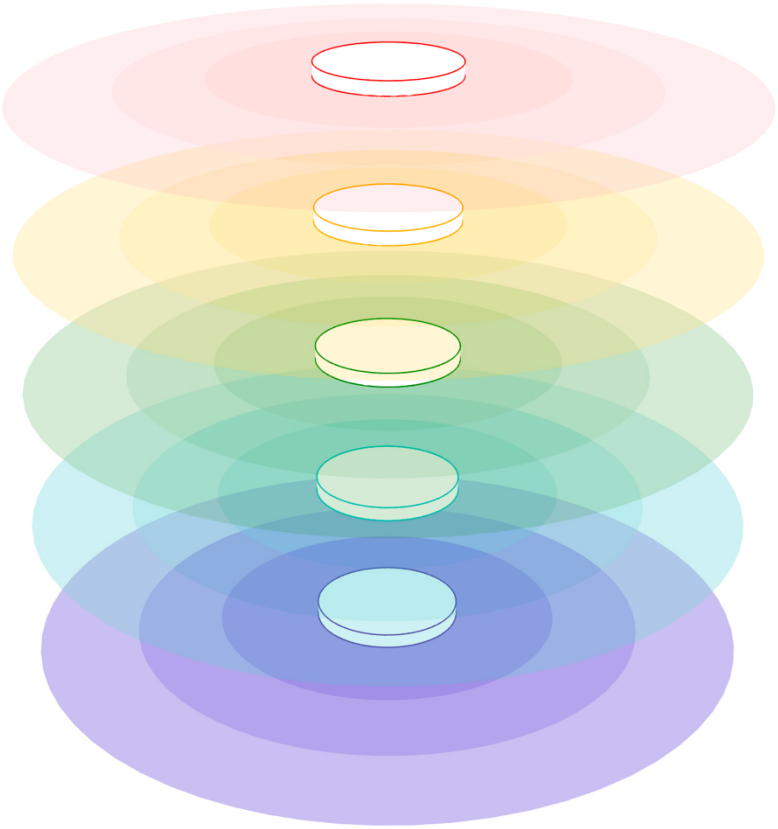

The TextileLab Model

Towards regenerative textile dyeing

Position Paper

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waag futurelab

1. Abstract

The dyeing of textiles is one of the most ecologically destructive processes in the textile sector. But it need not be so. Many have developed alternative ways of dyeing textiles with the aim of benefiting our environment rather than harming it. Yet, these initiatives often struggle against deeply entrenched extractive practices that shape the way we produce and consume textiles today. How to design for regenerative ways of dyeing textiles in the wake of such practices? Over the last decade, the TextileLab at Waag Futurelab has been researching, questioning, speculating and testing ways of dyeing textiles as part of their aim to make the textile sector more regenerative. In this time, they have developed a model of their ways of working: the TextileLab model (TL-model). We explain this model by observing its use in *Local Color*, a project aiming to bring back the local production of plant-based textile dyes in the Amsterdam city centre. The TL-model draws attention to entanglements of materials, tools, processes, systems and culture that come into play when attempting to design regenerative textiles. By shedding some light on the model and its use by the team, we hope to inspire others to join us in making the textile sector more regenerative.

2. Introduction

The pollution caused by textile dyeing processes calls for the development of alternatives that are regenerative.[1,2] That is, ways of dyeing textiles that are not just sustainable, but restore ecosystems, promote biodiversity, inspire local communities and operate within social and planetary boundaries.[3] For the last decade, the development of such alternatives has been one of the main aims of the TextileLab at Waag Futurelab in Amsterdam. Like many others aiming to make textiles more regenerative, the TextileLab has experienced "push back" from established ways of doing things in the sector. Taking a regenerative approach, it quickly becomes apparent how inseparable textiles are from the practices that shape them and how difficult it is to change those practices. To make, for example, a sample of woad-dyed linen in a regenerative way may require not just different fiber-processing or dyeing techniques but entirely different agricultural practices out of which the materials are sourced.

To face these challenges, the TextileLab has taken up a way of researching-through-making that brings these existing, entrenched practices into view while simultaneously proposing concrete alternatives and interventions. Out of necessity, they developed a model to guide this process (the TL-model). Over the last 9 years, the TextileLab has employed the TL-model to navigate a variety of projects, such as tcbl.eu, shemakes.eu, reflowproject.eu and tracks4crafts.eu. In what follows, we explain the model and supplement this explanation with field notes of how it is used in practice. We pay close attention to how the model emerged, and take account of the way it is used by the designers of the TextileLab and how it structures their processes. We do this because the model is tightly bound up with ways of

[1] Ellen MacArthur Foundation. (2017). *A new textiles economy: Redesigning fashion's future*. Report.
[2] Biomimicry Institute. (2021). *The nature of fashion: Moving towards a regenerative system*. Report.
[3] Raworth, K. (2017). *Doughnut economics: Seven ways to think like a 21-st century economist*. Random House, London.

working at the TextileLab, without which it loses its meaning. For the model to be able to travel to other practitioners it thus does not suffice to merely provide a visualisation of it along with a description of its terms. But first, before turning to the model itself, we must briefly situate the TextileLab and describe the method used to observe the model in practice.

3. Waag Futurelab's TextileLab

The TextileLab is a team of creative researchers and designers operating at Waag Futurelab in Amsterdam (see Figure 1). The lab researches, questions, speculates and tests how to transform the textile and clothing sector to be more values-driven, sustainable, or better: regenerative. Due to the complexity of this extractive and globally organised sector, the TextileLab always starts from the conviction that changing one aspect of a large interconnected socio-economical-ecological system (and its culture), will almost surely affect other, sometimes unexpected, aspects of this system.

Figure 1: Lead researcher Cecilia Raspanti developing plant-based dyes at the TextileLab in Amsterdam

4. Method

Because the meaning of the TL-model is context dependent and its terms are tightly bound up with ways of working at the TextileLab, the model was studied over a period of two years through participant observation. In participant observation, researchers "*join in correspondence with those with whom we learn or among whom we study, in a movement that goes forward rather than back in time.*"[4]. More concretely, one of the authors joined the TextileLab in their daily activities and observed the use of the model in a two-year project

[4] Ingold, T. (2014). That's enough about ethnography! *Hau: Journal of Ethnographic Theory, 4*(1), 383–395, p. 390. https://doi.org/10.14318/hau4.1.021

titled Local Color[5]. This project aimed at understanding and describing the conditions for sustaining a local city-level regenerative practice of plant-based textile dyeing in Amsterdam (see Figure 2). By joining in and making alongside the team, this author was able get a feel for the way the model shaped practice over time, including design decisions that are typically intuitive and not verbalised. Insight into the model's origins and how it was used between 2015 and 2022 were gathered through interviews with members of the TextileLab.

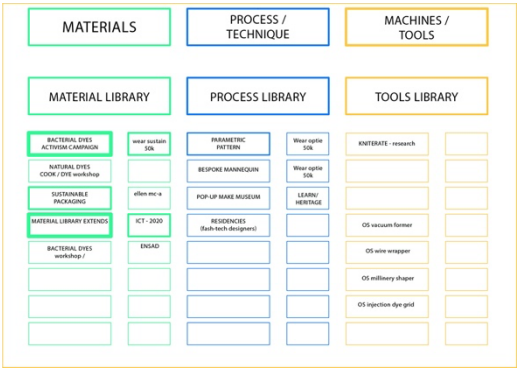
Figure 2: Planting a local dye garden in the centre of Amsterdam

A second reason participant observation was chosen as a method is because it emphasizes the role of description in making observations. It is difficult, if not impossible to describe what a model does without introducing all sorts of terms, resonances and lurking connotations from other practices in which modelling is done. It may, for example, seem obvious to call the images below (Figures 2 and 3) ‘evolutions’ or ‘iterations’ of a model. They are, after all, each made after each other. But using any of these terms would occlude the fact that these models were made in response to differing situations. Is ‘iteration’ still the right term if the use-case has changed? With participant observation, this kind of description is not taken for granted and becomes an issue to pay careful attention to. Attending to these nuances, we first present the current configuration of the TL-model, before detailing how it is enacted in practice.

[5] You can read more about Local Color at: https://localcolor.amsterdam/

5. The TextileLab Model

Ever since it was founded in 2015 the TextileLab has been developing a model to understand, differentiate, share, communicate, discuss and coordinate its design and research practice (see Figures 3 and 4).



Figures 3: The model from 2015 to 2017

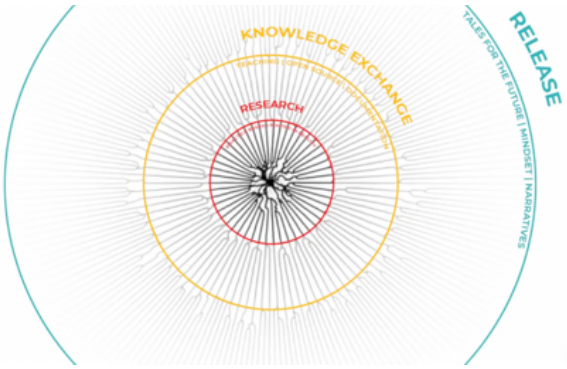


Figure 4: The model from 2017 to 2018

The current version of the model consists of 5 lenses: ways of looking that bring into view certain, often interconnected, concerns or courses of action. These lenses are: Materials, Tools, Processes, Systems and Culture (see Figure 5). Each lens pertains to particular activities or things. Each lens can be turned into a set of questions that can lead a creative and reflective process and each comes with its own paths for impact in the textile sector.

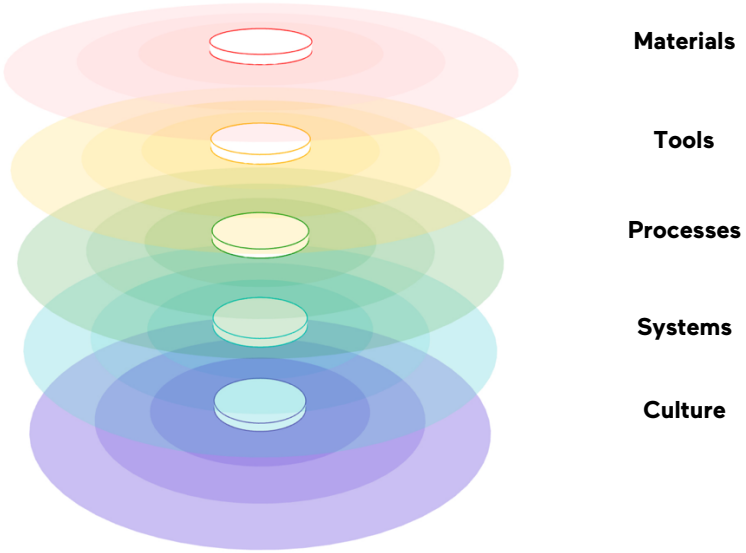


Figure 5: The current TextileLab model

The model in detail: modus operandi

Each lens has a layered structure, which is a visualization of the TextileLab's modus operandi: the types of activity that the TextileLab carries out and how they hang together. These are categorized as: *Exploration & Research*, *Knowledge Exchange* and *Release*.

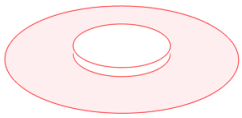


Figure 6:
Exploration & research

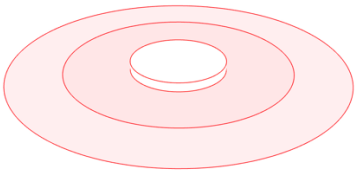


Figure 7:
Knowledge exchange

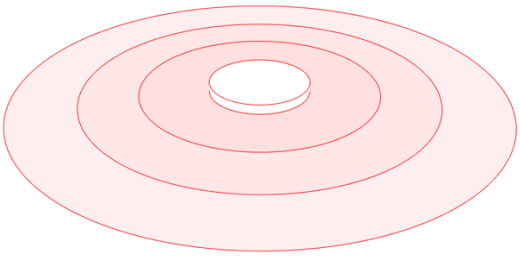


Figure 8:
Release

At the core of the TextileLab's operations are **practice-based research activities** (Figure 6). Take, for example, the development of a bacterial textile dye and the experimentation that comes with this. These activities are often carried out together with experts from other fields and skilled and practitioners. For this research, the team requires space and freedom to explore. Their process often includes the framing and reframing of challenges and questions. Thus, preconceived goals or too tightly defined targets work counterproductively.

The second layer of activities consists of **knowledge exchange** with the team's networks such as other (textile, fab or bio) labs, maker communities or educational and knowledge institutes (Figure 7). This sharing of knowledge is done in an open-source manner: documentation of the experiments and research activities is always made open to the public and the outcomes are replicable.

The outermost layer consists of activities related to the **release** of the TextileLab's outcomes to practitioners of other fields and communities of citizens, ranging from the curious, to the affected and the concerned (Figure 8). This is usually done through exhibitions, meet-ups, public events and programmes.

The model in detail: lenses

As we briefly introduced, the model consists of five thematic lenses: Materials, Tools, Processes, Systems and Culture. Each of these lenses pertains to certain activities or things that are part of the TextileLab's practice. When applied to the aforementioned layers of activities, these lenses can be used to generate pathways for impact or questions that guide research and exploration, knowledge exchange and release activities. Let's take a look at each lens, the corresponding activities and research questions.

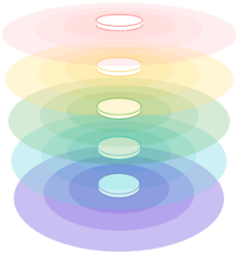


Figure 9:
The five lenses

Materials

The materials lens draws attention to the material aspects of textiles. Think of things like wool and other natural fibers, micro-plastics, biomaterials and activities like making a material archive or doing research into the use of microbes to dye textiles.

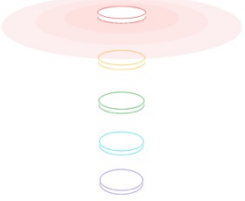


Figure 10:
The materials lens

Research questions that can be drawn up through this lens are, for example: *How can we design materials with their entire product life-*

cycle in mind? What is actually sustainable? And where could and should alternative local raw materials come from?

Pathways for impact that come into view through this lens are, for example: 1) developing hands-on expertise on material-making and material qualities through experimentation and by building and strengthening connections with a community of peers and experts, 2) training and educating others in these skills through a network of labs, and 3) exhibiting the results of such work publicly and sharing documentation of the process under open-source licenses.

Tools

The tools lens pertains to tools that are used the making of textiles, such as spinning machines, carding tools, bioreactors used to make biomaterials, but also educational tools such handbooks or guides.

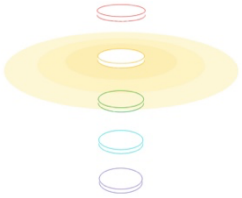


Figure 11:
The tools lens

Research questions related to this lens are, for example: *How can we create open-source tools to craft, locally produce and spread textiles to distributed networks?* Or: *How can we co-create digital tools to map out and imagine alternative textile practices that are more sustainable or even regenerative?*

Pathways for impact that result from this lens are, for example: 1) strengthening connections and exchanging knowledge with peers and industry partners, 2) developing open-source tools for textile production, 3) experimenting with local communities to develop public sensitivity for, among other things, the ecological effects of the textile sector and the potential of local production.

Processes

The processes lens focusses on processes such as fabrication methods and digital craftsmanship, but also educational processes such as the teaching and training that the TextileLab carries out in the Fabricademy.[6]

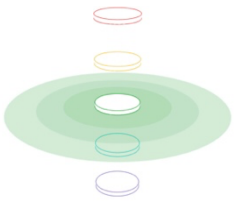


Figure 12:
The processes lens

Research questions that the processes lens raises are, for example: How can we shape values-driven processes through the opportunities that tech, crafts & heritage knowledge, teaching & training our community bring us? Or: Can we learn from lost heritage techniques and bridge them with present-day technology in order to make textiles more responsibly?

Pathways for impact that can be framed from the processes lens are, for instance: 1) researching and testing methods for cooperation with peers and industry partners, and 2) exploring and experimenting how to best share the TextileLab's in-house skills, knowledge and understanding with others.

[6] The Fabricademy is a 6-month educational course on the cross-section of textiles, digital fabrication and biology that the TextileLab hosts on a yearly basis: https://academy.waag.org/programme/fabricademy/

Systems

The systems lens views textiles not in isolation, but as part of larger, interconnected systems that bridge different fields in which textiles are present: grown, processed, crafted, used and broken down. Think of activities like mapping out value chains and things like a vision of a locally productive city.

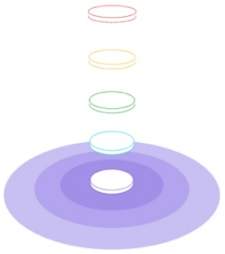


Figure 13:
The systems lens

Research questions within this lens are, for example: *How can we design enabling infrastructures to support our communities and networks in their development?* Or: *How can our surroundings transition towards a locally productive eco-system, able to produce and digest our presence? How can systems support regenerative cultures and practices?*

Pathways for impact that become visible through this lens are 1) the design of systems, platforms, and models to sustain and develop networks with peers, industry and government partners, 2) deploying platforms, providing access and overviews for gathering of knowledge with the TextileLab's networks and community, and 3) giving the TextileLab's communities the opportunity to act on their role and create impact in local systems.

Culture

This lens draws attention to the ways textiles and the way we make and use them are deeply embedded in and inseparable from culture. Through the lens of culture, the TextileLab works on activities that enable a shift of mindset like raising awareness and building common ground based on shared values.

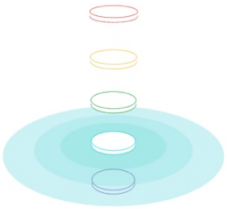


Figure 14:
The culture lens

Research questions that emerge from looking at textiles through a culture lens are, for example: *How can we foster a caring, open, fair & inclusive culture for a transition towards values-driven, circular, regenerative textiles to happen?* Or: *How can we start from our personal, inter-subjective experience in the process of transition towards change?*

Pathways for impact that can be framed from the lens of culture are, for example: 1) aligning on vision, scope or opportunities with a municipality, municipal partnership like the Metropoolregio Amsterdam or a ministry like the Ministry of Education, Culture and Science, 2) experimenting with local communities to develop public sensitivity for, among other things, the ecological effects of the textile sector, the potential of local production and the role of cultural narratives in this transition, 3) becoming aware of the TextileLab's own perspective and cultural frame that informs research questions and research methods.

6. The TextileLab Model in practice

In the following section we detail several observations of how the model was used in practice. Though the TL-model is indeed called, *the* model, it is in fact used in a variety of different ways, each with a different meaning. Over the last nine years, the model was used to **coordinate, share, differentiate, understand and question** the design and research

practice at the TextileLab. In the following section, each of these uses is clarified with examples.

Coordinate

The first, and perhaps most familiar use of the model to coordinate the research and design activities of the TextileLab. This happens at various timescales: from long-term strategies to projects and activities within them. In this use case, the team holds the conviction that, for their work to be effective in the pursuit of a regenerative textile sector, all five of the lenses should be addressed in relation to each other. On the short-term of a few weeks, for example, the team might use the model to make sure that the various speakers at an evening event cover the different dimensions of the topic at hand: *"We have someone for 'materials' and someone for 'processes'. Who could we contact for 'tools'?".* Over the duration of a project, the model might be used to coordinate activities: *"To understand the research approach concerning materials, we first need to focus on the cultural aspect and work on shared values."* On a longer timescale (years), the model is used for the strategy and planning for project development: *"We've done quite a few projects that focused mainly on 'culture' and 'systems', we should develop something for 'tools'"*. The use of the model in this way ties one project to the next and helps to keep in view how these different activities influence each other. This way the team can continously reflect critically and adjust if needed. It ensures there is continuity between the projects over time, allowing the team to develop and refine a long term vision.

Share

A second, familiar way the model is used is to share the TextileLab's ways of working with others. For example, the model might be used to share best practices with other labs that carry out similar work. Or the team might use the model at the kick-off of a project to explain their methods to stakeholders. In this latter case, though the entirety of the model might be showcased, the aim is not for others to apply the model to their own work. Rather, the model is presented simply to show that there *is* a model through which the teams efforts are organized and that they have a history of reflecting on their ways of working. Having to present their practice in such a situation has also prompted the team to make alterations to the model in the past and situate their work anew.

Differentiate

The flipside of the model as a way of sharing their practice is it's use as a way of differentiating the TextileLab from other, similar labs or teams. The lab operates in a competitive market, where many competing organizations apply for the same sources of funding. Besides that, the lab's way of working is noticeably different from typical organizations in the textile sector. In this context, the team is continuously required to position itself in its network, explain what makes them unique and present itself to potential sources of funding. The model sets up the search for differences with other practices and allows the team to compare what they do with other similar labs.

Understand and self-reflect

Perhaps a less obvious, yet critical use of the model, is as that of reflective tool. The model allows the team to get a better understanding of each other and their own research practice. In fact, it is for this reason that the first model was drawn in 2016, a year or so after the TextileLab was set up. Though the team had just started, they were tasked with giving some guidance to other, similar labs in Europe. Faced with this challenge, they felt they first had to understand what they were doing themselves: What *was* their approach? What parameters could they use to compare and evaluate different labs across Europe? They started drawing on a big piece of paper. "*What is a lab? What are we doing?*" They wrote their answers down and began to position them on the paper. It took quite a few tries until they were satisfied. This first model described technical domains (e.g., bio, digital) next to a thick layer called 'culture' and a section called 'events'. Placing these next to each other or overlapping each other allowed the team to discuss how their concerns might relate. It also allowed team members to make sure they were on the same page about certain topics and clarify terms: "*What do you mean by 'culture'?*"

Integrate history

Finally, the model allows the TextileLab to integrate the history of their making process into present-day activities and new concerns. A moment of discussion as the team prepares for a meet-up with stakeholders for the Local Color project shows this well:

> *As I sit in the corner of the TextileLab examining a jar of dried leaves, I overhear CR and IB planning out the meet-up with stakeholders. They start discussing where a project activity would "fit" in the model: "Does re-dying fall under systems or processes?" asks IB. "It's more processes, I think. Like fermentation", CR responds.*

In this discussion, CR argues her case for the 'fit' by naming a similar activity (fermentation) that was previously categorised under 'processes'. Discussions like this one happened quite often in this stage of the Local Color project. The question of under which lens an activity should 'fit' requires resolution. Often, answering a question like this is quickly done. But sometimes it can take a lot longer. It might require team members to give more reasons for their answer. 'Redying' might fit either under the 'processes' lens, or under 'systems' or both. One way to resolve it, as CR does here, is to relate new concerns to the history of their work. Sometimes this is settled by reasoning, sometimes it is settled by who is responsible for which lens in a project: *"I think IB is doing this, so systems."* Or it might not fit all. Such discussions may result in an alteration to the model, or even to an exploration of an entirely different visual configuration (see, for example, Figure 15).

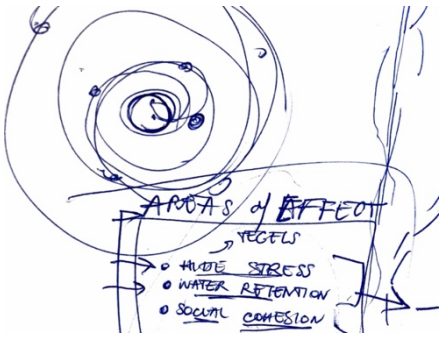


Figure 15:
Halfway through the design of a workshop session for an upcoming project, CR sketches a new visual of the TL-Model (top left).

The TextileLab's understanding of practices

As is shown in these observations, the TL-model is used in a way that is open-ended and flexible. First, the model does not have a singular purpose. It has varying stable meanings in various contexts. Second, it's terms (the lenses) are not strictly defined. They are open to interpretation, but not infinitely so. Third, the model is continually being reflected on and adjusted on over time.

One reason why the TL-model is so flexible is because it is a reflection of the variety of the TextileLab's work. The team engages in enormous variety of projects, with varying methods, aims and outcomes. They bring stakeholders together, facilitate workshops and map value chains. Some projects focus on designing new materials or tools, others are more exploratory and artistic in nature or are aimed at cultivating a specific way of working together. A rigid model would not be able to guide such a varied practice.

A second reason is that the TL-Model is so flexible has to do with the sensitivity the team has towards cultural practices. As demonstrated by the model's 'culture' lens, the team makes a continuous effort to become aware of the practices that textiles figure in, and the way their own activities and creative processes are shaped by practices. Roughly speaking, practices are relatively stable ways of doing things. A useful way to clarify the notion of practices is to contrast them with activities. Activities and practices occur over different timescales: An individual's activities, like darning a sock or putting on some shoes happen over a shorter timescale. Communal practices like repairing or shopping for clothes unfold over a longer timescale. But even though they happen on different timescales, activities and practices shape each other mutually over time.[7,8] Take the activity of designing a synthetic disperse dye like Disperse Blue 56. It only made sense to design and produce such a dye in the context of an emerging competitive fast-fashion shopping practice. In turn, the availability of such dyes reshaped the practice of dyeing textiles. It eroded the norm of dyeing textiles with plants such as woad and indigo and stabilized a more unsustainable way of doing things.

The TextileLab takes seriously that the practices we are caught up in are hard to notice. And that if we don't make an effort to uncover these practices in a creative process, we risk perpetuating them without knowing it. For the dyeing of textiles to become sustainable, or better, regenerative, it will not suffice to continue current extractive practices. We need to see how entrenched we are in our normal ways of doing things and make and imagine alternatives that do not perpetuate standing norms. It is for this reason that the TextileLab puts such a conscious effort into artistic research and reflection as well as the design of concrete alternatives. Reflecting, for example, upon assumptions concerning sustainability before they dive into material research, or questioning whether their focus should be on spreadability and replicability, instead of scalability as current industrial textile production practices might suggest.

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[7] Noë, A. (2015) *Strange tools: Art and human nature*. Hill and Wang.

[8] Zwan, S., Smith, M.L., Hummels, C.C.M., van Dijk, L. (forthcoming). Designing in an open-ended world. *Co-Design*

The TL-Model gives guidance to such processes. It is open-ended because it wants to break with many standing practices. Because it does not take its own history as a given, but makes an effort to see and carefully interpret it. Because it enables the making for worlds that have not yet come into existence or that we have forgotten about. This way of thinking can be felt. It is a gut reaction to problem frames or business models that are too 'stuck' or locked-in. It is a way of thinking that looks at how it can reinterpret our current ways of doing things and open alternative futures.

7. The TextileLab Model and the Public Stack

As part of Waag Futurelab, the TextileLab is committed to the design and research of (textile) technologies in service of public values and in a way that contributes to an open, fair and inclusive future. This ethos is embodied in Waag Futurelab's Public Stack model,[9] which is deeply embedded in the TextileLab's way of working and complementary to the TL-model. The Public Stack was developed as a way to structure thinking around (digital) technologies and the way they hang together with, among other things, values, forms of governance, design processes, technological infrastructures and types of 'end user'. The Public Stack is structured around six dimensions of technology. These dimensions can be turned into a set of questions that serve as an aid in investigating the extent to which existing technologies are in service of public values. They can also be used in a generative way, to design technologies in service of public values. These dimensions are outlined as follows:[10]

- **Power and representation**: Who is at the table? How are people involved in decision making? (In the design, development, deployment and maintenance of the technology)
- **Assumptions**: What are the foundational assumptions in play? What is the worldview?
- **Ownership**: Who owns what? How can ownership be organised in line with public values?
- **Governance**: How is governance organised?
- **Law and regulations**: Which law and regulations apply and what are their consequences?
- **Ecology**: How do we design within planetary boundaries?

Where, for textiles, the Public Stack helps reveal the institutional layers that organize technologies, the TL-Model serves as a guide for carrying out design and research processes, with materials, practices, and their entanglements as an entrance point. It draws attention to norms, and ways of doing that are hard to see, and that become visible through processes of making, using, repairing, designing, collaborating and reflecting. The Public Stack can help situate textile technologies within broader power and governance structures, while the TL-Model exposes how materials and practices are caught up in those very structures and how they might be reimagined.

[9] The Public Stack model was developed in European research consortiums DECODE and ACROSS.

[10] A more detailed account of the model can be found in Waag Futurelab's Strategic Research Agenda 25-28.

8. Conclusion

The work of the TextileLab shows that the design of regenerative textile dyes cannot be achieved through the innovation or improvement of materials and techniques alone. The conditions for such transformation of the textile sector also are, alongside materials, different tools, processes, systems and a change of culture. To design for such transformation requires a way of working that is open-ended, experimental, critical and reflective. The TL-Model enables such a way of working. On the one hand, it provides practical guidance for the TextileLab to coordinate, share, differentiate and understand their work. On the other, it is flexible enough to allow the team to integrate the history of their shared experience in projects as they unfold. Lastly, the model does not prescribe a linear way of working, but rather helps the team bring into view the practices that shape the ways textiles are grown, processed, crafted, used and broken down while simultaneously creating concrete alternatives.