

# VCH Lab Case Study Insight Analysis

## A Comprehensive Diagnostic of Systemic Barriers to Reproducible-Research Capacity at Windesheim University's Value Chain Hackers Lab

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**Purpose:** Comprehensive diagnosis of reproducibility barriers across five VCH Lab tracks to inform the development of a reproducible-research framework.

## Abstract

This analysis provides a comprehensive and systematic evaluation of five applied research tracks conducted within the Value Chain Hackers (VCH) Lab: Bakery, CRM, Organizational (Orga), Textile, and Cacao. Although each track addresses real sustainability challenges and demonstrates strong creative initiative, all exhibit critical weaknesses in documentation, methodological transparency, validation, and archival integrity. The analysis reveals structural patterns across the projects that collectively hinder the lab's ability to build reproducible-research capacity. These findings form the empirical foundation of the graduation project *Designing a Reproducible Research Framework for the VCH Lab*, and align with broader institutional goals outlined in Windesheim's open-science and research integrity agendas. The analysis demonstrates that reproducibility must be intentionally embedded through institutional structures, not assumed to arise naturally from student creativity.

## Context and Purpose

The Value Chain Hackers Lab aims to provide students with a dynamic environment to explore real-world supply chain sustainability questions. However, the absence of a structured research methodology has resulted in outputs that are creative and insightful but not reproducible. Reproducible research is an institutional responsibility that requires documentation standards, validation mechanisms, and secure data governance. This insight analysis diagnoses the current state of reproducibility within the lab and provides the conceptual basis for designing a structured and verifiable

research framework capable of strengthening Windesheim's reproducible-research capacity.

## Bakery Track

The Bakery track explored local sustainable sourcing practices through an interview with a regional bakery chain. The only surviving artefact is a single audio recording without transcript, metadata, contextual notes, ethical documentation, or analytical interpretation. While the interview itself represents genuine primary data, the absence of structured documentation means the insight cannot be verified, reproduced, or meaningfully built upon.

This case demonstrates a fundamental issue: when qualitative data are gathered without transcription, metadata tagging, or immediate documentation, the research becomes irretrievable and unusable. It reveals how the absence of even basic research procedures—such as recording the purpose of the interview, its participants, its method, and its analytical implications—results in the total collapse of reproducible value.

The institutional insight is clear: without minimum documentation standards, even authentic fieldwork cannot contribute to cumulative institutional knowledge or reproducible-research capacity.

## CRM Track

The CRM track centered on transparency in the lithium-ion battery supply chain and produced substantial conceptual material, including digital traceability concepts such as *Li-Monti Maps* and *LithiumSync AI*. Stakeholder conversations with actors like Umicore and TNO were reportedly conducted, and students engaged thoughtfully with regulatory frameworks. However, the documentation lacked methodological coherence. Interviews were neither transcribed nor coded, the analytical process was undocumented, and multiple versions of documents existed without traceable progression or version control.

While the project excelled in conceptual innovation, it lacked the procedural rigor to demonstrate how ideas emerged from data. This disconnect between ideation and evidence undermines research transparency and prohibits reproducibility.

The insight gained is that reproducibility requires traceability—not simply good ideas. Without versioning, analytic documentation, or validation logs, the relationship between data and conclusions remains opaque. This case highlights the need for structured data workflows, mandatory version control, and transparent analytic procedures to sustain reproducible-research capacity in applied innovation contexts.

## **Organizational (Orga) Track**

The Orga track captures the operating model of the VCH Lab itself. The reviewed Start-of-Year deck outlines a pedagogical approach based on Theory U, emphasizing observation, sensing, ideation, and presentation. While effective for creative learning, the model lacks explicit requirements for research design, validation cycles, ethical procedures, documentation standards, or data governance.

This track reveals the institutional origin of reproducibility challenges: the educational model prioritizes creativity and problem-solving but does not embed research method discipline. As a result, students are assessed and rewarded for outcomes rather than for process transparency.

The insight here is structural: reproducibility cannot be expected from students when the system does not require or support it. Building reproducible-research capacity therefore requires redefining expectations and structures at the educational level—not simply asking students to “be more rigorous.” The Orga track demonstrates that institutional design must evolve for reproducibility to become a sustainable cultural norm.

## **Textile Track**

The Textile track examined sustainable apparel and ethical textile sourcing. All project materials were stored exclusively on external cloud platforms such as Canva and Miro. These visual tools were used for ideation, campaign design, and value-chain mapping, but the underlying research process was undocumented. No data exports, written reports, contextual explanations, or analytical notes were preserved. Once the students' accounts expire, the entire project will disappear from institutional access.

This track represents the most severe form of reproducibility failure: complete data volatility. No part of the research is preserved in a durable, accessible, or verifiable form. From an institutional perspective, the case highlights a critical risk in allowing commercial creative tools to substitute for academic research infrastructures.

The insight gained is that reproducible research cannot rely on ephemeral tools. Mandatory file-export policies, archival requirements, and documentation checkpoints are necessary to prevent complete institutional memory loss, especially in visually oriented research domains.

## **Cacao Track**

The Cacao track produced *The Green Cacao Guide*, a polished and visually cohesive summary of ethical cacao sourcing and regulatory developments such as the EU Deforestation Regulation. The guide synthesizes credible secondary sources, including FAO and Fairtrade publications, and presents them in a clear, applied format. However, the research behind the guide lacks methodological transparency. There is no record of source selection criteria, analytic synthesis, version history, or expert validation.

Although the output appears academically strong, its lack of methodological documentation means it cannot be reconstructed, audited, or expanded by future researchers. This case demonstrates a subtle but critical issue: strong communication does not equate to reproducible research. Without documented methods, even accurate summaries lack scientific credibility and institutional value.

The insight here underscores the importance of explicit methodology sections, reference metadata, and transparent analytic processes for all research outputs—not only those based on primary data.

## Cross-Case Synthesis

The five tracks collectively reveal a system-wide absence of reproducible-research structures in the VCH Lab. Each project demonstrates creativity, engagement, and thematic relevance, yet all suffer from the same core issues:

- inconsistent or missing documentation
- absence of metadata and contextual information
- lack of validation procedures or analytic transparency
- dependence on ephemeral or unstructured storage
- no version control or reproducible workflow architecture

These problems recur regardless of topic, team, or year, confirming that reproducibility failure is not individual but systemic. The pattern forms a continuum: some tracks exhibit partial reproducibility collapse (Bakery, CRM), while others demonstrate total loss of verifiable evidence (Textile). The connecting factor is the absence of structural scaffolding for reproducible research—students are never given the tools, templates, or procedures required to preserve transparent research processes.

This synthesis validates the core hypothesis of the graduation project: reproducibility must be designed into the institution through structured workflows, mandatory documentation, validation checkpoints, and secure, version-controlled repositories. Without these, the VCH Lab will continue producing creative but non-reproducible outputs that cannot contribute to cumulative institutional knowledge.

## Institutional Relevance

This insight analysis provides Windesheim University with a comprehensive diagnostic of the methodological weaknesses in its applied research processes. It identifies the specific structural, educational, and operational barriers that inhibit reproducible research and clarifies how these barriers undermine the university's open-science commitments, research integrity goals, and long-term institutional learning. By documenting these issues across five distinct cases, this analysis offers a blueprint for reform and demonstrates the necessity of developing a reproducible-research framework aligned with FAIR principles, ISO 27001 data governance, and the Netherlands Association of Universities of Applied Sciences' standards for practice-oriented research.

It therefore serves not only as a supporting artefact for the author's GP1 and GP2 work but also as a reference document that future supervisors, researchers, and students can use to understand the systemic origins of reproducibility challenges within the VCH Lab.

## Conclusion

The VCH Lab case studies reveal that reproducible-research capacity is currently limited by systemic issues in documentation, validation, and data governance. These weaknesses prevent the formation of a cumulative, transparent, and institutionally valuable research tradition at Windesheim. This insight analysis establishes the empirical and conceptual foundation for the graduation project *Designing a Reproducible Research Framework for the VCH Lab*, demonstrating that creativity and innovation must be supported by methodological structure to produce academically trustworthy and socially impactful outcomes.

By embedding reproducibility into the lab's operational design—through templates, metadata standards, version control, and validation loops—Windesheim can transform its applied research processes into a reproducible and verifiable ecosystem capable of supporting sustainable innovation at scale.