



**UNIVERSITÉ
DE GENÈVE**

Comparing Digital Platforms for Challenge-based Learning

Master Thesis

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Abstract

The education landscape is evolving rapidly, and so are the digital tools that support it.

A number of related trends in learning methodologies, such as challenge-based learning [1], hands-on learning [24], action-based learning [25] and design thinking [6] have established themselves as widely used alternatives to traditional classroom teaching.

In these contexts, people need online tools to exchange knowledge, share experiences and to work in interdisciplinary teams to *innovate, design and implement solutions*.

New types of learning communities, like the maker community [17], open source hardware developers [26] and the fab lab movement [7], are also setting new requirements for digital documentation tools.

Popular innovation formats such as hackathons [22] and design sprints [23] are increasingly used in an educational context. In such events, time is limited and teams form and disband in days, adding additional demands for successful documentation.

The method of online documentation has a strong influence on how useful, learnable, available, shareable and accessible results are [8]. The complexity of documenting team-based projects has led to the creation of a variety of online communities and to many experiments with different ways of documenting results. Because documentation is often seen as tedious and time-consuming, developers are constantly seeking optimal solutions to reduce the effort needed to document results, while at the same time enabling users to collaborate and share their efforts more effectively.

In the first chapter of this thesis, we briefly survey a range of platforms developed to support of team-based projects in settings ranging from public hackathons to semester-long student projects. We analyze in more detail the pros and cons of a platform called Instructable, one of the most popular in the maker community.

In the second chapter, we introduce Build in Progress (BiP), originally developed by a researcher at MIT Media Lab for makers to document their creations in a more intuitive, visual way. We present results from developing and deploying SDG-in-Progress, a version of BiP that we customized for students at University of Geneva working on projects related to the United Nations Sustainable Developments Goals (SDGs).

In the third chapter, we focus on two contrasting formats where such a documentation tool is needed : hackathons that last just a few days, with teams made of people from a wide range of backgrounds, and a two-month summer school, where students build stronger teams over a longer time. We describe experience in situations with many concurrent hackathon projects, such as ‘17 hackathons’ and the Open Geneva festival, and how this experience informs decisions about suitable documentation tools.

In a concluding section we summarize our findings, and suggest next steps for developing and testing online platforms for challenge-based learning.

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Chapter 1

History of platform with 2 case study

1.1 History of documentation platforms

In the maker - movement [5], people need online tools to exchange knowledge, share experiences and to work in interdisciplinary teams to *innovate, design and implement solutions.*

The method of online documentation has a strong influence on how useful, learnable, available, shareable and accessible results are [8].

The complexity of documentation has led makers to create a variety of online communities and to experiment with different ways of documenting their results. Because documentation is often seen as tedious and time-consuming, makers are constantly seeking optimal solutions to reduce the effort needed to document their results. On the other hand, careful documentation enables makers to collaborate and share their efforts more effectively.

add my story

In the following, we will briefly survey a range of platforms developed to support makers in documenting their projects. We then analyze in more detail the pros and cons of two platforms, *Instructables* and *Build-in-Progress*. In both case we discuss how authors and readers benefit from online documentation, what motivates them to share a project and – in the case of *Build-in-Progress* what are the consequences of sharing a work in progress with online community.

The first section will review *Instructables*, describe how the platform works and describe in details the design orientation process. The second section will review the design approach of *SDG-in-Progress* and the added features. The last part will review the user interaction of *BiP*.

s Github, wiki, instructable etc..

- Time line of different platform : when it started, stopped or still used
- Properties of platform

History of platform
Timeline of different platform
properties

1.2 Instructable

In this section, I share with you an analyses of how users create and share DIY projects via online platform called Instructables. I share findings of the analyses of this platform and the understanding of how authors and users use Instructables

Instructables is an online platform for *DIY* communities that serves as a "place that lets you explore, document, and share your creations", it is a website specializing in user-created and uploaded do-it-yourself projects, which other users can comment on

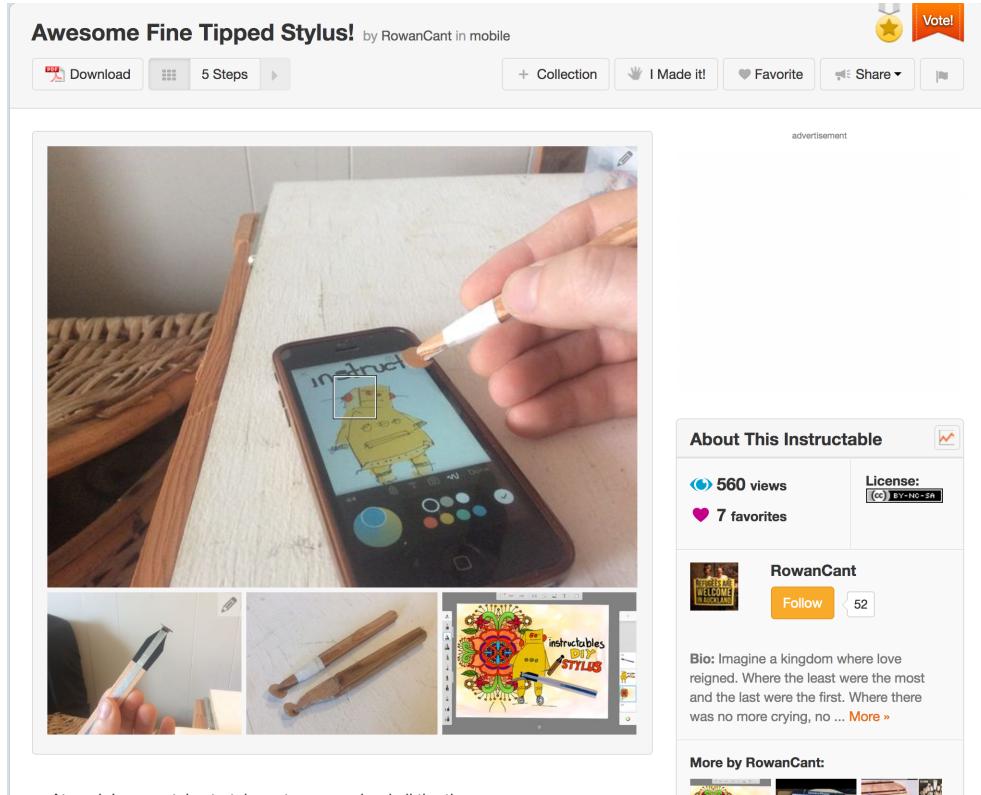


Figure 11: Sample Instructables project, <http://www.instructables.com/id/Awesome-Fine-Tipped-Stylus/>

and rate for quality [27]. There are different categories of project such as technology, crafts, food, home, workshops and living, with more than 263,258 projects and 9,888,442 monthly visit as of August 2017. Users create their project step by step and with each step they describe what they did in a text, photos or videos as displayed in the figure 11. Encapsulation of steps produce a typical guide that help others to re-create the project, learn from it or build a new thing on top of it and have their own version of the project.

The contributions in Instructables come from the sharing culture of projects, not only authors contribute but also readers who can view and give feedback by commenting on the project. Also, Instructables create a social community where they exchange their thoughts about a topic via forums and sub-forums dedicated to a special topic such as Arduino projects. Finally, prizes are given to the top shared Instructables as a kind of reward for their effort of sharing their project and to keep them connected with the community.

1.2.1 Methodology

To understand the users interactions of Instructables, an extensive study of the Instructables community has been done in the fall of 2011, this study used semi-structured interviews and online surveys. The semi-structured interviews had a framework of four themes that had been explored : (1) motivation, (2) Documentation tools, (3) Writing an Instructable and (4) Feedback. A theme was covered by a set of questions that took one hour with each interviewer. [19]. A survey of 15 multiple-choice questions and open ended-questions that ask users about different aspects of their experience with replicating or building on top of a project shared by a user on the platform.

1.2.2 User interaction

The study has shown three strategies for documenting a project. The first was to *write after you make*, as shown in the figure 72 [18].

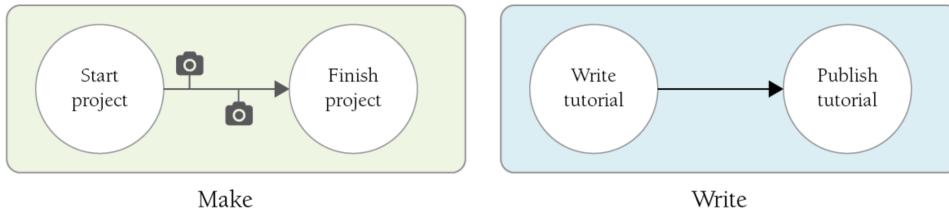


Figure 12: First strategy of documenting : write after you make, [18]

A problem confronted the users with this strategy, users forgot to document in the midst of making. Users outperformed this problem by following the second strategy of *writing after replicating*, as displayed in the figure 73 [19]

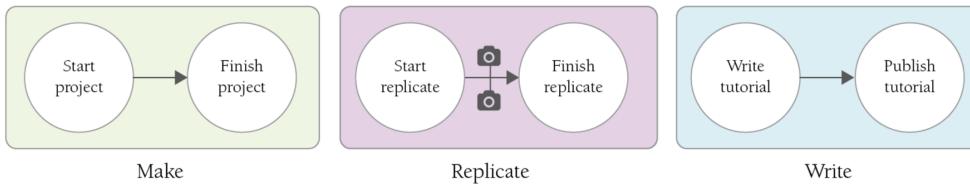


Figure 13: First strategy of documenting : Make, replicate then write, [18]

The final strategy was to *simultaneously write and make* (figure 74).

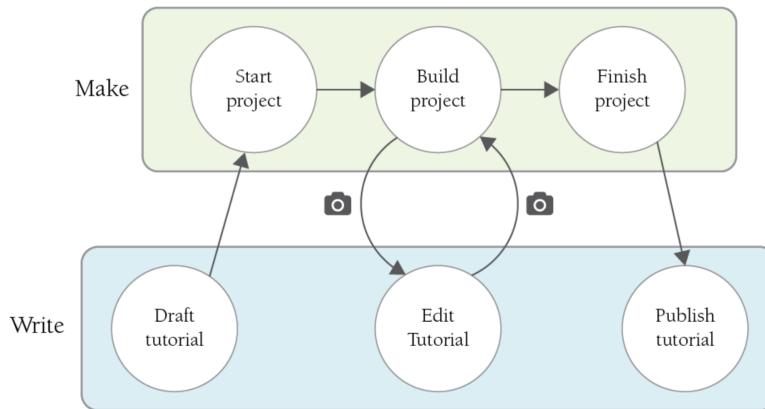


Figure 14: First strategy of documenting : write after you make, [18]

In summary, the study showed that users need to encapsulate the collected photos and videos to show to create all the steps and a common challenge was to remember to document after each step otherwise users had to replicate their project merely to creating good documentation.

Finally, authors saw that documentation well worth the effort to share their work but it is time consuming process when a project get more complex, it is hard to follow up or complete the documentation. [20]

1.2.3 Design and process oriented documentation

Several approaches were suggested by to improve the online documentation. Documentation techniques requires authors to simultaneously switch between making and writing, make a design process to not miss a step from not being documented or to radically recreate the project to document it in a proper way. Another challenges of documentation technique that needed to support not only the capture of digital artifacts but also physical artifacts where it is not possible to show the physical effort. With the recurring need to balance manual and automated ways of capturing, software and hardware tools need to solve open questions and be customizable for different activities and different audiences [11]. The workflow of documentation over time needed to not miss a key step in the documentation.

Documentation process seems to be more important for readers as it give them the opportunity to enable better decision making about components or materials to use [?], as well as successful in encouraging independent exploration and fostering a sense of accomplishment [14]. Also, as many users start by replicating some projects, having tools where they could be able to contribute to a project, can help more socializing and boost a collaborative work in the community.

1.3 Build in Progress

In this section, I share with you an analyses of how users create and share DIY projects via online platform called SDGinProgress that we adapted for the SDG sustainable goals, it is a fork from a platform called BuildinProgress that focus on maker community like Electronics, food and living. I share findings of two experiences that has been done with 22 student from the Geneva-Tsinghua summer school students and 26 student from the master of University of Geneva, the master is dedicated for the SDG goals. Also I share with you the analyses of this platform and the understanding of how authors and users use it

1.4 Introduction

Introduction about SDG in Progress, its context and why

1.5 Users Project

mention that the project of Bip was about living etc., mention some statistics in terms of users projects as well as more qualitaativey type of project.

1.6 features of BiP

what makes BIP different from others.

Build in Progress is a platform for sharing the story of your design process, where "makers share how their DIY projects evolve over time" [18]. It focus more on the storytelling of DIY documented project, a snapshot of the platform displayed in the figure ???. In our experience we forked the platform and we adapted it for the SDG goals, SDGinPProgres consist of 4 parts, (1) Projects where all the project are listed (2) Collections where featured project are displayed and that depends on their potential (3) welcome page where on the right side you have the list of the 17 SDG goals and undear of each goals you could find a related project to that goal.

1.7 From Build in Progress to SDGinProgress

What we did to go from Build in progress to sdg and the purpose from that move

SDGinProgress was launched in 2017 and within a collaboration with university of Geneva and the Geneva-Tsinghua summer school, it hosted over 16 projects in categories such as games, environmental project, pollution, digitization all related to an SDG goal.. Users contributed to SDGinProgress community by sharing, providing feedback and describing their progress of each step, the encapsulation of informations lead to a story about the project as SDGinProgress "*support a storytelling approach to documentation*" [18].

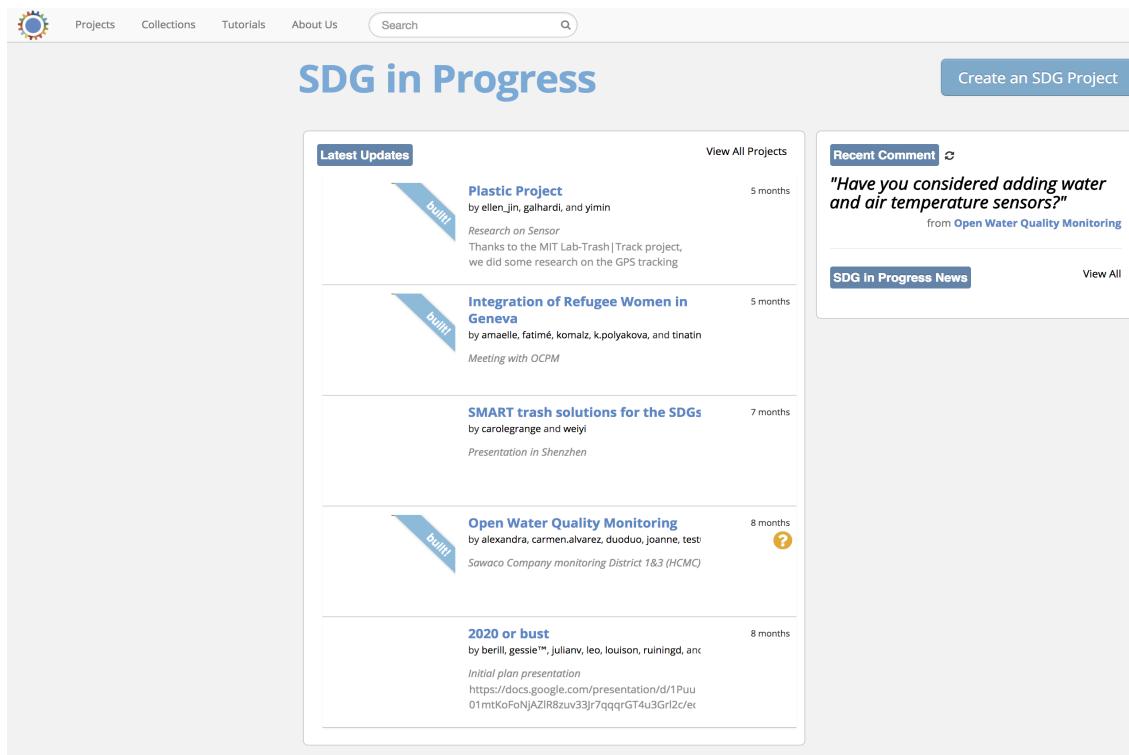


Figure 15: Build in progress welcome page

1.7.1 Design approach

Authors shared an iterative design process in the context of sharing their personal journey by creating step-by-step instructions of their project via the online platform *SDGinProgress* and companion mobile application. Readers contributed by suggesting to makers after publishing their steps, makers benefited from sharing step-by-step instructions over time by taking into account the suggestions of readers.

SDGinProgress was developed based on an innovative design process, it enables users to visualize their documentation in an iterative way. Authors can continuously iterate their building process, share their techniques to help others to reach out others in the community so they can have feedback. A social design process principle was considered among the online community to engage users more, to accumulate knowledge, to learn from others and connect users with same interest as *human-related issues in the form of social ties and knowledge sharing were reported as keys to successful collaboration* [10].

1.7.2 Features

SDGinProgress consists of many features in the project page and social feature. The two core features of the project page are : the *Process Map* and *Step Detail View* (82). In the process map, users can create a step, a label for one or more step, drag & drop to rearrange steps. Steps are organized in a tree-map-like format with sui generis branches, a label is added to a branch and it can be colored to designate a branch; for example orange labels represent that a branch is in progress.

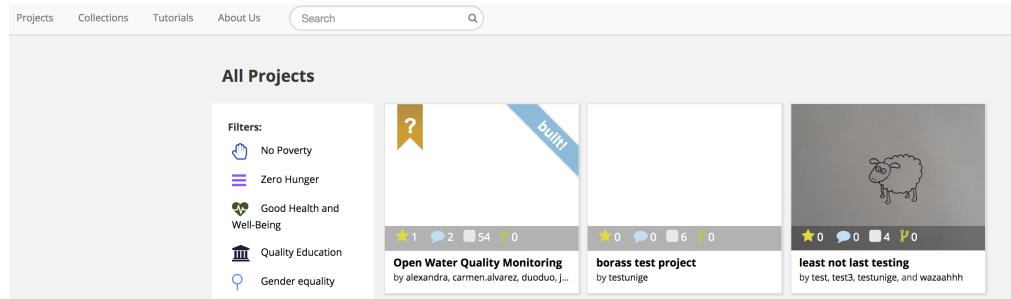


Figure 16: overall project page view, [<https://sdginprogress.com/projects/81/steps>]

Project are displayed in 3 different mode. The first is the default mode : tree-map, users can go through all the steps, step-by-step and discover more about it as shown in figure 83.

Project are displayed in 3 different mode. The first is the default mode : tree-map, users can go through all the steps, step-by-step and discover more about it as shown in figure 83.

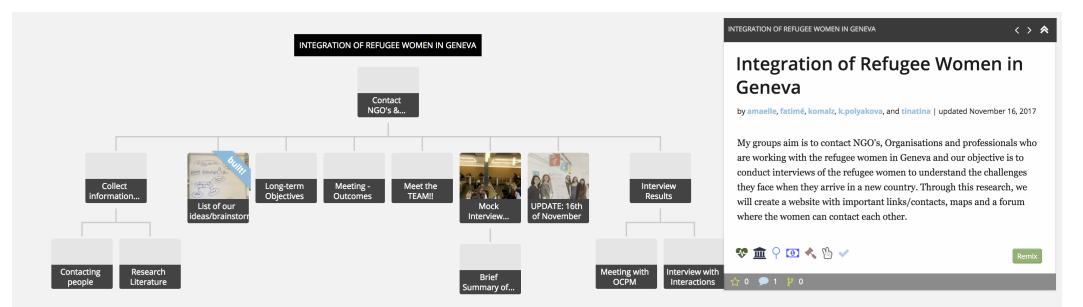


Figure 17: tree-map view of the project

The second is Gallery mode 84 and finally the blog mode : users can scroll down and an index of steps will be displayed on their left side of the page (figure 84).

Contact NGO's & Organisations
Collect information about refugees in Geneva
List of our ideas/brainstorming
Contacting people
Long-term Objectives
Research Literature
Meeting - Outcomes
Meet the TEAM!
Mock Interview with Organisation in Lausanne
Brief Summary of the interview
UPDATE: 16th of November
Meeting with OCPM
Interview Results
Interview with Interactions

My groups aim is to contact NGO's, Organisations and professionals who are working with the refugee women in Geneva and our objective is to conduct interviews of the refugee women to understand the challenges they face when they arrive in a new country. Through this research, we will create a website with important links/contacts, maps and a forum where the women can contact each other.

Contact NGO's & Organisations
Thursday, October 26 2017
Collect information about refugees in Geneva
Thursday, October 26 2017
List of our ideas/brainstorming
Thursday, October 26 2017

List of subjects relevant to our project:

- refugees/ asylum seekers women in geneva
- what are the definitions of a refugee and an asylum seeker.
- different documents (Permis F? B? C?) - which one allows them to work?

Thursday 26th of October:
We will be reaching out to people working in this field, that might be able to help us: 1) define the problem, 2) feedbacks

1. La Roseraie, rue de Carouge >>>>> EMAIL SENT
2. SOS Femmes
3. Hospice General
4. UNCHR >>>>>> EMAIL SENT
5. Organisation in Lausanne

Figure 18: Gallery view of the project

In *Details of step* users can upload photos or videos, add text description, ask others a question that will appear in the homepage of the platform, upload resources or files in different formats; e.g. .PDF, .PPT, a given example is shown in the figure 85 .

INTEGRATION OF REFUGEE WOMEN IN GENEVA

Gender equality **refugees/ asylum seekers**
SGIIT : Partnerships
trainings/ classes
integration

List of our ideas/brainstorming

List of subjects relevant to our project:

- refugees/ asylum seekers women in geneva
- what are the definitions of a refugee and an asylum seeker.
- different documents (Permis F? B? C?) - which one allows them to work?

Figure 19: Details steps view

The online platform incorporate many features that keep the SDGinProgress community more socialized and connected. Users can follow a project, see recent activity on the homepage and they will receive notification once an author add a step or ask a question.

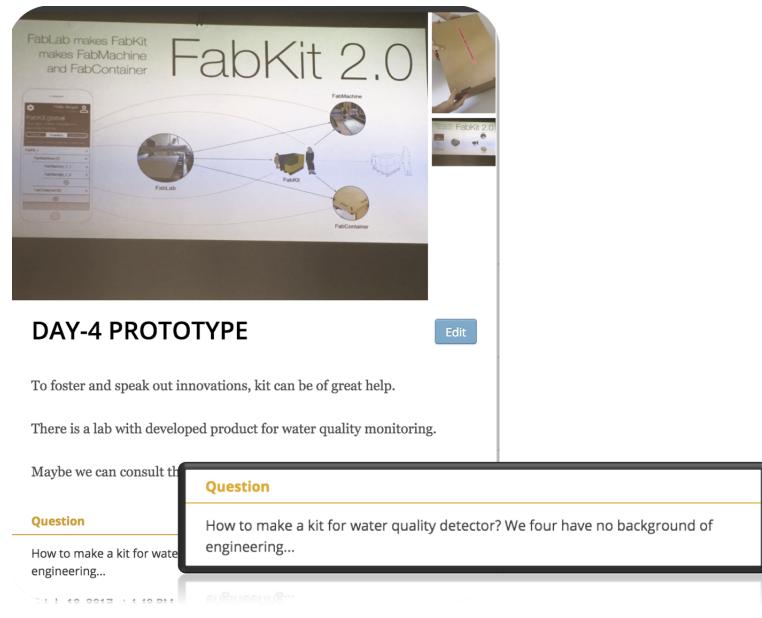


Figure 110: Question featured in the home page

Moreover, users can leave a text on any step and they will receive a notification when a comment is left. Authors can ask for feedback or help by embedding a question that will be added to the Community Activity section of the homepage, see figure 86.

Mobile application

A mobile application has been created to make documentation more efficient in which users upload images and videos to their projects directly from their devices instead of taking picture from their devices then transfer it to a computer and upload it (figure 87). But in our experience with the summer school we didn't used it.

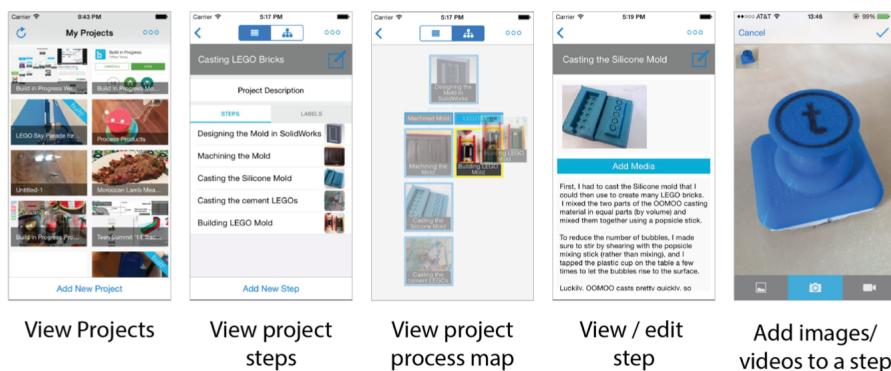


Figure 111: Mobile application interface, [Tseng, 2016]

1.8 Use of SDG

How many teams used it, what they used it for

Quote some feedback if it is written or recorded

1.8.1 User interaction

SDGinProgress has been used in summer-school programs and in after-summer-school by students who work on their own project. Teenagers and one adult fa-

cilitator have been interviewed and a weekly interview has been done to all teams to get an estimation about their weekly hours work.

The results of the interviews and surveys showed that users get motivated to share their project at the beginning as it facilitate getting a feedback of what they have done, create and show their portfolio projects, get engaged to document and to help others. Users were divided into two opinions, one part of the students found that SDGinProgress support meaningful documentation practices and the second part of the students found that it doesn't support their project the latter are typically software development project or policy making. Many strategies were identified depending on the type of project, the duration of a project and the age of makers who are using it.

1.8.2 Summary

The study of SDGnProgress showed that it support authors and readers but it has some limitation. The documentation help students to create a design process for their project by learning from the many iterations they did over time and SDGn-Progress motivates reflective practice on making, design process, and values and identity. Users get engaged, get feedback, and help others. SDGinProgress support all capturing way written and visual. **In our experiments** The platform SDGinProgress helped students to document their project and it gives them the opportunity to win visibility and get feedback from others, for example, as we see in the picture below. An engineer from CERN is giving them a comment about their hardware, others were asking question to the public to get some ideas. so the use of the platform overall is good for documentation but there is a lack of incentive for writing. Student tend to postpone documentation then forget what they want to document, which lead to weak documentation that give the big outline about a project and it doesn't really help if someone else want to copy the project

1.9 Discussion

SDGinProgress and *Instructables* didn't bring a new fundamental way in which users can share their captured media publicly or in private. Design parameters can be adjusted to support different type of users-interactions and goals. *Instructables* enable users to personalize through substitution and modification of a step and any missing step mean that authors should re-create their documentation while BiP focus more on the design process where users can iterate their project by creating new branches and forget about the unsuccessful branches.

The mix between capturing and text-based-description features in SDGinProgress enables teenagers to document. The ease of use for creating a branch, drag & drop simplify the job for younger audience especially readers who are new to the community of *DIY* as they can go through steps, iterate on their work, modify a step or re-arrange some steps. *Instructables* has both features but there is no friendly structure where authors get their documentation organized and if an author has a limited background in documentation or he doesn't like it, he will probably abandon the documentation of a project after the first type a user find that it is not possible to re-arrange the documented steps.

Sharing a project is not enough for authors. Users in *Instructables* found that they cannot share their thought or it is limited as the only way to express what they think is via a comment. SDGinProgress offers a text-based option where both authors and readers could ask a question or leave a comment, also, both can receive a notifications for a reply from the community or any other news concerning any modification in the project.

1. HISTORY OF PLATFORM WITH 2 CASE STUDY

The extension can be find for 6 \$ on this webpage:
[http://www.elechouse.com/elechouse/index.php?
main_page=product_info&products_id=2246](http://www.elechouse.com/elechouse/index.php?main_page=product_info&products_id=2246)

Design Files

ARDUINO_BOARD.doc

July 27, 2017 at 9:04 AM
Created by carmen.alvarez and alexandra

Comments (2)

pingu_98
Have you considered adding water and air temperature sensors?
9 months ago

carmen.alvarez
Hello pingu_98,
The water temperature sensor is included in the Electrical Conductivity Sensor that you can find here as well.
We haven't considered measuring the air temperature, do you think it will be useful?
9 months ago

Leave a comment...

Comment

Figure 112: Comments and feedbacks on a hardware ste, [?, https://sdginprogress.com/projects/47/steps?comment_id=4¬ification_id=442&step=214]

The process of sharing the effort in progress enable users to communicate more in BiP, they helped each other, they showed their effort, they get featured and receive feedback as described in section 8.4.2. Balancing the ease of use of automated documentation systems with the powerful feature, a mobile application, encourage more users to upload pictures or videos and enable them to be physically free so they can move around to document their project for example without having the problem of taking a photo, remember which step it is, transfer it then upload it to the platform as in Instructables.

Chapter 2

Challenge Based Event

2.1 Timeline of event

Visual for the timeline of events When it starts, when it ends, what happened in between and after

2.2 Test of CBE : Summer school

Chapter 3

Summer School

3.0.1 Summer school projects

Summer school is 8 week, 6 weeks in Geneva, 2 weeks in China. Student are supposed to tackle SDG problem. work on their idea in the first 8 weeks then go to China to prototype it using the facilities and the expertise that exist there.

3.0.2 Summer school teams

4 teams A and B

2 document as they want

2 document as suggested from the coach

2 patterns finded, vertical documentaiton and horizontal documentation

Vertical documentation, teams who document in a timeline whatever step they do without any label considering this, like week 1, week 2 as you see in the picture belo

Horizontal documentation : teams started to document vertical way, then we gave them a template to document. to them how they could document in a way where their followers could take a project from them and they started to devide their documentation into litterature, hardware, software testing, brainstorming

We asked a team to document via github.

3.0.3 Summer school documentation

There are around 9 project documented in this platform we asked 24 student to read these project and write a feedback about it and see if they could pick up a project from it. Zero project was selected, why ? first EGO. Second: documentation they don't find it useful, there are a missing part of the documentation like the litterature, benchmarking, few people knows how to do the benchmarking and I think this is a key in documentation, to read with openness, everyone has its own way of writing and documenting and they need to be open for others idea to write

3.1 Test of CBE : HUG hack

3.2 Events documentation

How events are documented

Hug hack mobility hack the port sc ms

3.3 Efforts

Visual of human resources

Chapter 4

CBE documentation : Case study

4.1 Adaptation of BIP

4.2 Motivation

4.3 Data set : SDGinProgress

Number of project, Number of boxes, Number of comments, Number of questions,
Number of answers,

Survey :

- What do you use to document your project ?
- What do you use to communicate ?
- what do you use to share folders ?
- what do you use to present/show what you did ?

4.4 Feedback from project

Why you didn't take any project SDG

Chapter 5

Discussion

Successful documentation from

1- China (carols project) 2- CosmicPi

Chapter 6

Conclusion and Recommendation & Future Work

- In which case it will make sens to use SDG in Progress
- Software perspective what could be done
 - what it does
 - how it works
 - software side
 - interface
 - how we adapt it for each type of events
 - – what is the challenge that we face
 - how to motivated people to document easily
 - – incentive of documentation
 - documentation is positive outcome
- Competitor
- Visual about instream of documentation
- Outstream ?

Innovators need tools for documentation to support their innovations. We found that one tool is not enough to support different goals and types of interactions especially if users are from different background and ages. But the availability of features in some tools can enable users to fulfil their need either in showing their effort, keeping tracks of their ideas [21], sharing their experience or exchange knowledge [15].

In this state-of-the-art we analysed *Instructables* the most popular online community for *DIY* and the most recent *DIY* platform *BuildinProgress* but at the same time I went through many other online community *Dorkbot*, *Ravelry*, *Craftster*, *Etsy*, *hacker*, *hackster.io* and I found that *DIY* community share one need : A tool that enable makers, hackers and innovators to share their experiences in a proper and meaningful ways. Another thing I have learned from my experience of more than 13 hackathons, the analyses of *Instructables* and *BiP* is that developing a new tools will not bring a new fundamental way of capturing media or writing text for documentation. Eventually, a goal would be to improve the process map used in *SDGinProgress*.

I can conclude that an existing tool is needed from a wide range of *DIY* community that would enable them to document in a meaningful way and make their documentation more sustainable. I believe, a tool that contains all necessary features for documentation with enhanced design process could be the new popular tool to use

by *DIY* community to document their effort in meaningful ways. To prove this we need to see how innovators will use this tool, how useful it would be and the method of design process would be questioned.

6.1 Future work

- 1- Study the open geneva experience for the next 5 years
- 2- Understand the incentive of writing from participants and build a tool that could fill the gap of documentation
- 3- Build a robo doc that could be part of a team, talk to them, collect data and help them documenting
- 4- Study the difference the instream of hackathons (why more and more industry are getting in)and look at the outstream of hackathon and how it could be stimulated.

Chapter 7

Overview of Documentation Platforms and a Case Study: Instructables

7.1 Introduction

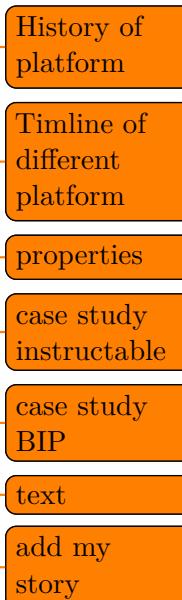
In the maker - movement [5], people need online tools to exchange knowledge, share experiences and to work in interdisciplinary teams to *innovate, design and implement solutions.*

The method of online documentation has a strong influence on how useful, learnable, available, shareable and accessible results are [8].

The complexity of documentation has led makers to create a variety of online communities and to experiment with different ways of documenting their results. Because documentation is often seen as tedious and time-consuming, makers are constantly seeking optimal solutions to reduce the effort needed to document their results. On the other hand, careful documentation enables makers to collaborate and share their efforts more effectively.

In this state-of-the-art, we will briefly survey a range of platforms developed to support makers in documenting their projects. We then analyse in more detail the pros and cons of two platforms, *Instructables* and Build-in-Progress. In both case we discuss how authors and readers benefit from online documentation, what motivates them to share a project and – in the case of *Build-in-Progress* what are the consequences of sharing a work in progress with online community.

The first part of this state-of-the-art will review *Instructables*, describe how the platform works and describe in details the design orientation process. The second part will review the design approach of *SDG-in-Progress* and the added features. The last part will review the user interaction of *BiP*.



7.2 Instructable

In this section, I share with you an analyses of how users create and share DIY projects via online platform called Instructables. I share findings of the analyses of this platform and the understanding of how authors and users use Instructables

Instructables is an online platform for *DIY* communities that serves as a "place that lets you explore, document, and share your creations" [9]. It is a website specializing in user-created and uploaded do-it-yourself projects, which other users can comment on and rate for quality [27] [27]. There are different categories of

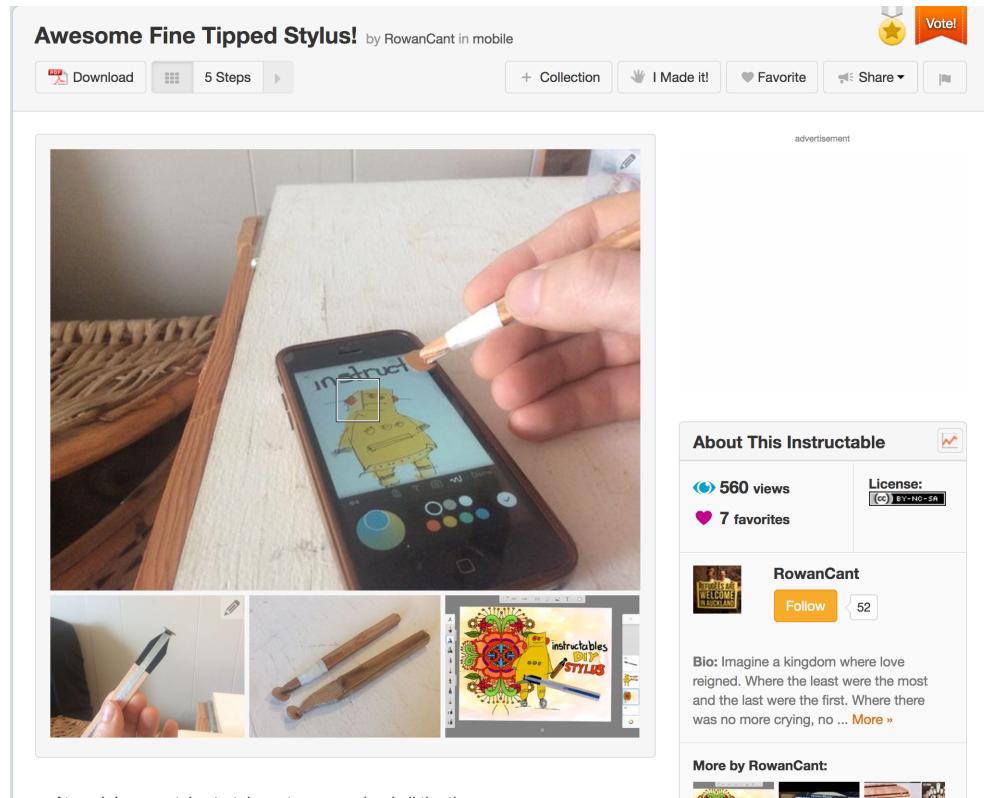


Figure 71: Sample Instructables project, <http://www.instructables.com/id/Awesome-Fine-Tipped-Stylus/>

project such as technology, crafts, food, home, workshops and living, with more than 263,258 projects and 9,888,442 monthly visit as of August 2017. Users create their project step by step and with each step they describe what they did in a text, photos or videos as displayed in the figure 71. The encapsulation of steps produce a typical guide that help others to re-create the project, learn from it or build a new thing on top of it and have their own version of the project.

The contributions in Instructables come from the sharing culture of projects, not only authors contribute but also readers who can view and give feedback by commenting on the project. Also, Instructables create a social community where they exchange their thoughts about a topic via forums and subforms dedicated to a special topic such as Arduino projects. Finally, prizes are given to the top shared Instructables as a kind of reward for their effort of sharing their project and to keep them connected with the community.

7.2.1 Methodology

To understand the users interactions of Instructables, an extensive study of the Instructables community has been done in the fall of 2011, this study used semi-structured interviews and online surveys. The semi-structured interviews had a framework of four themes that had been explored : (1) motivation, (2) Documentation tools, (3) Writing an Instructable and (4) Feedback. A theme was covered by a set of questions that took one hour with each interviewer. [19]. A survey of 15 multiple-choice questions and open ended-questions that ask users about different aspects of their experience with replicating or building on top of a project shared by a user on the platform.

7.2.2 User interaction

The study has shown three strategies for documenting a project. The first was to *write after you make*, as shown in the figure 72 [18].

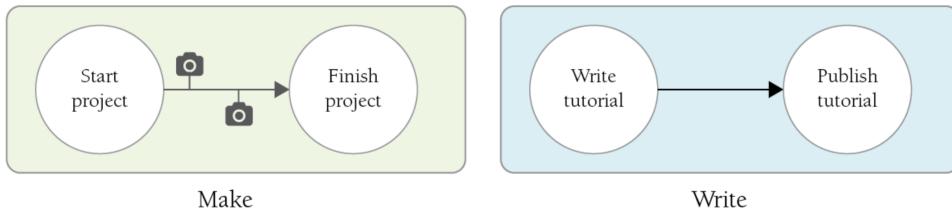


Figure 72: First strategy of documenting : write after you make, [18]

A problem confronted the users with this strategy, users forgot to document in the midst of making. Users outperformed this problem by following the second strategy of *writing after replicating*, as displayed in the figure 73 [19]

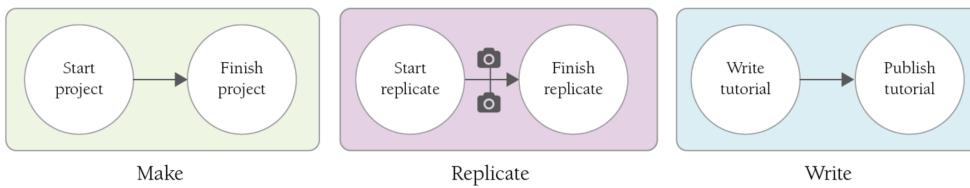


Figure 73: First strategy of documenting : Make, replicate then write, [18]

The final strategy was to *simultaneously write and make* (figure 74).

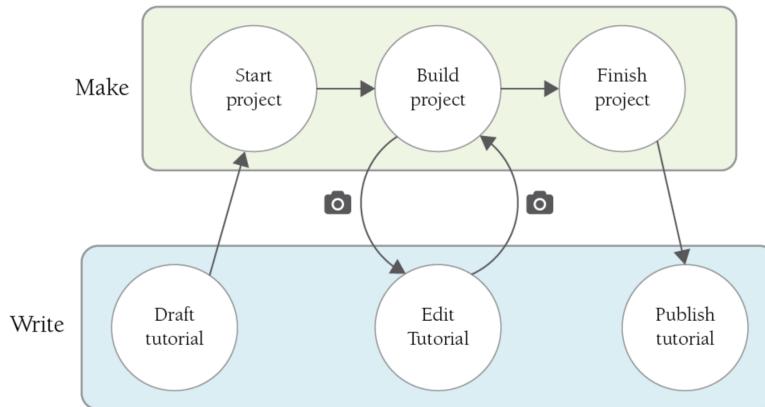


Figure 74: First strategy of documenting : write after you make, [18]

In summary, the study showed that users need to encapsulate the collected photos and videos to show to create all the steps and a common challenge was to remember to document after each step otherwise users had to replicate their project merely to creating good documentation.

Finally, authors saw that documentation well worth the effort to share their work but it is time consuming process when a project get more complex, it is hard to follow up or complete the documentation. [20]

7.2.3 Design and process oriented documentation

Several approaches were suggested by to improve the online documentation. Documentation techniques requires authors to simultaneously switch between making and writing, make a design process to not miss a step from not being documented or to radically recreate the project to document it in a proper way. Another challenges of documentation technique that needed to support not only the capture of digital artifacts but also physical artifacts where it is not possible to show the physical ef-

fort. With the recurring need to balance manual and automated ways of capturing, software and hardware tools need to solve open questions and be customizable for different activities and different audiences [11]. The workflow of documentation over time needed to not miss a key step in the documentation.

Documentation process seems to be more important for readers as it give them the opportunity to enable better decision making about components or materials to use [?], as well as successful in encouraging independent exploration and fostering a sense of accomplishment [14]. Also, as many users start by replicating some projects, having tools where they could be able to contribute to a project, can help more socializing and boost a collaborative work in the community.

Chapter 8

Experience with a Documentation Platform: from Build-in-Progress to SDG-in-Progress

In this section, I share with you an analyses of how users create and share DIY projects via online platform called SDGinProgress that we adapted for the SDG sustainable goals, it is a fork from a platform called BuildinProgress that focus on maker community like Electronics, food and living. I share findings of two experiences that has been done with 22 student from the Geneva-Tsinghua summer school students and 26 student from the master of University of Geneva, the master is dedicated for the SDG goals. Also I share with you the analyses of this platform and the understanding of how authors and users use it

8.1 Introduction

Introduction about SDG in Progress, its context and why

8.2 Users Project

mention that the project of Bip was about living etc., mention some statistics in terms of users projects as well as more qualitative type of project.

8.3 features of BiP

what makes BIP different from others.

Build in Progress is a platform for sharing the story of your design process, where "makers share how their DIY projects evolve over time" [18]. It focus more on the storytelling of DIY documented project, a snapshot of the platform displayed in the figure ???. In our experience we forked the platform and we adapted it for the SDG goals, SDGinProgress consist of 4 parts, (1) Projects where all the project are listed (2) Collections where featured project are displayed and that depends on their potential (3) welcome page where on the right side you have the list of the 17 SDG goals and under each goal you could find a related project to that goal.

8.4 From Build in Progress to SDGinProgress

What we did to go from Build in progress to sdg and the purpose from that move

SDGinProgress was launched in 2017 and within a collaboration with university of Geneva and the Geneva-Tsinghua summer school, it hosted over 16 projects in categories such as games, environmental project, pollution, digitation all related to an SDG goal.. Users contributed to SDGinProgress community by sharing, providing feedback and describing their progress of each step, the encapsulation of informations lead to a story about the project as SDGinProgress "*support a storytelling approach to documentation*" [18].

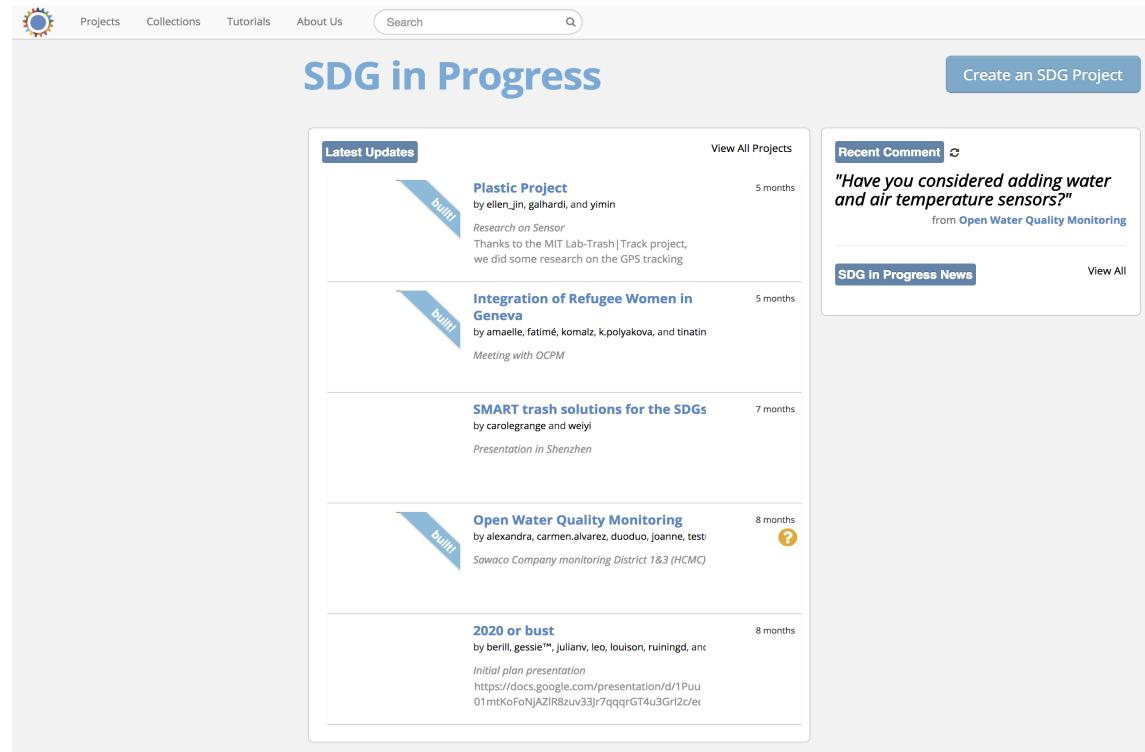


Figure 81: Build in progress welcome page

8.4.1 Design approach

Authors shared an iterative design process in the context of sharing their personal journey by creating step-by-step instructions of their project via the online platform *SDGinProgress* and companion mobile application. Readers contributed by suggesting to makers after publishing their steps, makers benefited from sharing step-by-step instructions over time by taking into account the suggestions of readers.

SDGinProgress was developed based on an innovative design process, it enables users to visualize their documentation in an iterative way. Authors can continuously iterate their building process, share their techniques to help others to reach out others in the community so they can have feedback. A social design process principle was considered among the online community to engage users more, to accumulate knowledge, to learn from others and connect users with same interest as *human-related issues in the form of social ties and knowledge sharing were reported as keys to successful collaboration* [10].

8.4.2 Features

SDGinProgress consists of many features in the project page and social feature. The two core features of the project page are : the *Process Map* and *Step Detail View* (82). In the process map, users can create a step, a label for one or more step, drag & drop to rearrange steps. Steps are organized in a tree-map-like format with sui generis branches, a label is added to a branch and it can be colored to designate a branch; for example orange labels represent that a branch is in progress.

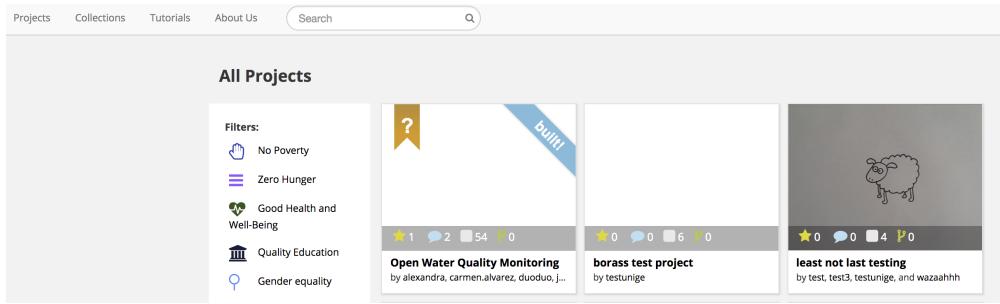


Figure 82: overall project page view, [<https://sdginprogress.com/projects/81/steps>]

& drop to rearrange steps. Steps are organized in a tree-map-like format with sui generis branches, a label is added to a branch and it can be colored to designate a branch; for example orange labels represent that a branch is in progress.

Project are displayed in 3 different mode. The first is the default mode : tree-map, users can go through all the steps, step-by-step and discover more about it as shown in figure 83.

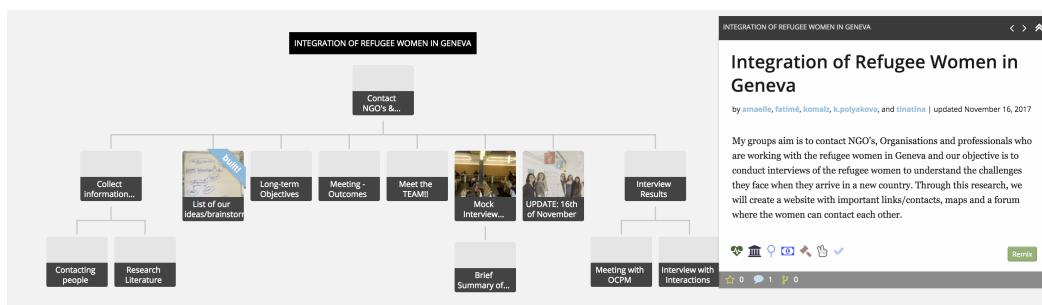


Figure 83: tree-map view of the project

The second is Gallery mode 84 and finally the blog mode : users can scroll down and an index of steps will be displayed on their left side of the page (figure 84).

8. EXPERIENCE WITH A DOCUMENTATION PLATFORM: FROM BUILD-IN-PROGRESS TO SDG-IN-PROGRESS

Contact NGO's & Organisations
 Collect information about refugees in Geneva
 List of our Ideas/brainstorming
 Contacting people
 Long-term Objectives
 Research Literature
 Meeting - Outcomes
 Meet the TEAM!!
 Mock Interview with Organisation in Lausanne
 Brief Summary of the Interview
 UPDATE: 16th of November
 Meeting with CCPM
 Interview Results
 Interview with Interactions

My groups aim is to contact NGO's, Organisations and professionals who are working with the refugee women in Geneva and our objective is to conduct interviews of the refugee women to understand the challenges they face when they arrive in a new country. Through this research, we will create a website with important links/contacts, maps and a forum where the women can contact each other.

Contact NGO's & Organisations
 Thursday, October 26 2017
 Collect information about refugees in Geneva

Thursday, October 26 2017
 List of our Ideas/brainstorming
 Thursday, October 26 2017

List of subjects relevant to our project:
 - refugees/ asylum seekers women in geneva
 - what are the definitions of a refugee and an asylum seeker.
 - different documents (Permis F? B? C?) - which one allows them to work?

Thursday 26th of October:
 We will be reaching out to people working in this field, that might be able to help us: 1) define the problem, 2) feedbacks
 1. La Roseraie, rue de Carouge >>>>> EMAIL SENT
 2. SOS Femmes
 3. Hospice General
 4. UNCHR >>>>>> EMAIL SENT
 5. Organisation in Lausanne

Contacting people
 Thursday, October 26 2017

Figure 84: Gallery view of the project

In *Details of step* users can upload photos or videos, add text description, ask others a question that will appear in the homepage of the platform, upload resources or files in different formats; e.g. .PDF, .PPT, a given example is shown in the figure 85 .

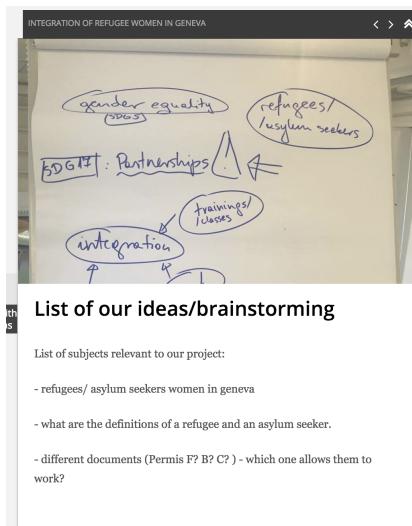


Figure 85: Details steps view

The online platform incorporate many features that keep the SDGinProgress community more socialized and connected. Users can follow a project, see recent activity on the homepage and they will receive notification once an author add a step or ask a question.

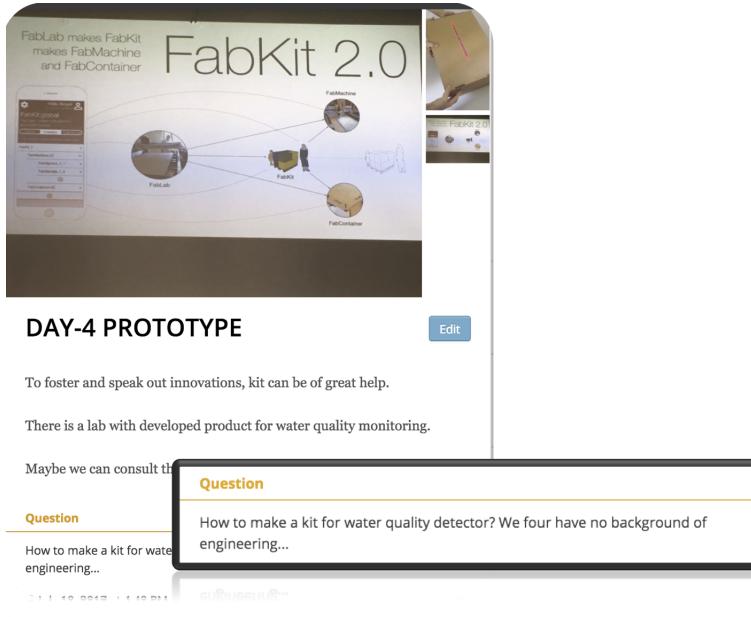


Figure 86: Question featured in the home page

Moreover, users can leave a text on any step and they will receive a notification when a comment is left. Authors can ask for feedback or help by embedding a question that will be added to the Community Activity section of the homepage, see figure 86.

Mobile application

A mobile application has been created to make documentation more efficient in which users upload images and videos to their projects directly from their devices instead of taking picture from their devices then transfer it to a computer and upload it (figure 87). But in our experience with the summer school we didn't used it.

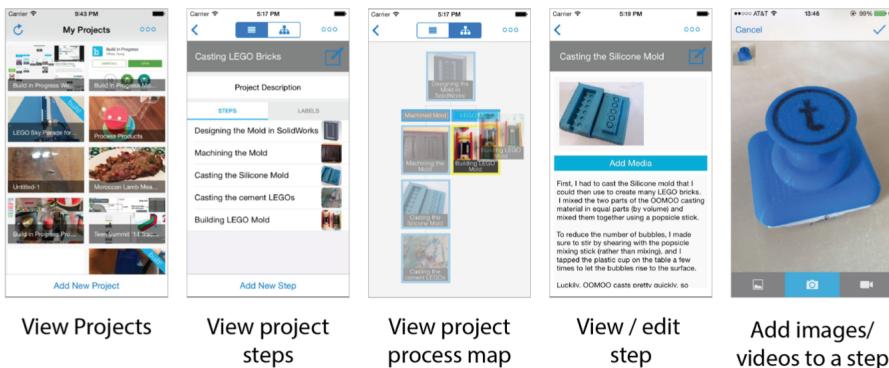


Figure 87: Mobile application interface, [Tseng, 2016]

8.5 Use of SDG

How many teams used it, what they used it for

Quote some feedback if it is written or recorded

8.5.1 User interaction

SDGinProgress has been used in summer-school programs and in after-summer-school by students who work on their own project. Teenagers and one adult fa-

cilitator have been interviewed and a weekly interview has been done to all teams to get an estimation about their weekly hours work.

The results of the interviews and surveys showed that users get motivated to share their project at the beginning as it facilitate getting a feedback of what they have done, create and show their portfolio projects, get engaged to document and to help others. Users were divided into two opinions, one part of the students found that SDGinProgress support meaningful documentation practices and the second part of the students found that it doesn't support their project the latter are typically software development project or policy making. Many strategies were identified depending on the type of project, the duration of a project and the age of makers who are using it.

8.5.2 Summary

The study of SDGnProgress showed that it support authors and readers but it has some limitation. The documentation help students to create a design process for their project by learning from the many iterations they did over time and SDGn-Progress motivates reflective practice on making, design process, and values and identity. Users get engaged, get feedback, and help others. SDGinProgress support all capturing way written and visual. **In our experiments** The platform SDGinProgress helped students to document their project and it gives them the opportunity to win visibility and get feedback from others, for example, as we see in the picture below. An engineer from CERN is giving them a comment about their hardware, others were asking question to the public to get some ideas. so the use of the platform overall is good for documentation but there is a lack of incentive for writing. Student tend to postpone documentation then forget what they want to document, which lead to weak documentation that give the big outline about a project and it doesn't really help if someone else want to copy the project

8.6 Discussion

SDGinProgress and *Instructables* didn't bring a new fundamental way in which users can share their captured media publicly or in private. Design parameters can be adjusted to support different type of users-interactions and goals. *Instructables* enable users to personalize through substitution and modification of a step and any missing step mean that authors should re-create their documentation while BiP focus more on the design process where users can iterate their project by creating new branches and forget about the unsuccessful branches.

The mix between capturing and text-based-description features in SDGinProgress enables teenagers to document. The ease of use for creating a branch, drag & drop simplify the job for younger audience especially readers who are new to the community of *DIY* as they can go through steps, iterate on their work, modify a step or re-arrange some steps. *Instructables* has both features but there is no friendly structure where authors get their documentation organized and if an author has a limited background in documentation or he doesn't like it, he will probably abandon the documentation of a project after the first type a user find that it is not possible to re-arrage the documented steps.

Sharing a project is not enough for authors. Users in *Instructables* found that they cannot share their thought or it is limited as the only way to express what they think is via a comment. SDGinProgress offers a text-based option where both authors and readers could ask a question or leave a comment, also, both can receive a notifications for a reply from the community or any other news concerning any modification in the project.

The extension can be found for 6 \$ on this webpage:
[http://www.elechouse.com/elechouse/index.php?
main_page=product_info&products_id=2246](http://www.elechouse.com/elechouse/index.php?main_page=product_info&products_id=2246)

Design Files

ARDUINO_BOARD.doc

July 27, 2017 at 9:04 AM
Created by carmen.alvarez and alexandra

Comments (2)

pingu_98
Have you considered adding water and air temperature sensors?
9 months ago

carmen.alvarez
Hello pingu_98,
The water temperature sensor is included in the Electrical Conductivity Sensor that you can find here as well.
We haven't considered measuring the air temperature, do you think it will be useful?
9 months ago

Leave a comment...

Comment

Figure 88: Comments and feedbacks on a hardware ste, [?, https://sdginprogress.com/projects/47/steps?comment_id=4¬ification_id=442&step=214]

The process of sharing the effort in progress enable users to communicate more in BiP, they helped each other, they showed their effort, they get featured and receive feedback as described in section 8.4.2. Balancing the ease of use of automated documentation systems with the powerful feature, a mobile application, encourage more users to upload pictures or videos and enable them to be physically free so they can move around to document their project for example without having the problem of taking a photo, remember which step it is, transfer it then upload it to the platform as in Instructables.

Chapter 9

Hackathons

Suggest combining the two last chapters into something like "Experience with Challenge-based learning events: from hackathons to student projects." Somehow, you need to link this more closely with the issue of documentation, and to connect to data and results that you have gathered. Same for the summer student part.

9.1 Introduction

Open innovation continue to expand the space of innovation and shape a new model for knowledge exchange between innovative industries, research and development laboratory, non-profit organizations and open communities. Hackathons became a platform for open innovation around the world and a scene for creative firms and institutions to help them achieve and sustain innovation. A Hackathon is a periodic event where computer programmers and others in the field of software development such as graphic designers, interface designers, UX experts, project managers and others collaborate intensively over a short period of time on software projects. It is also known as a hack day, hack fest, code fest [?]. These hackathon are giving the chance for everyone to learn, create and innovate. From participating in large numbers of hackathon in a large range of different spaces (open data, science hack, food hack, programming, and more). We first consider the origins of hackathons and its different formats, and that lead us to classify the different hackathon type that occur. We also look at the results of an analysis conducted of a 18 hackathon events we observed and participated. We then discuss the potential of open innovation events, including common general principles that we have observed. We conclude by contemplating the future and value of open innovation, especially in offering people the opportunity to meet and collaborate to build new liaison that extend beyond the short term focus of the event. Also the potential for open innovation for networking in new spaces, along with the emerging Festival of Hack. But there is a lack of documentation in these hackathons and open innovation events, many ideas are generated out of these events but we cannot find any trace of it or a continuation for the potential project that came out with.

Recently, researchers are paying attention to the use of the software development and code-hosting web service GitHub for other collaborative purposes. These alternative uses of GitHub as a platform for sharing non-code artifacts represent an important modification in the practice of open collaboration[13]. But due to the limitations of GitHub as a platform for technical participant, We investigate in a platform called *SDGinProgress* that is open for everyone and people with non technical skills to collaborate and share their project with others, identify its strengths and weaknesses when used in this mode, and propose conditions for successful collaborations on co-created project. Then we will see how created documentation could help in the future of the process in a long term perspective.

9.2 Hackathon

The term “hackathon” appeared first back at the end of 90s when a group of developers flock together from around the world, and they created the first IPv6 and IPSEC stack NNcompletely integrated into an operating system [2] within a week, and OpenBSD software developer’s use of the term referred to a cryptographic development event held in Calgary on 4th June 1999 where small number of developers came together to avoid the legal problems arising from export regulations of cryptographic software from the United States of America (USA). A hackathon is an event in which computer programmers, system engineers and others (graphic designers, interface designers and others) collaborate intensively over short period of time on software projects.

Hackathons became more widespread in the mid to late 2000s, increasingly attract companies, organisations and venture capitalists as a way to drive innovation, develop new software technologies and to discover new areas of funding. The hackathon movement have been growing while developing its organization from their impromptu pizza parties origins to professionally organised corporate sponsored bespoke events [4]. This has influenced the culture of innovation among companies and lead them to use hackathons to innovate because of its effectiveness [3]. The growth occurrence of hackathons around the globe and their effectiveness has lead to consider hackathons as an event that have significant impact of the culture of innovation and we will describe more the development of the culture of innovation. Also we are going to classify hackathon according to the them and format that take and we will and we will finish by sharing our finding about the incentive of writing and why is the lack of documentation.

9.3 Format

Generally, hackathons are one day or two days events. they start with pitching ideas, team are formed based on members individual interests and skills. At the end of the hackathon, each group presents their results in different format (demo of a prototype or presentation of the progress that has been done). The challenges or ideas can be announced before the event by the organizers or collected from the participants before the hackathon. Alternatively, a general topic could be suggested by the organizers and challenges/ideas could be generated at the event. Some hackathons include team building or ice breaking session e.g. in between pitching ideas and team matching to give the opportunity for participants to learn more about the ideas from others and to facilitate the team matching.

9.4 Potential of Hackathons

Hackathon became a genuine link between research and development, start-ups and the innovation world where people put together the laboratory setting and the field. Hackathons are a special place to think differently because it acts dynamically, it is characterized by constant change, activity, and progress [12]. The organizational forces that impel a team or a project to be shaped beforehand does not exist. People from different backgrounds project their interdisciplinary knowledge on a selected topic they choose to tackle with different range of magnitude that make up the innovation process. During one two or two days hack, participants find themselves in a decision environment that is complex, time pressure, spontaneously evolving and changing information and high information ambiguity. This environment drives them to iterate quickly over their idea, prototype it and see the result. This iteration process propels their idea/prototype to a new level that make up their innovation unique. Participants in a hackathon contribute to the project and to the team

effort, as max as they can, since the outcome gives them visibility and creates new opportunities and gives them a professional reputation.

These characteristics allow companies, corporations, academia to follow this model to help them innovate and sustain their creativity within an environment of high competition where they are always seeking new ideas, new products to offer to their customers. Also, hackathons have great potential to offer people the opportunity to explore new ideas, to learn about new areas and to make products in a short period without dealing with obligation and pressure to deliver. If this model of innovation is efficient and productive for industry, more effort need to be put down to find how we can encourage more areas of work to adapt this model to innovate and create in their field.

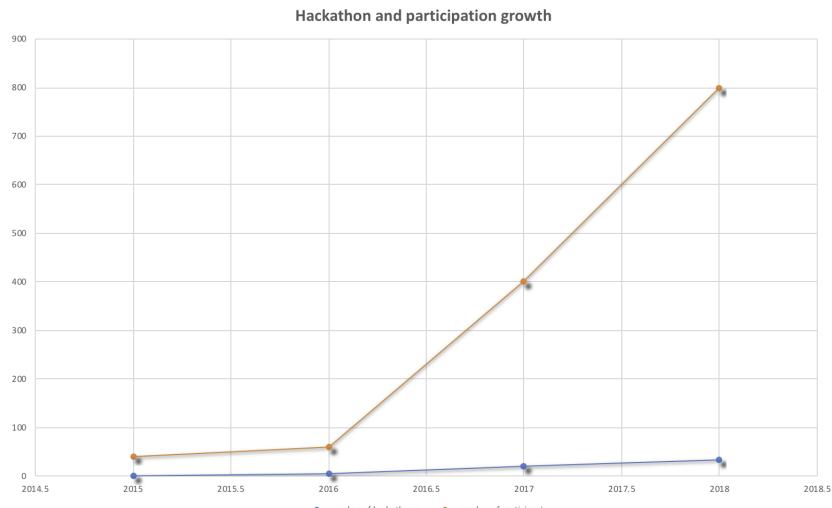
9.5 Classification

Hackathons are increasingly adapted by more environment, they don't have a specific focus or participants and organizers leave the participants to choose what to focus on. Hackathons focus on different aspects or topics. With the adaptation of the model of hackathons by the firms, institutions, NGO and more that work in different areas, hackathons started to be more oriented toward a specific topic. Based on our experience in the 17 hackathons and the 3 experiments of open geneva -open geneva is a festival of innovation where more hackathons occur on the same city in Geneva- we classified the hackathons as following Designathon, Humathon, Digithon, Codithon, Concepthon and Learnathon. Designathons are hacakthons that focus on design, Humathons for humanitarian hackathons, Codithon, Learnathon that focus on learning new skill and more

Designathon	2
Humathon	6
Digithon	11
Codithon	18
Concepthon	5
Learnathon	3

9.6 Open Geneva

Open Geneva has been established to promote open innovation with a spirit of knowledge sharing for the common good. In particular, Open Geneva aims to foster open innovation for the arts, science, technology, and for society in the Greater Geneva Area. Open Geneva was established in 2015 by the Geneva Creativity Center in order to promote innovation for the improvement of life quality in Geneva. During the 1st edition, several teams of students worked during 2 weekends on scientific projects, as well as social and technical innovations, related to energy, health, mobility. The 2016 edition was focused on medical technologies and brought a larger scope of participants during a curated hackathon organized by The Port in collaboration with the Geneva University Hospitals[16]. Open Geneva started with one hackathon at the computer science department at University of Geneva with a crowd of more than 40 participants. The initiative get the attraction of more companies and institution in Geneva and in 2017, there were more than 20 hackathon with more than 400 participants. We were afraid that if we organize more hackathons, it will not be easy to find participants but it turns out that more you organize hackathons, the more people you have. And, this year there were more than 30 hackathon organized around the city with more than 800 participants and here we see an exponential growth of hackathon and participants

**Figure 91:**

The figure needs a caption, and text on axes is not readable. Is this your data

9.7 DISCUSSION/CONCLUSION

1. Summarize experience of hackathons / personal point of view
2. Write about this experience and what you came out with
3. Democratize innovation

Chapter 10

Summer School

10.1 Summer school projects

Summer school is 8 week, 6 weeks in Geneva, 2 weeks in China. Student are supposed to tackle SDG problem. work on their idea in the first 8 weeks then go to China to prototype it using the facilities and the expertise that exist there.

10.2 Summer school teams

4 teams A and B

2 document as they want

2 document as suggested from the coach

2 patterns finded, vertical documentaiton and horizontal documentation

Vertical documentation, teams who document in a timeline whatever step they do without any label considering this, like week 1, week 2 as you see in the picture belo

Horizontal documentation : teams started to document vertical way, then we gave them a template to document. to them how they could document in a way where their followers could take a project from them and they started to devide their documentation into litterature, hardware, software testing, brainstorming

We asked a team to document via github.

10.3 Summer school documentation

There are around 9 project documented in this platform we asked 24 student to read these project and write a feedback about it and see if they could pick up a project from it. Zero project was selected, why ? first EGO. Second: documentation they don't find it useful, there are a missing part of the documentation like the litterature, benchmarking, few people knows how to do the benchmarking and I think this is a key in documentation, to read with openness, everyone has its own way of writing and documenting and they need to be open for others idea to write

10.4 Conclusion & Future Work

Innovators need tools for documentation to support their innovations. We found that one tool is not enough to support different goals and types of interactions especially if users are from different background and ages. But the availability of features in some tools can enable users to fulfil their need either in showing their effort, keeping tracks of their ideas [21], sharing their experience or exchange knowledge [15].

In this state-of-the-art we analysed *Instructables* the most popular online community for *DIY* and the most recent *DIY* platform *BuildinProgress* but at the same time I went through many other online community *Dorkbot*, *Ravelry*, *Craftster*, *Etsy*, *hacker*, *hackster.io* and I found that *DIY* community share one need : A tool that enable makers, hackers and innovators to share their experiences in a proper and meaningful ways. Another thing I have learned from my experience of more than 13 hackathons, the analyses of *Instructables* and *BiP* is that developing a new tools will not bring a new fundamental way of capturing media or writing text for documentation. Eventually, a goal would be to improve the process map used in *SDGinProgress*.

I can conclude that an existing tool is needed from a wide range of *DIY* community that would enable them to document in a meaningful way and make their documentation more sustainable. I believe, a tool that contains all necessary features for documentation with enhanced design process could be the new popular tool to use by *DIY* community to document their effort in meaningful ways. To prove this we need to see how innovators will use this tool, how useful it would be and the method of design process would be questioned.

10.5 Future work

- 1- Study the open geneva experience for the next 5 years
- 2- Understand the incentive of writing from participants and build a tool that could fill the gap of documentation
- 3- Build a robo doc that could be part of a team, talk to them, collect data and help them documenting
- 4- Study the difference the instream of hackathons (why more and more industry are getting in)and look at the outstream of hackathon and how it could be stimulated.

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