This forum highlights conversations at the intersection of design methods and social studies of technology. By highlighting a diversity of perspectives on design interventions and programs, we aim to forge new connections between HCI design and communication, science and technology studies, and media studies scholarship. **— Daniela Rosner, Editor**

Exploring DIY Tutorials as a Way to Disseminate Research Through Design

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Research through design (RtD) often centers on the making of *things*—artifacts, systems, services, or other forms—as a means to construct new knowledge in the interaction design and human-computer interaction (HCI) research communities. While designing things plays a prominent role in conducting research, there is an ongoing discussion around how insights, knowledge, and, more broadly, theories emerging from RtD should be documented, articulated, and communicated in the HCI and interaction design communities.

In recent years, annotated portfolios [1], design workbooks [2], and pictorials [3] have emerged as approaches used to communicate RtD insights through "the lingua franca of design" [1]. There is a need for a multiplicity of ways to better disseminate and communicate research insights, and these recent developments are exciting. In this article, we report on our explorations of do-it-yourself (DIY) tutorials as another approach to document, communicate, and disseminate the design details, processes, and materials of RtD artifacts. An inherent challenge in this approach is straddling the ways of knowing of two communities: DIY and RtD. Foregrounding this challenge, we examine two contrasting cases: the conversion of a cargo van into a camper van that relates strongly to DIY communities, and the making of a "counterfactual artifact" for material speculation known as the table-non-table that relates strongly to RtD [4]. We highlight our lessons learned in using DIY tutorials for RtD dissemination that by the nature of our approach straddles different ways of knowing.

DIY TUTORIALS

DIY tutorials are pedagogical in nature: They aim at concisely and clearly communicating how to make a wide range of things. Early print DIY tutorials were oriented toward helping everyday people conduct home improvements and car repairs (with *Popular Mechanics* and the *Whole Earth Catalog*). DIY tutorials are now broadly distributed through online platforms such as Instructables, which share instructions for topics including Arduino projects, bread recipes, handmade wooden toys, laser-cut decorations, and more. DIY tutorials traditionally offer information in sequential steps through a combination of images (photos and/or diagrams) and text. Their level of detail is high enough that someone reading the tutorial should be able to replicate the project on their own. DIY tutorials have a long and important history within DIY communities of supporting the sharing and exchange of design knowledge about processes, tools, materials, and the artifacts themselves.

Considering factors in DIY tutorials such as a strong focus on the artifact, attention to detail, and an aim for clarity of communication, we wanted to explore this format as a way to document, communicate, and disseminate the crafting of RtD artifacts. We do so with two contrasting cases, as described below.

Insights

- → DIY tutorials can document, communicate, and disseminate details on the crafting processes, form, and materials of RtD artifacts.
- → Using DIY tutorials to document and disseminate RtD artifacts poses interesting challenges because it straddles two communities: DIY and RtD.

CASE 1. AUTOBIOGRAPHICAL DESIGN PROJECT OF A DIY VAN CONVERSION

The first case is the conversion of a Mercedes Sprinter cargo van into a winterized camper van [5]. This project is an autobiographical design research project. By definition, this means that the project was created to respond to the genuine needs of its designers and makers [6]. The project was created by and for Audrey Desjardins and her partner Léandre Bérubé-LeBrun to have a "cozy cabin on wheels" for biking and skiing trips. Since they relied heavily on online forums and tutorials to convert the van, they created tutorials for each of the major steps in the making of the van as a way to give back to the DIY community. While this project was mostly DIY-oriented, Desjardins and Bérubé-LeBrun's experience with the van resonated strongly with current research on smart homes and the Internet of Things. This prompted us to use the van as a case to critically

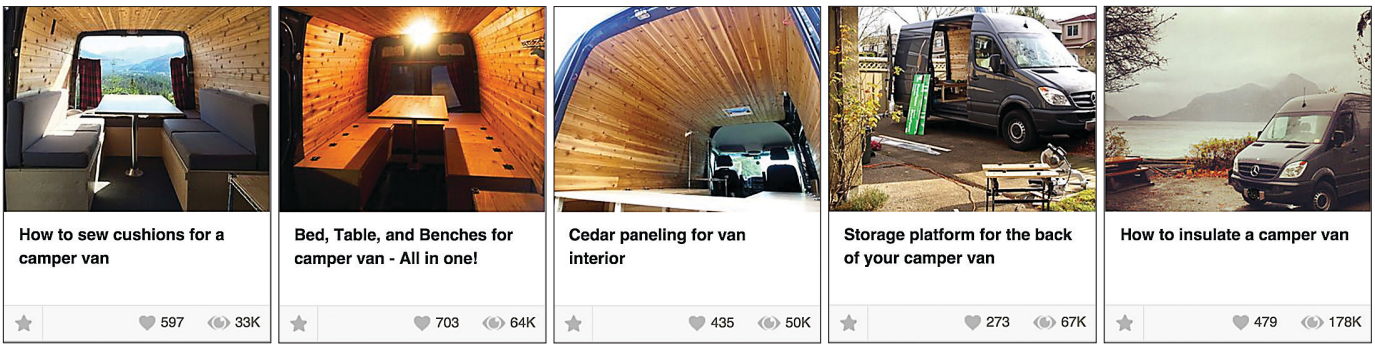
reflect on the current trajectory of the design of technology for the home. As we started to investigate this autobiographical design project, the information that was documented in the DIY tutorials emerged as detailed and comprehensive reports on design process and design rationales, which became a productive set of data for our research-oriented analysis of the project.

Currently, five tutorials about the van conversion project have been published (Figure 1). They include tutorials for insulating the walls, constructing a storage platform, finishing the walls with cedar panels, constructing benches and a table that convert into a bed, and making cushions for the benches and bed [7].

SUPPORTING REFLECTION IN AUTOBIOGRAPHICAL DESIGN RESEARCH THROUGH A DIY COMMUNITY

The van conversion tutorials are closely related to the DIY community, and they address a topic that is often discussed on platforms such as Instructables. The five tutorials received significant interest from the DIY community: Editors featured them on the homepage of Instructables; one of them won an Outdoors Project contest; and they have generated between 61,000 and 322,000 views to date. Together, the five tutorials hold more than 250 questions and answers representing exchanges between the authors of the tutorial and people in the DIY community.

While many of the comments are words of encouragement, some are questions specific to why we chose certain materials or how we used a certain tool. Many questions also emerged regarding how our builds evolved over time, how they held up to use in practice, and how they reacted to various weather conditions during travels. Our responses to these comments offer a record of our reflections on the design process and design decisions. Hence, this



TOP IMAGE BY KEVIN SIMMONS

Figure 1. Five tutorials for the van conversion project.

repository of reflections enabled us, as researchers, to gain an understanding of not only the making process but also the van conversion process in its use.

For example, one reader asked us if there is anything we would have done differently and what advice we would give her. Part of our reply was stating how we currently store our food and sports equipment under the platform, but how we might eventually "upgrade" to large drawers:

Also, this is something we can still add and we might: in the back, under the platform, we could also add really long heavy duty drawers that slide in and out. This would make it pretty easy to search for things and store things away. Just an idea. Right now, we are using milk crates (which fit perfect, out of sheer luck!) to store things and classify them.

In addition to the exchange with the DIY community, the simple fact of assembling the tutorials with the DIY

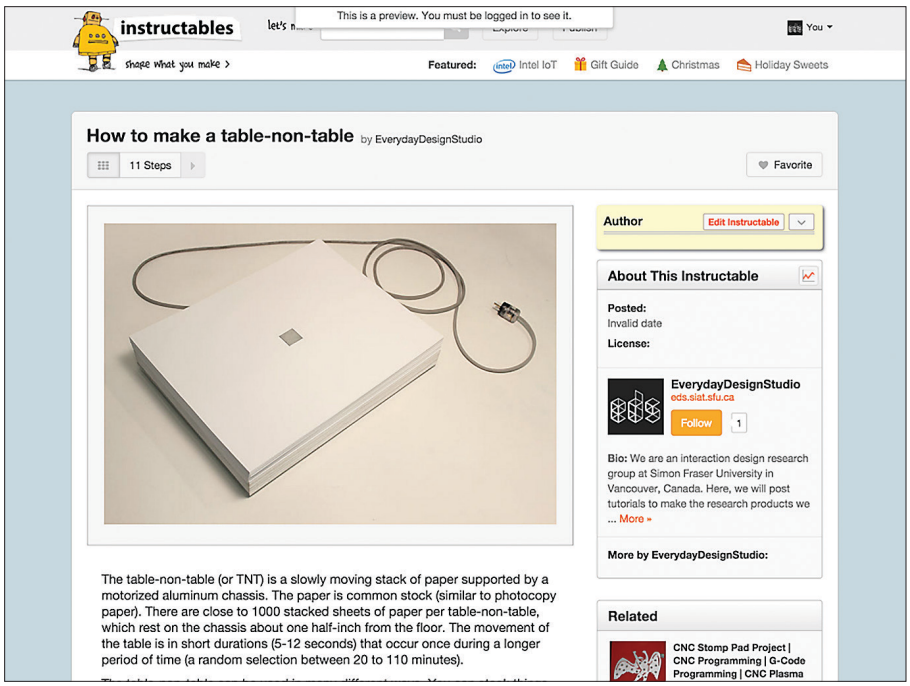


Figure 2. Introduction to the table-non-table tutorial.

Figure 3. Behind the scenes for the table-non-table tutorial.

community in mind directed the way we documented our process. The DIY tutorials were written and assembled on the Instructables website one to two weeks after each building stage was completed. Throughout the process, we wrote the tutorials by continually clarifying the underlying reasons grounding our design decisions. We hoped that design rationales would allow readers to go beyond the detailed step-by-step instructions and support their own appropriation of our design process. This strategy ultimately created valuable insights when revisiting the tutorials with "researcher" eyes. For instance, we were able to describe with precision the intimate and reciprocal relationship between the makers and the van throughout the building cycles.

The ease with which our tutorials were received by the DIY community proved to be highly relevant to support reflections about the design decisions we made throughout the project, which led to a rich and nuanced perspective on the design of interactive spaces. However, this same closeness to DIY practices became a challenge when writing for the RtD community with the intention of publishing in academic, peer-reviewed venues. In our writings, we had to make a distinction between the success of the DIY tutorials for the DIY community and the success of the project for the research community. In fact, the tutorials were presented as a way to collect data to serve our academic reflections, rather than as a way to disseminate the project itself. In the next case, we explore how a DIY tutorial can be much closer to the RtD community.

CASE 2. DOCUMENTING AND DISSEMINATING AN RTD ARTIFACT: THE TABLE-NON-TABLE

Our second case is a DIY tutorial to make the table-non-table [8] (Figure 2). This project contrasts with the van conversion project since it is much closer to the RtD community. The table-non-table comprises a thousand sheets of white paper stacked on an aluminum chassis that moves in very short durations (5–20 seconds) a few times a day. The table-non-table is a *counterfactual artifact* designed counter to the logic of normative design, yet it fits with everyday contexts as a means to inquire through design in an RtD approach known as *material speculation* [4]. The inquiry was aimed at the human-technology relations that form through the resourcefulness and acceptance of everyday objects and everyday living.

We have previously written about the ways in which people live with and engage with the table-non-table [9]; however, we offered only very brief descriptions of how it was designed and built. To deepen our documentation of this collaborative RtD project, we created a DIY tutorial describing how to make a table-non-table on the Instructables platform.

DOCUMENTATION, DISSEMINATION, AND PERPLEXITY

While the van conversion tutorials were community-oriented and eventually served as a tool for reflection, the DIY tutorial for the table-non-table was upfront a tool for documentation and dissemination that caused a certain level of perplexity in the DIY community.

The table-non-table is a long-term project involving a large team with various skills and expertise; the tutorial proved useful in helping organize all the data concerning the crafting of the research artifact. One person was in charge of the 3D CAD modeling for the chassis, another worked on electronics design and assembly, and yet another developed the software for the table-non-table. The files were distributed across various computers and in different locations. While we did have an online file repository, the folder was not as up-to-date, detailed, and organized as we would have liked. It was also not clear what files should be used if we planned to make another table-non-table. Putting the tutorial together allowed our team to clearly identify the final files for each aspect of the build, and furthermore to give clear instructions for how to use them. Even before the publication of the DIY tutorial, this documentation process was the most in-depth and detailed our design studio had produced for an RtD artifact.

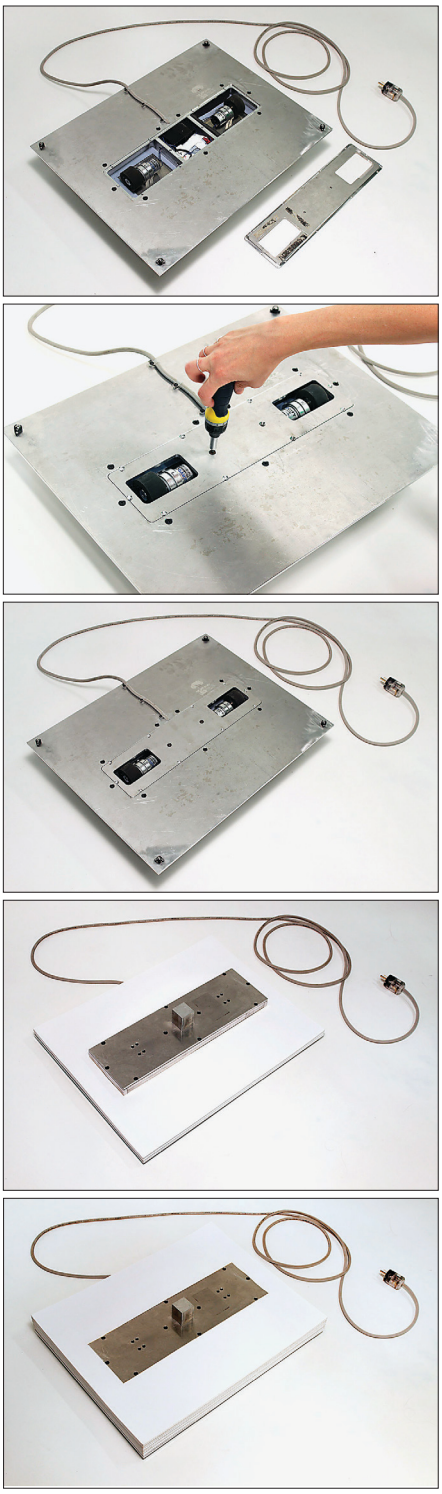


Figure 4. Uniformity and quality of image throughout the tutorial.

As an RtD studio, we also saw the opportunity to explore a clear and refined visual language in our photos. To create the tutorial, we disassembled the table-non-table, set up a photo booth with appropriate lighting, and took a series of photos to demonstrate the assembly of the table-non-table (Figure 3).

The result is a highly polished photo set (Figure 4). These photos stand out on the Instructables platform, where the majority of photos are taken on the go, while projects are being built. This distinction is interesting to reflect on as it highlights the contrast between the two communities with respect to disseminating and communicating information.

The table-non-table tutorial generated a strikingly different set of comments from the DIY community when compared with the van conversion tutorials. Since it was published in January 2016, the tutorial received comments that often expressed confusion, surprise, and misunderstanding. For example, comments included: "Interesting, but I can't seem to think of anything to use this for. It's way too short to be used as any sort of table," "I'm not sure what to ask. Cool though lol," and "Wow, I'm seriously confused." These comments reveal a real challenge for disseminating the crafting of an RtD artifact—especially a *counterfactual artifact*—on a platform meant for DIY enthusiasts. We realize that the table-non-table as an object on its own does not showcase a clear enough purpose and becomes difficult to make sense of when presented in a context other than research through design.

LOOKING FORWARD: FINDING BALANCE BETWEEN WAYS OF KNOWING

The contrasting examples of the van conversion tutorials and the table-non-table tutorial revealed the challenge of sharing RtD artifacts to a multiplicity of audiences: the DIY community and the RtD community. This sparks the first question for us: What would be the qualities needed for a sharing platform for the crafting of RtD artifacts among a design or research community separate from the DIY community?

However, keeping the RtD DIY tutorials on the same platform for both DIY enthusiasts and RtD researchers provides a valuable opportunity for new kinds of discussions and dialogues that led to research insights in the van conversion case. For instance, both researchers and amateurs could use the tutorials to re-create or remix RtD artifacts. This raises several interesting future research questions. What kinds of experiences and insights could be catalyzed through a DIY enthusiast making and living with a design artifact like the table-non-table? What other kinds of projects could the table-non-table inspire DIY enthusiasts to make? To what extent would they differ from projects made by RtD researchers? What kind of insights can we, as RtD researchers, gain from this crossover to a DIY community?

These questions represent intriguing new ways in which DIY tutorials could be mobilized as we continue to seek out new ways of disseminating RtD artifacts to audiences in and beyond the HCI and interaction design communities.

Endnotes

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