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Anthropotechnological Practice and Time Politics in the Development Industry

Conducting a rigorous, respectful and socially relevant participant observation. Completing and submitting reports, requests for funding and for funding extensions for deadlines that are always multiplying and getting closer. Analyzing data, co-constructing results and guiding technical choices whose realization is carried out at the pace of independent production chains. These are just a few of the paradoxical tasks – at least in light of their respective temporalities – that ethnologists adhering to the anthropotechnological approach must navigate when they are working in the context of the development industry. Unrealistic? Not if we consider how the paradox of ethnographic temporality combined with new technologies that facilitate simultaneity allow us to approach these questions from a new angle.

This article addresses one of the central questions of ethnographic practice, temporality, which is made all the more prominent by the contexts of cooperation familiar to anthropotechnology. This article aims to understand the particularities of the anthropotechnological approach in order to combine the ethnographic, bureaucratic and productive

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temporalities at work in the realization of projects aligned with this approach. Based on the case of an international cooperation project concerning sociotechnological innovation in matters of management and supervision of access to water, I will begin by referring to the argument according to which the cotemporality valued by ethnographic practice makes it possible to rethink cooperation practices. Then, I will develop the idea that, due to the simultaneity and openness that new technologies make possible, alternative routes and means to act other than those induced by the totalitarian temporality of bureaucracy are on offer.

I will illustrate my arguments throughout the chapter with some experiences from field research recently completed in Tanzania for a "development cooperation" project. This project uses an anthropotechnological approach and aims to contribute to better management of access, sharing, and consumption of irrigation water in agricultural communities in the Arusha region[1], located in the Pangani Basin.

1.1. Conducting research about water allocation when there is no water

In June 2012, I was offered a research assistant position to conduct field surveys about the management of water in irrigation systems in communities in the Pangani Basin in Tanzania. I was also to be the contact person in the "intervention area" for the project. The project had been granted substantial funding by a national development cooperation organization based on the first surveys completed by ministries and local administration concerned with water management in northeastern Tanzania. It had been determined that the river Themi – a tributary of the Pangani River upstream and downstream from the city of Arusha – would be an excellent pilot site, intended to be extended to neighboring river basins next. So I prepared to leave to carry out four months of ethnographic field research, mainly alongside the Water Users' Association (WUA), Themi River Committee and the village committees in charge of water supply channels, called Furrow

1 Project oMoMi: as the project is still in development, its title is anonymous.

Committees (FC), in order to understand how the allocation of water resources operated at the levels of the village (on-farm, within different villages), the river (off-farm, between the different villages along the river) and the basin (basin level, between the different waterways), and to understand the role of the different local (FC, RC, WUA) and governmental (Pangani Water Board, Ministry of Water) actors involved in managing water access. The project, which was intended to produce better information about water resources at the lowest cost, essentially relied on a crowdsourcing approach, where any individual with a cell phone was also a potential contributor to the system. Unlike traditional measurement methods that require infrastructure that is costly to purchase and maintain, the information was created by gathering a huge amount of microdata produced in the spirit of citizen science, aiming for better management of shared resources by using local knowledge. The funders were especially attracted by the anthropotechnological approach and wanted the technological concept on which they relied in this project – the crowdsourcing approach – to be as integrated as possible into the daily practices of future users (farmers and various government and non-government officials involved in water management). Additional funding was then obtained to conduct ethnographic research to that end in the first phase of the project: surveys were to be completed right away to support the phase-end report in six months. One can well imagine the countless contradictions between the necessity of producing results in a given time period designed around the schedule of the funders, and the realization of ethnographic surveys that are by nature long and concern practices that are governed by the calendar of seasons (a short rainy season, long rainy season and dry season)[2].

When, after learning about the seasonal rainfall patterns in my preliminary reading, I expressed concern about being able to conduct the research demanded for this period during which irrigation furrows were probably not used, I was told that the surveys had been budgeted for this phase and that they would therefore have to take place during

2 It should be noted that the agricultural calendar itself has become relatively unpredictable during the past few years, during which there have been some periods of drought and others of very abundant rains.

this period. “After all, water is needed to live all year round, and we can still learn from people involved in the irrigation systems even when these systems are not in use”, a colleague from an institution that we were collaborating with in Tanzania attempted to assure me. To my surprise, I found myself required to conduct surveys during a period of non-irrigation with committees that were not active at that time of the year and members of local government who were more occupied with surveying the protection of a small trickle of water than still ran through the Themi riverbed than supervising its allocation between different villages with rights to it.

The strength of ethnography, as opposed to experimental sciences that construct framework conditions from laboratory experiments, is that it is anchored in the “real”[3] of the people and groups that it studies. Incidentally, despite the absence of water and, consequently, irrigation, I learned a great deal about the tasks required to maintain the irrigation channels and the hierarchies at play in the execution of labor and their effects in the distribution in irrigation “rounds” when the time comes. The absence of water also informed me about the violence of conflicts that could occur at any time when, for example, a young farmer, desperate not to lose his seeds, collected water from the trickle that remained of the river. This resulted in retaliation by men from a neighboring village that led to his death in hospital a few days later. The rhetoric of abundance in the villages upstream of Arusha was the inverse echo of the continuous complaints from farmers downstream of the city about their peers upstream. This rhetoric also indicated the extreme sensitivity to the distribution of information about the availability of the water resource between these interdependent communities who are, nevertheless, in a situation of complete inequality in terms of access to water; those in the highlands have direct and almost unending access, while those in the lowlands only have access for a few months of the year through a complex rotating distribution system of inter- and intravillage channel networks[4].

3 I mean the term in the constructivist sense here.
4 For a detailed description of how the allocation of water resources in the irrigation network of the Pangani basin operates, see [KOM 11].

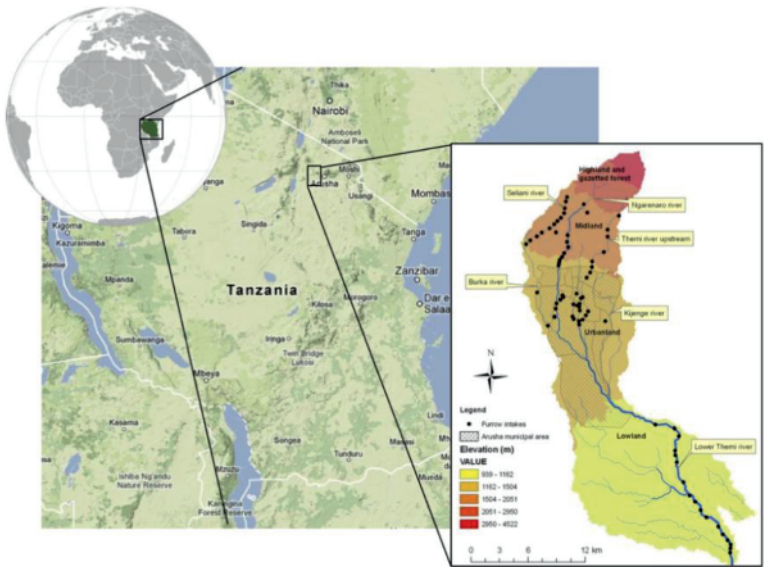

Figure 1.1. *Locations of irrigation channels along the Themi river and its tributaries (source: [KOM 11]). For a color version of this figure, see www.iste.co.uk/geslin/anthropotechnology.zip*

However, with regard to the request of the funders, my notebooks were destined to remain nearly empty of information about the specific processes that I had been asked to investigate for the simple reason that, in the temporality that governs the agricultural activities in the Pangani Basin, the actors involved in water management were "on standby" concerning issues of allocation during periods when the irrigation channels were not in use. On the other hand, the project timeline, inflexible to the contradictory signals arising from the land, was carried out according to the deadlines fixed by the funders around the two key annual steps: the tabling of budgets and funding requests for the next phase, and reports on the phases and the project evaluation. These each took place about every 6 months, according to the calendar logic of the national administration.

This example will no doubt bring to mind some of the experiences that anyone working directly or indirectly with the development industry has had and some of the absurdities they have been

confronted with as a result of the discrepancy between the "plan" created by a technical dissection of the "identified problem" [LI 07] and the local social reality. Of course, this is not unique to the development industry. It is common for different temporalities to coexist and sometimes conflict in our daily lives as well: whether it consists of schedules and deadlines in local bureaucracy, seasonal cycles in agriculture, tourism and other areas of production or, simply, in our private lives, the life stages of children in our care or their education requirements and so on, we are all constantly juggling different timetables. One of the particularities of the Tanzanian example is the fact that we can clearly discern a dominant temporality – that of funders who "plan" and allocate huge budgets, which many individuals know how to put to use very skillfully in Tanzanian villages and for which teams of dozens of European researchers compete – and a dominated temporality – that of the local reality of people involved in agricultural production and irrigation management in Tanzania, whose activities and subsistence are governed by increasingly unpredictable seasonal cycles.

It is this time–power relationship, and the modes of action of the anthropotechnological approach on this relationship, that will be the focus of this chapter and that I will address in more detail in section 1.2.

1.2. Time, power and cotemporalities

As anthropology has discussed extensively ([HAL 84 and RUT 92] for example), time is a social construct that differs according to social and cultural backgrounds and, as a social construct, it is always the object of power relations. However, as I suggested earlier, my understanding of "culture" is not unilaterally deterministic: it has been demonstrated that a multiplicity of times can coexist within the same social background. As an example, my Tanzanian interlocutors do not only live according to the rhythm of the seasons but also according to the movements of the global economy acting on the price of the foodstuffs they produce, the rituals of the life cycle of the Maasai tribe and even deadlines imposed by local and national politics, which periodically take precedence over the other temporalities that they tend to briefly immobilize.

The question of time has also been thoroughly examined in the agricultural sector, in particular with regard to the relations between the "local political cosmologies" of decisions and choices in agricultural matters [BOW 92] and the desire for the centralization and standardization of production by governments. As demonstrated in Rutz [RUT 92], these power relations generally materialize through different "objectifications of time" or "technologies of time" such as calendars, clocks, timetables, schedules and a standardized code, as well as through concepts such as "later", "faster", "now" or "after". These mechanisms do not all have the same function – calendars are usually tools to control large populations, whereas timetables and schedules are more often instruments of control within bureaucracies – but they share the fact that they are generally imposed from above and, when they are effective, make it possible for a person, group or organization to appropriate the time of other individuals. Consequently, Rutz explains [RUT 92, p. 7]: "a politics of time is concerned with the appropriation of the time of others, the institutionalization of a dominant time, and the legitimation of power by means of the control of time".

In the development industry sector – especially in the postcolonial world – where, paradoxically, anthropotechnology was primarily constructed and where it has also been located in practice[5], these

5 In the 1960s, Alain Wisner, ergonomist and founder of anthropotechnology, promoted his approach – directly in line with the ergonomic program – with the goal of improving working conditions, mainly in "developing" countries [GES 06, p. 152] where the "development" institutions relied primarily on the idea of technological transfer. Geslin, who subsequently solidified Wisner's program "in collaboration with anthropology" (see [GES 99]), accomplished this in part through various "development cooperation" projects in which he was involved and where he worked to invert some of the representations of community actors and their work approaches by urging them – at the risk of severe conflict at times – to contemplate their action based on "users and their practices" rather than the "technologies to be transferred". Geslin was critical of the "development industry" and its effects in the apprehension of technologies (see [GHA 04 and GES 99] for example). He also pointed out the ambivalent position of anthropotechnology when its interventions are part of this context, which leads it to continuously try to balance the interests in play and, in certain cases, to break off collaborations when they prove to serve no other purpose than to reinforce the existing power relations. Thus, unlike certain approaches structurally related to this industry, Geslin is careful to always define anthropotechnology in the field of the anthropology of techniques, adding a transformative dimension to it without imposing the

power relations, often described as neocolonial [AMI 74, NKR 73] or, more recently, imperial [COO 97, HAR 03] are omnipresent: the implicit logic being that development organizations impose their model, including their temporality, rather than adapting the models to the populations in which they are seeking to intervene. As Geslin noted [GES 02], Wisner also challenged the authority of Western technical policy models over those of the receiving populations and recognized the imperialist violence and the perpetuation of forms of neocolonial domination that technology transfers often contribute to sustaining. To put it simply and without repeating the critique of north–south relations: national and international, governmental and non-governmental development institutions have, for a long time now, often led a life mostly independent from the realities that they are supposed to participate in improving. The issue has intensified since the 1980s and a professional-managerial class of experts now hold posts within governmental bodies, insurance agencies and development institutions, applying the same standardized techniques of neoliberal development to them (see [LI 07, GAR 15]); symbolically, it is not insignificant that the intermediary evaluation meetings for the oMoMi project were periodically hosted in National Bank locations and conducted by economists and lawyers rather than by agricultural engineers.

As Bear summarizes with regard to temporality, neoliberal time, which, I suggest, is where the "experts" develop and what they often tend to impose, is that of a "present characterized by time-space compression, cultures of speed or uncertainty" [BEA 14, p. 3] wherein the abstract time reckoning of capitalism "always comes into conflict with concrete experiences and social rhythms of time" [BEA 14, p. 7].

north–south divide or a particular orientation toward the development sector. The approach developed by Geslin, and implemented at the EDANA laboratory since 2007 is intended to be equally applicable to designing water monitoring systems in Tanzania, servicing tools for historical sculptures in Swiss abbeys, or fall prevention tools for elderly people in hospital settings. The designer–user–object relationship is the focus of this approach; the context – development, conservation, or hospital – is considered to the extent that it is viewed as a kind of "culture" with its own set of practices.

It is very logical – though not without contention – to impose it as the "dominant time" in the intervention spaces of development programs. Consequently and anecdotally, this leads to absurdities such as the notion of conducting a survey of irrigation techniques in a period of non-irrigation appearing rational in this specific context where tabling reports and allocating budgets are prioritized over all other tasks. The issue at stake is the discrepancy between a dominated temporality, that of the reality of the field of inquiry, and a dominant temporality, that of the funders. In the following sections, I will address these two temporalities before focusing on the interstitial position of the practitioner of anthropotechnology between the "two worlds of designers and users" to use Geslin's expression [GES 06], between their two respective temporalities. I will rely on the Tanzanian example to show how it is, nevertheless, possible to reconcile these two temporalities by adopting an anthropotechnological approach.

1.2.1. *Ethnographic temporality*

Although anthropotechnology originated from the field of ergonomics, it conceptualized its practice around methods borrowed from anthropology, including the observation – with participation, if possible – of the reality of actor-users and the ethnographic rendering of reference situations that then serve as a basis for design. With regard to design, other methods borrowed from ergonomics, cognitive sciences and organizational sciences are used to guide the process toward a concrete realization, especially through the constitution of work groups and sustained iterations around the development of prototypes[6].

It is important to clarify what we mean by "ethnography", especially in relation to the temporality involved in this approach. I

6 For a formal description of this method, see *L'apprentissage des mondes: une anthropologie appliquée aux transferts de technologies* [GES 99]. For a discussion about the epistemological foundations of anthropotechnology, see *Les formes sociales d'appropriations des objets techniques, ou le paradigme anthropotechnologique* [GES 02].

refer here to Tim Ingold who, in an emphatic article in HAU, insisted on certain disciplinary particularities of the method within the large field of the social sciences that are sometimes misused. The product, a monograph, "aims to chronicle the life and times of people" [ING 14, p. 385], and to do that the ethnographer engages in an "ethnographic encounter", which means that:

> "In the conduct of our research, we meet people. We talk with them, we ask them questions, we listen to their stories and we watch what they do. In so far as we are deemed competent and capable, we join in. There is nothing particularly special or unusual about this: it is, after all, what people do all the time when they encounter one another. What, then, could possibly distinguish an encounter that is ethnographic from one that is not? Here you are in what you imagine to be the field. You tell people that you have come to learn from them. You are perhaps hoping that they will teach you some of their practical skills, or that they will explain what they think about things. You try very hard to remember what you have observed, or what people have told you, and lest you forget, you write it all down in fieldnotes as soon as the opportunity arises" [ING 14, p. 385].

It consists of embracing and recognizing the daily lives of people who are the focus of the research and appreciating the details, partly *by adopting* "their times" [ING 14, p. 385] and taking meticulous notes. The principle is therefore the cotemporality of the research and the object of research. In the case of the oMoMi project, it was only the following year, after spending 2 more months in the Pangani communities, this time during a period of irrigation of cultivable land, that I managed to observe the practices of allocating and sharing water in practice and to compare the previously encountered discourse used by people with their real practices. In this way, unlike other inquiry methods such as questionnaires, which can be quickly distributed, collected and analyzed, the ethnographic methods that

anthropotechnology is based on require sharing the "real" of actors rather than basing choices off of a certain external representation of this real. Concretely, and to return to one of the central temporalities of my interlocutors, I have included an example of what the calendar of irrigation channel use looked like. At maximum capacity, they were used six months of the year in the highlands (Figure 1.2), and in the lowlands south of Arusha this capacity was reduced to two months at best.

As it happens, the observation of practices proved to be an essential and necessary complement to the story that I had uncovered. The modes of sharing were much more flexible than had been indicated in the interviews and also revealed hierarchies internal to the villages and the principles of solidarity within them. Moreover, observing the practices of the furrow leaders revealed the limitations of the technological concept that had been developed by engineers and hydrogeologists: neither the farmers nor the elders had smartphones – the cornerstone of the crowdsensing technology desired by the project – and not for reasons of cost, as certain beliefs about the "poor African farmer" would suggest, but because of their high energy consumption and the scarcity of means to charge them. Calculations of the streamflow were made using a wooden stick marked specifically for each channel and not according to a universally transposable metric system. Finally, the flow estimate locations were, in practice, relatively far and infrequently accessed, unless there was a conflict over allocation. In short, the conceptual bases of the technology revealed their limitations while, under pressure from the deadlines for the project phases, the first prototypes had already been ordered from a long and costly production chain: prototypes that the first field observations already made it possible to disqualify.

I have now come to the second temporality, which I call bureaucratic temporality, that the practitioner of anthropotechnology must also grapple with even though it is often contradictory to the temporality of the survey.

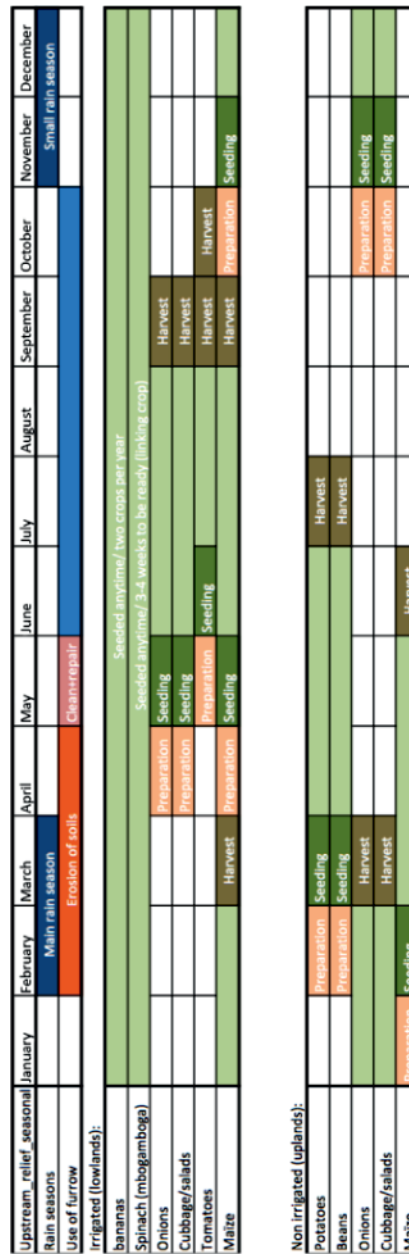

Figure 1.2. *Agricultural calendar and irrigation channel use calendar. For a color version of this figure, see www.iste.co.uk/geslin/anthropotechnology.zip*

1.2.2. *Bureaucratic temporality*

As I have already noted, the pace of the project – as the first prototype unfortunately demonstrated – is largely determined by bureaucratic temporality, or the dominant temporality of the funders. Moreover, the very notion of a "project" carries with it a certain conception of time in distinct "phases" with a start date and an end date that order the reality in an extremely restrictive and reductive way, especially because it tends to omit what has happened before (for example the "local memory of development" [GES 98]) and what will happen after (for example unexpected reappropriation of technological objects as was the case in the salt marshes in Guinea [GES 99]). The "start" of a project is the acceptance by the funders, defined as the opening of a line of funding, and the "end" of a project is consequently defined as the depletion of funds and the delivering of a financial report. In the interval, a series of "phases" punctuate the project, including intermediary financial reports and new budget lines between teams, themselves justified by research reports and biannual evaluations. As we have seen, their scientific value is all relative to the fact that they are produced at regular intervals and essentially seek to justify the pursuit of the project – its independent existence – without regard for the temporality of the field of intervention. On the other hand, they have a very concrete financial value because they make it possible to release huge amounts of funds to the different partners involved. In a certain way, project reporting in the style of practices used in international development institutions very much resembles what Graeber calls the "sovietization of capitalism" [GRA 15]: profits are increasingly extracted through bureaucratic production which, in the development sector, leads to a transformation of the work of researchers and engineers involved in the projects to increasingly resemble what Graeber calls *bullshit jobs* [GRA 13]. This is demonstrated by the multiplication of consulting positions to evaluate these projects at a rapid pace and "coordination" positions – not to mention marketing and copywriting – that more precisely consist of responding to requests for proposals in order to get funding and create project reports at regular intervals, tasks with low added value in terms of the project goals but that justify themselves by their capacity to maintain stability and the relative independence of the system and

its dependents. In the case of the oMoMi project, the bureaucratic calendar more or less resembled the following chart (Figure 1.3).

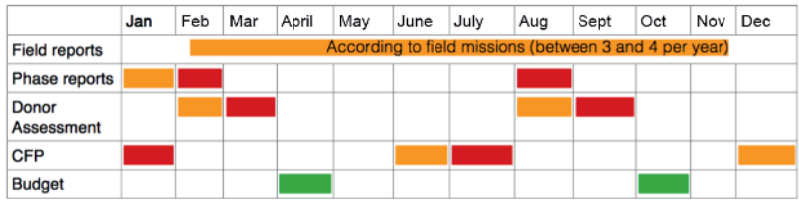

Figure 1.3. *Bureaucratic calendar (red: deadlines; orange: reporting; green: opening funding lines). For a color version of this figure, see www.iste.co.uk/geslin/anthropotechnology.zip*

If we replace the deadlines with those of the users in Tanzania, it appears difficult to simultaneously account for the management of channels at a time when the bureaucratic schedule is particularly full (see Figure 1.4). We can consequently see that there are many contradictions inherent to the intermediary position of anthropotechnology, seeking on the one hand to adopt the ethnographic temporality of its object of study and intervention and, on the other hand, to intervene prior to the design and monitoring of the projects.

1.3. Anthropotechnological temporalities: the Tanzanian case

Here, I will address the contributions and limitations of the anthropotechnological approach through three points that touch on its capacity to rethink the dominant temporality of development projects and to establish effective counterpoints in its framework by relying on technical choices that are consistent with its principles. First, I will briefly present the objectives of the oMoMi project and the initial intervention design.

1.3.1. *The oMoMi project*

I addressed the key features of the oMoMi project in the introduction to this chapter. I will return here briefly to some of its technical components to add context to the rest of my report.

The central concept of the project is *crowdsourcing*, and more precisely *crowdsensing*, or the fact that anyone who has a smartphone – later adapted to a simple cell phone – can contribute to generating information about available water resources by using the sensors integrated in their phone (such as the camera or video capabilities), or using their phone to share data collected using mobile sensors (such as soil humidity sensors or thermometers) or to share physical information related to *indigenous knowledge* (such as the approach of rains or the time to prepare the seeds). The aggregation of this mass of microdata – corrected using hydrometric models – should make it possible to do without traditional measurement station infrastructure that is cumbersome and unequally distributed. In addition, the quantitative (measured and recorded) data are completed by the qualitative data of "local ecological knowledge" such as the estimation of flow by users or their evaluation of the soil quality and when it is ready for planting. These data, once collected in a database, are then processed with the goal of providing information in return that is useful to management personnel at a government level and user–contributors in the agricultural sector.

After several iterations (see below), the data collection instruments would concentrate on:

i) streamflow *on-farm* and *off-farm*;

ii) soil humidity;

iii) basic meteorological data; each type of data corresponds to a type of measuring instrument and must respond to restrictions of portability and transmissivity for the data generated.

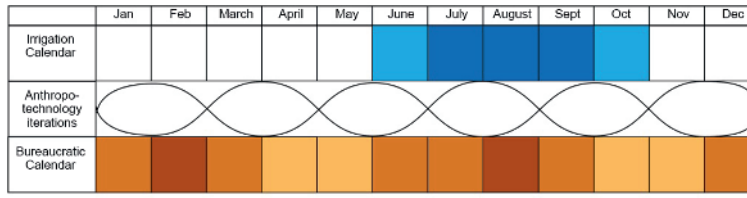

Figure 1.4. *Anthropotechnological iterations (dark red: heavy bureaucratic load; light orange: light bureaucratic load). For a color version of this figure, see www.iste.co.uk/geslin/anthropotechnology.zip*

Regarding the temporality of the project and that of the territory, the task of the anthropotechnologists consisted of avoiding a repeat of the failure of the first prototype – an unsuitable realization defined essentially by the "plan" and bureaucratic deadlines. The challenge was to develop an appropriate technology that would actually be used once the project finished, rather than to create a series of instruments destined to be forgotten once the funding was depleted. To that end, one of the central challenges was to reconcile the bureaucratic and field temporalities which, considering their respective calendars, left little space for technological design as such. The following sections will address this issue.

1.3.2. *Project genesis: when does a project begin?*

As Geslin states, "innovation is above all an endogenous process" [GES 02, p. 7]. In fact, regardless of whether the instrument, tool, concept or technical system was designed in the laboratories of a university or a consulting firm, their appropriation is necessarily the result of the work of innovation of the recipient users – as demonstrated by the multitude of unexpected uses of technical objects designed for other ends. With this in mind, anthropotechnology takes the users' capacity for innovation very seriously. The first step of its method therefore consists of reconsidering the "start" of all projects, by submitting the basic concepts and objectives of the project to be reviewed by future users – what Geslin calls the "reformulation of the request" [GES 99, p. 183] – and assuming that all or part of the project must be rethought through the innovative capacity of the users, and

even be simply abandoned if it does not make sense in their eyes and does not respond to their needs.

So, while the oMoMi project had begun nearly a year before in the temporality of the funders to which the engineers more or less complied, it had not yet addressed the reality of the water users in Tanzania. In this context, the first task of the anthropotechnologists was to gather everyone who was potentially concerned by the technological design and submit it to them for feedback until a consensus was reached about the orientations and the shape to give to the project. This included management from the WUA, members of different RCs and the FC, farmers and members of governmental bodies in charge of controlling the water and its use. At the end of this day-long meeting, which required more than a week of preparation, the project could be considered acceptable and would be reviewed with regard to the amendments made by the users. It is only really at this point that, in the temporality of the users, we could consider the project to have started. Rather than accepting *a priori* the direction and deadlines defined without consultation, anthropotechnology considers "going back" in the steps usually prescribed by project methodology to reformulate a request and a direction that is consistent with the expectations and needs of the users, as well as the limitations and particularities of the milieu.

On this basis, it was decided that the flow measurement technology would be modeled on the existing instrument, a wooden stick, but by including new and innovative technical capabilities for measurement and communication. While the project initially set out to focus on the question of water flow and volume, the farmers revealed the desire to manage their irrigation needs by having control over the state of soil humidity, which involved the design of a new tool for the engineers. Moreover, they brought the end of the production chain into the issue by insisting on the need for better information about the prices of their products in regional markets; information that could be relatively easily transmitted through the crowdsourcing system. Finally, the weather stations remained relevant but, instead of being isolated like they usually were, they would be set up in the schools in villages along the Themi river, which would prevent potential damage and

allow teachers to use them for practical lessons about geography, as well as raising awareness about questions of climate change and agriculture. The unsuitability of cell phones was also emphasized and therefore made it necessary to develop a transitional system compatible with standard GSM phones. Finally, the managers of the WUAs added an important point by underscoring the conformity of the system with the Tanzanian constitution about water use, which gave the crowdsensed collection of data a legal foundation.

Concretely, this first step consisted of moving backward in the steps of the project development to rethink the "start" of it not from the release of funds but from the formulation of a request that made sense for the future users. Then, through their involvement that followed in the form of work groups (see section 1.3.3), they participated more fully in the development of innovation and could realistically determine the pace of the needs and organization of their practices throughout the year.

1.3.3. *Supported iterations*

In theory, the project methodology is increasingly presented as a succession of iterative cycles. In practice, it is a fact that the breakdown into phases and subphases that determine access to funding makes it difficult to make such an approach a reality. In addition, it is also important to ask who is usually included in the iteration process. In general, it is the designers who make trips to the site and the reviewers charged with making changes to the progress made by the developers. The users, on the other hand, are often forgotten in this process. In the case of the oMoMi project, the first reviewers were the users themselves because, through their critical work anchored in their daily practices, they were in the best position to make changes to the developments designed by the engineers. It is a question of bringing the notion of expertise as close as possible to daily use and, in so doing, attempting to modify the "developer"–"to be developed" power relations that often frame work relationships in development projects. There are many examples in the critical literature about the world of development of experts from the north hurrying to assess the situation of populations where they are

intervening in the south in just a few days. This is generally accepted within communities of development experts: their time is precious – meaning more precious than that of their interlocutors; a belief that becomes a self-fulfilling prophecy since they overload their programs with formal visits and meetings instead of visits and meetings with future users. In their view, it is normal that the future beneficiaries of these projects, who are obliged to them in some way, accord them their time in abundance and be ready to pause their own activities for the benefit of those of the experts.

On the other hand, by considering that the "experts" are the future users of the technology in the midst of development, anthropotechnology also attempts to account for their temporality to pace the co-design process. Due to the ingrained nature of the North–South power relationships in the development industry, the anthropotechnological approach opts to formalize the expertise of users through the concept of "work groups". In the oMoMi project, just like with other projects by the EDANA lab, the future users of different technologies were appointed to "work groups" [GES 99] – committees of local experts that included members of the FC, RCs and WUA intended to use the oMoMi technology – whose deliberations served as references for the technical part of the design by the engineers in Switzerland. For example, it was through this supported iteration process that the traditional stick was transformed, through several steps and back and forth between the work groups and the engineers, into a "smart stick" capable of collecting and transmitting data recorded while maintaining the old functionalities.

Figure 1.5. *Water height measuring stick and the prototype of the "smart stick". For a color version of this figure, see www.iste.co.uk/geslin/anthropotechnology.zip*

The creation of "work groups" also acted as a safeguard against a certain propensity among engineers to privilege the technical dimensions over the social dimensions of the technologies. The work groups not only attempted to direct the technical developments beforehand, they were also the first to test prototypes, react to technical choices that had been made and make changes to them after. Although the principle of "supported iterations" has the advantage of allowing the co-construction of technology by promoting its integration with future uses and by bringing back the temporality of the design to the users, its function, nevertheless, remains largely dependent on the participation of the engineers – and in this case their regular trips to Tanzania, a limitation that can prove prohibitive, especially when it involves costly international travel.

In section 1.3.4, I will show how two fundamental developments of the oMoMi technology contributed to reducing the spatial and temporal distance that generally tends to keep users and designers isolated from one another.

1.3.4. *Productive cotemporality: simultaneity, crowdsourcing and FabLab fabrication*

Beyond just wanting to interact with the users, as several product methodologies seek to do through so-called participative approaches, the issue here was to see how to concretely co-construct a technology when the different actors involved do not *a priori* share the same space or temporality. The example of the oMoMi project demonstrates the growing possibilities of simultaneity for the production of information and its access, as well as the possibilities for almost instantaneous material (co-)production of technical objects thanks to 3D prototyping in the FabLab. In this way, I want to show how ethnographic temporality is imposed on bureaucratic temporality through the new technological interfaces mobilized in the anthropotechnological approach.

In his now famous critique of the "ethnographic present", Johannes Fabian [FAB 06] shed light on the tendency within ethnography to position studied situations in a present outside of time. This is one of

the paradoxes of ethnography that aims for a synchronous study of its object in the field and that, in the work of writing that follows, tends to distance itself from it and render its descriptions ahistorical, especially when the subject is framed by an essentialist vision of the culture. As underscored by Hastrup [HAS 90], ethnography is a "literary device" which, as a convention, must be questioned: the description of the reality of actors today is not evidence of their past nor of their futures. The anthropotechnological proposition seeks to assume the ethnographic present, or the synchronicity of observation *in situ*, by disposing of certain ideals of monographic writing through an experimental approach. Two paths were tested in this sense in the context of the oMoMi project: the creation of an ethnographic database accessible to the project teams and the use of direct channels of communication with the technology users through crowdsourcing.

As the different steps of the ethnographic investigations progressed, rather than writing a research report after the fact, it was decided to compile an ethnographic database concurrently with the research or in almost simultaneity with the progress of the ethnographic fieldwork. I compiled my observations in a wiki database that I could organize as I went with themes and subthemes, noted according to interest and shared directly with all teams who could in turn interact with it or request complementary information on certain points raised. The entries could be filtered and found by different partners thanks to simple research functions. Another important point was that the partners received an e-mail notification whenever a new entry was added, which made it possible to keep them alerted to new developments in the database. In this way, the temporality of the ethnographic research was combined with the first temporality dominated by the bureaucratic deadlines of the project. The clear advantage of this method was to reinforce simultaneous cooperation between different actors in the project. For instance, I received specific requests from engineers based in Switzerland about repositories for fragile or valuable objects, which I simply had to verify with Tanzanian contacts. Conversely, some of my posts in the database prompted concerns from the engineers about technical choices they were preparing to make and that they requested to have validated by future users and members of the work groups. Without

replacing the analytical process that accompanies monograph writing in other contexts, the ethnographic database had the advantage of focusing on dimensions pertinent for technical design during the ethnographic research and therefore offered an almost direct space of interaction between the reality of the field of intervention and the reality of the laboratory.

Secondly, because the technology as such was part of a crowdsourcing approach, a link was established with the users who started to interact with the technology. This instant communication made it possible to directly monitor user practices: for example, when the data stopped coming in from a certain village, the team at the Pangani Basin Water Office could reasonably assume that a technical or usage issue had been encountered. Thanks to this direct feedback on usage, it was possible to very quickly detect that certain users were not familiar with writing SMS messages, hindering their communication, and this led to a facilitation of the entry system. Similarly, users could directly provide their complaints through the same channel, which when they did not indicate a code recognized by the system, displayed an error message and gave full readability to the message transmitted by the user. After one trial month, for example, a user in a village to the south of Arusha wrote directly that the humidity sensor in her village was not working, which allowed the project maintenance operator to react quickly and the engineers to reflect on another placement that was better protected and more accessible to its users. These few concrete examples show that, because of the technological options involved beforehand, it is becoming possible to share a common temporality between designers and users that allows both to cooperate directly.

Finally, a third technological choice involved privileging technologies that are open source and can be created in a FabLab[7]. To illustrate this, I will briefly return to the iterations that gave rise to the fabrication of weather stations. Since the start, meaning during the foundational meeting to reformulate the request in Arusha, officials from the Pangani Basin Water Office had mentioned that the information loop would not be complete and effective without access to

7 See Chapter 6.

basic weather data. To do this, they pointed out the existence of weather stations around the city of Arusha (at the airport and near the reservoir) and the fact that these did not work. In fact, these very sophisticated stations had been installed using World Bank funding but their maintenance had proved to be costly and had quickly led them to be more or less abandoned. In addition, while the data were certainly calibrated for large-scale usage, the stations could not – given their small number and placement – relate the many existing variations between the highlands in the north and the lowlands to the south of Arusha, where conflicts over allocation were unfolding at the local level. Based on these observations, it was decided to opt for weather stations that were perhaps less precise but less costly and able to be maintained locally due to their open source technology and the possibility of creating them entirely on site with minimal FabLab infrastructure. Only a single laser printer and the knowledge to program the components were necessary. Consequently, the implementation of these stations could be done simultaneously with the teams that had worked on their design in Switzerland without these teams needing to travel; what is more, the partners in Tanzania largely appropriated the technology once they had taken charge of the programming and system implementation. With a more traditional mode of production based on external supply chains, such as the one that had been adopted at the start of the project, the project would have required months of isolated work in Switzerland and Europe, then depended on the pace of production chains for different technical components (sometimes several months), and would not have allowed for much, or any, local maintenance. The FabLab option, however, ensured a simultaneous cooperation between the creative efforts of work groups in Tanzania and Swiss and Tanzanian engineers, as well as the concrete realization of technical instruments.

1.4. Conclusion: designing technologies based on user temporality

Through these examples, I have attempted to show how the anthropotechnological approach involves technical choices that tend to invert the power relations that are deeply rooted in the development industry and more generally in the technical design process. One of

the manifestations of this is the appropriation of the time of researchers and the communities "to be developed" where they intervene by "developers". Researchers and engineers involved in the design process, whose tasks and missions are essentially regulated by bureaucratic temporality, dedicate a considerable amount of time to writing reports, submitting tenders, evaluating their peers or promoting their projects, because it is through these activities – much more so than through the design of robust sociotechnical systems – that they maintain their situation, ensure their funding and consequently, ensure the longevity of the industry in which they participate. Conversely, they expect their partners to have an unconditional availability for the project that they are supposed to benefit from, without considering the different imperatives proper to the temporalities in which they are involved or the simple fact that the *paid time* that they dedicate onsite is *given time* for their interlocutors.

The approach presented here has the merit, with regard to the temporalities that I addressed in this chapter, of being considerably liberated from the bureaucratic temporality: what need is there for costly and time-consuming "expert" assessment missions or long reports when the system is evaluated by its own users at the rate of their uses? By adjusting the pace of the design to pace of the users, the anthropotechnological premise is positioned against a certain tendency to dedicate more time and energy to marketing projects than to the co-construction of efficient solutions. The development world, just like the academic world, has become strongly bureaucratized by requiring the production of tremendous amounts of reports and forms to access funding and the legitimation of these by a second phase of reports and forms once these have been obtained. The account proposed in this chapter is not intended to irresponsibly promote an approach based on technologies – like crowdsourcing and FabLab creation – that illustrate one of the tendencies of neoliberal time, namely the explosion of tasks. Such technology could also be criticized for it may contribute to the dispossession of the prerogatives of the states in control of work and their lack of responsibility toward citizen subjects. These current developments certainly call for the necessity of taking a critical look at the forms of knowledge appropriation issued from the "commons" that they make possible [LAV 12, ETT 16] as well as their aim to produce

"empowered" citizens in the image of microcompanies, which the state will no longer need to worry about [FER 10]. However, like I suggested in this chapter, by inciting the creation of a space of cotemporality over the course of the design project, the anthropotechnological approach, together with the tools of simultaneity, has the advantage of promoting a perspective that is anchored much more concretely in the reality of actor-users. This contrasts in a notable and progressive way with the dominant practices and culture within the development world.

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