Will the Center Hold? What Research Centers Do to Universities and to Societal Challenges

Mats Benner and Anders Hylmö

Introduction: Centers and Universities

In this chapter, we analyze one specific aspect of how universities engage with societal challenges: through research centers. Centers represent variation and focus; they channel external engagement, and they work at the intersection of different interests, for instance, those of different disciplines and organizations. The research centers that we have studied for this contribution also represent external funding of universities, which brings another dimension to the activities of centers, namely, their role in attracting funding and providing outcomes within a given time frame. Thus, centers serve as one way in which universities articulate societal processes, marked by distinct, time-limited, concentrated efforts together with partners outside academia. How well, then, do centers function in relation to this ambition?

Universities are complex organizations operating with multiple goals and means in parallel. In their activities, universities combine the traditional organizational structure of faculties and departments with research centers and other ad hoc entities. While faculties and departments are easily distinguished and offer historical continuity—capturing defined areas such as medicine and the humanities, pathology, and history, and each one typically representing traditional disciplines or broad research fields (Hammarfelt, 2020; Hylmö, 2018)—centers are more fluid and multifaceted. Some may comprise just a few scholars with a delimited common interest—Dutch history, for example—while others may be the size of a department, or larger, in areas such as migration or nanoscience. Many are funded externally, supported by

M. Benner (✉)
LUSEM, PO Box 7080, 22007 Lund, Sweden
e-mail: Mats.Benner@ehl.lu.se

A. Hylmö
School of Business, Innovation and Sustainability, Halmstad University, PO Box 823, 301 18 Halmstad, Sweden
e-mail: anders.hylmo@hh.se

large-scale funding or endowments to meet societal expectations, whereas others are of internal descent, reflecting initiatives and engagements from within the university to diversify activities and focus on novel topics. Some are virtual—"centers without walls", with no common physical space—while others will have their own facilities. What centers have in common, irrespective of scale and scope, is timing. They are time-limited and therefore reflect a delimited and delineated mission. Centers, in their enormous variety, thus perform a transversal role in universities by adding to the existing organization an element of specific focus and a specific time limit. In addition to timing, they add focus by showcasing ambition around specific issues rather than disciplinary boundaries. They may also be part of the bridging between universities and the external world and spearhead alignment with forces beyond the university. They span disciplinary boundaries and engage with external funders and stakeholders, and they direct activities into specific avenues such as academic excellence, industrial alignment, or particular societal challenges. In all of these aspects, they widen the university and open it up to forces and ambitions that the regular organization purportedly does not produce in itself. The opening of the traditional university organization—both internally to break up disciplinary specialization and externally to foster collaboration with societal actors—has also been one of the common, overarching goals of the wave of center funding witnessed in various research systems during at least the last two decades (Aksnes et al., 2012; Hylmö, 2019; OECD, 2014).

But what do centers do? How do they affect how universities operate and how knowledge is created and disseminated? Are some centers more successful than others in their mission to affect universities, and, if so, why?

These are the issues that this contribution aims to illuminate by means of an analysis of a center program run in Swedish universities. The center program was a 10-year scheme to develop centers that fostered excellence in both research and innovation (VINN Excellence Centers) run by the Swedish Innovation Agency, Vinnova, between 2007 and 2016. The program funded 16 centers with annual support from Vinnova at 7 million Swedish crowns (around 600.000 Euros), with similar financial commitments from universities and partners, respectively. The aim of the program was to form internationally competitive centers with networks for needs-driven (Vinnova's own term) and multidisciplinary research. In addition, a related scheme with similar aims (Berzelii centers) was included in the study. This initiative was launched by the Swedish government in the 2005 research policy bill to stimulate the development of centers with strong scientific profiles, large industrial networks, and innovation potential—with a stronger focus on research quality than Vinn Excellence but with a similar orientation to corporate partnerships. Funding of the four centers in the Berzelii center program was larger than for Vinn Excellence, ranging from 7 to 30 million SEK annually during its 10 years of existence, but the share of partner funding was lower, ranging from 1 to 4 million SEK annually.

In this contribution, we therefore focus on centers that have been instigated by research funders to perform and profile specific functions of a university, or a conglomerate of universities, namely, to stimulate scientific excellence and societal value through new forms of collaboration. We look particularly into centers that have

been established to foster specific functions as models of engagement, looking at how they have been set up in relation to other parts of the university and what types of engagement and activities they foster.

What is a Center?

Analytically, we start out with the assumption that centers are intended to inject variation into university operations. Centers are formed around notions of efficacy and transformation of university operations, and specific procedures for accounting for their activities. They are structured around models of recruitment into and out of them. They are managed and given specific directions. They are informed by external influence through evaluations, contacts with funders and patrons, and advisory boards. They thus operate at the intersection of different interests and inject variation and differentiation into the matrix of activities in universities.

We have three analytical purposes. One concerns the structuration of universities and the significance of centers for universities as organizations. In centers, goals and means are formed in a way to respond to specific issues, as opposed to self-initiated activities whose end results are not specified to the same extent nor in the same format but rather derive from the social structuration of academic fields (Whitley 2000). This issue refers to the identity and structure of universities and how these are affected by centers, especially how centers, with their often interdisciplinary and practice-oriented focus, interact with the disciplinary structure of academia.

A second analytical purpose relates to the impact of funding schemes on work modes in academia and how center grants affect internal and external relations, between different academic fields, between academic researchers and partners outside universities, and between societal partners themselves. This aligns with theoretical debates on research steering and the impact of funding on work modes and the cognitive orientation of academic research depending on the organizational settings (Franssen et al., 2023; Gläser, 2019; Gläser & Laudel, 2016).

The third analytical purpose relates to research funding and the role of external funders and their remit and role in scientific development (Whitley & Gläser, 2010). One of the functions of research funding agencies is to instigate organizational change within universities, and this is done by many means, with research centers as one of the more prominent and invasive forms. The impact of other types of funding on an organization is less discernable or even expected, as it entails little in the way of expectations on an organization or networking. For this dimension, we highlight in particular how funders operate in relation to centers in terms of interaction forms, contracts, and assessment and monitoring of activities, and how that steering is enacted and absorbed in the centers.

With this, we aim to contribute to the analysis of the nature of centers and their role in and for universities. We also have an ambition to illustrate the effects of center funding and the conditions for center grants to fulfill their goals. We therefore assess the impact of centers and relate it to different properties of centers, their

funding, organization, and governance. Clearly, if based on the assessment of center evaluations, not all entities succeed in their work. Hence, we ask why some centers realize their missions and why others do not, or only partially succeed. In addition, we aim to highlight what success consists of, and what makes a center efficient and fit with the purposes of center schemes, especially when their ambition is to foster linkages between companies and universities.

Centers in Their Settings: Summary Points

We therefore understand centers as expressions of the steering mixture of universities. The university is understood as a steering arena, with multiple directions and activities available depending on resources and mandates. This mixed governance has been noted and viewed as both a propelling and constraining factor in the search for a stronger organizational fit between universities and their patrons (Musselin, 2006).

Universities are conditioned by a combination of resource flows and historical mandates (Clark, 1983). In themselves, universities have limited motives for transformation as they are organized to contain external change—the traditional forms of collegiality and organization in the form of departments and faculties ensure continuity over time. However, the path dependency and stability enacted by these organizational templates are challenged in different forms. One form of challenge is external evaluations, which open up the organizational matrix and allow for comparisons between units. Another and related form is performance-based funding, which is intended to trigger competition for prestige and resources between universities and their constituent parts (Hicks, 2012; Thomas et al., 2020). A third, and the most dominant, form comes from external funding (Stephan, 2012). External funding sometimes—especially if channeled through center support—entails conditions of various kinds, in the form of tangible deliverables, work modes, and organizational formats. This includes a historical dimension of research governance. Special arrangements for individuals and groups are nothing novel to universities—they followed from the introduction of project support to principal investigators that accompanied the introduction of research councils in the early postwar period (Stephan, 2012). Centers, however, represent a further extension of that tendency. If project support was primarily introduced to point to the selectivity of research—not all proposals succeed, and not all academics are given the opportunity to expand their project ideas—the centers' format takes this a step further. Centers are based on the presumption that universities are flexible and can be remolded to respond to changes in the expectations of academic research. This does not necessarily entail that centers will succeed the traditional format of universities (even though that has sometimes been argued; cf. Pestre, 2003), but rather that centers add a transversal dimension to academic organization, linking different fields and organizations in time-limited constellations formed around specific themes that span several fields and organizational settings.

How, then, can centers and their impact on universities, work modes in academia, and funder-university relations be analyzed in more detail? This is what we turn to now.

Empirics: Six Centers and Their Evolution

For the purposes of this investigation, we studied six centers funded under the Vinn Excellence and Berzelii schemes. The analysis, which is part of a broader impact analysis of the Vinn Excellence and Berzelii center schemes (Benner & Hylmö, forthcoming), is based on a broad palette of data, including center applications, reports, and other archival material, and 45 interviews with center directors, researchers, and external actors, including funding agency managers. It is further based on an interpretation of the three mid-term evaluations of the centers (see O'Kane et al., 2016a, 2016b; Reeve et al., 2007, 2009a, 2009b, 2013a, 2013b). The evaluations and their outcomes also served to indicate how and to what extent centers achieved the goals of the center programs. Thus, we use the assessments done in evaluations as the organizing principle of the empirics. The evaluations provide a well-informed estimate of center success as they were done by panels that included experts on center-based research as well as area specialists for the respective areas of the centers. The six centers were chosen as illustrative cases representing more and less successful centers across different research fields.

The main task is to gauge the impact of centers on how universities function and operate according to the following six dimensions:

Organizational foundation highlights the evolution of the center and the relationship to earlier collaborative structures. This dimension points to the significance of cumulative advantages and how they apply to centers. It also points to the organizational ecosystem of a center—whether it is a stand-alone center or part of a larger environment—and how that impacts a center's viability.

Network and partnerships includes the number of partners, the historical evolution of partner networks, types of contributions from partners, and vertical and horizontal relations between partners. Together, these aspects characterize the form and function of partnerships for the centers and the functions partners provide for the center, for academic research, and for and between partners themselves. This dimension therefore points to the relational qualities of centers, how they have evolved, and what functions they serve over time for the partners.

Leadership and organization includes the formalization of center tasks and responsibilities, boards and other governance mechanisms, the recruitment and designated role for a center leader, methods for allocation of resources, setting up and assessing activities within the centers, and models for managing relations within the center and between the center and other organizational entities. This further includes how intellectual property rights are managed and deployed in relation to partners.

This dimension pinpoints how centers are managed and how their identities are developed and maintained over time, including forms of interaction, collaboration, and identification of means and goals for the center.

The relationship with universities showcases how the organizational demarcations of a center align with the formal organizational structure of the host institution and other partner universities. This dimension therefore points at how centers affect and are affected by university organization and resource distribution, including university support of centers, the position that centers play in the organizational matrix of universities, their impact on education and research activities, and their alignment with university strategy and identity more broadly.

Personnel and competence transfer looks at the forms of personnel exchange within center partnerships, including the recruitment and outplacement of PhDs, shared positions between partners and academic environments, and other forms of mobility into and out of centers. The mobility aspects aligns with the relational aspects outlined in the first dimension (organizational foundation) and pinpoints how centers function to access and distribute competence in the wider systems in which they develop.

The epistemic effect of a center stresses how centers shape work modes and relations between different scientific areas. Most centers are constituted of a multitude of research traditions and adjacent work modes, and for this dimension, we identify specific effects when it comes to redefined relations between these traditions, changes in validation and publication patterns, and changes in the forms of interaction with corporate and societal partners.

Together, these dimensions point at the specific form of centers and how they evolve in relation to the ideal–typical center role outlined above, which is to affect relations between academic and societal entities and shape relations and processes around them by committing time and resources from the partners. This moves us to the empirics of our contribution, where we briefly outline the constitution of each center along these dimensions and summarize case descriptions by profiling the factors that explain why some centers emerged as "successes" (with positive assessments and prolonged funding) while others received more modest assessments or had their funding terminated.

The Electronics Center: A Center in a Network

This center is the outcome of a long-standing interaction between its parent university and companies in the area of microwave technology, an industry with a long historical presence and networks in the region. The center forms a core part of activities in a large department at the university along with another center funded through the Vinn Excellence scheme, and it also forges ties with another department at the university, in electrical engineering. Thus, it serves as a node for interaction within the parent university and creates coherence, interaction and flexibility between increasingly convergent areas.

Not only does the center function as a node for related activities in its parent university; it also connects industrial parties with similar but not identical profiles. The network approach shows in the mode of operation within the center, where industrial problems set the direction of research activities. After researchers and partners agree on the content of research, the center board formalizes the agreements. Hence, the center operates with a trust-based relationship, with research projects identified from the bottom up and led by industrial partners in collaboration with academic researchers, whereas the formal organization primarily plays a facilitating role.

Intellectual property is similarly devised to create an interactive, yet neutral, work mode, where the university owns intellectual property that partner companies can purchase for a fixed sum, and where individual researchers are compensated for this. This ensures that no bilateral agreements are made and that partners can remain committed partners over time.

There is a culture of "give and take," where all matters are seen through complementary perspectives to ensure inclusion and trust between partners and between the academic and industrial researchers engaged. Teamwork and clear demarcations—shown in the intellectual property example above—ensure the center's identity.

Centers also have organizational ramifications. As mentioned, the center was instrumental in bringing about cooperation between two different environments in the area, as well as creating dynamic interactions within the university. Cash commitments are very important, and the center was used to ensure that funding was obtained from the partners.

This operational model is enabled by the orientation of the companies: they themselves do research and interact on a regular basis with the academic environments, which creates an often seamless integration between the two, but with, as mentioned, formal bodies ensuring and approving the project proposals.

The corporate value varies between types of companies, but for the large companies that form the backbone of the center, it lies with the exploration of research frontiers and potential applications in the future. In addition, centers allow companies a simplified way to recruit engineers with PhDs, a highly risky recruitment otherwise. Companies are also enabled to interact between themselves as members of the centers, with complementary and non-proprietary knowledge flowing between them.

As to the relationship with the funder, the center has developed a mimetic relationship with Vinnova, where the successful leadership experience of the center was translated to conditions and support for other centers. It thus emerges as a "model center" for the funder. The center and its management disseminate the notion of a center and its epistemic and organizational meaning, creating a narrative around the work mode.

Epistemic effects are visible in the focus on issues that are negotiated—and funded—with companies, focusing efforts on a delimited set of issues. This is also visible in resistance to quantitative measures of impact—the impact is validated and enacted primarily through collaboration. Other evaluations, such as those done by

the funder, are seen as necessary and "sharpening," but the ultimate evaluation lies with industry interaction.

To sum up, the center had several properties that contributed to its successful development over time. It focused on a small number of projects to avoid overstretch. It empowered researchers to form projects in collaboration with corporate partners. It exemplified organizational flexibility as a neutral space for companies to share knowledge between them, and as a platform for exploration of technical opportunities for companies with scientific value for the researchers. In this sense, it functioned as a portal for corporate networking for the university, and for the reproduction of networks between academic and corporate partners.

More generally, the center emerged as a sustainable platform for academic and corporate interaction for the identification of common interests, the formulation and validation of projects, the transfer of human capital between them, and the management of common interests. It emerged as an organizational platform recognizable internally—to lessen the internal frictions and centrifugal forces of the academic system—and externally—to create long-term, mutually reinforcing relations with companies.

The Biotechnology Center: The Assisted Linear Model as Ideal

If the electronics center emerges as a successful center—bridging academic and corporate cultures and ideals in intertwined projects—the biotechnology center represents another strand. It instead derives its strength from the bridging between basic inquiries and corporate needs.

The center form has been strategically used throughout its existence. When its first large center grant came in the early 2000s, the model involved interacting groups with different but related interests and the ambition to transgress the organizational boundaries of universities to allow for the interaction between complementary competencies. Hence, when center grants emerged, the biotechnology center was prepared to reap the benefits, including from the grant it received in 2006.

The center is part of a complex structure of many center grants and other large-scale projects, and its identity is therefore somewhat understated. The two main functions of this center grant are to provide support for critical personnel (research engineers for the platform) and an industrial reference group. On the other hand, the complexity also gives rise to one of the challenges of center support, namely, that it often emerges in combination with other support forms.

The center was formed to address the limited capacity to absorb biotechnology in the forestry industry, but also the weak linkages between academic research and practical knowledge interests. It is based on seven technical platforms, which form its foundation. Each platform is managed by one group, but they are open for use by other research groups, thus forming a matrix organization.

In addition to the platform, the center has also developed three model systems for the genome-wide screening of trees. At least one of the genomes selected was identified through industry collaboration via the center. These platforms serve as integrating mechanisms for the main constituent part of the center, its research groups. Research groups are devised to hold complementary competencies and are nurtured by that and by the platforms available. This, in turn, enables them to thrive in the competitive funding landscape.

The model of recruitment is elaborated: it should be open, and all members are expected to spend time abroad after completing their PhDs. International inspirations abound and are in particular enlightened by experiences in leading US laboratories.

This center functions as a bridge not only between two departments but also between two higher education institutions. It has also provided an organizational roadmap to bring together complementary competencies between the two universities. This points to the proactive management of the center, with a highly developed capacity to bring together different parties and interests—and to trigger the interest of complementary funders. A key orientation of the center management is therefore to relate basic inquiries to strategic opportunities for industry, thereby relating research to applications and also, in that process, widening funding opportunities.

The organizational culture reflects this, with a high degree of trust between partners, as well as a capacity to create opportunities and potential solutions for them. The culture is non-hierarchical and draws on common academic training that has successfully complemented the needs and interests of the forestry industry. The key orientation is to reap the opportunities that biotechnology offers for both the researchers and for industry.

The center's networking approach also applies to partner companies: the center bridges different companies with complementary but different interests, as the center encompasses four large firms in different ownership networks as well as one public research institute and a spin-off company from the center. The spin-off company plays an integral role, as it links the academic research with industrial interests. It is semi-integrated into the center but also contains core industrial interests in its governance. Another key complementary aspect is the supply of industrial PhDs via the program, where companies and Vinnova share the cost of PhD training.

To sum up, this center is deemed a success for several reasons, in particular because it integrates academic interests with industrial ones, but also—as in the first case—it is run in a manner that creates cumulative advantages to all interested parties, where companies extend their planning horizons and get access to qualified scientists, while academia overcomes some of the organizational constraints of universities. The remaining constraints are scale-based—given the multiple center funding sources, the specific impact of each of these center grants is limited, and significant efforts are needed in order to match the demands and expectations of each funder. The center grant under study is no exception and is viewed as "artificial" for this center. Nevertheless, it adds an aspect not specifically covered by other funding sources, namely, industrial partnerships. In this sense, this center, like the previous one, represents a major path-shaping element in universities by breaking

organizational and epistemic boundaries and by integrating a mixed form of planning in the daily academic work with the interaction of academic and corporate interests.

The Working Life Center: A Center Without a Center

The working life center is based on an ambition to bridge between multiple interests: between social science and engineering in the area of working life research, and to combine a focus on solutions with a critical and explanatory stance.

This center is quite distinct from the two earlier constellations. It is basically social scientific in orientation and has a very different form of societal articulation—based less on a stable set of corporate partners and more on a fluid set of stakeholders. With some exceptions, the partnership consists of public sector organizations and trade unions, with a very low level of absorptive capacity compared to the more research-intensive engineering firms of most centers.

In lieu of common technologies and platforms, the center is instead based on the cohesive impact of concepts and frameworks. The one originally adopted was "mobility"—a broad concept covering everything from workplaces to the labor market. This conceptual foundation was, following evaluations and interactions with the funder, later changed to "sustainable working life" to better indicate the framework and direction of activities. Altogether, the center aims to function as a coherent center rather than a loose umbrella of activities, and given the lack of a specific corresponding sector or technological platforms, it instead aims to use a conceptual foundation that is useful to academic researchers as well as social partners.

The most distinctive, and arguably most successful, aspect of the center is its fundamental orientation to interaction, not merely as a process but also as an intellectual phenomenon with practical utility. All of its activities were processed through a model that located "research system" and "practical system" separately and at the same time, integrated. Conceptualization and interpretation align the two, whereas the validation of the "research system" and the "practical system" are distinct from one another—the first is global and collegial, and the other is local and pragmatic. But concepts and interpretation are what unite them, and these create coherence for the center and its constituent parts.

Given the rather flexible nature of the center, the role of collaborative partners is central to enable long-term collaboration, interaction, and learning. The center therefore operates with a rather small set of collaborative partners, which are regionally clustered to ensure compatibility and trust, covering both public and private organizations to maximize inputs and mutual learning across boundaries.

Networking is therefore the key to the center's vitality and also its main challenge. The personal connection to a visionary member of any of these organizations is critical to its success, and collaboration is therefore never given; it needs to be constantly redefined and rejuvenated.

The center, accordingly, has a work model that is based on short interventions with immediate feedback to ensure that collaborative partners experience that they

are getting something in return for their collaboration. Thus, the center is based on its activities rather than, as for other centers, its networks, or its platforms. Collaboration is both the means and the end of the center.

The center fulfills yet another function, similar to those in other centers, namely, to serve as a neutral arena for the sharing of experiences and sometimes even conflict resolution between the different parties (for instance, trade unions and companies). A very important role for the center is therefore to maintain the interaction between collaborators and ensure that the partnerships are balanced and mutually reinforcing.

Center leadership is tied to personal qualities, in this case, specifically the ability to mobilize different interests in the network and ensure that all constituent parts are aligned. Even though formal leadership mechanisms exist and are sometimes deployed, the informal qualities of leadership appear to be of greater importance.

Given the limited size of the center, its preferred meeting format includes the center as a whole. The division of labor is less marked than for other centers, and more of its activities are discussed and planned with the entire center. This includes the centerboard, which plays a very active role in setting directions and priorities, sometimes on a detailed level. This is again in contrast to the other centers, which are more decentralized and use common forums only selectively.

This center has also stretched and transformed relations within the academic system, not only by the sheer complexity of the center—spanning four departments in four different faculties at the parent university and one at another university—but also by organizing courses across departments, affording seed funding for new projects across the universities and buyouts of small shares for researchers, including those outside the core group.

Funding is used primarily to enact projects within the themes of the center. These were selected in a process that spelled out specific criteria, in particular concerning how the suggested projects relate to the overarching theme of the center. One of the challenges identified was the cross-fertilization between themes, which proved more difficult than expected.

The center's identity was more fluid and had to exist in parallel to departments rather than as a superstructure. This was seen as important to avoid conflicts with departmental and disciplinary interests. Unity was instead enacted through a common location where all engaged in the center could interact, and also through the aforementioned ambition to establish a conceptual core.

Another integrative mechanism was that funding allowed the center to recruit PhDs. PhDs primarily functioned as academic recruits with very little in the way of mobility between centers and partners. The absorptive capacity among the collaborating organizations is low, which has hindered mobility between academia and partners. Instead, most of the PhDs stay in academia, whereas interaction continues to be based on interactive projects rather than personal connections via alumni. This center is therefore highly dependent on its relational work with partners, which needs to be maintained over time.

Overall, the effects of center funding were marked for the following reasons:

The center grant challenged and bridged university boundaries and created a tension between traditional academic demarcations and center direction and identity. The center also enabled and maintained a network of partners that would not be possible without a center identity and center activities. The center gave—and received—additional value to the university via research concentration and a large PhD program, which was part of the profiling of the university as a collaborative environment.

The mode of operation, with dense interaction with partners and a broad-based set of internal members of various degrees of engagement, proved difficult to establish without center status and funding of integrating projects and activities. The center's status also created durability and resilience over time, which extended beyond the committed pioneers of the center. The long-term support contributed to the rejuvenation of the center, with new leaders emerging. The backdrop is that the mode of operation is not always seen as compatible with center expectations, for instance, in terms of scientific impact or, for that matter, common platforms. The center is based on a looser, conceptual, foundation, and its network is more flexible and transitory than is the case for some of the other centers. Thus, the very format of centers may be difficult to align with the work mode and epistemic foundation of this center, but it successfully manages different expectations—among partners in search of a platform for interaction on critical issues related to working life and workplace organizations and among scholars from a variety of backgrounds with a common interest in working life and labor market dynamics. The critical issue is whether the center can leverage in both directions and whether the practical deliveries (localized and often specific to one organization) can be translated into academic publications. However, the development of this particular center shows that it is possible for centers to thrive without a technical core.

The Transportation Center: Localized Success

This center represented a case that was largely successful over time but also had some challenges. The center specialized in transport research, in particular public transportation, integrating three disciplinary domains (psychology, management, and economics) and a wide range of societal partners.

One of the success factors of this center was that it was embedded in a larger center, which already existed as a framework for interdisciplinary work with dense partnerships and strong university support. The center therefore had a very strong fit with the overall university organization, and models already existed for the development of work along the lines of the center application. The novelty primarily lay in the focus on public transportation, hence, the center built on a model and concept that only needed to be aligned with the particular expectations of the call for a center specialized in transportation.

The profiled identity of the center showed in the recruitment of PhDs—including from partners—which was highly successful, and the environment emerges as an

attractive location for PhD studies, with half of the PhDs recruited internationally and only a few from the parent university. However, the center has been less active in recruiting post-docs and senior researchers, and thus it emerges as a somewhat localized environment, highly dependent on the parent university's location rather than international recruitments. This interpretation was reinforced by the partial use of an international advisory board and limited interaction with similar centers internationally, a missed opportunity to profile the center as an international environment in terms of impact, work mode, and recruitment.

Financially, the center was highly dependent on center grants and support from the university, with very limited financial support from partners. This decreased the ambitions of the center and forced it to maximize the benefits of this particular funding scheme rather than relating it to other funding opportunities.

This center's primary challenge resided in its scientific impact; it mostly produced practice-oriented publications with limited effect on the research frontier of its constituent disciplinary subjects. This pattern evolved despite its partner-driven model and dense contacts with Swedish public transportation, which is described as internationally unique in its citizen-centered approach. This points to a weakness in centers with a social scientific orientation, where disciplinary expectations and center properties (interdisciplinarity, partnerships, focus on interaction) do not always blend easily.

Notwithstanding this, the center had many strengthening properties, including an elaborated model for center support (proposals anchored with partners and then selected by the board) and a consistent and enthusiastic center leader. It emerges as a center constrained by a localized culture and work mode, but nevertheless with a major impact on the sector and the academic environment, in a model that was supported by the center format. It also had a reciprocal relationship with the parent university and had a clear impact on the university's organization, priorities, and direction by reinforcing an environment dedicated to interdisciplinary and partner-driven collaboration.

The Vehicle Center: A Moderate Success

This center specialized in vehicle research—a major industrial area in Sweden—at one of the leading technical universities in the country. For the purposes of the center grant, the traditional strength in vehicle design incorporated another element, environmental aspects of vehicle development. Given its orientation to one of Sweden's dominant industries, and its location in one of the leading environments of the area, it could reasonably be expected that this center would be as successful as the electronics center in creating a platform for interaction and learning between academic fields and corporate partners. The outcome was less pronounced, however, which opens for reflections on why some centers fail to meet their expectations. The center did receive full funding throughout its existence, but it had difficulties in establishing

itself as the core of vehicle research at the parent university and instead existed in parallel to several other organizations in the area.

One reason for this was failed complementarities. In reality, the profile of the center entailed only a small addition to an existing constellation rather than a full-blown merger between engineering and sustainability. Another constraint was the limited set of partners—excluding suppliers and small and medium-sized enterprises—and the overly national profile of the partnership, making the constellation more vulnerable to changes in the industry which was affected by large international transformations.

Leadership was both a strength and a weakness of the center. It was a strength in the sense that it developed a rotating and learning model between different organizational and epistemic backgrounds. It was a weakness in the sense that the role of the leader was weakly defined and changed several times during the existence of the center. No clear-cut role and identity as a leader emerged, but instead, an administrative approach to leadership was adopted.

There were positive elements with the center model, not least that it expanded beyond a binary relationship between companies and academic environments to take on a complementary role that included more partners and a widening of the networks.

Given that the center was a novel construct that coincided with the establishment of another initiative—a platform for vehicle research at the parent university—the center's lack of a specific identity became a liability; its identity could, evaluators argued, have been stronger and more clearly communicated. This was also reflected in the funding profile of the center, where partners afforded substantial in-kind support but only a little in cash. Hence, the commitment of the partners was significantly lower than for the more successful centers. However, the center's ability to function as a platform for a relatively large group of complementary partners, the organizational format that expanded beyond binary relations, and the flat leadership model with opportunities for variations and learning throughout the center's duration, indicate that it, in its own way, had some degree of success, even though it was not as durable as the centers that proved to be more robust over time.

The Logistics Center: The Center that Never Was

The last center outlined here represents a more clear-cut failure as a center, with funding withdrawn before the end of the center grant. This center, for logistics at one of Sweden's largest universities, was highly successful in terms of scientific publications and networking partnerships, but it was weakly integrated, with only minimal and inefficient integration between the constituent parts.

The center was founded on three departments within the same university. The departments had complementary profiles, but for various reasons, they never gained collaborative traction despite their epistemic similarities and similar orientations.

Another critical element of the center was its disintegrated model of partnership. It was based on a flexible membership structure with different levels of alignment and commitment, ranging from discussion partners to integrated partners with full

financial commitment, including exclusive intellectual property rights. Partners were therefore highly complementary in theory, but in reality, they had very different abilities to engage in research. Thus the partnership failed to function as an integrative mechanism. Rather, the network's fragmentation further compounded the weak integration of the academic fields.

The lack of cohesion showed in the organization. For being a relatively small center, with only some 20 members, it had a very complex organizational structure, with a board of external representatives in majority set up to manage issues of project selection. This was not adequate to meet the integration challenges, according to evaluations. In addition, the center had a plethora of managing mechanisms—a research team leader forum, a program advisory board, a scientific advisory board, and several other forums to set directions—but overall, it was marked by an unclear chain of command.

Evaluations also pinpointed limited effects on university structure; differences between constituent parts were reproduced via the center, and there emerged few examples of new commitments to the center (shown in weak internal identity and commitment to the strategy among members).

Overall, this center deployed organizational flexibility instead of integration to compensate for weak alignment between academic and industrial partners, and the lack of interaction between the academic partners. It emerged as a network of related activities and partnerships rather than an integrated whole, and therefore it dissolved over time. It never became a center despite the ambitions, which shows that centers are not easily enacted, even if the conditions seem conducive to complementarities evident in the center design. The road from design to practice is more complicated. In sum, the combination of organizational embeddedness within parent universities, extensive and durable networks, mobility from the centers to adjoining partners, and "real" collaborative projects engaging both academics and practitioners seem to be what distinguishes successful centers from those with more mixed outcomes. This may sound truistic as a conclusion—successful centers are those that resonate with the goals expressed when there are calls to establish a center—but it points to the challenges of centers. Ideally, they serve as mechanisms to renew universities and connect them with societal problems and partners—making universities matter—but in reality, they often fall short of these ambitions. Centers may be one way to propel universities' contributions to the resolution of societal challenges, but they often fail in that endeavor.

Conclusions: The Impact of Centers

What, then, can be concluded from this study of a specific form of centers, centers founded to develop academic-industrial collaboration with the aim of fostering both academic and societal excellence?

First, a theoretical contribution of this study is that it clarifies the variegated processes by which universities are affected by external steering. Hence, there is a

duality here, where universities are not as exposed to external steering as might be theoretically assumed, but rather show varying degrees of responsiveness to external steering. Arguably, when external steering aligns with internal processes of profiling, centers are the most successful. However, this is not the most common pattern, and most centers develop in relative isolation from university strategy and resource allocation.

Second, centers vary in success depending on the connection between the field and the societal environments around them. In short, centers that operate in dense corporate networks enjoy the greatest benefit of support, as activities in academic and industrial environments share ideals and work modes. They are both fully in an exploitive mode and there are only marginal differences in the operations of academic and corporate partners. Another type of center that benefits from this type is linear centers, where the industry is exploitive and the academic research is explorative, as exemplified by the biotechnology center. Here, radical differences in orientation do not preclude strong interaction, as the logic of the academic and corporate partners are so different. Another successful mode of operation is that of the working life center, which also starts out from practical knowledge interests and combines them with academic explorations, in parallel processes. This also applies to the transportation center, which derives its strengths from the unicity of Swedish public transportation, which translates into an empirical and analytical underpinning in academic work. Both of these centers focus on their interdisciplinary profile and how it might be aligned with the fixed structure of academic environments in the social sciences. Such boundaries are more porous for the centers in the natural sciences and engineering, which showcase a more pragmatic relationship between different academic fields. Thus, center work is variably oriented to the management of internal relations. As for the external relations, the degree of partner contribution is also more limited for the centers anchored in the social sciences, where partners are more important as empirical co-producers, whereas partners for the centers in the natural sciences and engineering share considerable resources over extended periods of time; their planning horizons allow for this, and the networks in which they operate are more robust.

Finally, centers that are successful are those that integrate societal and university ambitions into their strategies and can draw on university support for center profiling and funding. Hence, there is a match between internal and external ambitions, and even when there are internal frictions between fields or partners, they are managed in forums that communicate center identity and direction to all members.

When centers fail to realize their ambitions, the main reason is that practical interests primarily serve as legitimizing devices for academic ambitions. The centers are not fully anchored in their societal settings, and partner commitments are limited. The lack of articulation with real problems among partners leads to unclear and fragmented relations within the centers and even less commitment from partners.

The conclusion that can be drawn, then, is that societal challenges thrive in academic environments in which there is a fit between work modes, university strategy, and partner orientation—and when there are complementarities between (academic) exploration and (societal) exploitation among academics and partners.

The centers that developed less successfully were marred by coordination issues between the academic and societal partners.

Center support therefore reinforces existing patterns—if integration is weak or partners are fragmented at the onset of programs, this will only show more strongly during the center's time of existence. The reverse is also true; if the underpinnings are strong and there exist mutual and/or complementary interests, a center status only reinforces those underpinnings. Centers are therefore no panacea but work best if there is a fit between collaboration, strategy, and ambitions. If not, centers seem destined to have only a limited overall impact on societal challenges.

References

Aksnes, D., Benner, M., Borlaug, S. B., Foss Hansen, H., Kallerud, E., Kristiansen, E., Langfeldt, L., Pelkonen, A. & Sivertsen, G. (2012). *Centres of excellence in the Nordic countries: A comparative study of research excellence policy and excellence centre schemes in Denmark, Finland, Norway and Sweden.* Nordic Institute for Studies in Innovation, Research and Education (NIFU). http://hdl.handle.net/11250/2357780

Benner, M., & Hylmö, A. (forthcoming). *Effect analysis of Vinn Excellence and Berzelii Centres.* Report to Vinnova

Clark, B. R. (1983). *The Higher Education System.* University of California Press.

Franssen, T., Borlaug, S. B., & Hylmö, A. (2023). Steering the direction of research through organizational identity formation. *Minerva.* https://doi.org/10.1007/s11024-023-09494-z

Gläser, J., & Laudel, G. (2016). Governing science: How science policy shapes research content. *European Journal of Sociology/Archives Européennes De Sociologie, 57*(1), 117–168.

Gläser, J. (2019). How can governance change research content? Linking science policy studies to the sociology of science. In D. Simon, S. Kuhlmann, & J. Stamm (Eds.), *Handbook on science and public policy* (pp. 419–447). Edward Elgar Publishing. Retrieved October 10, 2019, from https://www.elgaronline.com/view/edcoll/9781784715939/9781784715939.00033.xml

Hammarfelt, B. (2020). Discipline. *Knowledge Organization, 47*(3), 244–256.

Hicks, D. (2012). Performance-based university research funding systems. *Research Policy, 41*(2), 251–261.

Hylmö, A. (2018). *Disciplined Reasoning: Styles of Reasoning and the Mainstream-Heterodoxy Divide in Swedish Economics.* Lund University. Retrieved from https://portal.research.lu.se/portal/sv/publications/disciplined-reasoning(cc58fc36-aafa-4932-a3dd-f283e067d574).html

Hylmö, A. (2019). Centrumsatsningar: en ny form av stöd till starka forskningsmiljöer. In A.-C. Ramsten, & M. Benner (Eds.), *Forskningspolitik För En Kunskapsoberoende Värld: Samling För Samverkan* (pp. 60–81). Vinnova analysis 2019:13. Vinnova. Retrieved from https://www.vinnova.se/publikationer/forskningspolitik-for-en-kunskapsberoende-varld/

Musselin, C. (2006). Are universities specific organisations? In G. Krücken, A. Kosmützky, & M. Torka (Eds.), *Towards a multiversity? Universities between global trends and national traditions* (pp. 63–84). Transcript Verlag.

O'Kane, M., McKay, A., Morris, R., Mintova, S., Teeri, T., Allona, I., Knudsen, G. M., & Lechuga, L. (2016a). Third Evaluation of Vinn Excellence Centres - AFC, BiMaC Innovation, BIOMAT-CELL, CESC, CHASE, ECO2, Faste, FUNMAT, GHz, HELIX, Hero-m, IPack, Mobile Life, ProNova, SAMOT, SuMo & WINGQUIST. VR 2016:01. VINNOVA.

O'Kane, M., McKay, A., Morris, R., Mintova, S., Teeri, T., Allona, I., Knudsen, G. M., & Lechuga, L. (2016b). Third Evaluation of Berzelii Centres Exselent, UPSC & Uppsala Berzelii. VR 2016:02. VINNOVA.

OECD. (2014). *Promoting research excellence: New approaches to funding.* OECD Publishing

Pestre, D. (2003). Regimes of knowledge production in society: Towards a more political and social reading. *Minerva, 41*(3), 245–261.

Reeve, D., Anderson, A. H., & Stenius, P. (2007). First Evaluation of the VINNOVA VINN Excellence Centres NGIL, HELIX, SAMOT and ECO2 Together with the STEM Competence Centre CICERO: September-November 2007. VR 2007:14. VINNOVA.

Reeve, D., Anderson, A. H., Sörensen, B. A., Morris, R. E., Chippindale, A., Tsai, C.-J., Teeri, T., Knudsen, G. M., Chen, Y., Büchel, C., & Lüthi, A. (2009a). First Evaluation of the Berzelii Centra Programme and Its Centres EXSELENT, UCFB, Uppsala Berzelii & SBI Berzelii. Vinnova Report. VR 2009:03. VINNOVA.

Reeve, D., Anderson, A. H., Sweden, & Verket för innovationssystem. (2009b). First Evaluation of the Second, Third and Fourth Round of VINNOVA VINN Excellence Centres: I.e. FASTE, SUS, FUNMAT, CHASE, GHz, MOBILE LIFE, IPACK, HERO-M. PRONOVA, BIOMATCELL, WINGQUIST, SUMO, BIMAC INNO, WISENET and AFC. VINNOVA.

Reeve, D., Anderson, A. H., Johnston, B., Stenius, P., McKay, A., O'Kane, M., Dreyer, H., Skrivervik, A., & van der Zwaag, S. (2013a). Second Evaluation of VINN Excellence Centres - BiMaC Innovation, BIOMATCELL, CESC, Chase, ECO2, Faste, FunMat, GigaHertz, HELIX, Hero-m, IPACK, Mobile Life, ProNova, SAMOT, SuMo & Wingquist. VR 2013:08. VINNOVA.

Reeve, D., Johnston, R. E., O'Kane, M., McKay, A., Skrivervik, A., Allona, I., Allik, J., Chippindale, A., Cioni, G., Lechuga, L., & Teeri, T. (2013b). Second International Evaluation of the Berzelii Centra Programme. VR 2013:02. VINNOVA.

Stephan, P. (2012). *How economics shapes science.* Harvard University Press.

Thomas, D. A., Nedeva, M., Tirado, M. M., & Jacob, M. (2020). Changing research on research evaluation: A critical literature review to revisit the agenda. *Research Evaluation, 29*(3), 275–288.

Whitley, R. (2000). *The intellectual and social organization of the sciences.* Clarendon Press.

Whitley, R., & Gläser, J. (Eds.). (2010). *The changing governance of the sciences.* Springer.