Chapter 6

The Project-ed Community

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6.1 Introduction

Projects are now ubiquitous in scientific work, to the extent that they might appear self-evident. With their institutionalisation in science policy and funding, they have become ‘a key organizing principle into science’ (Felt 2016, p. 136). The ‘projectification’ of research (Felt 2016; Ylijoki 2016) has become an object of inquiry in its own right. Projectification goes along with a series of widely documented trends in the organisation of scientific research. These include the rise of ‘New Public Management’ in the governance of research, the focus on so-called ‘excellence’, the encouragement of academy-industry and interdisciplinary collaborations, and increased expectations for research to display its relevance to society (Gläser and Laudel 2016, p. 121). In this context, projects are simultaneously ways of organising day-to-day scientific work and instruments of science policy. They serve the thematic steering of research according to governmental science policy and the accountability of funding. They are also, more often than not, collective endeavours that bring together researchers across teams, countries or disciplines. All of this makes them privileged sites to investigate evolutions in the collective dynamics of science. To what extent do projects exemplify, and participate in, the emergence of new forms of scientific communities?

This chapter takes an ethnographic perspective to investigate how projectification translates in collective research dynamics. It draws on the participant ethnography of a large interdisciplinary project exploring potential avenues for the production of biofuel by microorganisms. Microbio-E was a two-year project bringing together a dozen research groups around Aix-Marseille, France. Its disciplinary core was

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in microbiology, but it also involved disciplines from biophysics to sociology. While project-based funding is well established in France,¹ participants in Microbio-E often described this particular project as relatively unusual in interviews and meetings. Microbio-E stood out because of its very broad thematic and disciplinary scope and, to a lesser extent, its applied horizon. Both characteristics stemmed from Microbio-E's institutional embedding. The project was funded by the 'Aix-Marseille's Excellence Initiative' (AMIDEX), a scheme aiming to develop world-class research, innovation and higher education around Aix-Marseille University (AMU).

I took part in Microbio-E for 18 months as a post-doc. I visited the teams involved and interviewed 40 permanent researchers, PhD candidates, post-docs, and administrative staff related to the project.² Interviews covered everyday work, roles within the project and relationships with other teams and participants, experiences of interdisciplinarity, and perceptions of the bioenergy promise advertised in the project. I participated in project meetings and seminars and collected project documents: project proposal, intermediary project report, slides from meetings and presentations, documentation on research groups, and previous project proposals on related topics. I was based in the project's core research group and had regular informal discussions with project participants.

One practical and methodological challenge in conducting fieldwork was to define Microbio-E as a group. Whether the project constituted its own community (beyond the ad-hoc gathering of researchers) and, if so, what delimited it, became central questions. These had additional salience in this case, because one stated objective of Microbio-E was to foster a local research community around bioenergy. This chapter attempts to address them by tracing the contours of what I call the 'project-ed community'. This entails a more general reflection upon what defines a project as a collective venture. In line with the analytical programme presented in this volume's introductory chapter (Kastenhofer and Molyneux-Hodgson, Chap. 1 this volume), the ethnographic perspective interrogates the dynamic role of projects in shaping and transforming research collectives. It makes it possible to delve into the heterogeneities that make up daily scientific life and, thus, informs reflections upon the concepts that can equip the empirical analysis of collectivities. In the case drawn upon in this chapter, it allows for addressing the question to what extent 'projectification' can help us to account for contemporary forms of scientific communality.

¹The share of projects in research funding in France increased from 11% in 1982 to 21% in 2002 (Thèves et al. 2007); projects became a dominant form of funding with the creation of the National Research Agency in 2005.

²Interviews took place either in French or in English and were translated by the author when needed.

6.2 Project-ed Communities

The notion of a ‘project-ed community’ is a play on the different meanings of ‘project’. It is meant to underline that a project exists on several levels and serves several purposes. First, the ‘project-ed community’ refers to the community that is gathered to carry out a project. Moreover, this community is also ‘projected’ as an image, a display of relevance and quality: the project is meant to showcase and nurture research competences. In that sense, community-building itself can be seen as a project, as much as the strengthening and development of existing communities. Last, the planned nature of projects points to a third meaning: ‘to project’ is to plan for the future, to look forward. Since projects are temporary and goal-oriented, a ‘project-ed community’ is gathered by a vision of what it *will* achieve at least as much as by what it is doing at any particular moment.

To test out this conception, I trace how Microbio-E and its community materialise (1) in project documents, (2) in institutional arrangements, and (3) in daily research. All three takes provide different, but coherent, pictures of the project-ed community. This points to the versatile function of projects in science: Microbio-E, I argue, can be equally analysed as an argumentative device, as a strategic venture, and as an arena for scientific work.

This chapter contributes to the ongoing investigation of how new collective scientific structures affect the way research is lived and done. Recent works suggest a proliferation of new entities that are emerging to organise research collectively according to thematic, geographical, or science policy rationales. Besides projects, examples include local research fields (Merz and Sormani 2016), regional clusters (Vinck 2016; Merz and Biniok 2016; Robinson et al. 2016), thematic networks and centres (Strathern and Khlinovskaya-Rockhill 2013), and emerging fields such as synthetic biology (Meyer and Molyneux-Hodgson 2016; Molyneux-Hodgson and Meyer 2009) and bioenergy (Tari 2015). One of their common traits is that they are not primarily based on disciplines and often embed research in extra-scientific financial, societal and political concerns, echoing (and maybe institutionalising) Knorr-Cetina’s ‘transepistemic arenas of research’ (1982). Knorr-Cetina introduced the notion as a critique of analyses focusing on “specialty communities”, and used it to emphasise the entanglement of research practices in multiple relationships not contained in laboratories and specialties. She also stressed the importance of focusing on groupings that are meaningful for participants, which invites an inquiry into the relevance of these new communities for scientists.

When it comes to projects, the focus has been on how they affect the organisation of scientific work, especially within research groups (Barrier 2011; Hubert and Louvel 2012; Jouvenet 2011), in terms of the relations between the governance and the content of research (Tricoire 2006, 2011), and temporality-wise (Felt 2016; Ylijoki 2016; Schultz 2013). Projects enact their own temporality, or ‘project time’ (Ylijoki 2016), altering the perception, quantification and organisation of time and generating tensions. Research, in a project, becomes something that fits in a predefined time span (Felt 2016, p. 136). Here, I consider projectification from a different angle: the focus of this chapter is not on how research fits into projects, but

rather on how one project takes its place within a research landscape. This perspective is informed by the work of Leonelli and Ankeny (2015), who show how some projects perpetuate into lasting communities, becoming ‘blueprints for the way in which whole communities should do science’ (Leonelli and Ankeny 2015, p. 705). Leonelli and Ankeny conceptualise as ‘repertoires’ the shared sets of norms, infrastructures, procedures and resources that allow these communities to perpetuate and adapt to their research and funding contexts. The case of Microbio-E, in which the community itself is a project, allows for the study of how potential repertoires are tentatively built as part of project research.

6.3 The Project as Argumentative Device

In a context dominated by project-based funding, projects start out as written proposals arguing for the allocation of money to specific research groups and questions. Documents such as project proposals and reports are central in defining, justifying, and ultimately enabling projects: at the outset, a project is a successful proposal. A project can then be conceived as an argumentative device that assembles on paper a set of competences, research questions, promises concerning output and impact, and funding constraints so as to demonstrate feasibility and relevance.

Two documents delineated the contour of Microbio-E in this way: the project proposal (Microbio-E 2014) and a midway report (Microbio-E 2015). They described the project as uniting ‘100 researchers and engineers from 13 different labs’ around Aix-Marseille, listing their areas of expertise, resources, and expected contributions. They also stated the budget needed (around 1.5 million euros over 2 years) and accounted for its actual use. Most of the budget funded short-term contracts: 11 post-docs, 3 PhD candidates, and one research engineer, all listed in the progress report.

The bulk of the documents was devoted to laying out what the project was meant to achieve and how. Microbio-E’s full title, ‘BIOMass valorization by MICRObes for BIOEnergy Production’, emphasised its main ambition: “to set up and promote innovative and original scientific projects involving interdisciplinary approaches from biology to process engineering that push back the frontier of knowledge relative to the great world challenges and that will eventually allow (sic) the emergence of new biotechnological processes and economy” (Microbio-E 2014, p. 3). The proposal claimed that Microbio-E would foster “the emergence of an internationally recognised task force aimed at remov[ing] biological constraints currently limiting the development of advanced biofuels” by combining the “strong expertise in microbiology, metabolism, lipidomics, bioinformatics, biophysics, bioprocess, chemical engineering, economy” available locally (Microbio-E 2014, p. 2). While referring to encouragements for scientists “to act for the development of alternative energy sources and new feedstock for chemistry” (Microbio-E 2014, p. 2), the project focused on fundamental questions, which made up the main part of the proposal. Interviews confirmed that most teams were devoted to basic research

and considered their work as “really, really upstream” (Interview 31, lecturer in chemistry). The objectives were thus threefold: to further basic scientific understanding on topics related to advanced bioenergy; to stimulate cross-disciplinary networking and collaborations among local teams; and to create a regional ‘task force’ able to increase the University’s academic impact through publications and patents.

The proposal then detailed how the resources put together in the project would be organised to achieve its goals. It divided the project in three ‘tasks’ and several ‘sub-tasks’.

- Task 1 would gather biologists, biophysicists and electrochemists studying enzymes and enzymatic reactions involved in biomass formation and degradation at a molecular level;
- Task 2 would explore the potential of micro-algae for the production of biofuels and high-value compounds, associating plant biologists, bioinformaticians and bioprocess engineers;
- Task 3 would focus on the production of hydrogen by micro-organisms and its use in fuel cells. It would involve biologists, electrochemists, process engineers, and social scientists, who were supposed to study “challenges of the use of biomass in the bioenergy sector and [...] in the Hydrogen industry” from a socio-economic perspective (Microbio-E 2014, p. 27).

Project documents, especially the proposal, sought to assert the relevance of the project’s ambition and organisation to the concerns of the funder and, through it, to the policy context more generally. Following a local call, Microbio-E was funded by AMIDEX,³ whose purpose was to foster so-called ‘excellent’ local research on a set of priority themes. The proposal, reflecting the expectations from AMIDEX, sketches a project that appears emblematic of many of the trends identified by sociologists of science. This suggests that these trends have become incorporated in conceptions of how research should be presented. For instance, the project ticks several of the boxes of ‘Mode 2 knowledge production’ (Gibbons et al. 1994). Gibbons and colleagues have described Mode-2 research as externally funded, transdisciplinary, problem-oriented, occurring in applied contexts, and evaluated according to its social and economic utility, as opposed to the disciplinary, curiosity-driven, institutionally stable, and internally assessed ‘Mode-1’ research (Gibbons et al. 1994; Ylijoki 2016). Microbio-E was, indeed, designed as interdisciplinary—cutting across natural sciences to “break the locks that will allow innovative strategies to become economically viable” (Microbio-E 2015, p. 2), and across the natural and social sciences to “enhance the chances of contributing to an innovative project” (Microbio-E 2014, p. 27). It claimed to be problem-driven and to contribute to solving energy issues. On paper, Microbio-E is a striking

³AMIDEX is one of 10 ‘Initiatives d’Excellence’ (IDEX). IDEXes originate in a national programme launched in 2010 to reinvigorate innovation after the 2008 financial crisis. They are meant to drive the emergence of world-class academic clusters in France, with the aim of improving French scores in global university rankings (Juppé and Rocard 2010).

example of ‘strategic research’: basic research expected to produce a broad base of knowledge from which solutions to practical problems may emerge (Irvine and Martin 1984; Rip 2004). The proposal interwove grand promises with detailed, mundane descriptions of highly specialised research: it was an explicit attempt at articulating scientific excellence and societal relevance, a characteristic of strategic research (Rip 2004). In the project rhetoric, bioenergy served as an ‘umbrella term’ (Rip and Voss 2013) under which various strands of research were packaged and related to a societal and political concern—namely climate change and energy. The project proposal then appears as an argumentative device aiming to demonstrate that a specific combination of scientific resources would serve the interests of the funder and that the objectives of involved researchers were compatible with those of the funder.

6.4 The Project as Strategic Convergence

The community displayed in project documents does not only exist on paper. The very process of jointly writing a project proposal fostered interactions across groups. It consolidated a convergence of strategies and interests. Microbio-E stemmed from two distinct strategies for navigating the science policy environment: that of basic biology laboratories and researchers, and that of Aix-Marseille University. Their convergence enabled the enrolment of additional partners. The project then worked as a device to keep these strategies together and ensure their synergy, at least for its duration.

6.4.1 *Bioenergy to Sell Basic Microbiology*

Though interdisciplinary, Microbio-E had its core in biology. Basic biology was already well established in Aix-Marseille, with a close-knit network of strong groups that published, recruited, had enough money to run, and were recognised nationally and internationally (Interviews 1 and 34, senior researchers in biology; fieldwork data). Yet, in interviews, researchers often stressed that basic biology was increasingly hard to fund in its own right, and that they constantly had to justify their work as relevant to society (Interviews 1, senior researcher in biology; 5, researcher in electrochemistry; 8, researcher in biophysics; 9, lecturer in process engineering; 20, researcher in biology). Bioenergy was one of the umbrella terms under which they could sell their expertise, they explained, so many framed their research as relevant to future progress in hydrogen production, algae-based biofuels, biomass degradation, or biofuel cells. They argued that this not only helped obtaining funding but also publishing in high-impact journals (Interviews 1, senior researcher in biology; 5, researcher in electrochemistry), which was an excellence criterion as defined by AMIDEX.

As one senior researcher explained, energy constituted a distinctive thematic niche in biology, where most applications relate to health (Interview 15, physics professor). Interviewed researchers quickly added that this positioning was not purely opportunistic but also helped choose among a multitude of interesting topics, and opened up fascinating fundamental issues (Interviews 1, senior researcher in biology; 15, physics professor). Referring to energy is at times an individual (Interview 38, researcher in biology) or a punctual strategy (Interviews 9, lecturer in process engineering; 17, researcher in bioinformatics; 34, senior researcher in biology), but it had also become deeply ingrained in some research groups, as group leaders explained in interviews.

The leading group in the Microbio-E consortium was led to the energy theme by its research on hydrogen. Since its creation in 1991, it had studied enzymes involved in hydrogen production or degradation in micro-organisms. In the early 2000s, the group realised this could be linked to energy issues (interview 15, physics professor). By 2005, French research funding was targeting hydrogen as an energy carrier. The group rode the wave, promoting its hydrogen-related skills to obtain money and equipment. “We have been living on it for 10 years”, I was told. In an emphasis that energy might be an area of application but that it was not their main scientific interest, they also told me: “we do *not* work on energy” (Interview 1, senior researcher in biology). Energy-oriented projects fostered lasting research orientations and collaborations, for instance on biofuel cells or on hydrogen production from biomass (Interview 1, senior researcher in biology; project proposal archives).

One other research group, focused on microalgae and lipids, also benefitted from the hydrogen hype of the 2000s. This group was created in 2006 with an explicit focus on biofuels, building on longstanding local research in plant biology. Its positioning resulted from hydrogen-related projects, as its leader explained, especially a “programme called Biohydrogen [...] that coordinated research on biohydrogen to try to reinforce it, to make it more visible” and that “made [them] realise that it was in [their] best interest to develop this” (Interview 25, senior researcher in biology). The group then created a technological platform supported by the Region, France and the EU, thereby increasing visibility and capacity to attract collaborators and recruits. For this group, contributing to the development of biofuels is a guiding principle. This contrasts with the former group, where relevance to bioenergy as a potential area of application was conceived of as a way to obtain funding, but not as a scientific objective in itself.

6.4.2 Aix and Marseille’s Excellent Adventure

The project brought these two versions of strategic research together and aligned them with the objectives of Aix-Marseille University (AMU). AMU was created in 2012 following national reforms increasing the autonomy of universities and encouraging rapprochements between academic institutions. It merged three local universities. A few months later, the ‘initiative for excellence’ AMIDEX was launched.

After a probation period, it obtained stable funding of 26 million euros a year from 2016 onwards.

AMIDEX, whose slogan is a straightforward “Towards more excellence with Aix-Marseille University”, enacts a specific vision of excellence defined by performance in international rankings, the ability to attract international students and academics, interdisciplinarity, and the integration of scientific, economic and industrial actors. AMIDEX organised calls for projects to fund “top international level research and higher education projects (emergent, interdisciplinary and innovative)” on “five priority scientific themes [...] where Aix-Marseille University and its partners can become leaders at an international level within 10 years” (AMIDEX website). Energy featured as priority theme; it was, in fact, pushed forward by biology groups (fieldnotes).

To foster cross-disciplinary interactions, AMIDEX created interdisciplinary networks for each priority theme. The steering committee of the Energy network gathered biologists, physicists, engineers, lawyers, economists, and sociologists, who met every month. They have thus learnt to know one another. This is where the biologists met the non-biologists who would join them in Microbio-E and where they worked to align their strategies with those of AMIDEX.

6.4.3 *The Making of Microbio-E*

AMIDEX had identified energy as a high-potential theme in the region, but one that was scattered and poorly structured, except for bioenergy—an effect of the strength of the biology network and the strategic positioning of several groups in the field of bioenergy. Yet, initial efforts to organise bioenergy research failed to obtain funding.

As a result, by 2014, AMIDEX had funded very few projects on energy. It needed a flagship energy project before its evaluation in 2016. Those who had submitted energy-related projects were prompted to try again. One scientist central in the project recalls:

The lab managers were summoned, and they told me: well, you need to write a project. I said, ok, but I already wrote two, I'm not writing a third one to get thrown out. So I met the vice-president, I asked: what would be needed? And he told me: you include mechanics, and you include social sciences. I include mechanics, I include social sciences. And we get the project. (Interview 1, senior researcher in biology)

The project was pieced together quickly, over “two or three week-ends” (Interview 32, senior researcher in biology), drawing on previously rejected proposals. Pressured by short deadlines, participants proposed input based on their ongoing or planned work. The need “to bring everyone together” (Interview 1, senior researcher in biology) accounts for Microbio-E's broad scope.

The inclusion of social sciences resulted from a top-down injunction informed by a rather abstract commitment to interdisciplinary research. Contrary to what the few

paragraphs about social sciences in the proposal suggest, there was no clearly defined research agenda.⁴

When focusing on what brought the participants in Microbio-E together, the project appears quite different from the way it is formulated in project documents. In this version, Microbio-E appears as the extension of an already strong network of biologists. For its scientific leaders, Microbio-E was the continuation of a strategy to frame their basic research as relevant to the development of bioenergy. The proposal succeeded in enrolling participants from other disciplines who could join under the umbrella of bioenergy. It also aligned with the ambition of AMIDEX to mould local research according to its criteria for excellence. These strategies converged in the project's function as a device to strengthen a community sharing an affiliation (AMU) and a topic (bioenergy), and to display its promises. This version of the project-ed community does not stand alone: it is a stage in the evolution of a local research community and contributes to its perpetuation and performance at the scales of both research groups and the university.

6.5 The Project as Arena of Research

Ultimately, projects constitute arenas of research: they fund and organise scientific work. To describe them as such, we can follow them in day-to-day research, and ask how and where participants actually encounter the project as such. This means looking for projects in their daily manifestations. This version of Microbio-E is fuzzier than the previous two, which could be traced quite directly from a set of documents or from the accounts of group leaders. Yet, in the case of projects as large as Microbio-E, it is how most participants will relate to it: not everyone involved takes part in the writing of project documents or in long-term strategic decisions. This is where the ethnographic method proves most useful. I followed Microbio-E in two directions: first, searching for the project-ed community as a coherent whole; second, considering the individual collaborations that resulted from the project.

6.5.1 *The Project as a Whole*

In practice, Microbio-E as a whole turned out to be quite elusive. While researchers knew the project existed and what it was about, it was not always clear who/what was part of it and who/what was not. Researchers sometimes appeared uncertain about whether they were part of it when I contacted them. Doubts about the exact perimeter of the project surfaced during interviews:

⁴There were no attempts to conceal the fact that the main contribution expected of social sciences was to ensure proposal success.

I am not even sure, actually, that I know exactly which projects are on the payroll, and which are not. Hydrogenases, for sure; molybdoenzymes, I think we're on the payroll too, in relations with the formate deshydrogenase [...]. So, I think I am related to this by two projects. (Interview 31, lecturer in chemistry)

A discussion on whether a team was included or not similarly illustrates the fuzziness of Microbio-E's boundaries:

So, they're not directly funded, they could be in it without being in it, that was not very, very clear... they would have liked to be in but they were not. (Interview 25, senior researcher in biology)

So, where is the project-ed community to be encountered? Project documents seem like an obvious starting point. As outlined above, they framed the project in terms of research questions, links to bioenergy, and teams involved. They included lists of participants, hires, and publications. Yet, the version of the project presented in documents did not match its real-life enactment perfectly. The researchers listed and the actual participants in Microbio-E were not exactly the same, and the same holds true for research questions. Besides, project documents were not distributed among participants. Only a handful of participants contributed to the proposal, and, according to one of them, "no one had a final version" (Interview 38, researcher in biology). In contrast, several researchers I interviewed admitted having never read it. Project documents were not for internal use, but intended for displaying the project to external readers, mainly AMIDEX.

The budget was a second concrete manifestation of the project as a whole, and a crucial one. Its management was centralised under the authority of the project coordinator, resulting in extra work for the administrative staff, for whom the existence of Microbio-E was very concrete indeed, and occasionally overwhelming (Interview 40, administrative staff). It mainly funded short-term contracts for people from outside the region, without guarantees that they would be able or willing to stay. Half of them were to be co-supervised by two research groups: co-supervised postdocs and PhD embodied the promise of collaboration, but also its temporary character. Funding translated into very concrete personnel additions to research groups, as well as in the mention of AMIDEX in publications. Yet, the financial lens does not fully account for the project, either. Not all research groups involved got funding from Microbio-E, and connection to the project was not necessarily limited to the staff funded by it:

I think that, beyond the PhD that is funded, it is a project in which we are involved in a more important way, because the very essence of the lab is linked to these energy issues, so... we could almost put the whole lab in the project, if we wanted. (Interview 25, senior researcher in biology)

One year into the project, a gathering of Microbio-E as a group took place. All participants were invited to a day-long meeting. It consisted of presentations displaying what each team had been doing and a lunch buffet for networking. The concluding session provided an overview of the project's ambitions, allowing for a discussion of the purpose and future of this project-ed community that was gathered in a single room for the first time. Yet, there was only one such meeting in two years,

not allowing for an in-depth collective discussion of findings or for contacts beyond existing collaborations. Like the project documents, it was a display of strength rather than an arena for collective work and community-building.

Interestingly, my own work also participated in enacting the project as a community. As I circulated across teams, I brought the project-ed community into existence—or at least, made it aware of its own existence. Interviewees often asked questions about Microbio-E and its organisation. I acted as a facilitator for community-making by mapping collaborations, transmitting information, and constructing and spreading a narrative about the project. But I was an imperfect messenger: I did not meet each and every participant, and my grasp of the science was limited.

In addition to these situated manifestations of the project, its participants were connected by two shared elements. First, the project narrative and bioenergy label provided a unifying perspective. Everyone in Microbio-E became identifiable as related to bioenergy, and was encouraged to consider potential applications in this domain. Sometimes, this genuinely sparked new research orientations: one researcher explained how she was inspired by a collaboration between biologists and process engineers and wanted to try something similar (Interview 36, biology professor). However, not everyone bought into this new identity. Several participants considered the relation of their work to bioenergy as tenuous at best, explaining: “it is not going to guide what we do on a daily basis” (Interview 14, lecturer in physics), or that “there’s nothing established, like a process or something too specific, so it’s more the perspective that you work in the same direction” (Interview 19, postdoc in biology). Second, the very existence of the project, as a materialisation of the university’s ambition to intensify local interactions, acted as an incentive for collaboration. “I think that it forces us—well, forces us, it encourages us to collaborate, that’s not a bad thing” (Interview 28, researcher in biology), said one plant biologist, while the bioinformatician he collaborated with as part of Microbio-E stated that “when you join a consortium, you have to try to interact; so even if they have the resources at home, they look on the fact that we do it with a favourable eye, to create bonds” (Interview 17, researcher in bioinformatics).

Interviews suggest Microbio-E provided a frame for informal exchanges and revived old scientific connections; it led to the identification of potential new partners; and it allowed teams to showcase their research, and to secure involvement in a local bioenergy research field. For some, this was the main motivation for joining: they were looking for opportunities to join a new community and to develop their work in new directions (Interviews 17, researcher in bioinformatics; 24, R&D team manager).

All of these manifestations of Microbio-E as a coherent community played out only occasionally in the work of most participants. Besides being difficult to delineate, the project-ed community as a whole did not appear directly relevant to day-to-day research activities. Interviewed postdocs, especially, tended to feel remote from the project, even though their position and salaries directly depended on it (Interviews 21 and 33, postdocs in biology).

6.5.2 *A Patchwork of Subprojects*

The structuring impact of Microbio-E mostly played out in the smaller collaborations that were initiated or sustained by it. In terms of scientific activity, Microbio-E mainly worked as a patchwork of independent subprojects. Collaborations emerged and developed—or not—as part of the day-to-day pursuit of research, with the project working as a catalyst.

This loose, federalist structure was to an extent built into Microbio-E. As one coordinator explained, there was deliberately no top-down organisation of research activities:

I don't have control over people's research. In terms of research, I have control only over my research, my team's research, but not the others' research. I am not going to say, what you're doing is not good, or you're wrong. Everyone is responsible for their own topic. (Interview 1, senior researcher in biology)

This gave way to various engagements with and within the project. For some, Microbio-E hardly changed anything, but merely provided resources to develop ongoing research and collaborations. The researchers already well inserted in the Microbio-E network and topics had no need to divert from their interests (Interviews 2, senior researcher in biology; 14, lecturer in physics; 34, senior researcher in biology; 38, researcher in biology). For them, the project-ed community was a mere extension of their own local network: “we were already married”, one researcher told me after detailing the history of the connections among the research groups involved (interview 34, senior researcher in biology). Symmetrically, involvement in Microbio-E had little effect on groups that hitherto had few connections with other teams in the consortium. They had proposed subprojects that corresponded to their own ongoing work, and largely stuck to them, arguing that two years is too short a period to build meaningful new collaborations (Interviews 20, researchers in biology; 22, lecturer in mechanical engineering; 32, senior researcher in biology).

In contrast, four collaborations were strongly identified with Microbio-E, either because they were initiated by it or because they were in line with its philosophy of fostering regional interdisciplinary collaborations to connect basic research with bioenergy applications.

The first was a collaboration between microbiologists and process engineers which had been initiated *before* Microbio-E. It studied hydrogen production by bacterial consortia, seeking to scale-up results obtained on the lab bench. It involved three permanent researchers in addition to one Microbio-E postdoc and one PhD candidate. The collaboration took shape through the transfer of instruments and staff from the process engineering lab to the microbiology lab and through their necessary adaptation to different experimental conditions and lab practices. A process engineer spent two years as a visiting researcher in the microbiology lab, installed her experimental devices, and eventually supervised a PhD candidate based there. This collaboration served as a blueprint for Microbio-E, as can be traced in the project proposals that preceded Microbio-E. It came to significantly shape the activities of

the two teams involved: Microbio-E sustained and reinforced a collaboration that was not limited to this single project. The project was part of the ongoing constitution of a small-scale shared ‘repertoire’ (Leonelli and Ankeny 2015) of experimental methods and devices, theories, meeting venues, potential funding sources, and strategies to present and frame research. This repertoire was embodied in experimental reactors as they moved from the process engineering lab to the microbiology lab and in the diverse set of people, competences, and research questions assembled around them.

The second example was a collaboration *initiated for* Microbio-E. It involved microbiologists, biochemists, bioinformaticians working on genetic sequences, and a technology-transfer unit focused on renewable energy, none of whom had ever worked together before. Microbio-E paid two postdocs and one PhD student. They converged around a shared object—*Asterionella formosa*, a freshwater microalga that grows with a community of bacteria and is of fundamental as well as industrial interest. The collaboration led to the multiplication of the forms of manipulation and scrutiny that the alga and its suit of bacteria were subjected to as they travelled from lab to lab: they were cultivated in containers ranging from a few millilitres to 30 litres, observed and counted using several microscopy techniques, and genetically sequenced by an external facility so that bioinformaticians could study them. Combining all these techniques required regular interactions and meetings, making this the most collaboration-intensive part of Microbio-E (fieldnotes and interviews), and resulting in a paper co-signed by all participants. Skills were sought for outside of the Microbio-E perimeter—here too, the collaboration went beyond the frame of the project. However, it is hard to tell to what extent the resulting group will last, especially since the persons involved full-time held short-term contracts.

The third example emerged *on the margins of* the Microbio-E project, but developed into collaborations within the consortium. It grew out of a PhD thesis on the production of alkanes—a family of chemical compounds that can be used directly as fuel—in microalgae. The PhD student’s team identified a light-activated enzyme catalysing the production of alkanes in microalgae and used the Microbio-E network to study the enzyme further. They collaborated with other Microbio-E teams to characterise the enzyme structure and to do spectroscopic analyses. This collaboration was not planned in Microbio-E, but was facilitated by it. It was also presented as a success story that could provide the backbone for future collaborations (meeting notes, March 2016): a “beautiful story that we hope to continue” (Interview 15, physics professor).

The inclusion of social science was another collaboration initiated because of Microbio-E. As opposed to the three previous examples, it was not built around a shared object of enquiry, but driven by constraints from the funders. As is often the case in such situations, we moved through different roles (Balmer et al. 2015). Yet, we did not enter a ‘collaborative mode’, mutually shaping the knowledge produced (Calvert and Martin 2009). The main objective was to foster mutual knowledge and exchanges about energy across the social and natural sciences. The collaboration existed through my circulation across teams and the resulting interactions and mutual observations (I too was subjected to curiosity, scrutiny, and questions

about the role, outputs, and practices of sociology). The project itself constituted the common ground upon which to establish these interactions. It meant something for each participant; it was the motivation for our meetings; and it was an object of interrogation and investigation. Through the presence and findings of social sciences, Microbio-E appeared as an experiment in community-making: not a roadmap, but a nutrient broth, or an incubator (to use biological metaphors) in which some collaborations might thrive while others barely caught on.⁵ Indeed, when we presented our study, some of Microbio-E's participants asked us if we had recommendations about what was done well or not and about what worked best in terms of project organisation.

6.6 Conclusion

Combining ethnographic observation, interviews, and document analysis, I have tried to understand projects in contemporary technoscience. In particular, I sought to characterise projects as collective ventures and to specify how they take their place among existing research institutions, communities, and practices. My analysis was based on the in-depth study of a large interdisciplinary project with a regional focus and an ambition to link basic research to potential applications relevant to bioenergy—Microbio-E. In defining my research object, I found that Microbio-E as a whole was loosely connected and hard to delineate. The closer I got to the day-to-day practice of research, the fuzzier the notion of the 'project' seemed to get.

In fact, I encountered several versions of Microbio-E. In project documents and general presentations, the project works as an argumentative device: it is a coherent narrative connecting research questions, available scientific competence and resources, funders' requirements, and societal concerns to demonstrate the relevance and excellence of a collective research plan. In retracing the genesis of Microbio-E and its institutional embedding, the project appears as a strategic convergence: it emerged where the long-term interests of those involved met, because it brought resources that they could use for their own agendas. Last, when observing daily scientific work, the project appears as a protean arena, a pool of resources that influences research collaborations and topics to an extent, but intervenes only punctually as a discrete entity. Thus, Microbio-E functioned as a boundary object (Star 2010). It was a flexible arrangement of material, procedural, and social resources that was ill-structured as a whole, but it was mobilised by different groups with their own references and objectives. In its co-existing versions, it served a range of strategic needs: those of researchers needing money or contacts; those of the

⁵Some participants understood the project in this way, explaining in interviews that not all collaborations were expected to fare equally well: Microbio-E was a test to identify which could yield interesting results and secure future funding (Interview 4, senior researcher in biology).

university promoting excellence; those of research groups and networks seeking increased visibility and prestige.

This has implications for how we conceive of projects, because it shows that projects are not just a way of organising research and research communities. Considering the project in terms of how it shapes the work and interactions of researchers only tells one part of the story. This is what I try to convey with the notion of a ‘project-ed community’ and the various forms of ‘project-ing’ that it implies. Certainly, projects create communities—these are provisional, more or less loose, and may not outlast the project, but they are communities nonetheless in that they are united by shared objectives, resources and constraints. Projects also contribute to shaping and reconfiguring existing scientific communities and groupings, for instance by drawing them together or introducing new areas of research (though, here again, this may only be temporary). But ‘project-ed’ communities are not just communities constituted by a project. Projects do more than dispatch resources. First, they are displays of strength and relevance: they constitute symbolic resources for research groups and academic institutions to justify their existence and emphasise their potential contributions to science and society. They also constitute projections of a desirable future: they show what a current grouping could become and achieve if resources keep flowing. In that sense, community-making can be a project in itself and an objective of projects—it was very much so with Microbio-E. From this conception of projects, we can draw conclusions along two lines.

First, from a methodological and analytical perspective, there is a tension between the relevance of projects as arenas of research and their artificiality. The study of Microbio-E confirms that projects affect research practices because they allocate resources, foster specific forms of collaboration, define temporalities, and frame scientific work. All the same, projects are a lot about what *will* or *could* be. One function of projects is to display research communities and their work to the outside world (starting with funders). In that sense, projects are strategic constructions to enable the pursuit of daily work, and do not fairly represent the reality of this work. Most of the subprojects that constituted Microbio-E reached beyond the strict frame of this project, be it in terms of topics, participants, or temporality. This warrants caution on the observer’s part. While projects provide privileged settings in which to witness the entanglements that constitute research practices, one has to be careful not to confer on them more importance than they have for participants.

Second, from a conceptual point of view, my ethnographic take on Microbio-E contributes to the understanding of what glues scientific communities together, especially since community-making was one explicit objective of Microbio-E. While Microbio-E is not representative of all scientific projects (those come in too many shapes, sizes and contexts), it provides insights into how scientists work together when they are constrained by the timeframe, predefined objectives, and funders’ expectations that come with a project. Given its stated aim to foster a strong local research collective, Microbio-E also exemplifies the ‘promise of communities’ that Kastenhofer and Molyneux-Hodgson point at in their introduction (this volume), and so its outcomes give us insights into how such promise fares in practice. Microbio-E did foster several collaborations, across many disciplines. I have shown

that these were usually grafted onto pre-existing ties or resources and, most crucially, that they took material forms: adapted laboratory instruments, biological organisms or molecules scrutinised using different methods, collaborating researchers. In sharing very concrete matters, subgroups within Microbio-E tentatively developed their own small-scales ‘repertoires’ (Leonelli and Ankeny 2015)—sets of shared resources, practices, and (small-scale) infrastructures that structure the way they do science and help them navigate the research and funding context. Leonelli and Ankeny show that the constitution of repertoires allows projects to lastingly structure the way whole communities do science; but they also emphasise that not all projects lead to the development of a repertoire. What the study of Microbio-E shows is that projects can be designed to experiment with potential repertoires, not necessarily at the project scale, but by fostering interactions on specific topics and with an expectation of results. This is, however, at odds with their short temporalities and reliance on non-permanent staff.

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