

The implementation of the sandpit methodology by research funding agencies: considerations regarding equity, diversity, and inclusion

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Introduction

Obtaining research grants is crucial for surviving and succeeding in the academic world¹. Unfortunately, there are inequalities in the way funding is distributed. Benchmarks that are used for evaluation are primarily based on academic achievements, which have long been considered as objective criteria. However, researchers who are highly successful and esteemed receive *disproportionally* more funding than others²³: fruitful academic output in early career stages will increase the chances of obtaining grants; and obtaining grants will in turn increase the chances of obtaining more grants. Recent research suggests that this cycle is not the result of an increase in impactful research outputs enabled by the initial grant. Rather, these increased chances of receiving additional grants are only due to the fact that a grant was obtained before⁴. This leads to large inequalities between individual researchers and (networks of) leading institutions¹ and fewer opportunities for less successful but equally skilled researchers to catch up. It could even lead to some labs being so successful they have more money than they can spend productively³. Other critiques focus on the historic inequality in terms of gender, identity, neurodivergence, and ethnicity within science in general⁵⁶⁷ and specifically within the allocation of research funds⁸⁹¹⁰: these academics are consistently underrepresented within (top) functions in academia and receive less research funding as well. Additionally, the content of funded research is critiqued for the fact that the impact on diverse and marginalized communities is generally not included in standards of societal impact⁵. These factors have emphasized the need for the scientific community and for decisionmakers specifically to think about new ways to allocate financial resources.

One way in which funding agencies have tried to stimulate innovative collaborative research based on more equitable principles is the sandpit (or idea lab) model¹¹. While there is no consensus on the exact characteristics of a sandpit, it is described as an intensive interactive workshop that aims to stimulate collaborative thinking processes regarding complex societal challenges. Sandpits are considered to provide a solid basis to generate innovative research projects by forming interdisciplinary consortia. The goal of a sandpit is commonly that during the workshop, not only different interdisciplinary consortia are formed, but that these interdisciplinary consortia in turn compete to obtain funding for their research proposals. Apart from the possible monetary rewards that are linked to

¹ Ma, A., Mondragon, R.J., Latora, V. (2015). Anatomy of funded research in science. *Proceedings of the National Academy of Sciences of the United States of America*, 112(48), pp. 14760-14765

² Merton, R.K. (1968). The Matthew Effect in Science. *Science*, 159(3810), pp. 56-63

³ Hicks, D. & Katz, J.S. (2011). Equity and excellence in research funding. *Minerva*, 49, pp. 137-151.

⁴ Bol, T., De Vaan, M., & Van de Rijt, A. (2018). The Matthew effect in science funding. *PNAS*, 115, pp. 4887-4890

⁵ Graves, J.L.Jr., Kearney, M., Barabino, G., & Malcom, S. (2022). Inequality in science and the case for a new agenda. *PNAS*, 119(10), e2117831119

⁶ Brown, N., & Leigh, J. (2018). Ableism in academia: where are the disabled and ill academics? *Disability and society*, 33, pp. 985-989. <https://doi.org/10.1080/09687599.2018.1455627>

⁷ Mellifont, D. (2021). Ableist ivory towers: a narrative review informing about the lived experiences of neurodivergent staff in contemporary higher education. *Disability and society*, in press, <https://doi.org/10.1080/09687599.2021.1965547>

⁸ Lauer, M.S., & Roychowdhury, D. (2012). Inequalities in the distribution of National Institutes of Health research project grant funding. *Computational and Systems Biology*, eLife 10:e71712.

⁹ Bedi, G., Van Dam, N.T., & Munafo, M. (2012). Gender inequality in awarded research grants. *The Lancet*, 380(9840), p. 474.

¹⁰ Van der Lee, R., & Ellemers, N. (2015). Gender contributes to personal research funding success in The Netherlands, 112(40), pp. 12349-12353.

¹¹ Maxwell, K. & Bennenworth, P. (2018). The construction of new scientific norms for solving Grand Challenges. *Nature: Humanities & Social Sciences Communications*, 4, doi:10.1057/s41599-018-0105-9

participating in sandpits, there is another advantage to participate in a sandpit: participants get the opportunity to expand their network for future multidisciplinary research collaborations outside of the sandpit¹¹. Usually, sandpits last three to five days with twenty to forty diverse participants from different scientific disciplines^{11,213}. The group can additionally consist of a group of mentors, who are independent experts in the field meant to ask critical and insightful questions to improve the research ideas generated by the participants. Furthermore, there might be collaboration partners or other stakeholders who will think along and can become collaborators within the consortia. And finally, there are professional sandpit facilitators who guide the process by structuring the meeting and giving assignments regarding networking, brainstorming, and developing ideas.

Whereas sandpits are seen as a novel way to encourage innovative thinking in academia and to improve the societal impact of scientific research, very little research is done on whether and how this works¹². One interesting study has focused on the extent to which sandpits aid in supporting multidisciplinary collaborations and the equality and inclusion of different scientific disciplines¹¹. Based on interviews with a group of scientists who participated in a sandpit in Norway, the authors conclude that the method can indeed be a useful tool in promoting multidisciplinary research. Only few critiques have been published on the sandpit methodology. One open letter focused on the lack of equality in the accessibility of sandpits for caregivers¹⁴. Another focused on the lack of open-mindedness in funders to actually allocate grant money to creative and innovative multidisciplinary applications instead of opting for 'safer' but less creative and innovative projects¹⁵. However, no attention has been given to the ways in which the sandpit model reproduces the inequities that are apparent in more traditional systems of distributing funding. Because little research is done on the sandpit model, and no clear guidelines are given on how to organize and facilitate a sandpit event, we discuss several potential pitfalls of the sandpit methodology that could put some researchers at a disadvantage. We also provide recommendations for implementing methods like the sandpit.

Our reflections are based on the available literature and on the experiences of the first author during her participation in a sandpit meeting organized by the Dutch Research Council (NWO)¹⁶. In the summer of 2022, the NWO organized a sandpit meeting on 'advancing equity in academia through innovation'. Forty participants were present who formed a diverse group in terms of cultural background, career stage, age, and scientific background. An additional seven expert functioned as mentors, asking critical questions along the way. Finally, there were three facilitators.

Caregivers

Sandpits are intense multi-day events, including evening activities, that are only accessible to people who have the time and means to be away from home for this amount of time¹⁴. During the NWO sandpit, which lasted four days, people were explicitly

¹² <https://petranetwork.org/wp-content/uploads/2020/05/Sandpit-methodology-overview-March-2020.pdf>

¹³ https://www.centreforfacilitation.co.uk/files/public/Innovation_and_Creativity/Sandpit_Case_Study_WDYTYA.pdf

¹⁴ <https://www.theguardian.com/higher-education-network/blog/2013/dec/18/research-council-sandpits-funding-decisions>

¹⁵ <https://blogs.lse.ac.uk/impactofsocialsciences/2018/10/15/sandpits-can-develop-cross-disciplinary-projects-but-funders-need-to-be-as-open-minded-as-researchers/>

¹⁶ NWO call "Advancing Equity in Academia through Innovation" <https://www.nwo.nl/en/calls/advancing-equity-academia-through-innovation>

encouraged to keep (net)working throughout lunch and dinner or to otherwise work on the project by, for instance, preparing pitches or doing other 'homework' assignments. This means that caregivers, who need their free time to tend to children or who have other formal or informal care duties, are at a disadvantage. Furthermore, those with a heavy teaching load may not be able to be present for this amount of time either. Going home in the evening to perform caregiver responsibilities or skipping a (part of a) day to teach might be possible, but it is likely that people who do so will be left behind in the process: new alliances can be made, and new ideas can develop or be shot down at any time, so being fully present is an advantage in order to profit from the sandpit meeting.

It is important to note that this is a gendered issue – that was exacerbated during the COVID19 crisis¹⁷ -, with women often having more caregiving responsibilities^{18,19}. The burden is even heavier for single parents, and there we see an imbalance as well, since more women than men raise children alone¹⁹. Furthermore, research has shown that women more often find themselves in teaching roles as well, with men on average having more time for research²⁰.

Rather than putting the responsibility of care on the individual or on their employer¹⁴, a simple way to overcome this problem is that the sandpit organizers provide support. This can be done by providing childcare on location, or by providing hotel accommodation for partners and children as well. Another option is to provide compensation for care costs. Regarding ways to aid those with teaching duties, flexibility and support from the employer is crucial, but organizers should check in with their participants to see what their needs are and whether they can assist. Finally, it is important to consider hybrid events so people who cannot attend the meeting in person still have the chance to join in. However, in this case it is important to make sure that 'online' attendees feel included as well. Since the COVID-19 pandemic, there is increasing research on how to organize effective hybrid meetings²¹ and how these meetings can be made more inclusive²². Different universities have developed checklists for this purpose^{23,24}. Some examples are to regularly check in and directly ask remote attendees whether they have anything to add; ask everyone to raise their hand if they have a question or comment; to avoid that people who are present in the room have side conversations that remote attendees cannot follow; to use live captions if needed; and to describe everything that is happening in the room to the remote attendees.

¹⁷ Skinner, M., Betancourt, N., & Wolff-Eisenberg, C. (2021). The disproportionate impact of the pandemic on women and caregivers in academia. *Ithaca S+R*, <https://doi.org/10.18665/sr.315147>

¹⁸ Bonawitz, M. & Andel, N. (2009). The glass ceiling is made of concrete: The Barriers to promotion and tenure of women in American academia. In *Forum on Public Policy Online* (Vol. 2009, No. 2). Oxford Round Table. 406 West Florida Avenue, Urbana, IL 61801.

¹⁹ Morgan, A., Way, S.F., Hoeffler, M.J.D., Larremore, D.B., Galesic, M., & Clauset, A. (2021). The unequal impact of parenthood in academia. *Science Advances*, 7: DOI: 10.1126/sciadv.abd1996

²⁰ Barry, J., Berg, E., & Chandler, J. 2012. Movement and coalition in contention: Gender, management and academe in England and Sweden. *Gender, Work and Organization*, 19, pp. 52–70.

²¹ Thomas Neumayr et al. "What was Hybrid? A Systematic Review of Hybrid Collaboration and Meetings Research". In: *CoRR abs/2111.06172* (2021). arXiv: 2111.06172. URL: <https://arxiv.org/abs/2111.06172>.

²² Bjerke, Thomas, et al. "Inclusion of Remote Participants in Hybrid Meetings." <https://folk.idi.ntnu.no/baf/eremcis/2022/Group15.pdf>

²³ <https://www.bristol.ac.uk/media-library/sites/equality/documents/inclusion-insights-inclusive-hybrid-meetings-A4.pdf>

²⁴ <https://hr.colostate.edu/flexible-work-arrangements/tips-for-inclusive-meetings-for-hybrid-teams/>

Early career researchers (ECRs)

Another important factor is the eligibility to participate. Often, as with other grant applications, the institution of potential participants needs to express their commitment to the participation of a specific individual, especially when the funding comprises multi-year projects. For universities, it is easy to commit to researchers who already have long-term or permanent contracts. However, it can be difficult to commit to ECRs who have short-term contracts, since commitment implies a promise of an extension of the contract in case the grant is won. Uncertainties about budgets may hamper the possibility for these researchers to apply for sandpit meetings even though these researchers would benefit most from obtaining funding and expanding their network. Notably, this problem will be much less prominent for the leading universities or labs who have no money shortage¹ and who thus have the means to provide longer contracts for their ECRs.

We realize that responsibility for short-term contracts for ECRs at universities does not lie with funding agencies. However, we advise to reconsider the criteria for participating in a sandpit. We propose that funding agencies make it possible for those who have shorter contracts to be co-applicants on research proposals. Furthermore, consortia should be encouraged to include ECRs. For instance, the involvement of ECRs and mentoring by more senior team members could be part of the assessment criteria. We are confident that allowing ECRs to participate could boost their career by increasing their network, growing as researchers, and to increase their standing within the academic world if they obtain the funding. In turn, this would lead to an increased chance for these researchers to gain longer term contracts²⁵.

A related issue that might disadvantage ECRs is that sandpits can reflect the hierarchy within the academic world. Those who have tenure, those who have experience in obtaining research funding, those who have extensive networks within and outside their institutions, or those who have a combination of these, are likely to be regarded as more valuable assets for a consortium. For instance, some people who are part of the wealthier labs might bring into the sandpit the promise of matched funding by their department or university, if they submit a successful application. A less experienced researcher might have interesting and innovative ideas but depending on different aspects of the group (e.g., the number of people overall, the number of early and later stage researchers, the willingness of members of the group to take on less experienced researchers), this might not be enough to win a seat at the table and to be taken seriously. Consortia whose members have a combination of scientific expertise, expertise on how to obtain funding, and having extensive networks will always be at an advantage over consortia who do not have members with these advantages. It resembles a popularity contest in which the participants who do not stand out but do have all the skills that are needed to perform well end up losing. Furthermore, such a contest likely does not lead to the best functioning, creative and innovative teams. Instead, the process reproduces inequalities within the academic world.

It is important to note that the unequal position of ECRs is a gender and race-related issue as well. Women, people of color, non-western migrants, and people from the global south are increasingly represented among the group of ECRs, but remain

²⁵ Bloch, C., Krogh Graversen, E., & Skovgaard Pedersen, H. (2014). Competitive research grants and their impact on career performance. *Minerva*, 52, 77-96. <https://link.springer.com/article/10.1007/s11024-014-9247-0>

underrepresented in the higher levels of academia²⁶²⁷²⁸²⁹. In other words, people from historically underrepresented groups are more likely to be ECRs and therefore might be less likely to be eligible for participating in a sandpit, and when they do, they might not be considered as a suitable member for a successful consortium.

A solution lies with the facilitators of the sandpit. They should be aware of the power dynamics in the room and to check in with the different participants and consortia. One step that could be taken to make sure everyone has a say is to make sure that everyone has a chance to share their expertise with the group. This can be challenging in large groups, but possibly a booklet could be made for which all participants briefly provide a description of their expertise and interests. Alternatively, a bulletin board can be placed in the meeting room (or online) on which each participant can post a brief note. As an exercise, participants can then create groups for brainstorm sessions based on this information. Facilitators could stand by to ensure that participants do not go for the most obvious choices when creating groups. Furthermore, facilitators or mentors could sit in on consortium discussions and making sure everyone has a chance to share their viewpoint. In some situations, it might even be productive to have a facilitator or one of the independent mentors chair the group discussions to ensure that the process is equitable. Making the inclusion of ECRs a requirement for obtaining funding will of course also help here.

(Neuro-)diverse personalities

Another factor to take into consideration is that sandpits are highly intense social situations in which extraversion is a plus: people are expected to network quickly and easily and to feel comfortable enough to brainstorm and to spontaneously pitch ideas without having much time to reflect or prepare. Furthermore, the intensity and fast-paced nature of the sandpit process are notorious. For instance, within the NWO sandpit, each exercise was strictly timed, with most lasting two to five minutes, with very little room for personal reflection. Whereas some might enjoy this, for others it might be overwhelming.

As one facilitator of the NWO sandpit noted, the process is inherently not equitable: extraverted people who thrive in this type of context are highly likely to become main applicants within the consortia and are thus more likely to be rewarded. In contrast, people who are more introverted (a group that comprised up to 50% of the population³⁰), who need more time to feel at ease in a large group of people and who need more time to reflect before they speak will be at a disadvantage. Furthermore, people with high sensory

²⁶ Michelle I. Cardel, Emily Dhurandhar, Ceren Yazar-Fisher, Monica Foster, Bertha Hidalgo, Leslie A. McClure, Sherry Pagoto, Nathaniel Brown, Dori Pekmezi, Noha Sharafeldin, Amanda L. Willig, and Christine Angelini. Turning Chutes into Ladders for Women Faculty: A Review and Roadmap for Equity in Academia. *Journal of Women's Health*. May 2020. 721-733. <http://doi.org/10.1089/jwh.2019.8027>

²⁷ Fox Tree, J.E., & Vaid, J. (2022). Why so few, still? Challenges to attracting, advancing, and keeping women faculty of color in academia. *Frontiers in sociology*, <https://doi.org/10.3389/fsoc.2021.792198>

²⁸ MacPhee, D., Farro, S., & Canetto, S.S. (2013). Academic self-efficacy and performance of underrepresented STEM majors: Gender, ethnic, and social class patterns. *Analyses of social issues and public policy*, 13, pp. 347-369

²⁹ Syes, M., Azmitia, M., & Cooper, C.R. (2011). Identity and academic success among underrepresented ethnic minorities: an interdisciplinary review and integration. *Journal of social issues*, <https://doi.org/10.1111/j.1540-4560.2011.01709.x>

³⁰ Cain, S. (2012). *Quiet: The power of introverts in a world that can't stop talking*. Crown Publishers/Random House

sensitivity (an estimated 20% of people³¹), people who are on the autistic spectrum (2.2%³²), or people with attention deficit hyperactivity disorder (an estimated 4.4%³³) would quickly be overwhelmed in a sandpit atmosphere. Considering these high prevalences, it is likely that for many sandpit attendees, the surroundings are not optimal for coming up with valuable research ideas. This is particularly unfortunate since research has shown that neurodiverse people are often creative and innovative thinkers^{34,35}.

One option is to only invite those whose personalities are more in line with the demands of a sandpit meeting. For instance, the expression of interest form of the NWO sandpit contained questions about personal characteristics such as the ability to easily settle in the company of others and to be able to deal well with ambiguity³⁶. However, selecting only people with specific personalities would imply that a disproportionate number of talented academics will miss out on an opportunity to participate. Another option, which was proposed during the NWO sandpit, was that those who felt overwhelmed could step away. Whereas this indeed will relieve some of the pressure, this eventually increases inequalities: stepping away means missing crucial developments within the sandpit and consequently, the possibility of not being included in a consortium.

Fortunately, there are ample opportunities to make sandpits more accessible for different personalities. It is important to ask participants during registration whether they have specific needs in order to thrive during the sandpit. Not only will this give organizers valuable information, but it will also make participants feel heard and valued. It is possible to anticipate some needs in advance, such as having some flexibility in the schedule, having a quiet space, or having regular breaks without any input or assignments³⁷. Another option is to provide the possibility to attend the meeting online, so participants have the opportunity to minimize irrelevant or distracting social input³⁴.

Discussion and conclusion

We identified several problems in research funding: the disproportionate allocation of money to the academic elite, the inequality in terms of gender, identity, race, and neurodivergence, and the lack of impact of funded research on societal impact^{1-8, 26-29}.

One might argue that sandpits were developed to advance science by increasing multidisciplinary collaborations to tackle important societal problems, for which initial evidence already exists⁹; and that it was never the goal to make the funding process more equitable or inclusive. We would argue that any steps that are taken to improve the way in which science is funded *should* have the goal to make this process more equitable or inclusive. The Matthew effect (i.e., disproportionate rewards for eminent researchers) has

³¹ Rizzo-Sierra, C.V., Leon-S., M.E., & Leon-Sarmiento, F.E. (2012). Higher sensory processing sensitivity, introversion and ectomorphism: new biomarkers for human creativity in developing rural areas. *Journal of Neurosci Rural Pract.* 3(2), pp. 159-162

³² <https://www.cdc.gov/ncbddd/autism/addm.html>

³³ <https://www.nimh.nih.gov/health/statistics/attention-deficit-hyperactivity-disorder-adhd#:~:text=Prevalence%20of%20ADHD%20Among%20Adults,-Based%20on%20diagnostic&text=The%20overall%20prevalence%20of%20current,all%20other%20race%2Fethnicity%20groups.>

³⁴ Bewley, H., & George, A. (2016). *Neurodiversity at work*. Research paper. National Institute of Economic and Social Research.

³⁵ Grant, A. & Kera, H. (2021). Considering the autistic advantage in qualitative research: the strengths of autistic researchers. *Contemporary Social Science*, 16, pp. 589-603.

³⁶ <https://www.nwo.nl/en/calls/advancing-equity-academia-through-innovation>

³⁷ <https://meetings.skift.com/accommodate-event-attendees-neurological-needs/>

been seen as a problem for scientific advancement since the nineteen sixties². Inequalities in academia have been described and criticized for decades and this is still a current problem³⁸³⁹. Not taking these issues into consideration when developing new policies will keep these mechanisms in place and only reproduce and amplify these inequalities.

We encourage organizers to consider equity, diversity, and inclusion in different steps of the process and ask themselves critical questions. First, they need to reflect on who is eligible to participate in the sandpit. Should assessment be based purely on motivation, on experience or a combination of different factors? How do the organizers guarantee that the group really represents the diverse scientific community? How can they avoid excluding crucial groups, such as caregivers, ECRs, people with non-western migration backgrounds, people of color, and neurodiverse people? Second, there is the sandpit meeting itself: who should organize these workshops, and how can they guide the process, so opportunities are truly equitable and to make sure that everyone is heard? How do they make sure that specific hierarchies and inequalities that play an important role within the academic world are not mirrored in the meeting room? How do they deal with unequal power relations in the room? And is the sandpit accessible to all attendees? Third, there is the assessment of the research proposal: are the criteria clearly defined and is every consortium treated fairly? How much weight is given to the esteem or academic performance of specific individuals in the group?

Furthermore, it is possible that sandpits, as they are currently designed, are not the ideal way to make the funding process more equitable and other ways should be considered. One option is to make equity, diversity and inclusion part of the grant schemes or part of the assessment criteria. Important examples of this are the initiatives of Horizon Europe, which require that universities have gender equality plans⁴⁰. Furthermore, NWO has reinstated their Mosaic grant scheme⁴¹, a grant specifically aimed to support PhD students with a non-western migration background. We applaud these initiatives and encourage funding agencies to take these ideas even further, and to think about ways in which to support different underrepresented groups. Other steps could be to facilitate the development of consortia, by arranging inclusive networking events on societal themes specifically aimed to connect diverse groups of academics and diverse groups of stakeholders.

One easy way to achieve equity when designing sandpits, networking events, or even when designing funding calls, is to involve different groups from the target population in the development of the event: ECRs, neurodiverse people, people with non-western migration backgrounds, people of color, and caregivers could share their needs, identify possible problems and help find solutions. Co-creation and the inclusion of stakeholders are valuable and increasingly appreciated elements of science⁴², so using these elements in the development of sandpits or similar meetings should help advance their functionality. Finally, the development of inclusive funding calls is in line with the Recognition and Rewards programme that was developed by Dutch knowledge and funding institutions

³⁸ Dupree, C.H., & Boykin, C.M. (2021). Racial inequality in academia: Systemic origins, modern challenges, and policy recommendations. *Policy Insights from the Behavioral and Brain Sciences* 8, pp. 11-18.

³⁹ Casad, B.J. et al. (2020). Gender inequality in academia: Problems and solutions for women faculty in STEM. *Journal of Neuroscience Research*, <https://doi.org/10.1002/jnr.24631>

⁴⁰ <https://op.europa.eu/en/publication-detail/-/publication/ffc06c3-200a-11ec-bd8e-01aa75ed71a1/language-en/format-PDF/source-232129669>

⁴¹ <https://www.nwo.nl/en/researchprogrammes/mosaic>

⁴² <https://www.ec.europa.eu/docsroom/documents/13402/attachments/1/translations/en/renditions/native>

VSNU, NWO, ZonMw, NFU, and KNAW, in which the appreciation of a diversity in career paths, skills, and achievements plays an essential role⁴³.

⁴³ <https://recognitionrewards.nl/wp-content/uploads/2020/12/position-paper-room-for-everyones-talent.pdf>