

ODIN: IMPACT ASSESSMENT

FINAL ASSESSMENT OF THE OPEN DISCOVERY
INNOVATION NETWORK (ODIN) PILOT PROJECT



DANISH CENTRE FOR STUDIES IN
RESEARCH AND RESEARCH POLICY
DEPARTMENT OF POLITICAL SCIENCE
AARHUS UNIVERSITY



About the report

This is the final report from the impact assessment of the Open Discovery Innovation Network ([ODIN](#)) pilot project at Aarhus University.

The impact assessment was carried out independently and objectively by a research team at the Danish Centre for Studies in Research and Research Policy (CFA), Department of Political Science, Aarhus University. This report draws on data collected during the period 2020 to 2023 and extends findings published in the 2022 [Interim Impact Assessment report](#). For the impact assessment, CFA has received a total of 750,000 DKK financed via the original ODIN grant to Aarhus University from the Novo Nordisk Foundation (Grant no. NNF20SA0061466).

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KEY FINDINGS AND RECOMMENDATIONS



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The impact assessment concludes that ODIN has been **a highly successful pilot project**. In addition to meeting (and exceeding) its KPIs, ODIN has demonstrated that Open Science Partnerships (aka Open Innovation in Science platforms) are a viable and valuable form of university-industry collaboration within the project's context of operation. Interviews with university and industry representatives suggest that ODIN has stimulated growing interest in and acceptance of open collaborative practices, as a supplement to conventional "closed" collaborations.

Three defining features of the ODIN project have been identified in the impact assessment:

- 1. ODIN has successfully developed and gained acceptance of a novel open legal framework.** This framework has been accepted by participating companies, and academic and industry participants praise it for *reducing barriers to collaboration and knowledge exchange* between universities and companies.
- 2. ODIN has effectively used facilitated ideation and matchmaking process** to stimulate co-creation of collaborative projects. ODIN has engaged more than 100 academic group leaders and 40 companies in the ODIN network (substantially over the original targets of 30 group leaders and 15 companies). Ideation and matchmaking efforts within this network have been effective in *stimulating the formation of novel collaborative ties* and the development of *needs-driven projects* with both scientific and industry value.
- 3. ODIN has provided funding for selected research projects.** ODIN completed *two calls* and funded 11 projects. For academics, ODIN is *an attractive source of financing for basic research and industry collaboration*. Third-party funding provided by ODIN helps ensure "balanced", open collaborations (as projects are not dictated by a single firm). For industry, ODIN funding *lowers barriers to basic research collaboration*, which provides crucial inputs to their long-term R&D activities but for which limited internal funding is available.

ODIN HAS MET (AND EXCEEDED) ITS KPIs

Key Performance Indicators (KPIs)	Target	Status
Organizational development		
Establishment of an open legal framework	Yes	Yes
Number of PIs involved	30	107
Number of PhD students and postdocs involved	30	29 *
Number of industrial companies involved	15	44
Productive interactions		
Number of ODIN projects created and funded	5-7	11
Number of new emerging research avenues	2-4	11+ **
Number of lectures/pitches given by industry in ODIN	12-15	12

* 29 PhD students and postdocs have been involved in ODIN-funded projects. An as of yet unknown number of postdocs have contributed to rejected applications and ideation.

** End-of-project interviews revealed that all 11 projects have embarked on or are planning to pursue new research projects based on findings and results in their ODIN-funded project.

ODIN HAS FUNDED 3 TYPES OF PROJECTS

Basic research projects aimed at furthering fundamental insight into disease mechanisms with a view to identifying possible biomarkers or targets for future drug discovery projects

Data-focused projects aimed at generating or gathering data on a large scale, e.g. to improve models for target validation or compare the usefulness of various animal and human models for diagnosis and monitoring of progression of diseases

Platform technology projects developing a generic technology that can be used in multiple applications, e.g. for different disease areas

Key characteristics of the 11 ODIN-funded projects

- The focus in ODIN on active involvement of firms is credited with fostering **higher-than-usual commitment from firms**. More specifically, the requirement of active involvement is attributed with increasing the likelihood that the firm will make a clear, upfront commitment to the project and allocate resources accordingly.
- ODIN funds **basic research with a focus on possible applications, or ‘needs-driven basic research’**. This is enabled by the ideation process as well as the explicit focus on active engagement of participating firms (since the precondition for firms committing resources to a project is that they feel it holds sufficient potential value). Projects are informed by industry knowhow, which increases their relevance for firms.
- ODIN is described as having a **high tolerance for risk and failure** and as stimulating **open-ended projects**. This means that instead of defining outcomes narrowly from the outset, projects are more exploratory and/or descriptive. Typically, academics are not able to pursue such projects because it is difficult to secure funding for projects without well-defined outcomes. Yet such projects allow for focused work and accelerated progress that is crucial to the advancement and application of science. Thus, ODIN appears to be filling an important gap in the science-funding landscape.
- The **limited size of projects** helps to keep them focused and agile and to facilitate close collaboration. Meanwhile, the open legal framework ensured an “NDA-free space” that facilitated **free exchange of knowledge and data** within and beyond the 11 projects. The collaborations in almost all projects were described positively by PIs and firms. Industry participants’ level of engagement differed across projects but was generally reported to match their originally intended level of commitment.

About openness in ODIN-funded projects

- **For firms**, the primary motivation for participating in an open platform like ODIN has been the opportunity to lower entry barriers to university-industry collaborations; to address unsolved challenges in industry R&D through needs-inspired basic research; and to engage in complex projects and long-term investments in knowledge building and exploratory R&D within topics that complement and extend internal R&D aims. **Potential downsides (for firms) of openness are expected to be tempered** by the lead time advantages that participating companies enjoy (incl. the ability to influence research aims and approaches as well as tacit knowledge of the project gained through participation) and by the fact that ODIN's legal framework allows for downstream IPR protection. Definitive conclusions cannot yet be drawn, since the projects' outcomes are still early-stage, but so far there are no indications of negative impact on downstream development.
- **For academics**, openness is key to enhancing quality, replicability and efficiency in research and to accelerating scientific progress. **Some challenges and concerns were nonetheless identified.** First, incentives to provide a high level of curation of the data are lacking, as instructions from ODIN about the expected degree of curation were seen as unclear. Meaningful sharing – which promotes accessibility of open data – is very resource-demanding. Second, although ODIN requires that outputs are shared without delay, some PIs postponed sharing until they felt more secure in their data sets, fearful of sharing unvalidated data. Third, several PIs expressed scepticism regarding the value of open data sharing before a flagship publication has been published, as it provides information on the potential uses of a dataset. Fourth, several PIs expressed concerns about "being scooped", i.e. losing priority to other groups working on their openly available data.

Progress and results of the projects

- The ODIN-funded projects were recently completed or still ongoing during the last round of interviews in connection with this evaluation (Q4 2023). Thus, the projects will continue to yield results and publications for some time. Moreover, all the projects focus on early-stage research, which requires substantial further research and development for potential applications to emerge. Therefore, this assessment offers only **a very preliminary window into the results of the ODIN-funded projects.**
- Some projects experienced delays due to e.g COVID-19 lockdowns, practical setbacks, or scientific or technical challenges. Adjustments were made without major impact on the aims or execution of the projects. The **high degree of flexibility** offered by the ODIN secretariat was described as positive in allowing projects to make necessary adjustments and pursue the most meaningful path forward for their project.
- 5 of the 11 projects are still ongoing, awaiting key results. Overall, however, all **projects have been (or have the potential to be) successful in meeting their aims.** PIs and industry participants expressed similar assessments of their projects, signalling a common understanding of aims and achievements.
- All PIs described **new research avenues** that emerged from their ODIN-funded project to be pursued either as purely academic projects or as continued collaborations with their industry partners.
- While the majority of industry participants experienced valuable outcomes from the projects and expressed optimism regarding the potential for **follow-on R&D projects** either in their own firm or in others, the downstream IP potential was generally described as being “several years into the future, probably at least 10 years”.

PRELIMINARY OUTCOMES FROM PROJECTS: OVERVIEW

Outputs and outcomes	Assessment	
Outputs from projects (results, data, methods, technologies, etc.)	✓	11 of the 11 projects have reported new data and results in line with the original aims of their projects.
Scientific publications	✓	4 published by the end of 2023. 38 publications are in progress or planned.
Scientific publications co-authored with industry partners	✓	Of the 4 publications, 1 was co-authored with industry partners. Of the 38 planned articles, 22 are expected to be co-authored with industry partners.
Industry contributions to projects	✓	Industry partners have made intellectual contributions (20 instances), material contributions, e.g. compounds, tissue samples etc. (6 instances), conducted analyses or given access to instruments, facilities or technologies (18 instances) and trained, hosted or exchanged researchers (2 instances)
Bi-directional knowledge exchanges	✓	There has been varying degrees of bi-directional knowledge exchanges within projects.
Open sharing of outputs: project results are accessible to third parties	✓	7 projects have confirmed open sharing of results (some of these still have data that is to be shared). 4 projects are awaiting final results before sharing.
New research avenues and follow-on academic research projects	✓	All 11 academic PIs report they are planning follow-on academic research projects. 7 projects are realized, and 3 of them have secured funding.
Follow-on academic collaborations with industry	✓	10 of the 11 academic PIs report to have begun planning follow-on academic collaborations with industry. 2 projects have been started.
Other (e.g. downstream R&D projects in industry, spin-outs, etc.)	✓	One spin-out established by the end of 2023. Several projects note that their platforms or results have been used by both academia and spin-outs.

Recommendations

- The ODIN pilot project has shown that Open Science Partnerships offer **a valuable supplement** to IP-based collaboration models. There is a good basis for a possible continuation of ODIN. Efforts could also be made to build additional experience with ODIN-type models in other fields (as is already the case with Plant2Food).
- The thematic scope in the ODIN pilot project could, according to industry participants, be expanded in a possible continuation of ODIN to include a **broader range of possible precompetitive research themes**.
- Given the apparent value of the ideation process in stimulating the formation of novel ties and needs-inspired basic research projects, further efforts should place emphasis on **maintaining effective ideation and matchmaking activities**. This could include further developing both academics' and firms' abilities to pitch ideas for projects or describe industry needs. Company participants also called for involving more universities in similar future programs to increase the pool of potential academic collaborators.
- Big pharma companies are driving most of the collaborations from the industry side, but **SMEs** are also involved in several projects. While they have experienced benefits from their participation, engagement in ODIN-type platforms can be more challenging for SMEs – both in accepting the terms of the open legal framework and finding the resources to participate actively in projects. Ensuring that Open Science Partnerships are relevant and attractive for SMEs could be a focus area in a possible continuation of ODIN.
- **Interest companies:** The concept was only used in a handful of ODIN projects to allow interested companies to participate in a passive role in relevant projects. Generally, however, interest companies were not engaged or considered much. The idea is good (a way to engage more firms in projects, allowing for different degrees of involvement) but did not work well in practice. It might be worth it to revisit the concept and to operationalize it to make it easier to implement and help align academic and industry expectations of “interest companies”.

- To realize the full intentions of the **requirements of open sharing of research outputs**, such efforts should be better supported. This includes providing clearer instructions, for instance regarding the desired level of compliance regarding accessibility of openly shared data. This includes considering how to address the substantial resources and training needs involved in openly sharing data. Good examples of open data sharing could inspire and guide researchers.
- Several respondents from academia and industry called for **more knowledge sharing *across* ODIN-funded projects**, for instance through regular online seminars on current activities and preliminary results from projects, open to all ODIN network members. This could be relevant to pursue in a possible continuation of ODIN, which would likely include a larger volume of projects and network members.
- If continuation of ODIN is secured, relevant **grant types** should be considered. The small size of the ODIN-funded projects was positively received, as it fosters risk-taking, agility and close collaborations. However, some project grants were considered short and could, according to participants, have benefitted from an extra year or an option to apply for follow-on grants to further develop promising findings.
- Finally, the impact assessment team recommends **following up on outcomes and impact** of the pilot project, for example in 2-3 years. Given that this impact assessment was completed in the last months of the ODIN project, while many projects were still in progress or recently completed, it can only paint a very preliminary picture of the results and outcomes of the project. These can be more fully assessed, along with the overall impact of the ODIN pilot project, in a few years and provide additional insight into achievements and lessons learned from ODIN.

1. INTRODUCTION



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ABOUT ODIN

OPEN DISCOVERY INNOVATION NETWORK

A Novo Nordisk Foundation Sponsored Initiative

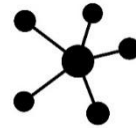
Pilot project (April 2020-December 2023) administered by Aarhus University (AU) and funded by the Novo Nordisk Foundation (total budget: 54.5 M DKK)

Focus: drug discovery (themes: biomarkers and target validation)

Two calls for project proposals (one in 2020, and one in 2021)

11 projects funded

More info ▶ [ODIN](#) webpage



NETWORK for AU researchers, big pharma companies and SMEs, open to all interested companies. No membership fee, but firms must sign the non-negotiable legal framework to join.



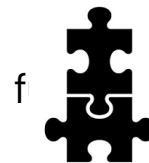
IDEATION AND MATCHMAKING: Companies and academics pitch ideas for projects; proposals for collaborative (precompetitive up to TRL 3) projects are co-created via a digital platform and matchmaking.



FUNDING FOR OPEN PROJECTS is provided for the academic component of projects selected via competitive calls; companies must contribute actively to projects and finance their own participation.



OPENNESS is secured through a non-negotiable legal framework. All results generated must be made openly available, and IPR cannot be claimed (though IPR can be claimed on downstream work)



AIMED AT SPURRING FOLLOW-ON R&D AND INNOVATION, e.g. academic R&D; university-industry R&D collaborations; contract R&D; in-house private R&D; university spinouts etc.

ABOUT THE IMPACT ASSESSMENT

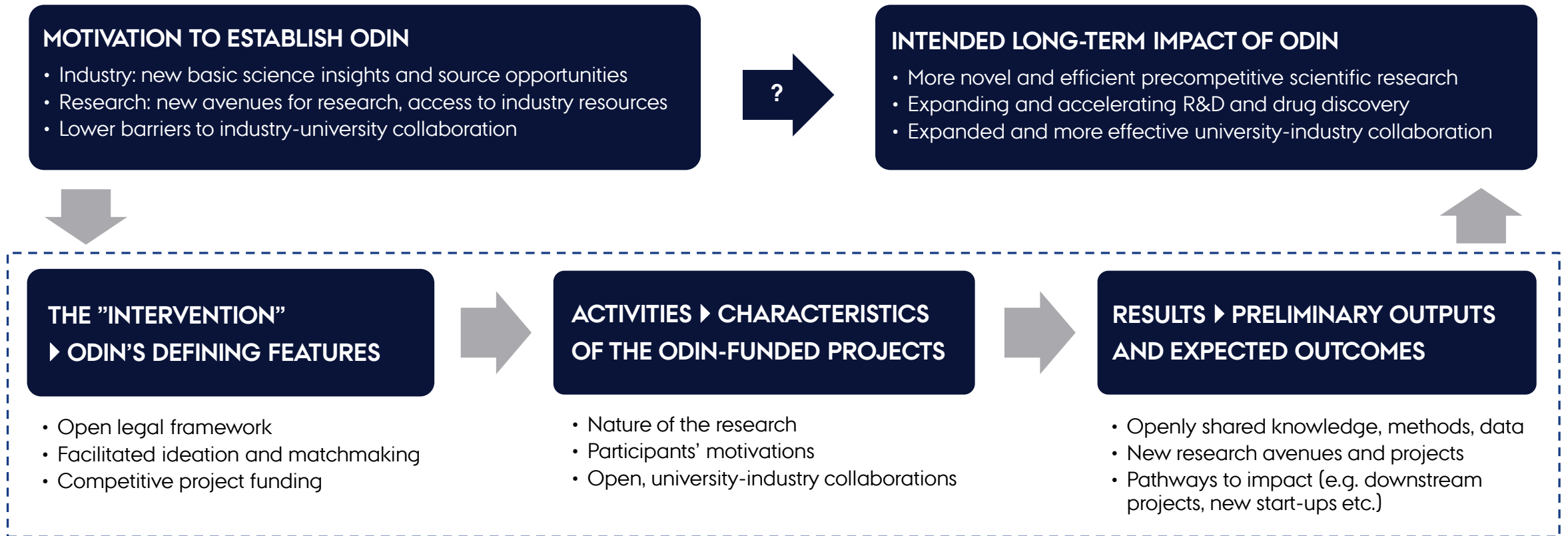
Aim: To assess *progress* and *impact* of the Open Drug Discovery Network ([ODIN](#)) pilot project.

Main questions:

- What are the **defining features** of ODIN, e.g. compared to (a) 'conventional' frameworks for university-industry collaboration and/or (b) other Open Science Partnerships (OSPs)?
- What are the **characteristics** of the ODIN-funded projects, and to what extent are they attributable to the defining features of ODIN?
- What are the **preliminary outputs and expected outcomes** of the ODIN-funded projects, and to what extent are they attributable to the defining features of ODIN?

For information on data, methods and interview respondents, please see the Appendix.

ABOUT THE IMPACT ASSESSMENT: OVERVIEW



2. DEFINING FEATURES OF ODIN



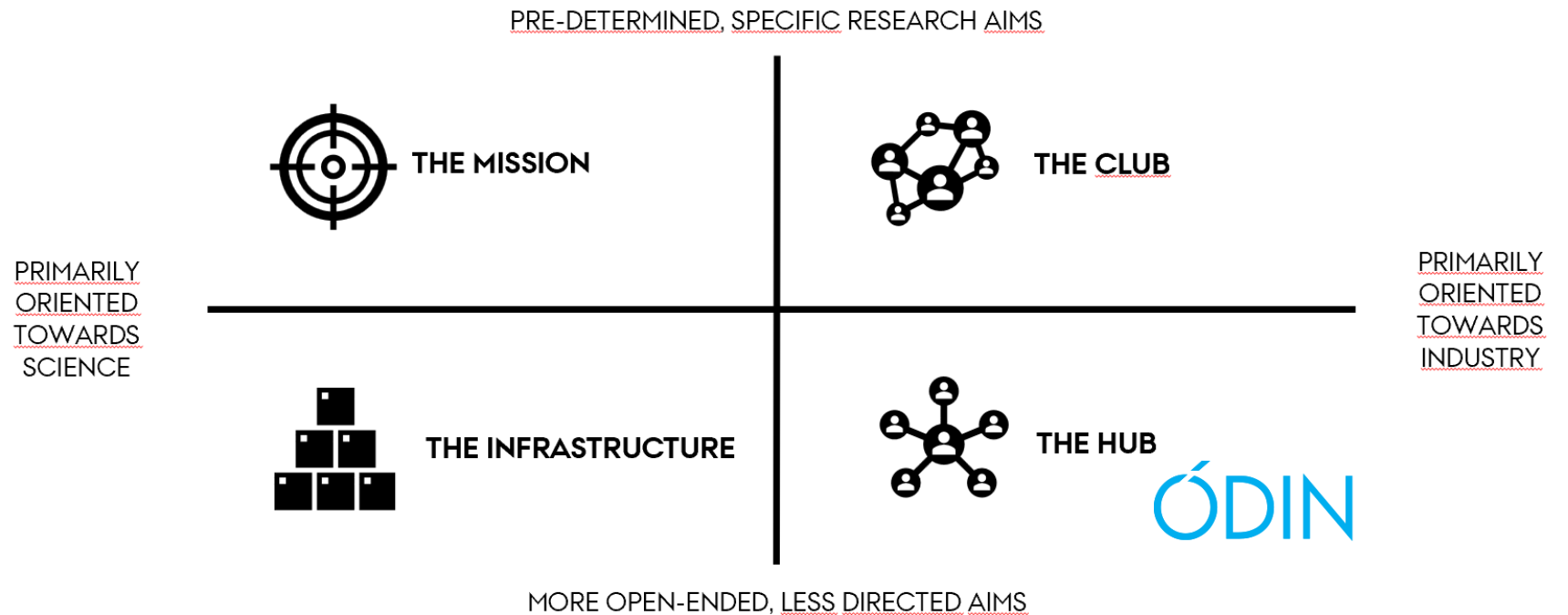
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HOW ODIN COMPARES TO OTHER OPEN PLATFORMS

OSPs can pursue different aims which shape how the OSPs are designed, their results and effects.

Compared to other OSPs, ODIN has little or no influence on the aims set for the projects that it funds; these are set by participants themselves. ODIN is also oriented towards stimulating industry uptake of science.



DEFINING FEATURES



The open legal framework. Participants must sign a non-negotiable legal framework to gain access to the ODIN network and qualify for ODIN funding. This framework requires that participants adhere to the ODIN open principles, notably that all research outputs must be shared in the public domain with no restrictions on their further use, which also precludes participants from taking out IPR on direct outputs of ODIN-funded collaborations. This framework requires a higher degree of openness than typically seen in precompetitive public-private partnerships, many of which have more restrictive policies regarding IP and knowledge sharing.*



Facilitated ideation and matchmaking. ODIN provides a digital platform for ideation and co-creation of project proposals that can subsequently be submitted to competitive calls in ODIN. The digital platform, which includes descriptions of ideas and online pitches of project ideas by academic researchers and industry representatives, is supported by handheld matchmaking of project partners by the ODIN Secretariat when needed. The aim of this process is to stimulate novel research project ideas in line with the overall aims for ODIN.



Funding for projects. ODIN provides in-cash funding for the academic component of projects selected via the competitive calls organized by ODIN.

2.1. THE OPEN LEGAL FRAMEWORK

All research data and results produced under ODIN must be shared with the public without restrictions on their further use. To ensure compliance with these principles, a legal framework was developed. Some of its key points:

- Any foreground knowledge generated under ODIN-funded projects must be made publicly available as soon as reasonably practicable (allows parties time to ensure that no confidential knowledge is disseminated).
- No one can claim exclusive rights to this knowledge, and it may not be protected by patents or the like.
- Anyone in/outside ODIN has an irrevocable right to use this knowledge free of charge for any and all purposes.
- Projects can draw on confidential background knowledge, but confidentiality must not prevent access to/usage of data generated in the project.

- ODIN grant holders are **responsible** for implementing correct data management in their projects, and participants must follow **the FAIR principles**.
- Data and results must be shared **openly as soon as possible**.
- All data and publications should be uploaded to **Zenodo** (ODIN_DK Community).
- All data must be shared under the **CC0** “creative commons” license.
- All publications must be available through **open access**.

Participants' reflections on the open legal framework

- According to both academic and industry participants, the framework **reduces the time and barriers involved in entering collaboration.**
 - The non-negotiable legal terms remove the need to negotiate the distribution of IPR or possibilities to delay publication of results.
 - The framework helps prevent early-stage, broad patents, which are less effective and valuable than more specific patents (which firms can pursue through subsequent R&D, if relevant).
- Interviews indicate that the open legal framework **promotes open sharing of knowledge and data** in ODIN-funded projects.
 - Industry participants could share relevant data and materials when the need arose without having to apply for internal approval, provided the data were covered by the scope of the ODIN project.
 - Open principles were described as having the positive by-product of infusing collaborations with openness: Without NDAs, participants could communicate freely about ideas and findings within and beyond the project. The open principles were seen as providing projects with a safe space for knowledge exchanges.

“Openness makes it a bit easier to restrict topics, easy to delimitate what is off topic – which works quite well when collaborating. And then, when talking about ODIN, everyone knows that it must be open and shareable.” (Academic participant)

“An important aspect of the openness is that there’s been no NDA. That’s been really important. It’s just no fun working under an NDA. The things we’re working on, everything we know, we use it in a lot of projects. An NDA would’ve meant that we couldn’t talk about the project and that would’ve been a disadvantage.” (Academic participant)

2.2. IDEATION AND MATCHMAKING

Ideation and matchmaking were supported in both ODIN call rounds but played a much greater role in the second round. The first call round was launched at the outset of the COVID-19 pandemic lockdowns and moved online; this hampered the intended effects of the ideation process, and many of the proposals developed during the first round built on existing ideas for projects and existing collaborative ties between academics and firms.

The second call round placed more emphasis on ideation processes, including online pitch sessions. This is reflected in the table below: 4 of 5 funded projects from the first call emerged from the ideas and personal networks of the PIs, and 4 of 6 funded projects from the second call emerged from the ODIN ideation process.

Origin of ideas for ODIN-funded projects	Call 1 projects	Call 2 projects
PI had the idea. Industry partner(s) contacted through personal network	4	2
Project idea and consortium were substantially developed through ODIN	1	4
Total	5	6

Participants' reflections on the ideation and matchmaking

- The ODIN ideation and matchmaking activities appear to have been effective in promoting the **formation of novel collaborative ties** as well as **needs-driven research projects** co-created to cater to both scientific and industry interests.
- For academics, ODIN **provided easy access to firms**: Industrial ambassadors in the pharma companies served as gatekeepers and matchmakers, pointing PIs in the right direction and paving the way.
- Firms described ODIN's ideation process – especially the virtual pitches – as an **eye opener** in terms of the breadth of ideas and competences available in academia, allowing them to pursue collaborations outside their staff's personal networks. Pitches also provided useful insight into activities in other companies.
- Both PIs and industry representatives have called for **more academics** (from AU and other universities) to become involved to expand the pool of potential (and often highly specialized) collaborators.
- In the latest round of interviews, PIs described the ideation/matchmaking process as **the greatest difference** in ODIN-funded projects compared to other university-industry collaborations (also greater than openness). Once projects were underway, they were experienced as similar to other collaborations the participants had experience with.

“[The idea with] the ideation process – to really open up and discuss what are the needs, what do we have in academia, how can we utilize it, how can we come up with projects that are relevant, and to have this open discussion – is really new. [...] In the ideation phase, you can come and talk openly about your ideas, your project, your expertise – and anybody can chip in and discuss projects.”
(Academic representative, ODIN Project Review Committee/Steering Group)

“I think the ODIN program has made a lot of effort to try to facilitate these bilateral interactions and to try to create some connectivity between Aarhus researchers and our own researchers. [...] I also liked the idea that the pharma/industry side got the opportunity to pitch some ideas, like problems or challenges we would like help solving [...].” *(Academic representative, ODIN Project Review Committee/Steering Group)*

2.3. COMPETITIVE PROJECT FUNDING

About the funding provided by ODIN

- The bulk of the funding awarded to ODIN by the Novo Nordisk Foundation was distributed as funding for research projects to be completed within the lifetime of the ODIN project. Funded projects had to hold relevance for pharma companies with the potential to lead to new pharmaceuticals downstream.
- Projects must involve academic participants from at least two faculties at AU as well as at least one industry participant and must be headed by a tenured group leader or tenure track researcher at AU.
- Two-way interaction between academic and industry participants was required in both the idea/proposal development phase and in the actual projects selected and funded by ODIN.
- ODIN provides funding for the academic component of joint projects with industrial partners, while the latter and other partners (e.g. regional hospitals) fund their own participation. Participating companies are not required to provide in-cash funding for the projects in which they participate. However, they are expected to contribute with in-kind resources, including their own time, reagents, access to compound libraries etc.
- Calls for funding applications were open to all members of the ODIN platform. The projects ultimately funded were selected by the ODIN Steering Group on a competitive basis, after review by an independent expert review panel and based on recommendations from the ODIN Project Review Committee.

Participants' reflections on the funding provided by ODIN

- **Industry perspective:** Several companies mentioned the role of third-party funding from the Novo Nordisk Foundation as crucial to their motivation to enter the open collaborative platform. The funding provided to academic partners lowers internal barriers to participation in companies, as firms have limited in-house capacity for (especially explorative) R&D, and there is often internal competition for funding for research collaborations. Companies therefore have limited possibilities to fund early-stage research with applicability for many firms (not just later-stage, company-specific interests), even though such research holds great value for them.
- **Academic perspective:** Access to funding is crucial for academics' motivation to contribute to ODIN. Moreover, the third party funding provided through ODIN was seen as providing greater freedom to conduct explorative research, which can be difficult to finance through classic funding schemes (cf. Section 3.1, Nature of the research). The external funding provided by ODIN is also described as crucial (compared notably to pure industry funding) in ensuring the broad scope of funded projects as well as their high level of openness, flexibility and agility in these projects.

"[...] It'll be another 10-15 years before [the project] can be turned into humane studies. We want to support the field, but very few pharmaceutical companies have the opportunity to invest resources at this early stage, and that's why ODIN is a great opportunity to do so." (Industry participant)

"We might have gone into something similar to this [project]. [...] But we probably wouldn't do it with such a high degree of openness. Those other collaborations are generally less open. This is the first time we've entered into such an open collaboration. But it is of course externally funded." (Industry participant)

"It matters a lot where the money comes from. [...] Because if the company has to pay, they usually don't want the openness, and they may feel that they are paying for a product. This leads to projects that can be quite rigid." (Academic participant)

3. CHARACTERISTICS OF ODIN PROJECTS



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PROPOSALS RECEIVED AND PROJECTS FUNDED

11 projects have been funded. Five in the first call for project proposals (2020), and an additional six projects in the second call (2021).

All projects included academic participants from at least two AU faculties and at least one participating company.

Most of the company participants are large pharmaceutical companies, but some projects also include SMEs offering specialized expertise and services, and one biotech firm.

	Call 1 (2020)	Call 2 (2021)
Number of ideas posted	37	23
Number of applications received	19	13
Resubmitted applications	n/a	3
Funded projects	5	6
Max. budget per project	7.5 M DKK	4.5 M DKK
Max. duration per project	2.5 years	2 years
Total project funding allocated	21.8 M DKK	23.9 M DKK

3.1. NATURE OF THE RESEARCH

Types of projects funded by ODIN

- All ODIN-funded projects were grounded in basic research, but their primary focus and aims differed. Three main types of ODIN projects have been identified by the evaluators:

Basic research projects aimed at furthering fundamental insight into disease mechanisms with a view to identifying possible biomarkers or targets for future drug discovery projects

Data-focused projects aimed at generating or gathering data on a large scale, e.g. to improve models for target validation or compare the usefulness of various animal and human models for diagnosis and monitoring of progression of diseases

Platform technology projects developing a generic technology that can be used in multiple applications, e.g. for different disease areas

In the following, we examine additional properties of the projects identified in the impact assessment: (i) the needs-driven nature of the basic research projects funded by ODIN, (ii) their open-ended nature and (iii) the level or type of risk associated with the projects.

Needs-driven basic research

- ODIN funds **basic research with a strong focus on possible applications** (“use-inspired basic research”^{*}).
- According to industry respondents, the needs-driven nature of ODIN-funded projects is **enabled by the matchmaking and ideation process** in ODIN as well as the **explicit focus** in assessment and granting procedures on the active engagement of participating firms (firms can only commit to the project if they feel it holds sufficient relevance and potential value for them).
- Projects are **informed by industry** knowhow of drug discovery and development (practices, standards, prior R&D, promising avenues etc.), which was described as increasing their relevance for firms.
- Projects are on a **larger scale/more complex** than would have been initiated in industry: Many projects are labor intensive and rely on e.g. knowledge, tools, models etc. built up over a long time in academia or industry. Unlikely that any one organization could or would do it on their own.

For example, in one of the projects, the industry partner was instrumental in ensuring that the platform under development in the project targeted not just a narrow part but all major parts of the part of the body that their pharmaceuticals are developed to affect, significantly increasing the potential value of the project’s outcomes for the pharmaceutical sector:

Illustrative quote from another project: “[Our aim is] to build a platform that hopefully makes it easy for other scientists, companies and groups to tap into and utilize the fairly new science [that the project focuses on] for as many distinct purposes as possible. So, the aim is to bring the [field] forward, to open it up to more participants by introducing standardization as well as control into the system, [and establish] a solid foundation [...] that hopefully anybody would find useful. So it’s really good to have a human model that can get us away from testing on animals or at least allow us to heavily supplement the animal work [...] It should help us to reduce our animal footprint and ethical issues surrounding animal testing. And hopefully it will also give us very accurate data [...] and that will just give us extra safety and confidence before we go to actual patients. Not to say that we are close to testing, but if it gets up and running [...] we would definitely use this platform.” (Industry participant)

ODIN stimulates open-ended projects over "close-ended" projects

- In ODIN projects, outcomes are not clearly/narrowly defined from the outset. There are underlying (starting) hypotheses, but the projects are too early stage for specific hypothesis generation and testing > **Projects are more exploratory and/or descriptive** than typical academic projects.
- This type of research is **difficult to get funding for** from industry and competitive research funding sources. Generally speaking, it is difficult to secure funding for projects without specific, well-defined outcomes and/or for platform projects (that allow for focused work and accelerated progress towards the development of a workable technology).
- ODIN-funded projects allow for **a focused, accelerated effort to advance science and methods** that would otherwise be developed on a piecemeal basis as elements in other projects or not pursued at all.
- The latest round of interviews confirm interim findings that ODIN projects are more open-ended than often seen. ODIN may thus be **filling an important gap in the science funding landscape**. This seems to be a consequence of the limited competition for funding (giving researchers more leeway to pursue desired projects rather than projects that are expected to be more 'fundable'); and of the explicit focus in ODIN on openness, meaning that partners have to settle on a 'space' for maneuvering that is clearly precompetitive.

*"There is a hypothesis, an idea, behind the project, but the project is still very open and we don't have a narrowly defined hypothesis or specific question. We know we will find something; we will find some differences; we just don't know yet what they'll be. So, I think our approach is very data-driven. Everything depends on the data we get out. And our output, in this type of approach, will always be data."
(Academic participant)*

*"It's very open ended; we don't know what we'll catch yet. And projects like this would be almost impossible to secure funding for normally, but I really appreciate the chance to go exploring."
(Academic participant)*

Risk in ODIN-funded projects

- In the first round of interviews with ODIN-funded projects (undertaken when projects were just starting up), academic and especially industry participants emphasized the **”high-risk, high-rewards” nature** of ODIN funded projects.
- The perceived level of risk was generally described as lower in the end-of-project interviews than in the original round of interviews.
- On the one hand, ODIN was described as having a **high tolerance for risk and failure**, and it was described as **highly uncertain** whether the projects would meet their aims since they were based on early-stage, exploratory ideas (cf. next slide).
- On the other hand, because of this exploratory nature, all projects have yielded valuable insights, which – at least for industry partners – reduces the overall risk, even if their long-term commercial potential could not yet be ascertained. Even unsuccessful projects were described as yielding relevant insights, e.g. by allowing a ”door to be closed” or by producing data that could spur further research.
- For PIs, however, positive and especially highly novel results were seen as more valuable than negative or less notable results because the former are easier to publish and to use as a basis for further fundraising.

”The thing about this project is that it’s [...] high-risk, high-gain. If this were easy, someone would have already figured it out and developed medicine from it. But if you look at it, there isn’t really much in the pipeline [of pharmaceutical companies]. There actually isn’t really anything. And that’s an indication that the science needs to catch up. Because we will see it [i.e. basic science to support and develop this approach]. [...] It’s increasing at an exponential rate, if you look at publications, high-impact publications, within [this field]. [...] That’s why we want to catch this wave now. [...] And that’s why it’s nice that [ODIN] is willing to invest in these projects, because I think it’s highly unlikely, at least where our company is now, that we would invest 4-5 million in a high-risk, high-gain project.”
(Industry participant)

3.2. PARTICIPANTS’ MOTIVATIONS

In the interim assessment, the participants expressed the following motivations for participating in ODIN.

Academic participants (PIs)	Industry/big pharma	Industry/SMEs
<p>A possibility to pursue desired academic projects and/or collaborations with industry.</p> <p>ODIN as additional source of funding with limited competition and grants of a reasonable size/duration.</p> <p>Access knowhow, materials, models etc. in companies.</p> <p>Funding (“seed money” for further grants and collaborations).</p> <p>Openness expected to accelerate progress/increase quality/strengthen impact of science.</p>	<p>Quicker and more effective way of entering academic collaborations.</p> <p>Address unsolved challenges in industry R&D through needs-inspired basic research that can ultimately pave the way for new treatments.</p> <p>Opportunity to engage in more complex projects and long-term investments in knowledge building and exploratory R&D within topics that complement/extend internal R&D aims/interests.</p> <p>Expand the firm’s academic network (through the digital platform and matchmaking).</p> <p>Signaling (the firm as an R&D-intensive company).</p> <p>Access to clinical material that is otherwise difficult for private firms to access.</p>	<p>Opportunity to showcase and hone/develop specialized skills and service offerings (which is described as a key competitive parameter, usually more important than IP).</p> <p>Increased visibility and access to networks of collaborators and potential clients.</p> <p>Opportunity to engage in collaborative R&D despite limited internal resources for R&D – by being able to tap into a larger and partially funded research collaboration.</p>

3.3. THE COLLABORATIONS

- ODIN's focus on active involvement of firms is credited with fostering **higher-than-usual commitment from firms**. More specifically, the requirement of active involvement is credited with increasing the likelihood that a firm will make a clear, upfront commitment to the project and allocate resources accordingly. Almost all participating firms delivered on their commitments to the projects.
- Academic participants stressed the value of third party funding in ensuring "**balanced**" collaborations (academics and firms were equal partners, and the project was not dictated by a commissioning firm).
- Several respondents underlined the benefit of the **limited size of the projects**, which helped keep the projects focused and agile while facilitating close collaboration.
- End-of-project interviews indicated that collaborations were most successful when there was a **substantial overlap** of knowledge or complementary knowledge bases, and when the participants had close and consistent contact (incl. for instance having staff stationed at the partner firm).
- The main differences experienced by participants (compared to prior collaborations) were the initial ideation process and the high degree of openness (the "NDA-free space").

How collaborations developed in the 11 ODIN-funded projects

- Collaborations were generally **described positively** by both PIs and industry participants, who had similar impressions of their projects. A few noteworthy events:
 - In two cases, a major and unexpected change in the R&D strategy of a key industry partner meant that the projects were no longer relevant to them. Both firms nonetheless delivered the agreed upon contributions to the project, and the relationship between the parties remained positive.
 - In one case, the industry partner was disappointed by the level of engagement with the academic team and would have liked closer collaboration; in contrast, the PI was content with the collaboration.
 - One case described the collaboration as limited (consisting mostly of communication on related but parallel projects in academia and industry).
- The **level of engagement** of industry participants differed significantly across projects but was generally reported to match their originally intended level of commitment (except in the two projects where the industry partner changed R&D strategy).
- **Interest companies:** The concept was only used in a handful of round 2 projects, but only seems to have been used or considered in one project. The idea is good (a way to engage more firms in projects, allowing for different degrees of involvement) but did not work in practice. Recommendation: It might be worth revisiting the idea and operationalizing it to make it easier to implement and to help align academic and industry expectations to the interest company status.
- It should be noted that many company representatives did not respond to requests for interviews. The assessment above therefore many not reflect all industry participants' experience.

OPENNESS/THE INDUSTRY PERSPECTIVE

- The **degree of openness in ODIN is described as substantially higher** than in usual university-industry collaborations. Participating in ODIN has been enabled by a **gradual change in industry culture and practice** re openness (they have experienced limitations of early-stage IP; wish to reduce duplication of effort; and share a growing belief that collaboration and open sharing will contribute to knowledge). Increased open collaboration is seen as **a necessary change** in R&D practices in response to decreasing productivity in R&D, increasing complexity, rising R&D costs, attrition etc.
- Openness is expected to **accelerate scientific progress** (and thereby eventually commercial applications). Potential downsides of openness are expected to be tempered by the **lead time advantages** that participating companies enjoy (incl. the ability to influence research aims and approaches with insight into industry needs and practices; gaining tacit knowledge of the data/outputs and possible commercial applications; having time to build up internal know-how and competences; developing close ties to the academic scientists with a view to further open/closed collaborations etc.) and the fact that ODIN's legal framework allows for **downstream IPR protection**. It is hard to say at this stage since the projects' outcomes are early-stage, but so far, there are no indications of a negative impact on downstream development.

"I think that if you had asked me [to join ODIN] 5-10 years ago, then you would probably not have met the same mindset. But an internal revolution has happened [in our company], and it's reflected in [ODIN]. It's based on the idea that we have to think differently. We used to have this idea that if it wasn't made here, then it wasn't interesting. It's a bit black and white, no? But it's also because we've been extremely good at what we do [...]. We just have to acknowledge that the world has changed, and we have to be more open."
(Industry participant)

OPENNESS/THE ACADEMIC PERSPECTIVE

- PIs see openness as key to **enhancing quality**, replicability and efficiency in research and to **accelerating the progress of science**. It also allows academics and industry to capitalize on the "explosion" of data in the field.
- **PIs were generally more skeptical re value added of openness in the end-of-project interviews than in the first interview round.** It appears that in most projects, the open sharing of outputs was undertaken primarily to live up to ODIN requirements ('a minimum compliance model') and not with a view to maximizing further use of this data. There were several reasons for this, as described in the following.
- Incentives to provide a high level of curation of the data are lacking. Detailed protocols are often necessary for third parties to understand what the data can be used for, but ODIN does not specify the expected degree of curation. Moreover, curation is very time-consuming, and it requires skills and knowledge about how to meaningfully share data openly. Not all PIs felt that such skills were available in their current research groups and therefore requested training for group staff.
- Although ODIN requires that data and results are shared without delay, some PIs postponed open sharing until they felt more secure in their data sets. Uncertain of how to interpret "without delay", they preferred to spend time validating and improving their data before risking sharing faulty or poor data.

- The *degree* of openness in ODIN is not unusual in PIs' fields, but the *timing* of disclosure (i.e. before a flagship publication is out) is. Several PIs expressed skepticism regarding the value of open data sharing before a flagship publication has been published, as it provides information on the origins and usefulness of a dataset. Such information can be difficult for third parties to access even with a high level of curation.
- Several PIs expressed concerned about 'being scooped', i.e. losing priority to other groups working on their openly available data despite having a head start and deep knowledge of the data. These concerns were much more prominent in the last round of interviews than in the first.
- Some PIs argued that publishing purely open access was risky for early career researchers. One PI did not dedicate any ECRs full-time to the project for the same reason but only PhD students and postdocs on a part-time basis. Potential costs to one's publication track record were described as less risky for established/tenured academics.
- On a positive note, the open principles in ODIN were described as **crucial to promoting efficient collaboration** because they enabled free communication and sharing of data and knowledge within and across projects. According to respondents, this represented a welcome change from usual collaborations with industry.
- Several respondents from both academia and industry called for **more knowledge sharing across ODIN-funded projects**, for instance through regular online seminars on current activities and preliminary results from projects, open to all members of the ODIN network.

4. PRELIMINARY OUTPUTS AND OUTCOMES



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PROGRESS IN RELATION TO PREDEFINED KPIS

ODIN measures its own progress according to a number of predefined KPIS agreed upon with the Novo Nordisk Foundation. The KPIS mostly concern activities that enable ODIN to attain its goals (e.g. develop the open legal framework, get more academic researchers and companies involved in ODIN etc.). The table on the right presents the status on formal KPIS for ODIN as of November 2023. As the table shows, ODIN has met all KPIS and exceeded most of them.

KPI	Target	Status
Organizational development		
Establishment of an open legal framework	Yes	Yes
Number of PIs involved	30	107
Number of PhD students and postdocs involved	30	29 *
Number of industrial companies involved	15	44
Productive interactions		
Number of ODIN projects created and funded	5-7	11
Number of new research avenues that emerge	2-4	11+ **
Number of lectures/pitches given by industry in ODIN	12-15	12

* 29 PhD students and postdocs have been involved in ODIN-funded projects. So far, an unknown number of postdocs have contributed to rejected applications and ideation.
 ** End-of-project interviews revealed that all 11 projects have embarked on or are planning to pursue new research projects based on findings and results in their ODIN-funded project.

PRELIMINARY STOCKTAKING

- The ODIN-funded projects were recently completed or still ongoing when the last interviews were conducted in connection with this evaluation (in Q4 2023). Thus, the projects will continue to yield results and publications for some time.
- All projects focus on early-stage research, which requires substantial further research to advance the underlying science and to develop potential applications. It is therefore not yet possible to assess the full outputs of the ODIN projects.
- The full impacts of ODIN and its projects will not materialize until years after the end date of the project given the basic, precompetitive nature of the research collaborations and the long R&D and innovation processes in the pharmaceutical sector. As such, it is not yet possible to reliably assess the outputs of ODIN-funded projects, much less the broader impacts of ODIN. The findings presented in this section are therefore preliminary.
- Although the ODIN pilot project aimed to catalyze follow-on, downstream R&D projects in industry, such projects remain likely but have yet to materialize. While the industry participants described their projects as generating valuable outputs, it will take additional research and years before they are expected to lead to internal drug discovery projects or the like.

Challenges and adjustments: nothing major or out of the ordinary to note

- Some of the projects experienced some delays (notably in connection with recruitment or access to labs/equipment) due to the COVID-19 pandemic and associated lockdowns, delays or difficulties in connection with access to or transfer of data/materials (e.g. GDPR issues) or other practical setbacks (e.g. staff changes). Delays or setbacks did not have major effects on the projects.
- Some projects encountered scientific challenges or technical setbacks, which required adjustments to the projects, but nothing that fundamentally altered the aims of the project.
- The flexibility offered by ODIN/the secretariat was mentioned as positive in making necessary adjustments.

Projects were largely successful in achieving their aims (or are still in progress but may yet be successful)

- Of the 11 ODIN-funded projects: self-assessment by PIs indicates that 6 projects were successful, i.e. met all/most their objectives; 2 were partially successful (i.e. met some aims and still working on others); and 3 were uncertain (still in progress and awaiting key results).
- All projects have been or may yet prove successful.
- Interviewed PIs and industry participants expressed consistent views of the results and outcomes of their projects

New research avenues and follow-on academic research projects

- All PIs described research avenues that emerged from their ODIN-funded project which they were interested in pursuing, either as purely academic projects or as continued collaborations with their industry partners.
- All academic PIs are planning follow-on academic research projects. Seven projects are realized, and three of them have secured funding.
- All but one academic PIs have begun planning follow-on academic collaborations with industry. Two projects have already been started.

Downstream follow-on projects

- One spin-out has been established by the end of 2023 as the result of an ODIN-funded project.
- Several projects note that their platforms or results have already been used by both academia and spin-outs.
- While the majority of industry participants were optimistic regarding the potential for follow-on projects in their own or in other firms, the downstream IP potential was generally described as “several years into the future, probably at least 10 years”.
- Other, more immediate outcomes described by the industry partners included new contacts in academic environments, openness to new research avenues, exchange of employees, and knowledge of new technologies that they expect to benefit the company in the future.
- The industry partners appreciated the contribution to the knowledge base in their field from basic science through the ODIN-funded projects and being part of academic publications through co-authored articles.

PRELIMINARY OUTCOMES FROM PROJECTS: OVERVIEW

Outputs and outcomes	Assessment
Outputs from projects (results, data, methods, technologies, etc.)	✓ All 11 projects have reported new data and results in line with the original aims of their projects.
Scientific publications	✓ 4 published by the end of 2023. 38 additional publications are in progress or planned.
Scientific publications co-authored with industry partners	✓ Of the 4 publications, 1 was co-authored with the industry partners. Of the 38 planned articles, 22 are expected to be co-authored with the industry partners.
Industry contributions to projects	✓ Industry partners have made intellectual contributions (20 instances), material contributions, e.g. compounds, tissue samples etc. (6 instances), performed analyses or given access to instruments, facilities or technologies (18 instances) and trained, hosted or exchanged researchers (2 instances)
Bi-directional knowledge exchanges	✓ Bi-directional knowledge has been exchanged to varying degrees within projects.
Open sharing of outputs: Project results are accessible to third parties	✓ 7 projects have confirmed open sharing of results (some of these still have data to be shared). 4 projects are awaiting final results before sharing.
New research avenues and follow-on academic research projects	✓ All 11 academic PIs are planning follow-on academic research projects. 7 projects are realised, 3 of them have secured funding.
Follow-on academic collaborations with industry	✓ 10 of the 11 academic PIs have begun planning follow-on academic collaborations with industry. 2 projects have been started.
Other (e.g. downstream R&D projects in industry, spin-outs, etc.)	✓ One spin-out established by the end of 2023. Several projects note that their platforms or results have been used by both academia and spin-outs.

APPENDIX

DATA, METHODS AND LIST OF INTERVIEW RESPONDENTS



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Data and methods used in the impact assessment

Document study of materials on ODIN (accessed via the ODIN platform, website and secretariat), including data on funded projects and project outputs (provided by the ODIN secretariat)

Comparative study of the ODIN legal framework with a standard “fast track” contract used for collaborative projects with industry involvement at Aarhus University

Background interviews (2020-2021)

- ▶ See Appendix 2 for a list of interview respondents

Initial interviews with ODIN project participants (conducted fall/winter 2020/2021 and spring 2022)

- ▶ See Appendix 2 for a list of interview respondents

Final interviews with ODIN project participants (conducted fall/winter 2023)

- ▶ See Appendix 2 for a list of interview respondents

Self-funded comparative study of five biomedical Open Science partnerships (Norn, Priego Pujol, Ramos-Vielba, Ryan, Conradsen, Durcan, Edwards, Hulcoop, and Knapp, *work in progress*)

INTERVIEW RESPONDENTS

► ACADEMIC PARTICIPANTS

Principal Investigators (PIs) from all ODIN-funded projects were interviewed twice: when their projects were starting up and in 2023 at the end of the ODIN pilot project period.

Call round	Project	PI	Interviewed (Y/N) in 2020-22	Interviewed (Y/N) in 2023
1	BIOMETSCO	Lasse Sommer Kristensen	Y	Y
1	KidDO	Robert Fenton	Y	Y
1	MiCO	Mark Denham	Y	Y
1	oLIVER	Jørgen Kjems	Y	Y
1	THOR	Jacob Fog Bentzon and Mette Nyegaard	Y Y	Y N
2	FRIGG	Rikke Nørgaard and Lene Nejsum	Y Y	Y Y
2	BioPsych	Betina Elfving	Y	Y
2	BALDER	Peter Sørensen	Y	Y
2	P2P CPP	Hanne Poulsen	Y	Y
2	IMPAD	Marina Romero-Ramos	Y	Y
2	CELPPLUS	Duncan Sutherland	Y	Y

INTERVIEW RESPONDENTS ► INDUSTRY PARTICIPANTS

All industry participants were contacted.

In the original interview round (when projects were starting up), representatives from 13 of 18 industry participants were interviewed.

In the 2023 interview round, representatives from 7 of 18 industry participants were interviewed.

Some projects include so-called “interest companies”, which do not play an active role in the projects. These companies were not contacted for interviews due to their limited involvement in the projects.

Call round	Project	Industry participants	Interviewed (Y/N) and respondents, 2020-22	Interviewed (Y/N) and respondents, 2023
1	BIOMETSCO	BioXpedia nanoString AstraZeneca Omiics	N N N Y (Susanne Venø)	N N N N
1	KidDO	AstraZeneca	Y (Pernille B. L. Hansen)	Y (Pernille B. L. Hansen)
1	MiCO	Novo Nordisk Omiics	Y (Jonathan Niclis) Y (Susanne Venø)	N N
1	oLIVER	Novo Nordisk	N	N
1	THOR	Novo Nordisk	Y (Michael Nyberg)	Y (Michael Nyberg)
2	FRIGG	Novo Nordisk AstraZeneca Nordic Bioscience	Y (Peter H. Kvist and Agnès Bénaudeau) Y (Pernille B. L. Hansen and Timo Haschler) Y (Federica Genovese)	N Y (Pernille B. L. Hansen) Y (Federica Genovese)
2	BioPsych	Omiics Bioneer	Y (Morten Venø) Y (Boye S. Nielsen)	N N
2	BALDER	Novo Nordisk	N	N
2	P2P CPP	STipe Therapeutics	Y (Richard Bethell)	Y (Richard Bethell)
2	IMPAD	Lundbeck	Y (Karina Fog)	Y (Karina Fog)
2	CELPPLUS	Leo Pharma	Y (Christine B. Read and Andreas Herschenhan)	Y (Christine B. Read)

INTERVIEW RESPONDENTS

► BACKGROUND INTERVIEWS

Finally, a series of background interviews were undertaken in connection with the interim evaluation published in 2022.

Role	Respondents
ODIN Secretariat	Marie Louise Conradsen, Freja Bertelsen and Ditte Engholm, AU
ODIN Project Review Committee	Lene Nejsum, AU Jørgen Kjems, AU Pernille B. Lærkegaard Hansen, AstraZeneca Daniel Timmermann, Novo Nordisk Georg Duenstl, Leo Pharma
ODIN Steering Group	Niclas Nilsson, Leo Pharma
AU Technology Transfer Office	Anette Poulsen Miltoft, AU