs to be some thought given to how these changes can be linked to the activities of the institution. For example, where a medical school or teaching hospital has developed a drug that increases life expectancy of cancer sufferers, in order to show attribution, the college would need to show that it was the effect of that particular drug that led to a change in life expectancy. It is more likely that research, alongside other factors, will have contributed to improvements in health and life expectancy. Therefore, the quantitative data needs to be accompanied by qualitative explanation to demonstrate plausibly how the research is likely to be one of the contributing factors to any improvement seen.

Source

Quality improvement data; Public Health data; Electronic health records data

66



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Improved quality-of-care metrics

Description

The ultimate aim of research in the health system is to provide better care—and quality-of-care metrics are one measure of this. Institutions are likely to collect quality-of-care metrics on a regular basis; the challenge is linking changes in such metrics to research being carried out by the institution. This could be because new treatments, practices, and tools developed through research are being put into practice, improving the quality of care offered. It may also be because of increased absorptive capacity—i.e., because of their engagement with research, care providers are better able to understand and implement best practice based on research conducted elsewhere.

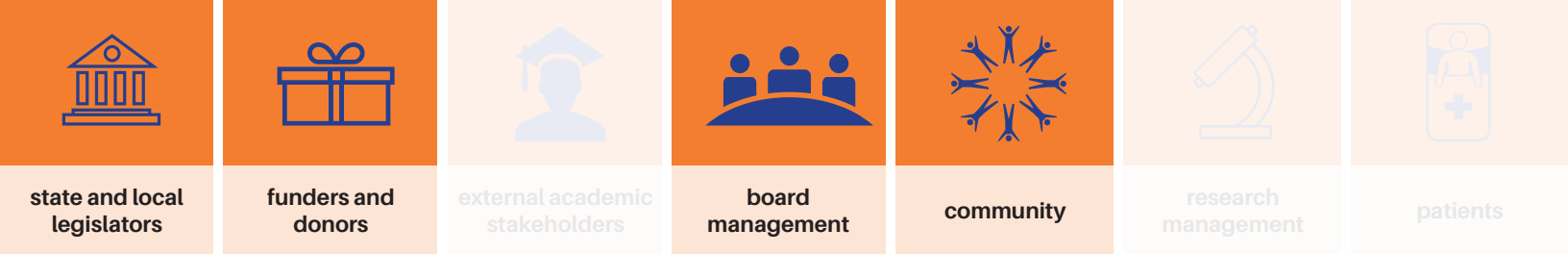
Caveats and Limitations

Many other wider factors will play a role in achieving the quality of care seen at the institution. To suggest links to research, it is necessary look for correlations, or causal stories. If a particular metric can be shown to have improved over time, and this corresponds to a research program in that area, this evidence, though not conclusive, suggests a potential link. The alternative approach is to qualitatively explore the causal chains that might lead from the research to the improvements in care.

Source

Wider institutional records; Quality improvement data; Electronic health records data

67



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS
- NETWORK
- POLICY
- HEALTH**
- ECONOMICS

Number of lives touched

Description

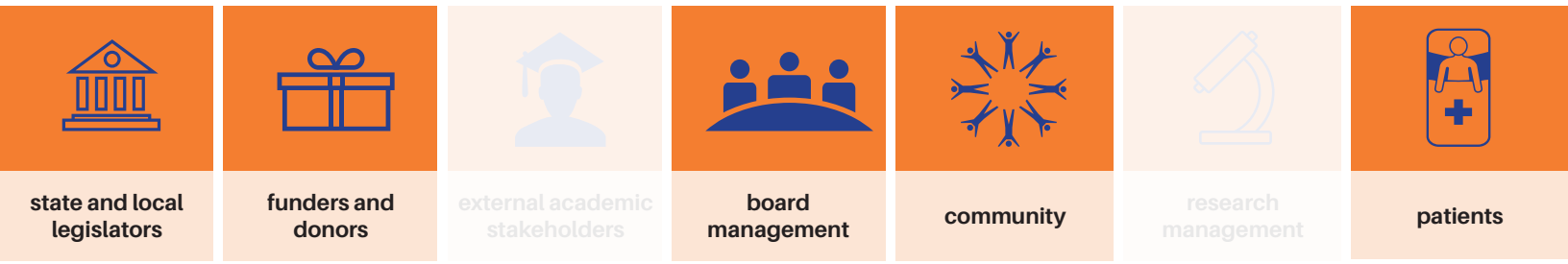
This metric aims to capture an easily grasped measure of the reach of the academic medical center—it is a count of all the individuals engaged with or affected by the center’s activities. This engagement can be split into a series of levels: those directly involved in delivering the services or carrying out research (researchers, other staff, and volunteers), those directly benefiting from the activities (participants in trials, students), and the wider community affected (those benefiting from follow-on programs run by others, those engaged through social media). These different levels of engagement can be represented as a series of expanding constituencies.

It is also possible to estimate a “potential lives touched” measure by estimating the size of the demographic groups targeted by an academic medical center’s programs.

Caveats and Limitations

Comparisons of this measure would need to be carried out carefully because of the subjective nature of what counts as a “life touched.” The measure also looks only at the number of lives touched, with a very limited consideration of the significance of the impact, so large programs with relatively minor effects will be favored by such a measure.

Source
 Research administrative documents; Wider institutional records



- RESEARCH
- PRESTIGE
- CAREER
- PROCESS
- NETWORK
- POLICY
- HEALTH**
- ECONOMICS

Narrowing of health/health care disparities

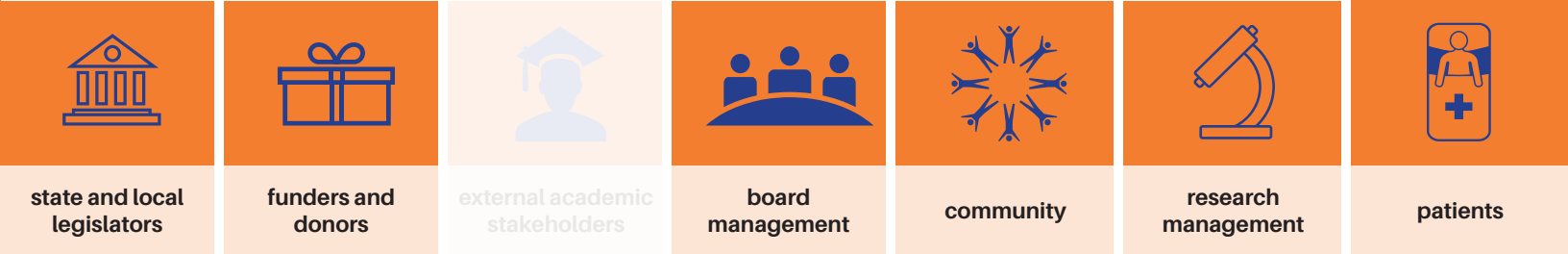
Description

Health disparities, also referred to as health inequities, can be measured through a number of indicators available from public datasets. A common way to express health disparities is by comparing such indicators for different groups of the population. Frequently used indicators are life expectancy, low birth weight, infant mortality, all-cause mortality, obesity rate, and smoking prevalence. Observed changes in health disparities can generally not be attributed directly to a single project or health intervention, as multiple factors are likely to have influenced the health of the population. Several evaluation methods are available to establish the impact of a specific project or intervention, such as a randomized controlled trials and observational studies. In addition, qualitative studies of health interventions can shed light on the pathway by which an intervention can influence the health of the population. Research conducted may reduce health disparities because of the implementation of practices from research which address these issues, by raising awareness of these issues amongst clinical staff at the institution that impacts on their practice more widely, or through increasing absorptive capacity—i.e., by engaging with research in this area, clinicians may be better able to engage with and implement research findings on health disparities from other researchers.

Caveats and Limitations

Apart from the difficulty of attribution, it is important to recognize that the level at which data on health disparities are available often differs from the level at which interventions are active. Data used to inform health disparities is often available at aggregate, macro levels, such as the state or country level. Many health interventions are conducted at lower levels, which makes it difficult to identify data on health disparities at a similar level of disaggregation. Even if data are available, the problem of attribution is still relevant.

Source
 Public health data, Electronic health records data



RESEARCH
PRESTIGE
CAREER
PROCESS
NETWORK
POLICY
HEALTH
ECONOMICS

Improved awareness of preventive measures in the community

Description

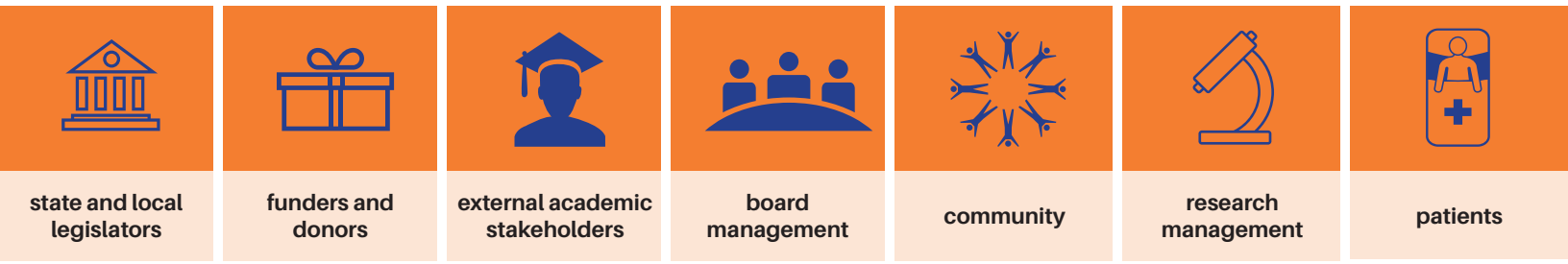
Preventive measures encompass a variety of actions, including vaccinations, health checks, and exercise. Community awareness of Preventive measures may be improved through researcher interaction with the community. Such awareness can be measured through surveys of the community or community partners. In some areas, it might be possible to rely on survey data already collected for other (research or policy) purposes.

Caveats and Limitations

Awareness of preventive measures, while important, is not the same as uptake of healthy behaviors, and care needs to be taken to investigate whether increased awareness can be attributed to the research activities of the academic medical center.

Source
Survey of community partners

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RESEARCH
PRESTIGE
CAREER
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HEALTH
ECONOMICS

Number of treatments developed in-house

Description

This metric demonstrates the innovation impact of the medical school or teaching hospital.

This metric consists of a number and description of treatment improvements developed through research at the institution over a particular time period. For a full picture, the number of new treatments developed and put into practice is best complemented by a description of those treatments and, ideally, their benefits. The degree of implementation should also be identified, and a decision must be made about the point a treatment improvement should achieve for inclusion in the list (i.e., being used just once in a nonresearch setting, being used half the time, or completely replacing existing practice wherever appropriate).

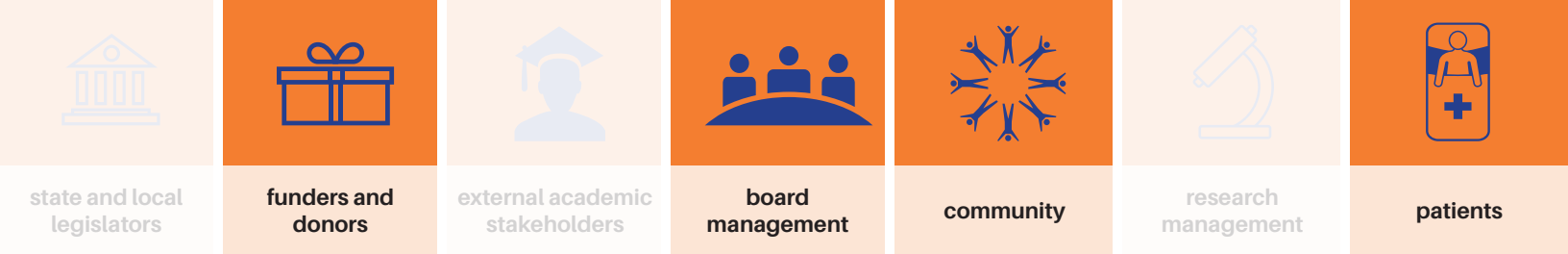
Caveats and Limitations

New treatment approaches will likely build on research conducted elsewhere, so claiming that the benefit is entirely due to research conducted in-house may be inappropriate. However, it might be appropriate to claim that specific circumstances at the medical school or teaching hospital helped the improvement be developed.

The number of new treatments, when used separately from the description of the treatments, may be misleading, as it does not provide any information on the nature of the treatment, the number of patients to which it is relevant, and the improvement that it brings. Narratives of success could be used to describe the more significant examples of treatment improvements where they occur.

Source
PI survey

71



RESEARCH
PRESTIGE
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PROCESS
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Number of new treatments available (adopted from elsewhere)

Description

This metric captures an institution's ability to apply new knowledge, or its "absorptive capacity." The rationale behind the metric is that conducting research will increase the capacity of an institution to adopt new developments arising from research elsewhere. In turn, the capacity to adopt new treatments can improve the quality of care provided.

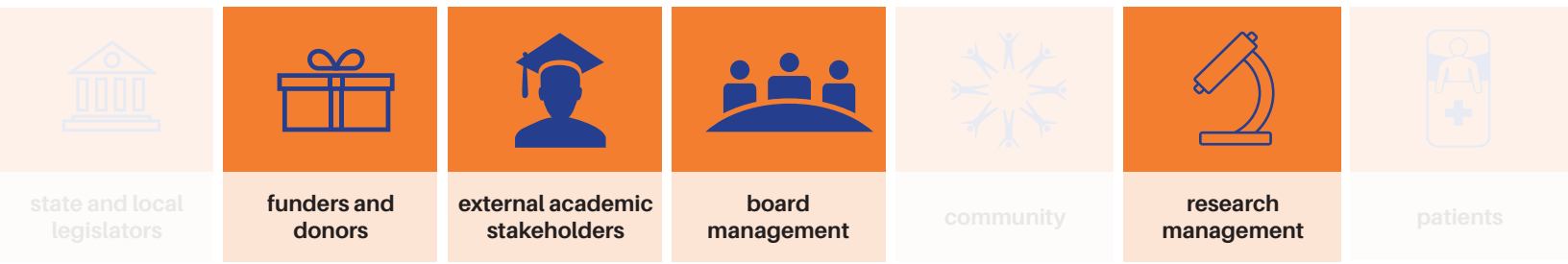
Caveats and Limitations

The number of new treatments, when used separately from the description of the treatments, may be misleading, as it does not provide any information on the nature of the treatment, the number of patients for whom it is relevant, and the improvement that it brings them. For example, a treatment that brings a significant improvement in mortality across half the patients treated will be much more significant than a treatment improvement that slightly reduces the length of treatment for a handful of patients.

Narratives of success could be prepared to describe the more significant examples of treatment improvements and how they came about.

Source
PI Survey

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Percentage, number, and range of types of clinicians on research projects

Description

This metric tracks the involvement of different types of clinicians (in terms of their role, and their expertise or specialty) on research projects. It can be defined as either the number of clinicians at the institution engaged in research or the percentage of all clinicians working at the institution. The metric not only covers doctors but also other clinical staff, such as nurses.

Engagement in research projects can impact on the care delivered by clinical staff in two ways. First, staff may incorporate the findings of the research directly to improve their practice. Second, they may be better able to engage with and implement research findings from others, again improving the care they offer.

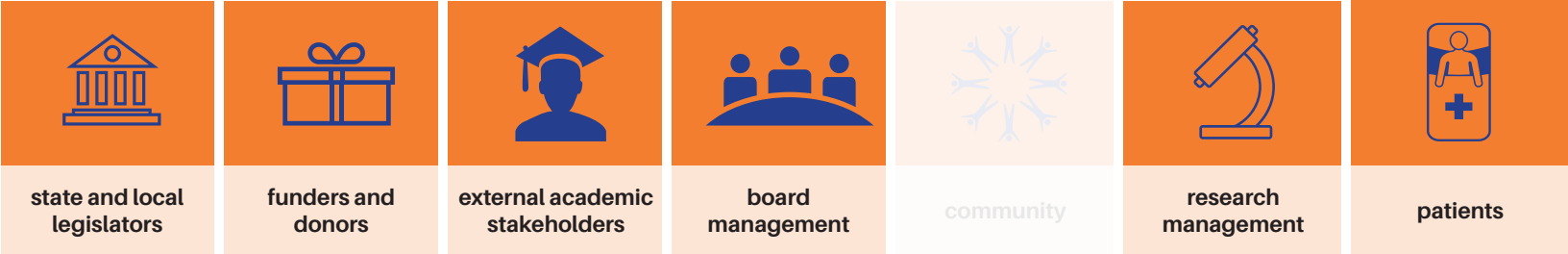
Caveats and Limitations

Although it may be beneficial for many clinicians to be engaged in research, it will take up a proportion of their time and may reduce the time they have available to deliver care. Therefore, this metric needs to be considered in light of the wider availability of staff and the institution's strategic direction with regard to research. If the institution wishes to see a high proportion of its staff involved in research, it will need to consider how to achieve this while ensuring that sufficient staff are available to deliver care.

The metric does not measure the level of involvement of the clinicians in the research. It may be preferable to have a small number of high-level clinicians deeply involved in research, rather than having a large number of people engaged more superficially.

Source
Departmental secretary survey; PI survey; Analysis of research administrative records

73



state and local legislators

funders and donors

external academic stakeholders

board management

community

research management

patients

- RESEARCH
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- PROCESS
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- HEALTH**
- ECONOMICS

Number of uses of research infrastructure in clinical practice

Description

This metric measures the number of times that research infrastructure at the academic medical center is used in clinical practice, as well as the number of different conditions or patient groups it has been used with in practice. Research infrastructure is defined as infrastructure purchased through research funding.

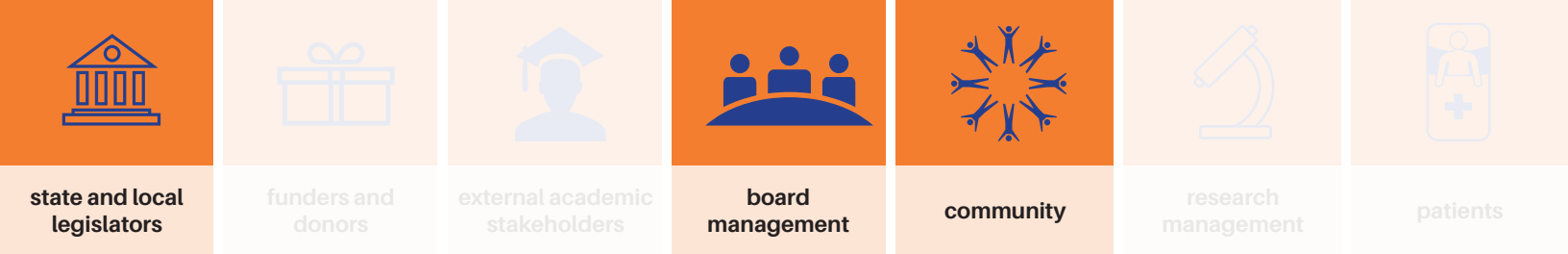
The metric provides an indication of the link between research and care, and engagement of clinicians in research, and provides an indication of the quality of the research infrastructure.

Caveats and Limitations

This metric assumes that the use of research infrastructure for care indicates engagement of clinicians in research; however, this is not guaranteed. It also assumed that the research infrastructure is used because it is of higher quality or more advanced than the standard infrastructure available for clinical care, rather than simply for capacity reasons.

Source

Wider institutional records; Analysis of research administrative records



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Level of local spending

Description

Investments in research increase the amount of money that research institutions spend on local services, such as technical support and catering, and products, such as stationary. Furthermore, many investments create jobs, which in turn increase the level of spending in the local economy through providing disposable income.

Data on the level of spending on local products and services can be gathered from an institution's expenditures accounts (through an analysis of research administration data).

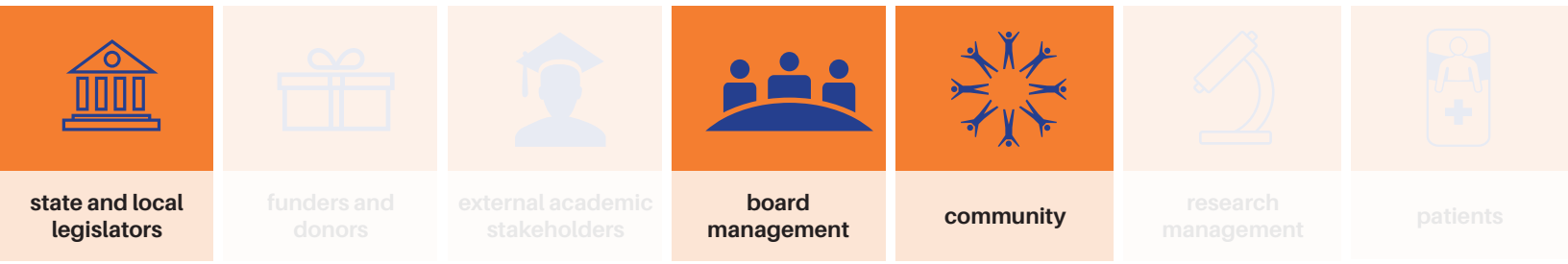
It is more difficult for research institutions to measure the increase in the level of local spending resulting from jobs created. However, an institution can measure the number of jobs that were created through research activities and use this figure as a proxy for changes in local spending levels. Data on job creation through research can be collected using STAR Metrics.

Caveats and Limitations

All increases in local spending provide economic stimulation; however, they also incur opportunity costs. That is, it is possible that the money could have been better spent elsewhere or on different products and services, or might have produced more economic stimulation if spent in a different way. Measurements of local spending do not account for opportunity costs.

Source
StarMetrics data; Analysis of research administrative records

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Amount of direct employment

Description

Research activities directly generate employment for both researchers and support and administrative staff. These jobs are referred to as direct employment effects in the region.

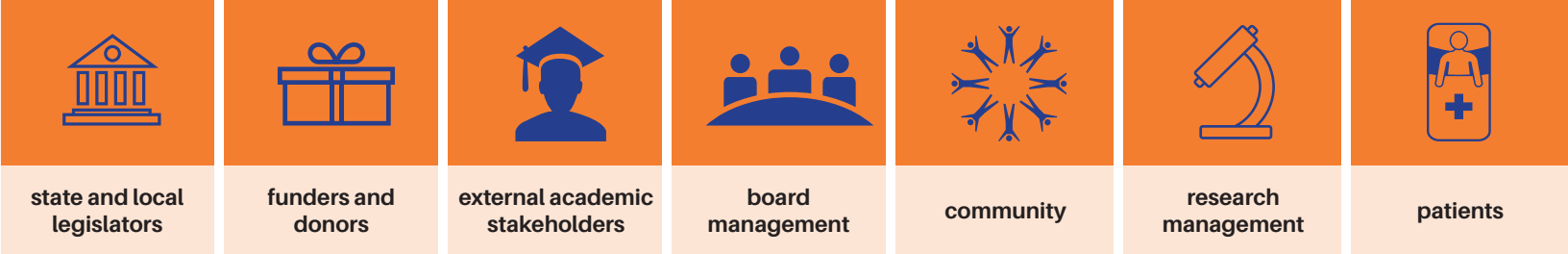
By creating employment for both researchers and others, research activities can help reduce unemployment. In turn, newly created and filled jobs stimulate the local economy through the spending of those who fill the jobs. Such higher expenditures are captured by the metric "Level of (local) spending."

Caveats and Limitations

This metric provides a measure of the jobs created by research spending, and hence an indication of economic stimulation. It does not compare the effects of spending money on research with spending in other areas—for example, teaching—which may also provide new jobs.

Source
Labor market analysis; StarMetrics data

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Number and type of new offices (including subsidiaries) in the area

Description

The presence of companies setting up new offices and labs close to a research institution is an indication that the institution contributes to a vibrant and innovative environment with high-quality staff and opportunities for productive collaboration. The most relevant companies are those that operate in fields similar to the research institution (e.g., for a medical school or teaching hospital, relevant companies would include pharmaceutical corporations).

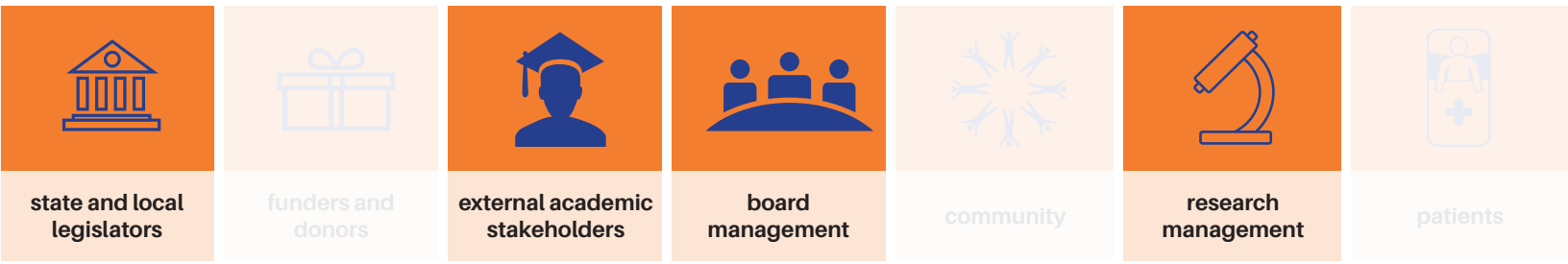
The central administration of a university or research institution is likely to keep track of new offices being established by (major) corporations in relevant areas.

Caveats and Limitations

While high numbers of newly established offices tend to reflect the presence of an innovative and research-active environment, low levels need not reflect the absence of such an environment; it may be that certain regions do not have economies that are large enough to attract new offices.

Although major corporations will generally make informed decisions about where to establish new offices, these decisions will be affected by a range of factors in addition to the quality of the research or innovations being conducted in that region.

Source
Survey or interviews with companies; Labor market analysis



RESEARCH
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Size of technology transfer office

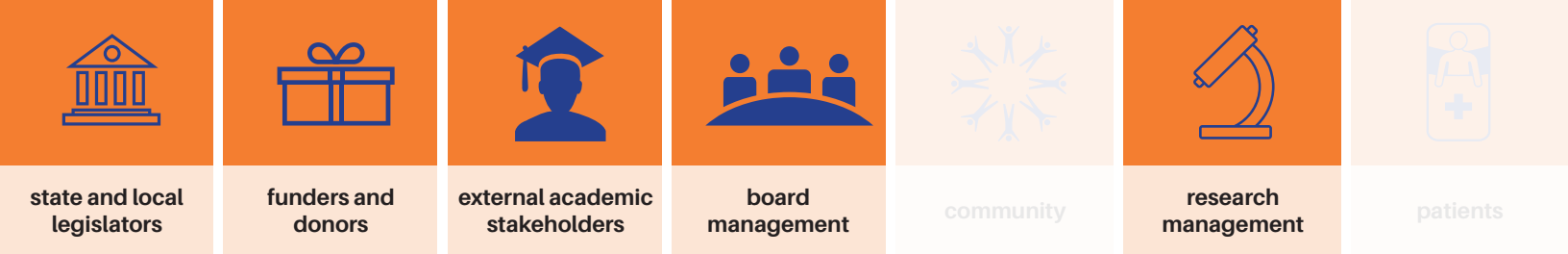
Description

The size of an institution's technology transfer office provides an indication of the level of support for translational activities at the institution. It can be measured through the number of FTE staff it employs or the amount of funding committed to running the office.

Caveats and Limitations

This measure should be considered in the context of the size of the institution, particularly if making comparisons among institutions. There is also a balance to be considered—a large technology transfer office may signify support for translational activities, but if it is very large that may indicate that technology transfer activities are not being carried out efficiently. Technology transfer can also occur without the support of a large technology transfer office, for example through existing collaborations and relationships between researchers and industry. This metric is not a suitable measure of the level of innovative activity; rather, it measures the level of formalized institutional support for innovation and translational activities.

Source
Analysis of research administrative records



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- ECONOMICS**

Existence of intellectual property policy

Description

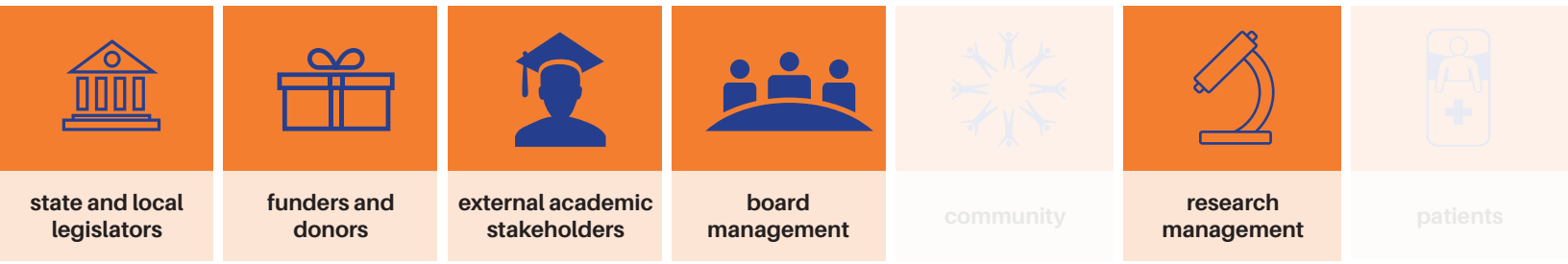
This metric describes the intellectual property (IP) policy at the institution, which is evidence of support for translation activities within the institution. In its simplest form, it can be an indication of whether the institution has a policy on IP, but it may also be useful to collect a simple description of that policy.

Caveats and Limitations

The existence of an IP policy is only one part of the wide range of support that can be provided for research translation, and as such this should form part of a wider suite of metrics describing the research translation environment. It should also be noted that the presence of an IP policy does not necessarily mean that researchers are aware of the policy, that the policy is appropriate, or that the policy has been effectively implemented.

Source
Internal policy documents

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Number of patent applications

Description

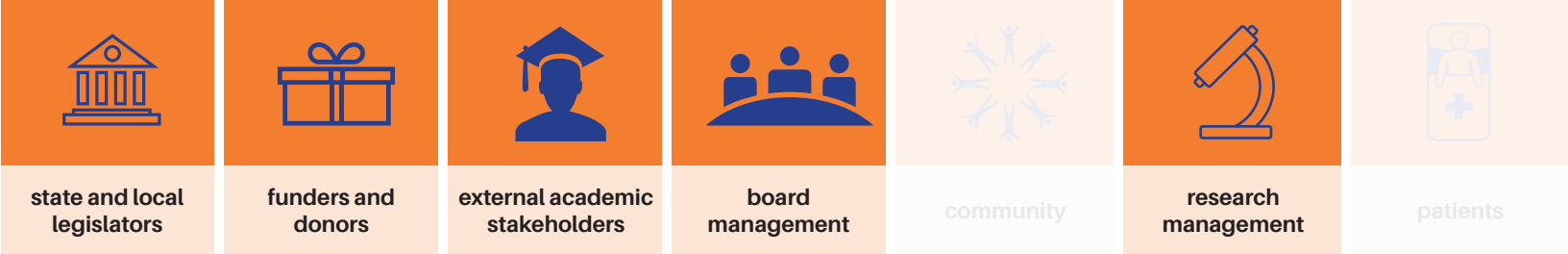
The number of patent applications is often considered a measure of innovative activities at an institution. A high number of applications reflects an innovative environment capable of producing new research outcomes and translating these into patent applications. Taken together with the number of patents awarded, the number of patent applications can function as a measure of innovative activities undertaken at an institution. If both numbers are high, it is an indication that the institution is producing a high volume of novel material worthy of patenting.

Caveats and Limitations

While patents are often seen to reflect new knowledge being produced, this measure will not capture all aspects of innovation, because many forms of new knowledge are not patented. Applying for a patent is a time-consuming and costly activity and is often judged not to be worthwhile.

Source
Patent database; Analysis of research administrative records; PI survey; Funder records (including NIH REPORTER)

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Number of patents awarded

Description

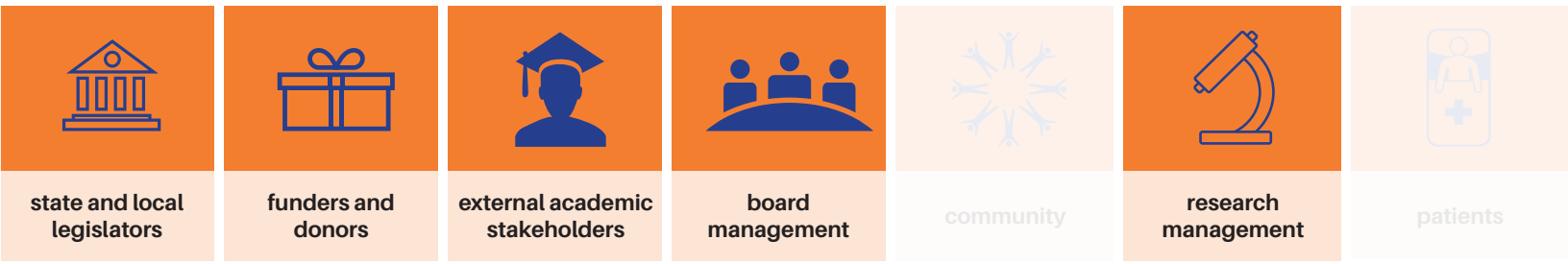
The number of patents awarded across the institution over a particular period of time gives an indication of the innovative impact of the research at the institution. It also gives an indication of the practical applicability of the research, along with its potential economic impact for the institution and the region more widely.

Caveats and Limitations

Patents capture only some types of innovation, and many types of research do not produce outputs suitable for patenting. For example, research may develop innovative ways of delivering treatments that are highly applicable but not patentable. It may also be that researchers prefer to publish findings rather than patent them, or that they do so because of funding requirements. Therefore, this metric should form part of a wider suite of measures that capture innovative practice, products, and other outputs in addition to patents.

Source
Analysis of research administrative records; PI survey

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Number of patent citations

Description

In the same way that article citations are used as a proxy for the utility and quality of an article, patent citations—references made to existing patents by new patents—can be a proxy for the quality and importance of the patent within its field.

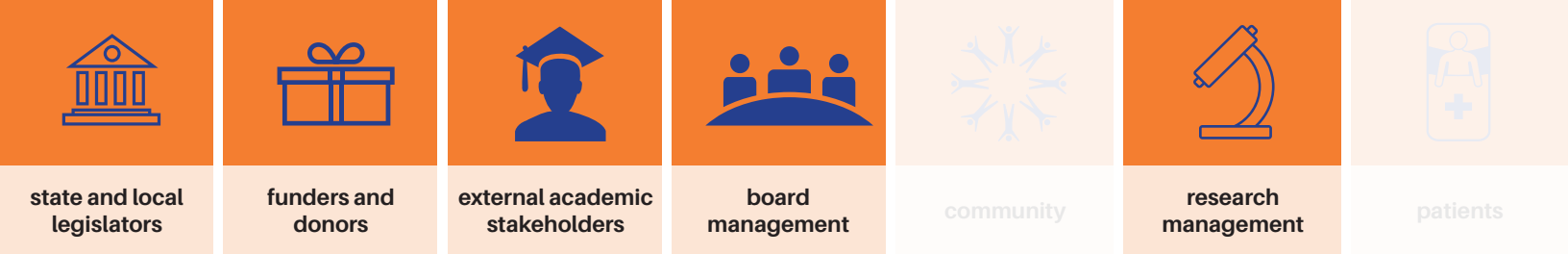
For more information, visit the USPTO section on “Laws, Regulations, Policies & Procedures” regarding patents: <http://www.uspto.gov/patents/law/index.jsp>

Caveats and Limitations

While patents are often seen to reflect the creation of new knowledge, not all new knowledge is patented. Applying for a patent can be time-consuming and costly and therefore is not always judged to be worthwhile.

Source
Patent databases

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Number of licensing agreements and licensing revenue

Description

This metric refers to the number of agreements by which an institution has licensed any of its products or patents to a third party for a fee. Because they require interest by third parties, licensing agreements provide an indication of the quality of patents and products.

Licensing agreements can serve as an important stream of revenue that helps strengthen the financial base of a medical school or teaching hospital and allows the institution to reap financial benefits from the expertise it has acquired in a particular field.

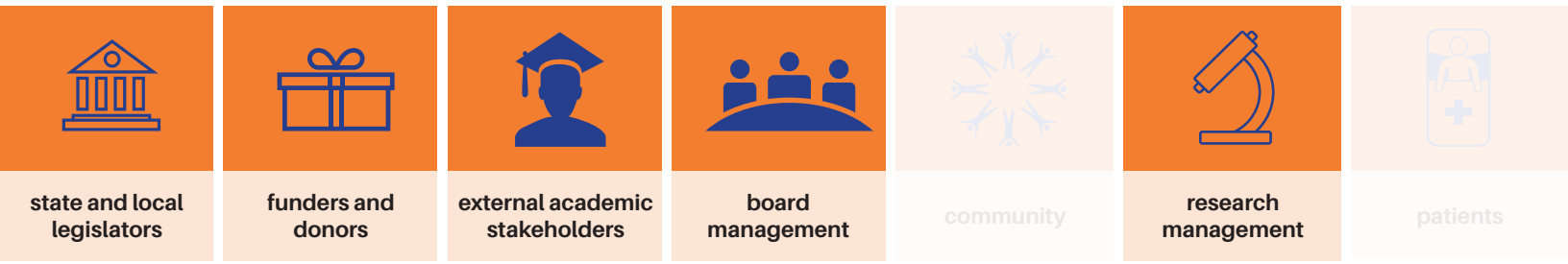
Data on the number of licensing agreements established and the total revenue generated through these agreements can be collected through an analysis of research administration data. Most institutions keep close track of licensing agreements and the revenue generated through them.

Caveats and Limitations

This measure is not appropriate for all types of research because some research is unlikely to produce products that can be licensed. In addition, even when research does produce useful and applicable outputs, they may not be licensed because of economic considerations.

Source
Analysis of research administrative records

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List/examples of know-how taken up by industry

Description

This metric is a list of instances where know-how developed through research at the institution has been taken up by industry. Examples could include direct licensing of patents and more tacit knowledge, processes, and techniques that may not be patented. It would also cover learning taken up through collaborations or contract funding. This metric can demonstrate the innovative impact of the medical school or teaching hospital, and illustrate its links with industry.

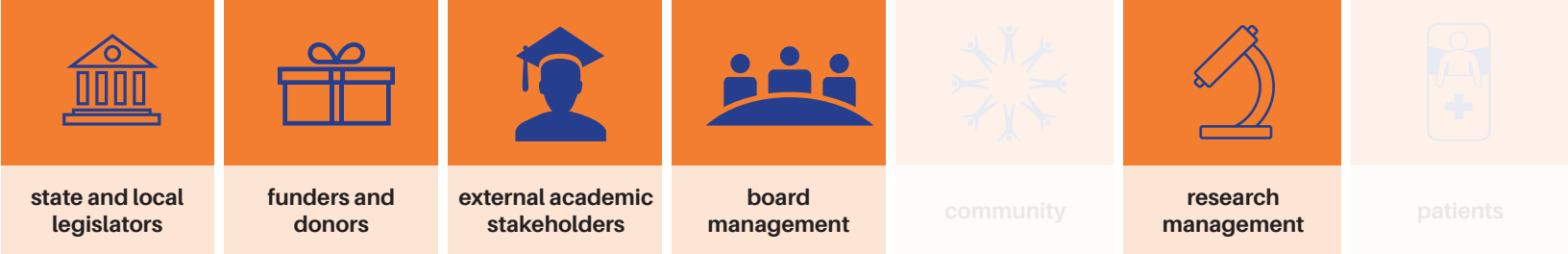
Clearly, the know-how should be a result of the research process, but it could be limited to new developments by researchers at the institution or include wider research knowledge that was passed on to industry through their interactions with researchers at the medical school or teaching hospital. What to include will depend on how the information is to be used. To demonstrate how the institution interacts with and benefits industry, the wider definition may be suitable. However, if the metric is intended to show the institution's innovative impact in terms of its new and innovative research outputs, the narrower definition would be more appropriate.

Caveats and Limitations

Such a list provides a more complete picture of the learning taken up by industry from the medical school or teaching hospital than that provided by counting patents. However, it is also more difficult to define and measure, and thought needs to be given as to what to include in the list.

Source
PI survey; High impact case studies

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Number of private-sector innovations/products/devices brought to market

Description

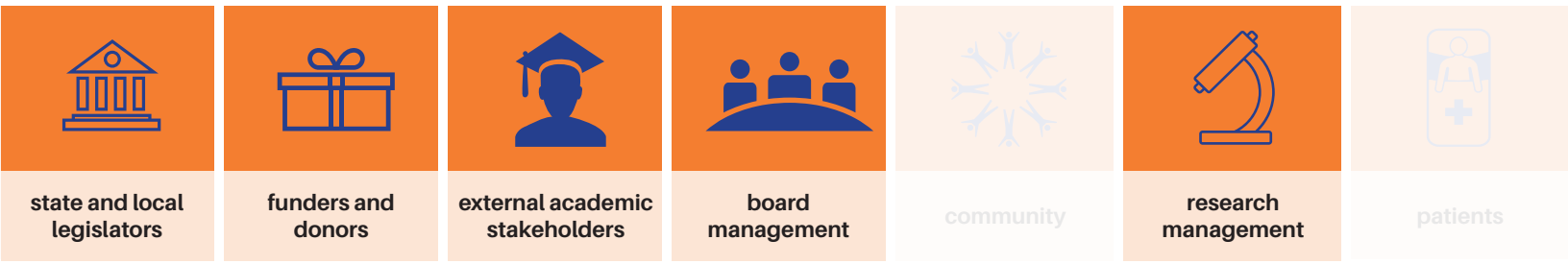
The number of innovations, products, or devices produced by companies as a result of research carried out by the institution gives a measure of the social and market impact of the research. These products may have been developed by an institution's researchers directly or through collaboration or consultancy work. Note that this refers to cases where companies are able to bring products to market through direct interaction with academic researchers, rather than cases where researchers are awarded patents.

Caveats and Limitations

There will be a number of factors leading to each innovation, product, or device coming to market, and the researchers will be only one element contributing to this development. It is also important to note that researchers may not be aware of when products reach the market, because this may occur after their engagement with the company ends. Thus, there is value in maintaining relationships to allow follow-up on the outcomes of such collaborations.

Source
Survey or interviews with companies

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Number of spin offs

Description

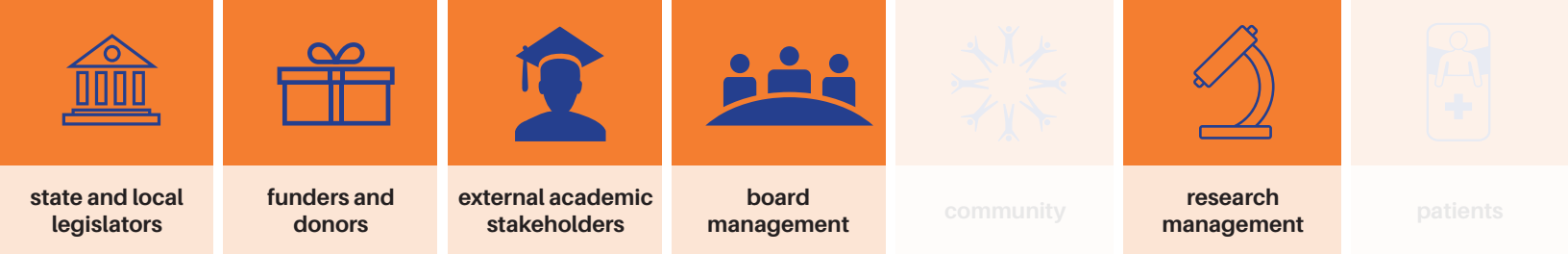
The number of firms established on the basis of an institution's research is one indicator of the contribution an institution makes to innovation. These "spin off" firms can be established by researchers or research groups from the institution, or can be based on research outcomes produced there. The firms aim to further develop the research outcome into a product that is fit for the market. Having a high number of spin offs could indicate that the institution produces innovative research suitable for commercialization. This metric, especially in combination with the metric on venture capital investments in start-ups, can inform institutions about their innovation impact.

Caveats and Limitations

There are various reasons why the innovations generated by an institution may not translate into a spin off. For example, the institution may not provide much support (financial or otherwise) to researchers to commercialize their work. Spin off firms can fail or have little impact; they do not necessarily lead to substantial contributions to innovation. To address this, in addition to number of spin offs, data on turnover or number of FTE staff employed by these spin outs could be captured.

Source
Departmental secretary survey; Analysis of research administrative records

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Venture capital invested in start-ups

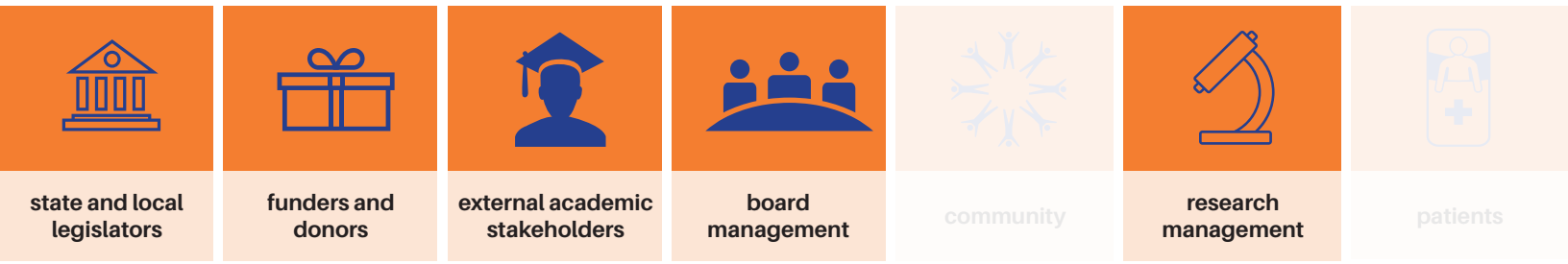
Description

The amount of venture capital (VC) being invested in start-up businesses in a particular region can reflect the vibrancy of that region's innovation environment. Changes in the level of investment over time can help track changes in innovation activities. VC is funding invested in companies at a very early stage, often before the companies have access to the mainstream capital market (e.g., banks). Risks for VC investments are generally presumed to be relatively high, yet returns can also be above average.

Caveats and Limitations

While having high levels of VC investment in start-ups tends to signify that there is an innovative environment, a low level of investment does not necessarily indicate the absence of an innovative environment. Certain regions may produce innovative research but lack VC funding, for example. Furthermore, while venture capitalists can be assumed to make informed investment decisions, the quantity of VC money invested may not directly reflect the quality of the innovations funded.

Source
Analysis of research administrative records



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Number and size of consultancy agreements

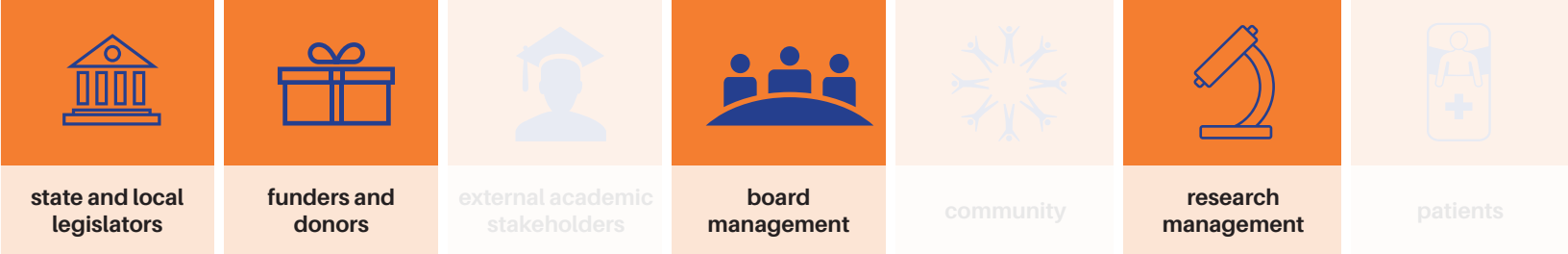
Description

Consultancy agreements, which take advantage of the specific expertise of a researcher or research group, can serve as an important revenue stream. This metric refers to the number of agreements and the total revenue they generate. Revenue generated by consultancy agreements can help strengthen the financial base of a medical school or teaching hospital and allows the institution to reap financial benefits from the expertise it has acquired in a particular field.

Caveats and Limitations

Some types of research may better lend itself to consultancy, and it is likely in some research areas there is little demand for such consultancy work.

Source
Analysis of research administrative records



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Contract funding from industry

Description

This indicator reflects the networks that the institution has with industry and the innovative impact of the work being conducted at the institution. It is likely that work conducted under contract in this way may directly affect the company in question to improve their business and may therefore have economic or commercial impacts.

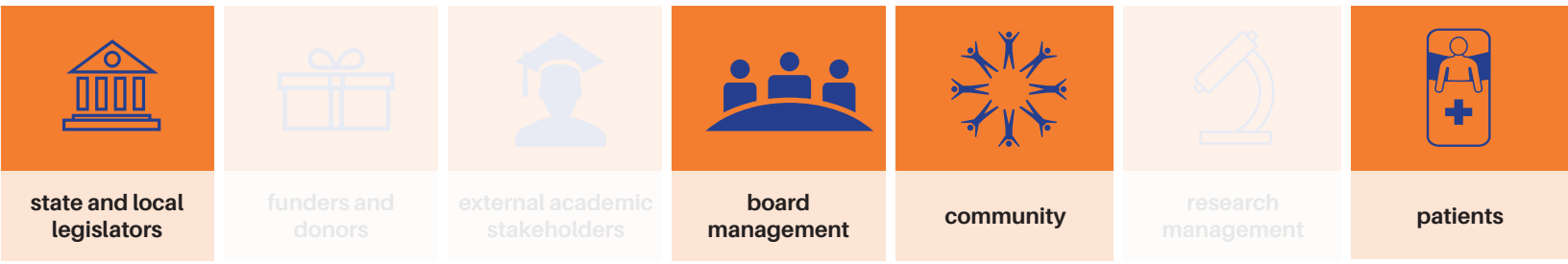
Caveats and Limitations

Some research fields are more interesting to industry and hence have more contract funding available, so this metric will be affected by the areas of research at the institution.

This is a proxy for economic impact—it may be that some work funded under contract is not productive, or does not lead to economic or commercial gains for that company.

Source
Analysis of research administrative records

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Number of and list of new treatments

Description

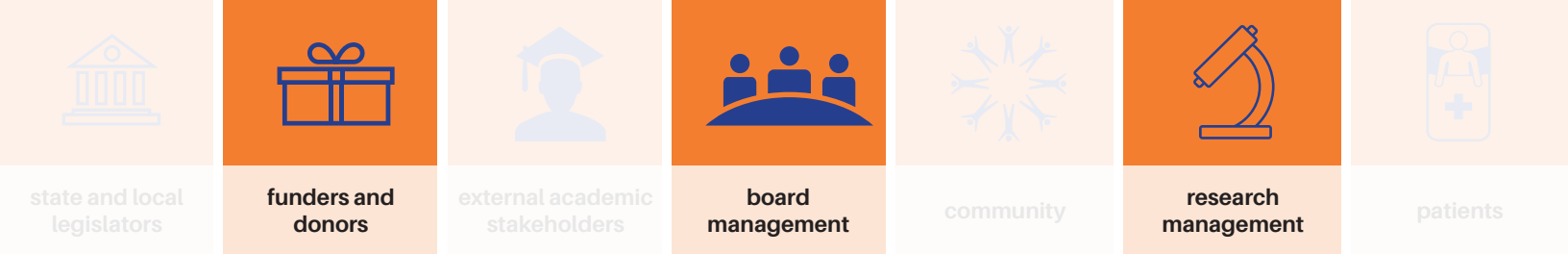
A list of new treatment provides a measure of the contribution an academic medical center is making both to innovation in general, and to improvements in health in particular. To define such an indicator, “new treatments” would have to be carefully defined.

Caveats and Limitations

Because scientific research is a collaborative undertaking, it is important to look carefully at the attribution of new treatments to particular researchers or institutions. The measure also looks only at the count of new treatments rather than their cumulative impact.

Source
Wider staff survey, Wider institutional records

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Fraction of indirect costs covered

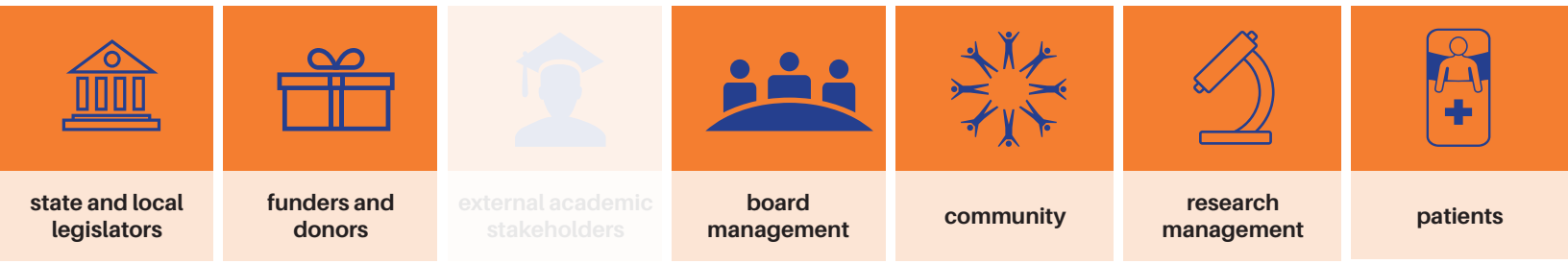
Description

This metric describes the proportion of the indirect costs of research covered by the research grants portfolio held by the institution. This includes costs for infrastructure, equipment, and support. This measure indicates the extent to which the institution's research program is self-sustaining, in that it is able to cover all of its costs, not just the direct research costs.

Caveats and Limitations

This situation will differ significantly between academic medical centers depending on their financial model.

Source
Analysis of research administrative records



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Cost-benefit calculations

Description

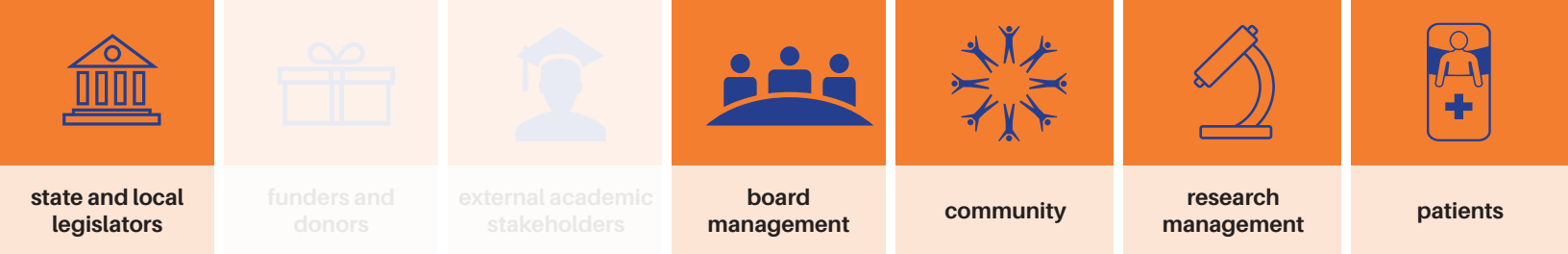
Cost-benefit metrics can be derived from research administrative documents, quality improvement data, public health data, electronic health records data, StarMetrics data, Labor market analysis, Funder records

Cost-benefit calculations provide an estimate of the economic benefit of research. One example is return-on-investment (ROI) calculations that compare the cost of research with the economic and monetized benefits produced (chiefly health improvements), taking into account the time taken for these benefits to be realized. Such calculations provide an estimate of whether a research investment was economically worthwhile.

Caveats and Limitations

Accurately calculating costs and benefits is not straightforward. In the case of costs, capturing the full costs of a research program can be challenging. While data on the costs of direct resources used, such as staff time and equipment, may be readily available, this is often not the case for indirect costs, such as the rent and maintenance of buildings. The calculation of benefits is often even more complex. The Quality Adjusted Life Year (QALY) is frequently used to capture the benefits of a health program or intervention; however, there is no consensus in the literature about the monetary value of a QALY. Based on the assumptions made, the calculations of costs and benefits can vary substantially.

Source
Analysis of research administrative records; Quality improvement data; Public health data; Electronic health records data; StarMetrics data; Labor market analysis



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Perceptions of equity, quality, and access

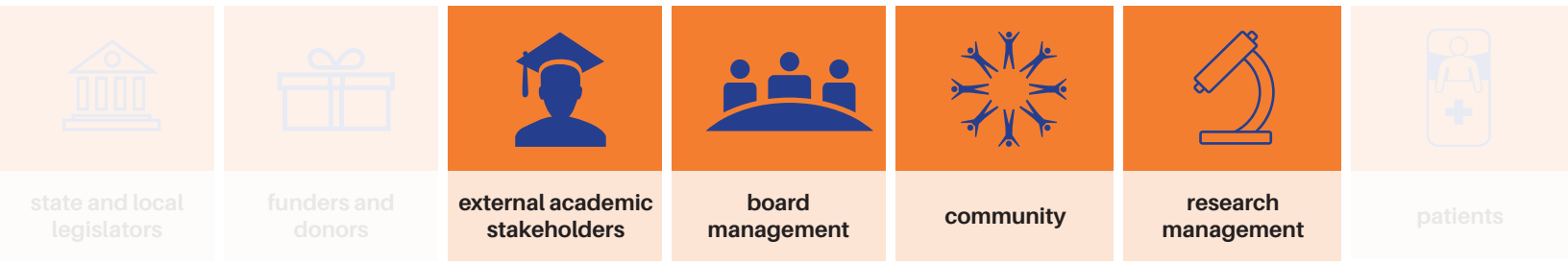
Description

This metric captures the perceptions of stakeholders—notably members of the community and community partners—about the care offered and research carried out at an institution, with a particular focus on how the care and research address issues of equity, quality, and access.

Caveats and Limitations

This is a qualitative metric, and as such cannot be directly compared between institutions. It may be possible to capture some numerical data through surveys to allow some internal comparisons year to year, but the focus is on the perceptions and views of the relevant groups. The metric will therefore consist of a set of aggregated information on strengths and weaknesses, potentially including quotes from specific individuals.

Source
 Survey or interviews with community partners; Survey or interviews with research participants



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Perceptions of staff

Description

This qualitative metric that captures staff opinions and provides an insight into the culture of the organization. The metric could include both the way in which the environment supports staff members' work and their learning and development, and also wider perceptions around the strengths and weaknesses of the organization. Such information could be collected as part of an annual staff survey.

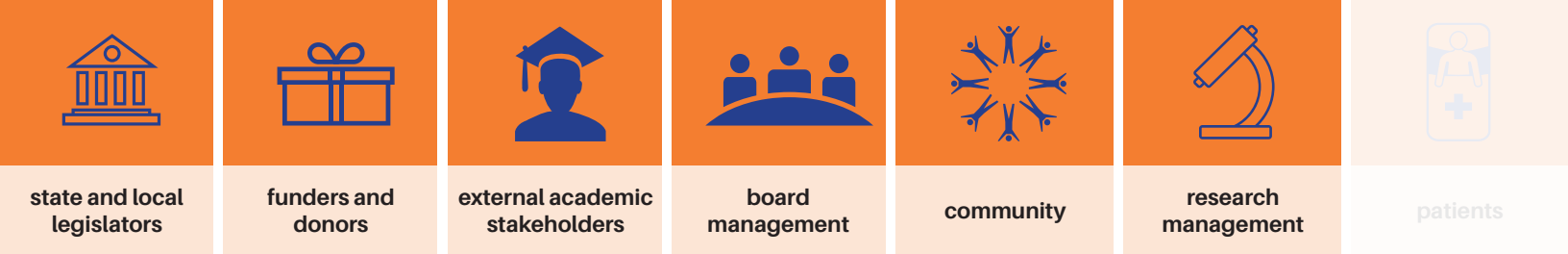
Caveats and Limitations

This measure could be restricted to research staff only. However, extending it to administration and support staff could provide a valuable extra perspective.

Because staff perceptions are likely to depend on their background and previous experiences, it may be more helpful to examine the trends in this metric over time, rather than as a snapshot.

Care needs to be taken to consider what type of information is collected and how it can be aggregated to strike a balance between the range of information collected and ensuring the collection and analysis is manageable.

Source
 PI interviews; PI survey; Wider staff survey; Staff interviews



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Perception of community partners

Description

This metric aims to capture views of the individuals and organizations in the community who interact with the academic medical center. The information collected could include opinions about the research conducted at the institution and its relevance to the community, and how the institution interacts with community partners.

As well as a general overview of opinions from across various groups, it may be helpful to use specific quotes to provide specific examples. Care needs to be taken when selecting such quotes, both to ensure they helpfully illustrate the overall message of the metric and also to ensure that appropriate permission has been obtained.

Caveats and Limitations

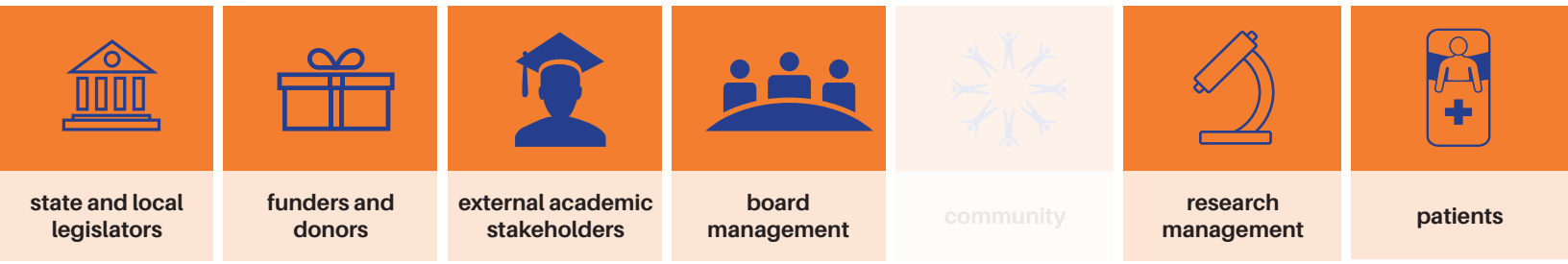
Community partners can be crucial to the success of research in some areas, so their opinions and views are important. They can also, to some extent, be considered a “barometer” of overall community perceptions of the institution and its research. However, this generalization needs to be made with care. As research partners, they will have a different and potentially more sophisticated understanding of the research process and research goals of the institution or particular researchers, and may not be representative of the wider community.

Depending on the range of stakeholders questioned, there may be issues around generalizability. In the context of an individual institution, it may well be feasible to gather viewpoints from all the partners engaged in research.

To minimize reporting bias, the data need to be collected in an atmosphere of trust, perhaps by an independent person or organization, and, where appropriate and possible, anonymized. It is also important that the evaluation process is culturally sensitive and responsive to the needs of different community group.

Source
Survey or interviews with community partners

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Perceptions of external experts

Description

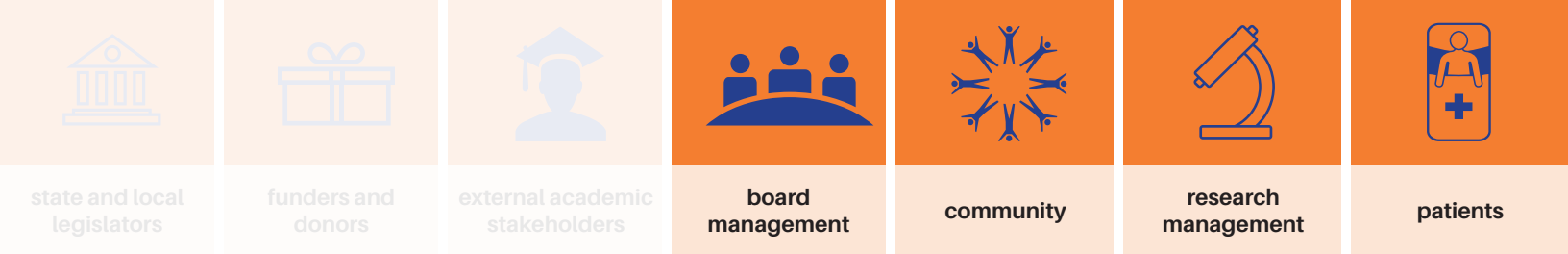
This qualitative metric captures the perceptions of external experts on the institution, its performance, and its processes. Relevant experts could include researchers or senior staff from other institutions, or relevant experts from industry or community groups. For example, research finance management from another institution could offer their perspectives on the financial management system used, or an industry expert could offer views on the collaboration and licensing arrangements used. In the case of staff from other institutions, the process could be organized as an exchange, with sharing of learning and ideas across the institutions.

Caveats and limitation

Compiling such a metric requires a willingness to share both strengths and weaknesses, which relies on establishing trust. It is important to consider the expert’s perspective—their host institution will inevitably be different in some way, so some of their expertise may not be transferrable. Systems that work at a medical school with a large research endeavor, for example, might not be appropriate for a medical school with a nascent research program.

Source
Expert peer review; External researcher site visits

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Perceptions of people participating in research

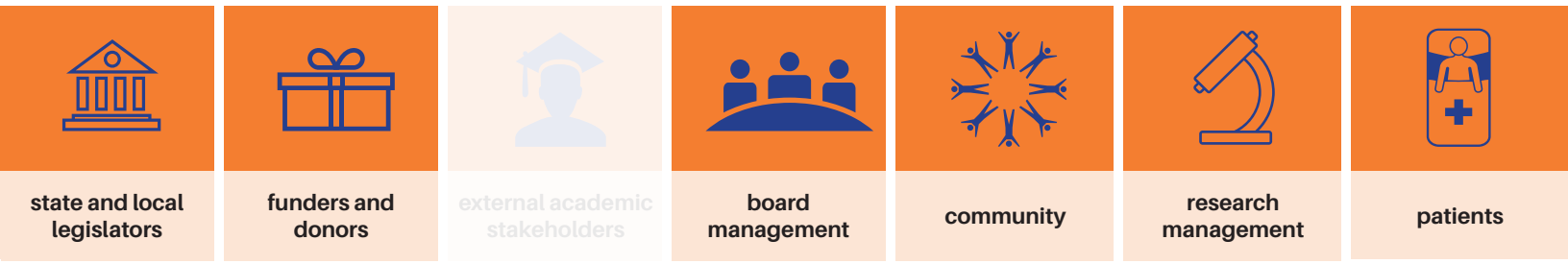
Description

This metric gathers information on the views and experiences of people who have participated in research as research subjects—for example, those participating in clinical trials. The metric captures the quality of their experience: were they well treated, were they kept informed, and was there suitable follow-up.

Caveats and Limitations

As a perception based metric, this should be used alongside clinical quality-of-care metrics that monitor the quality of care being delivered to participants in research.

Source
Survey or interviews with research participants



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Attitudes of research participants toward research

Description

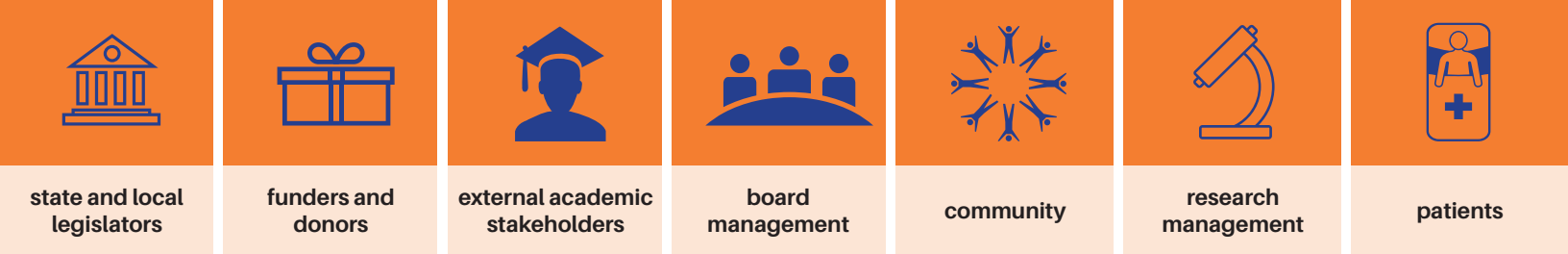
Attitudes of research participants toward research may be influenced by that participation. Participation may generate a greater understanding and appreciation of science and research, and such changes can be measured through surveys of and interviews with research participants.

Changes in the attitudes of participants in research through the process of participation are both a measure of the educational impact of research on the public and the community and an indication of the quality of the institution. Apart from strict academic purposes, interactions with research participants can be useful to further inform the public about science and research and to build trust between the community and the academy. This metric would capture how well this is done.

Caveats and Limitations

While improvement in attitudes could be an indication that participation in research made a contribution, this is not a straightforward causal link. Any claims of impact would therefore have to be made with caution, as other factors could have influenced the attitudes of participants toward science and research.

Source
Survey or interviews with research participants



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Narratives of success

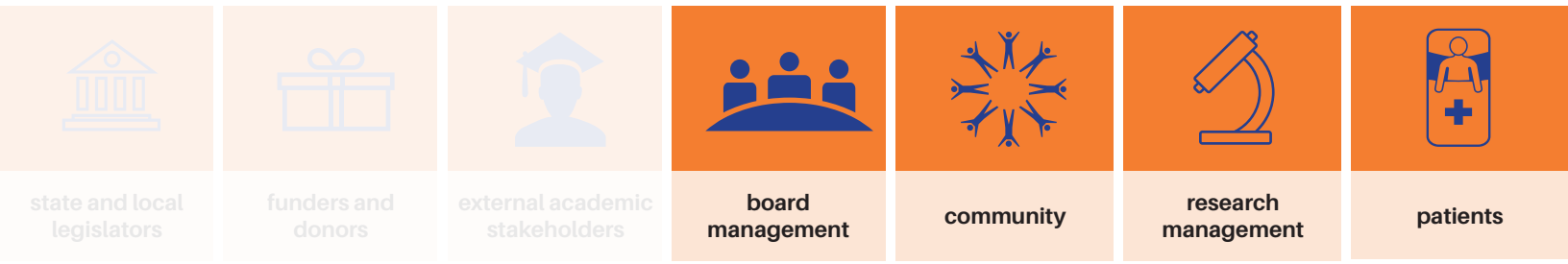
Description

Medical schools and teaching hospitals that want to showcase the success of their research can do so by using case studies of the best examples of their work. Such examples form narratives of success, with examples ranging from the development of policy guidelines specifically referencing outputs from the institution, or a spin-out from the institution that is doing well.

Caveats and Limitations

The main limitation of this metric is that it lacks a quantitative basis, and as such cannot be said to represent the totality of a medical school or teaching hospital's work. That said, the qualitative nature of these narratives means they may be of interest to media, who often look to engage the public through stories.

Source
High impact case studies



- RESEARCH
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- ECONOMICS

Narratives of performance

Description

Narratives of performance describe pieces of research and how they develop, both within the research community and how they may affect, or be affected by, wider society. In comparing research that has, or has not, developed in particular ways, the aim is to understand more about what factors contribute to or hinder development. Such comparisons provide an opportunity to extract lessons that can help improve future performance.

The nature of narratives will depend on the type of performance to be investigated. For example, to look for ways to improve grant writing, a set of narratives including successful and unsuccessful funding applications could be used. Analyzing such a set could allow a comparison of factors such as the size of the grant, the timescale over which the proposal was written, the competitiveness of the funding source, the mix of expertise in the team involved in writing the proposal, the administrative support provided, and so on.

Caveats and Limitations

The lessons drawn from a set of narratives are only as good as the quality of the narratives themselves, in terms of diversity, completeness, and honesty. Researchers are often reluctant to discuss their failures, so these types of narratives can be more difficult to produce than narratives of success. Selection is also important. For example, in the case of funding applications discussed above, if all the narratives were taken from basic health research, the applicability of the lessons learned to health services research might be limited.

Source
Representative case studies