Netnographic approach to investigate user innovations in the online community Instructables

Jakob J. Korbel
research associate

Technical University of Berlin
Chair of Information and Communication Management
REALITAETENLABOR

Workshop:
How innovative are peer communities?
Approaches to the empirical assessment of peer innovation

Date:
14th of January 2022

Research Question

How and to what extent do users in online communities innovate to create and use their own renewable energy?

Literature Review

References: Korbel & Grosse (2020)

Applied UI Criteria	UI measuring results in publications					
	Luethje (2004)	Luethje et al. (2005)	Tietz et al. (2005)	Ogawa & Pongtanalert (2013)	von Hippel et al. (2012)	Ogawa & Pongtanalert (2011)
Hyysalo et al. (2013,2016)	37,3% 9,8%	38,7% 19,2%	45% 26%	n. c.	n. c.	n.c.
Baldwin et al. (2006)	n. c.	n. c.	n. c.	3,7% 4,2% (+ 12,7%)	n. c.	n. c.
Gault (2011)	n. c.	n. c.	n. c.	3,7 % 0,41 %	6,1 % 2,01 %	5,2 % 0,94%

n.c. : not calculated
XX % : Ratio of user innovations / innovators
XX % : Re-estimated ratio of user innovations / innovators based on criteria from other UI publication

Table 1. Examples of differences between ratio of user innovations depending on applied UI measuring criteria

Assessment	Publications			
	de Jong et al. (2015)	Kim (2015)	von Hippel et al. (2012)	Oliviera et al. (2015)
Users' self-assessment	251 UI	412 UI	166 UI	263 UI
Researchers' assessment	176 UI	201 UI	104 UI	182 UI
Difference (%)	- 30%	-51,2%	- 37%	- 31 %

Table 2. Examples of differences between ratio of user innovations depending on the evaluator

Literature Review

References: Korbel & Grosse (2020)

UI identification criteria:	e.g., idea vs. implementation, material vs. market
UI classification criteria:	e.g., increm. vs. major improv., new to the user vs. firm
UI ratio:	e.g., decrease from 39% to 9 % or increasing by 12,6 %
User vs. researcher assessment:	e.g., different perception of innovativeness up to 50%

Research Question

~~**How and to what extent do users in online communities innovate to create and use their own renewable energy?**~~

How do UI identification and classification frameworks differ and what are reasons for the different perception of innovativeness between users and researchers?

Non-participatory Netnography

Reference: Korbel & Grosse (2017)

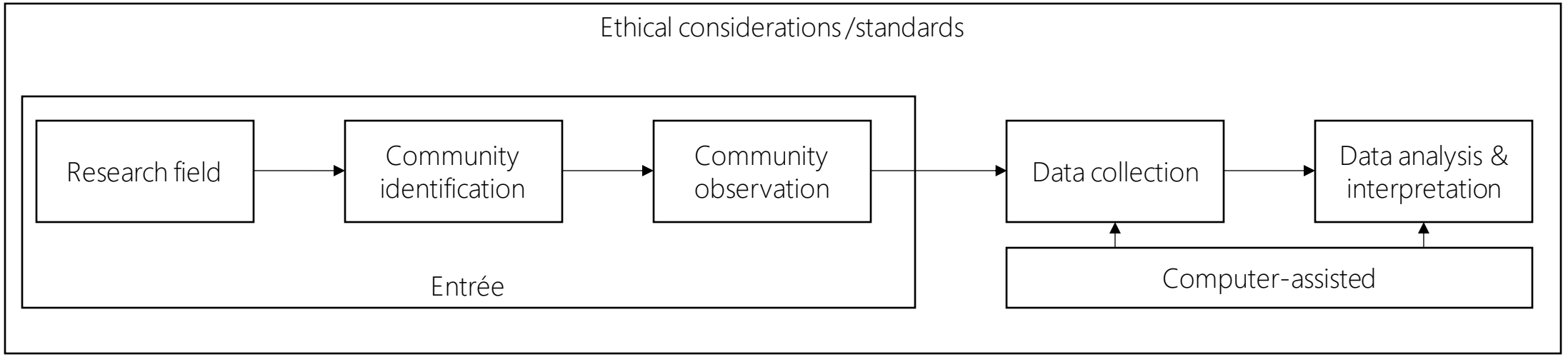
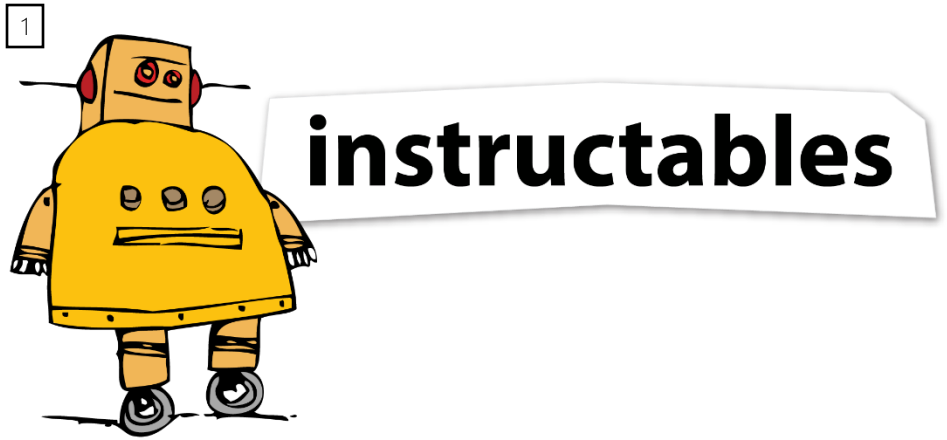


Figure 1. Research design for netnographic study based on Kozinets (2009).

Community: Instructables

References: Korbel & Grosse (2017), Instructables (2022)

Community:	Instructables
Founded:	August 2005
Founder:	Eric J. Wilhelm
Origin:	US
Focus:	Maker projects
Operator:	Autodesk Inc. (since August 2011)
Employees:	51 - 100



	2017		2021	
Users:	Contributing users:	108.871	Contributing users:	~ 160.000
Projects:	Projects:	237.909	Projects:	~ 350.000

Data Collection and Analysis

References: Korbel & Grosse (2017)

1. Data collection:

Identification of energy-related user projects in the Instructables community based on machine learning.

2. Project coding:

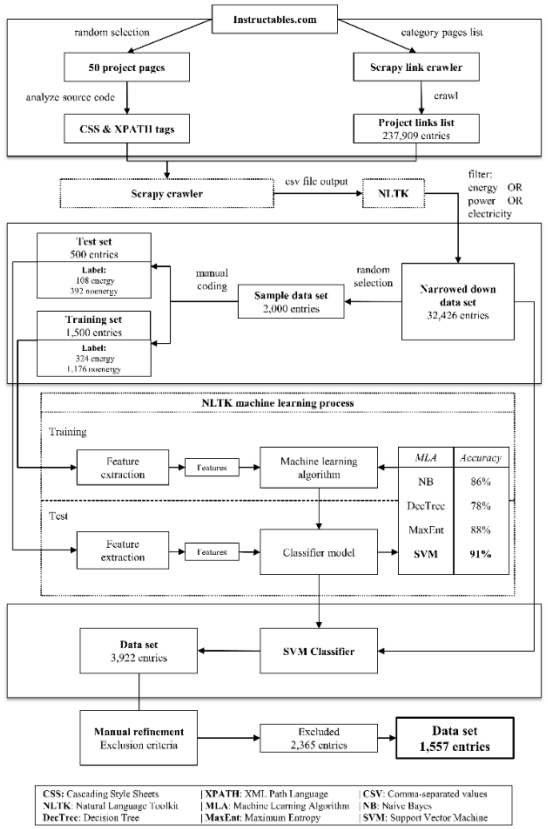
Coding of user projects based on energy systems, sub-systems and usage.

3. Data analysis:

Data analysis and interpretation based on project descriptions and user comments.

Data Collection and Analysis

References: Korbel & Grosse (2017)



2. Project coding:

Coding of user projects based on energy systems, sub-systems and usage.

3. Data analysis:

Data analysis and interpretation based on project descriptions and user comments.

Data Collection and Analysis

References: Korbel & Grosse (2017)

1. Data collection:

Identification of energy-related user projects in the Instructables community based on machine learning.

2. Project coding:

Coding of user projects based on energy systems, sub-systems and usage.

3. Data analysis:

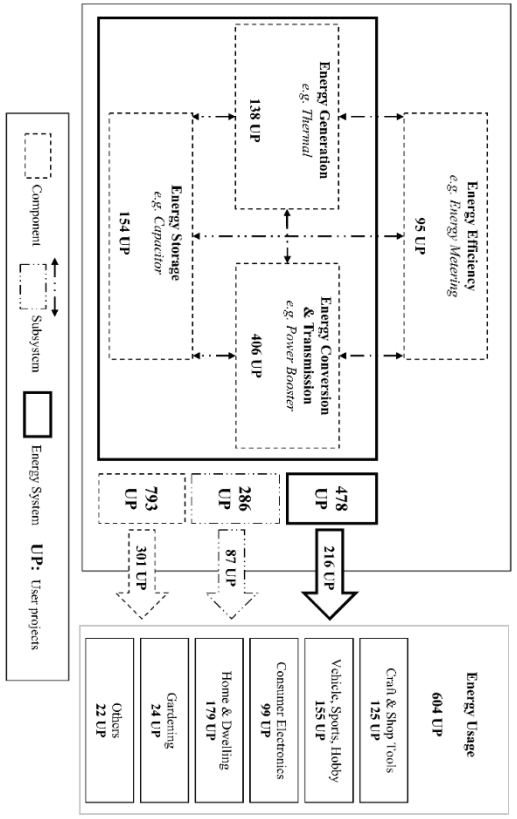
Data analysis and interpretation based on project descriptions and user comments.

Data Collection and Analysis

References: Korbel & Grosse (2017)

1. Data collection:

Identification of energy-related user projects in the Instructables community based on machine learning.



3. Data analysis:

Data analysis and interpretation based on project descriptions and user comments.

Data Collection and Analysis

References: Korbel & Grosse (2017)

1. Data collection:

Identification of energy-related user projects in the Instructables community based on machine learning.

2. Project coding:

Coding of user projects based on energy systems, sub-systems and usage.

3. Data analysis:

Data analysis and interpretation based on project descriptions and user comments.

Data Collection and Analysis

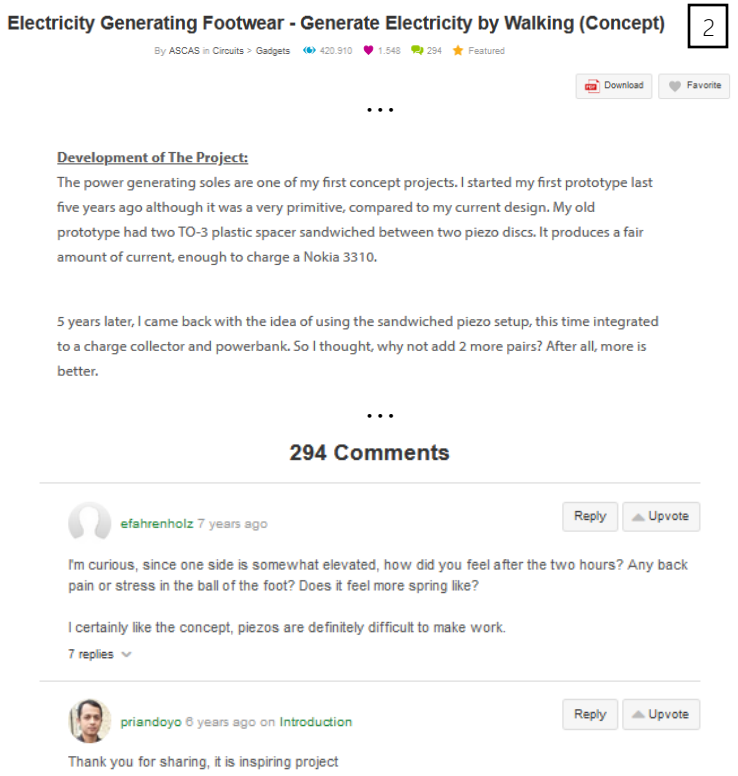
References: Korbel & Grosse (2017)

1. Data collection:

Identification of energy-related user projects in the Instructables community based on machine learning.

2. Project coding:

Coding of user projects based on energy systems, sub-systems and usage.



Electricity Generating Footwear - Generate Electricity by Walking (Concept) 2

By ASCAS in Circuits > Gadgets 420,910 1,548 294 Featured

Download Favorite

...

Development of The Project:

The power generating soles are one of my first concept projects. I started my first prototype last five years ago although it was a very primitive, compared to my current design. My old prototype had two TO-3 plastic spacer sandwiched between two piezo discs. It produces a fair amount of current, enough to charge a Nokia 3310.

5 years later, I came back with the idea of using the sandwiched piezo setup, this time integrated to a charge collector and powerbank. So I thought, why not add 2 more pairs? After all, more is better.

...

294 Comments

efahrenholz 7 years ago Reply Upvote

I'm curious, since one side is somewhat elevated, how did you feel after the two hours? Any back pain or stress in the ball of the foot? Does it feel more spring like?

I certainly like the concept, piezos are definitely difficult to make work.

7 replies

priandoyo 6 years ago on Introduction Reply Upvote

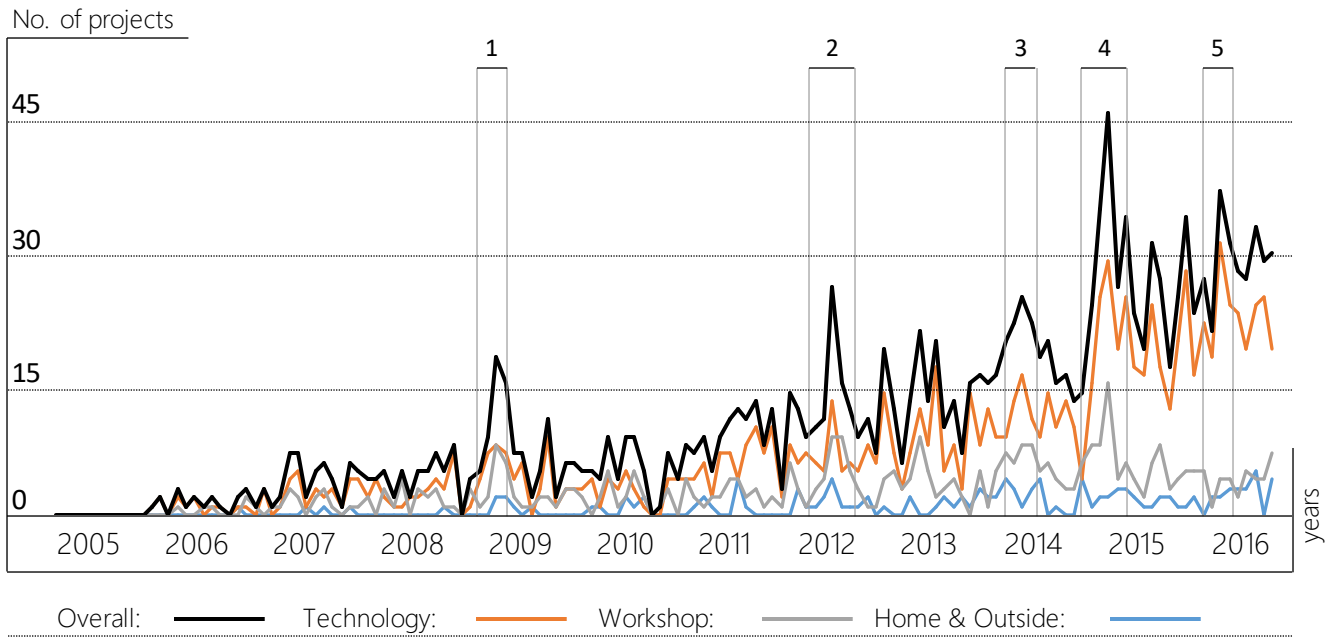
Thank you for sharing, it is inspiring project

Descriptive Statistics

References: Korbel & Grosse (2017)

Users	**All**	**Energy-related**
Contributing users	108.871 (98,94%)	1.169 (1,06%)
Projects	**All**	**Energy-related**
Total num. of projects	237.909 (99,35%)	1.557 (0,65%)
Projects in categories	**All**	**Energy-related**
Technology	64.601 (27,2%)	1.022 (65,6%)
Workshops	29.719 (12,5%)	392 (25,3%)
Outside	13.078 (5,5%)	69 (4,4%)
Home	32.176 (13,5%)	57 (3,7%)
Play	30.875 (13,0%)	11 (0,7%)
Crafts	32,484 (13,7%)	4 (0,2%)
Food	27,357 (11,5%)	0 (0,0%)
Costumes	7,619 (3,2%)	0 (0,0%)

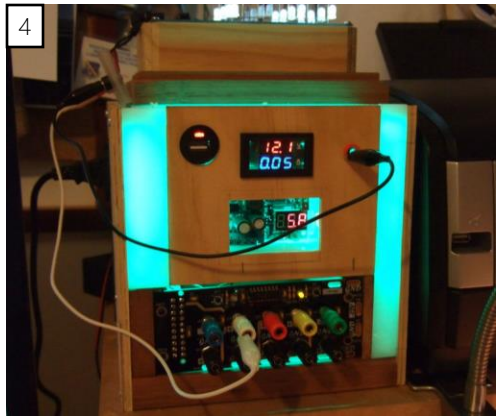
Table 1. Overview of users and projects on Instructables



Contests	Duration
1: The Earthjustice United States of Efficiency Contest	March – May 2009
2: Green Tech Contest & Off the Grid Contest	May – September 2012
3: The Green Design Contest	May – Juni 2014
4: The MAKE ENERGY: A US-Mexico Innovation Challenge	November 2014 – March 2015
5: The Renewable Energy Contest	May – July 2016

Figure 2. Overview of energy-related projects and energy-related user constests

Examples



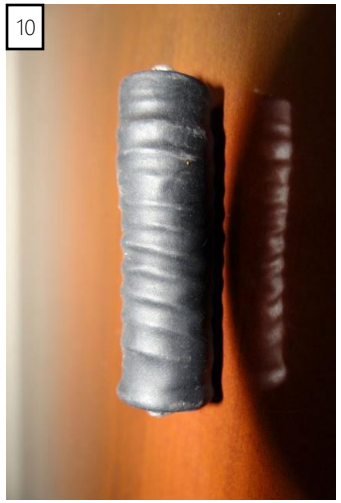
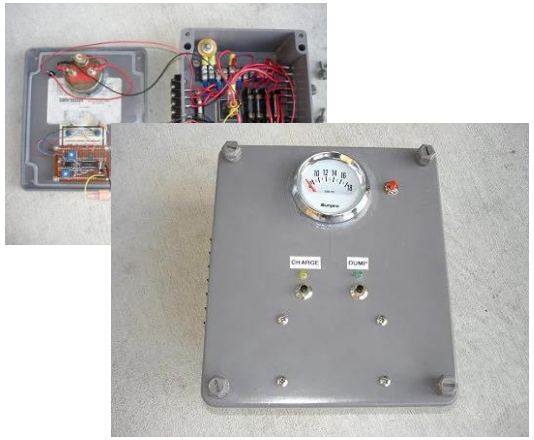


Figure 3. Examples of energy-related user projects in the Instructables community

Parallel Market and Importance of Context and Complexity

11



Mr. Davis' Wind Turbine System

- Mr. Davis built a complete wind turbine system on his own from scratch.
- The blades, the wind turbine itself and the batteries are similar to market products.
- Costs for the project: $140.62 (commercial wind turbine system: ~750$–1.000$).

Charge Controller

- The charge controller he built, however, was innovative and recognised as such by users.
- He did not compare the functionality of his components with commercial products.
- Other users on Instructables adapted his charge controller design for wind turbines.
- Users also adapt the charge controller for other contexts, e.g., solar panels.
- 2011: charge controller wins the 555 Design Contest.
- 2013: charge controller is adopted in the Science Channel TV to build a bike-generator.

Parallel Market and Importance of Context and Complexity

1. Users do not compare their projects with products on the commercial market but with community products (exist alongside).
2. Users develop community products further, not commercial products.
3. Users adopted and imitated projects from other community if the project were new to the Instructables community.
4. Hence: users ought to assess their product in relation to their market, the parallel (community) market.

Parallel market: Users focus on community products, not commercial market products.

1. Users use their creations as components in different context and products.
2. Users innovate on a component level in complex products.
3. Hence: products and components need to be assessed on different levels of the system they are embedded in.
4. Hence: products and components need to be assessed both independently from and within its context.

Importance of context and complexity: context and complexity have a major impact on innovation classification

Measuring User Innovation

References: Korbel & Grosse (2020)

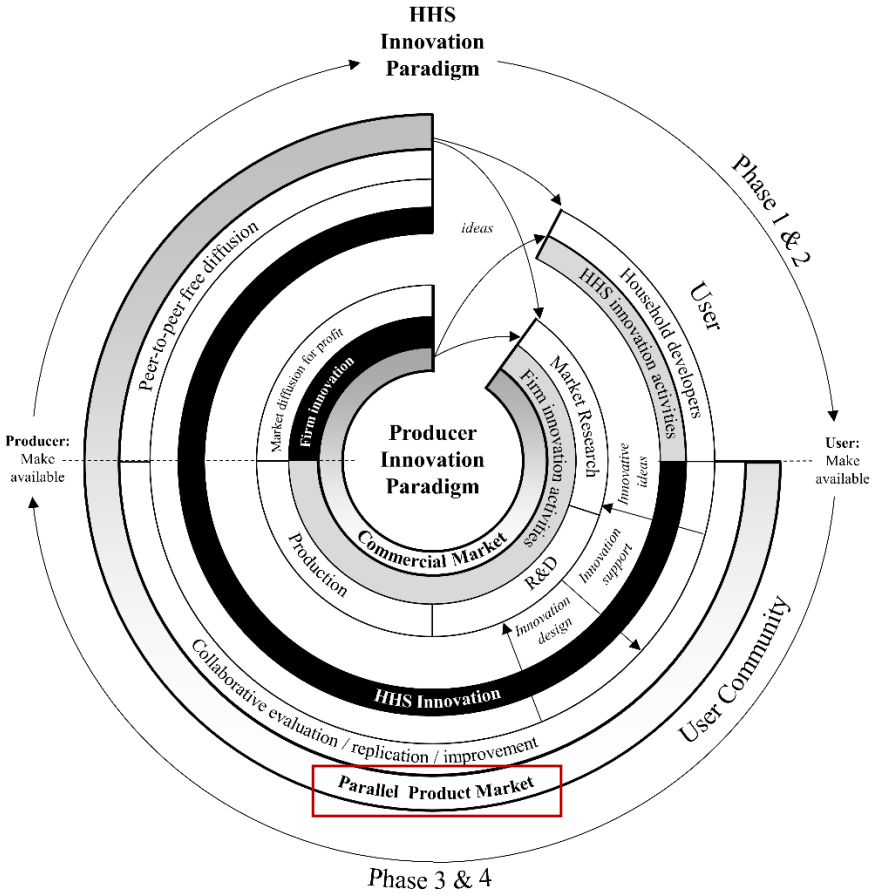


Figure 3. Modified HHS innovation cycle

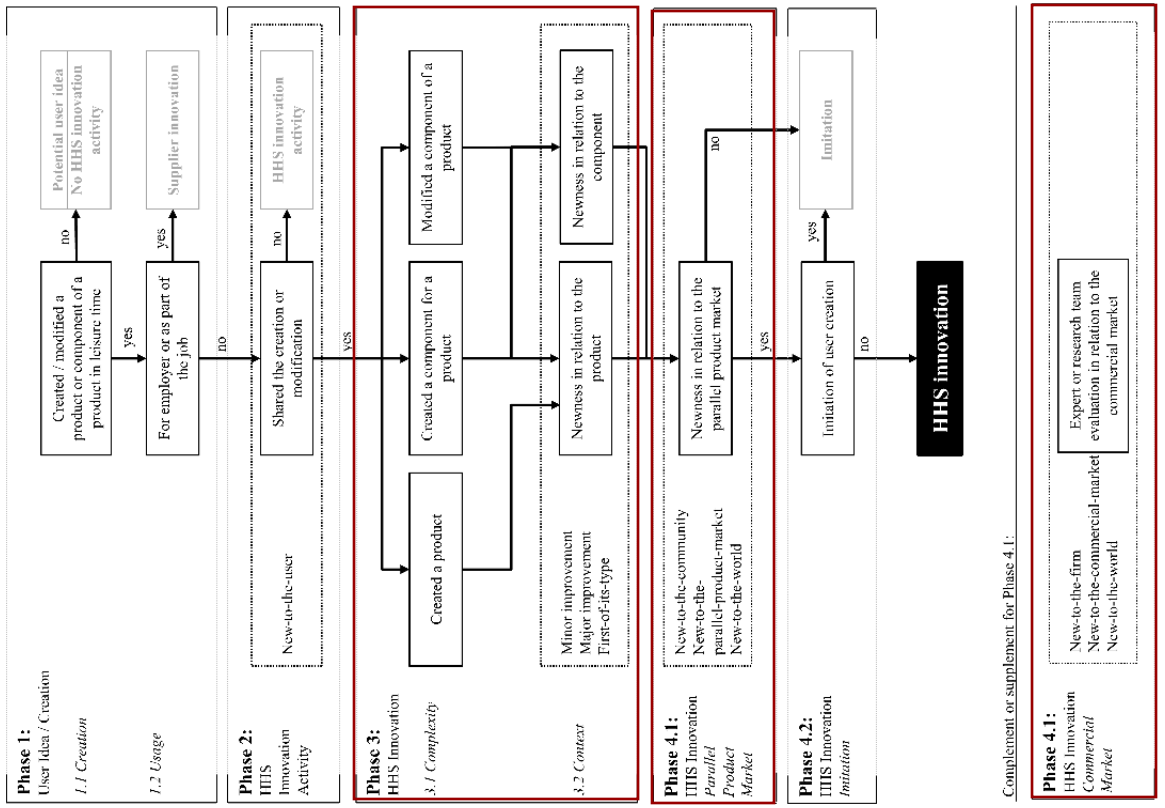


Figure 4. HHS innovation identification and classification framework.

Implications for the Workshop

What characterises innovation in online communities and how do they differ from conventional innovations?

1. Variety of frugal innovations / bricolage, creating products with materials at hand.
2. Lower awareness of innovativeness in comparison with commercial products than researchers or experts.

What are the contributions of online communities to innovation and socio-technical change?

1. Enable users to build their own products with materials at hand at low costs, e.g., own renewable energy products.
2. Community support for building the products and components and recognition of innovations through other users.
3. Direct Research Transfer: Users adopted research papers or patents and adjusted or build it with different materials.

How can innovations in online communities be identified and measured?

1. Netnographies are suitable methodology to identify and measure user innovations, however, work-intensive.
2. Machine Learning with NLP might be a promising approach to reduce the work-intensity for UI identification.
3. Consider parallel market and importance of context and complexity :)

Thank you for your attention!

Contact:

jakob.j.korbel@tu-berlin.de

...and thanks to the Instructables community

1

References

Literature:

Baldwin, C., Hienerth, C., & von Hippel, E. (2006). How user innovations become commercial products: A theoretical investigation and case study. *Research Policy*, 35 (9), pp. 1291–1313.

de Jong, J. P., von Hippel, E., Gault, F., Kuusisto, J., & Raasch, C. (2015). Market failure in the diffusion of consumer-developed innovations: Patterns in Finland. *Research Policy*, 44 (10), pp. 1856–1865.

Gault, F. (2011). User Innovation and the Market. *SSRN Electronic Journal*.

Hyysalo, S., Johnson, M., & Juntunen, J. K. (2017). The diffusion of consumer innovation in sustainable energy technologies. *Journal of Cleaner Production*, 162, pp. S70-S82.

Hyysalo, S., Juntunen, J. K., & Freeman, S. (2013). User innovation in sustainable home energy technologies. *Energy Policy*, 55, pp. 490–500.

Instructables (2022). *Instructables – Yours for the making*. Retrieved from: https://www.instructables.com/.

Korbel, J. J., & Grosse, M. (2017). Identification and Classification of User Innovation: Implications for Future Research. In: *15th International Open and User Innovation Conference*. Innsbruck, Austria.

Korbel, J. J., & Grosse, M. (2020). Identification and classification of household sector innovation: the parallel product market and the importance of context and complexity. *Innovation*, 22 (2), pp. 193-215.

Kozinets, R. V. (2009). Netnography: Doing ethnographic research online. *Thousand Oaks, CA: Sage Publications Ltd*.

Kim, Y. (2015). Consumer user innovation in Korea: An international comparison and policy implications. *Asian Journal of Technology Innovation*, 23 (1), pp. 69–86.

References

Literature:

Luethje, C. (2004). Characteristics of innovating users in a consumer goods field: An empirical study of sport-related product consumers. *Technovation*, 24(9), pp. 683–695.

Luethje, C., Herstatt, C., & von Hippel, E. (2005). User-innovators and "local" information: The case of mountain biking. *Research Policy*, 34(6), pp. 951–965.

Ogawa, S., & Pongtanalert, K. (2011). Visualizing Invisible Innovation Continent: Evidence from Global Consumer Innovation Surveys. *SSRN Electronic Journal*.

Ogawa, S., & Pongtanalert, K. (2013). Exploring Characteristics and Motives of Consumer Innovators: Community Innovators vs. Independent Innovators. *Research-Technology Management*, 56(3), pp. 41–48.

Oliveira, P., Zejnilovic, L., Canhao, H., & von Hippel, E. (2015). Innovation by patients with rare diseases and chronic needs. *Orphanet journal of rare diseases*, 10(1), 41.

Tietz, R., Morrison, P. D., Luethje, C., & Herstatt, C. (2005). The process of user-innovation: A case study in a consumer goods setting. *International Journal of Product Development*, 2 (4), pp. 321–338.

von Hippel, E., de Jong, J. P., & Flowers, S. (2012). Comparing Business and Household Sector Innovation in Consumer Products: Findings from a Representative Study in the United Kingdom. *Management Science*, 58(9), pp. 1669–1681.

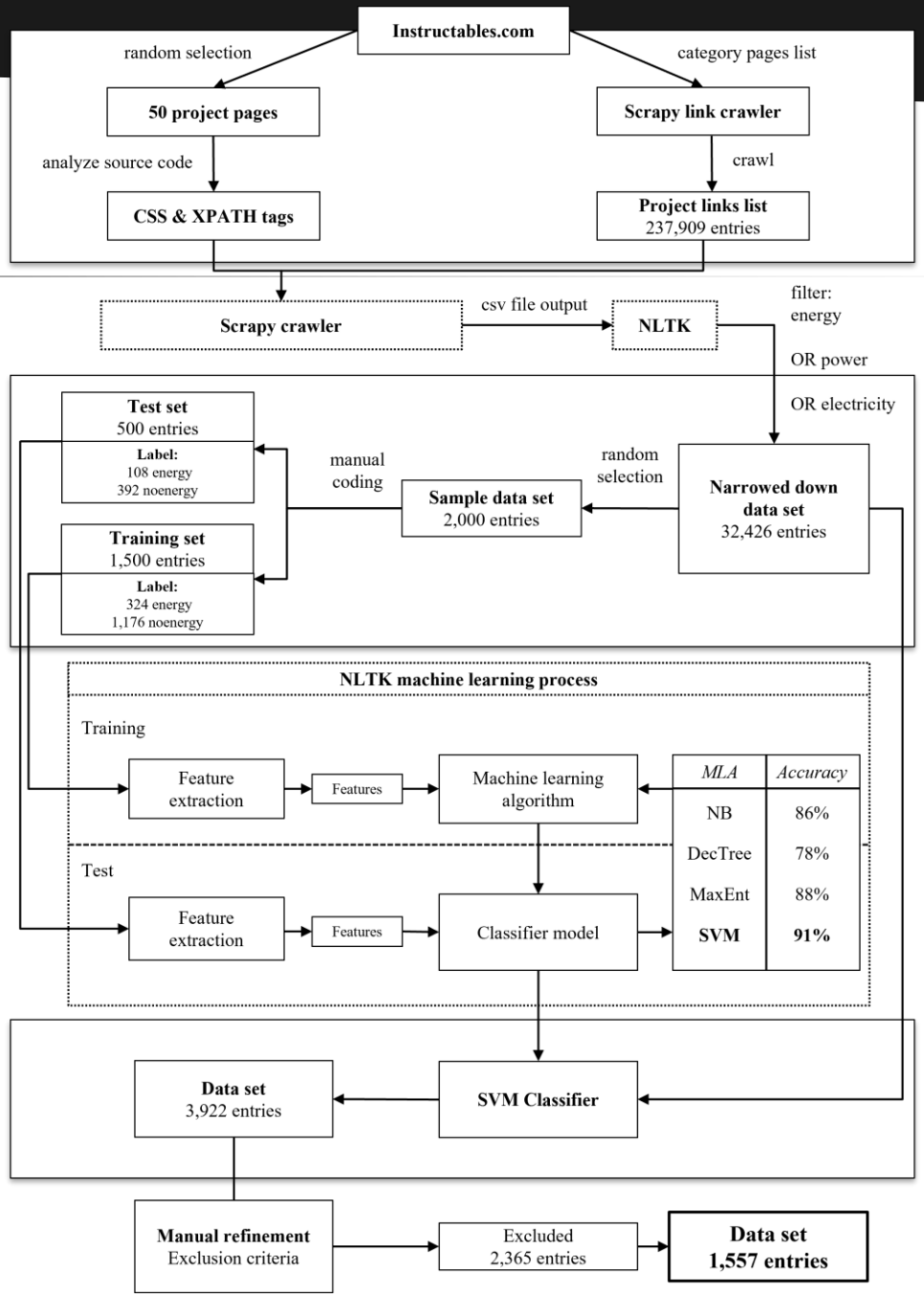
References

Images:

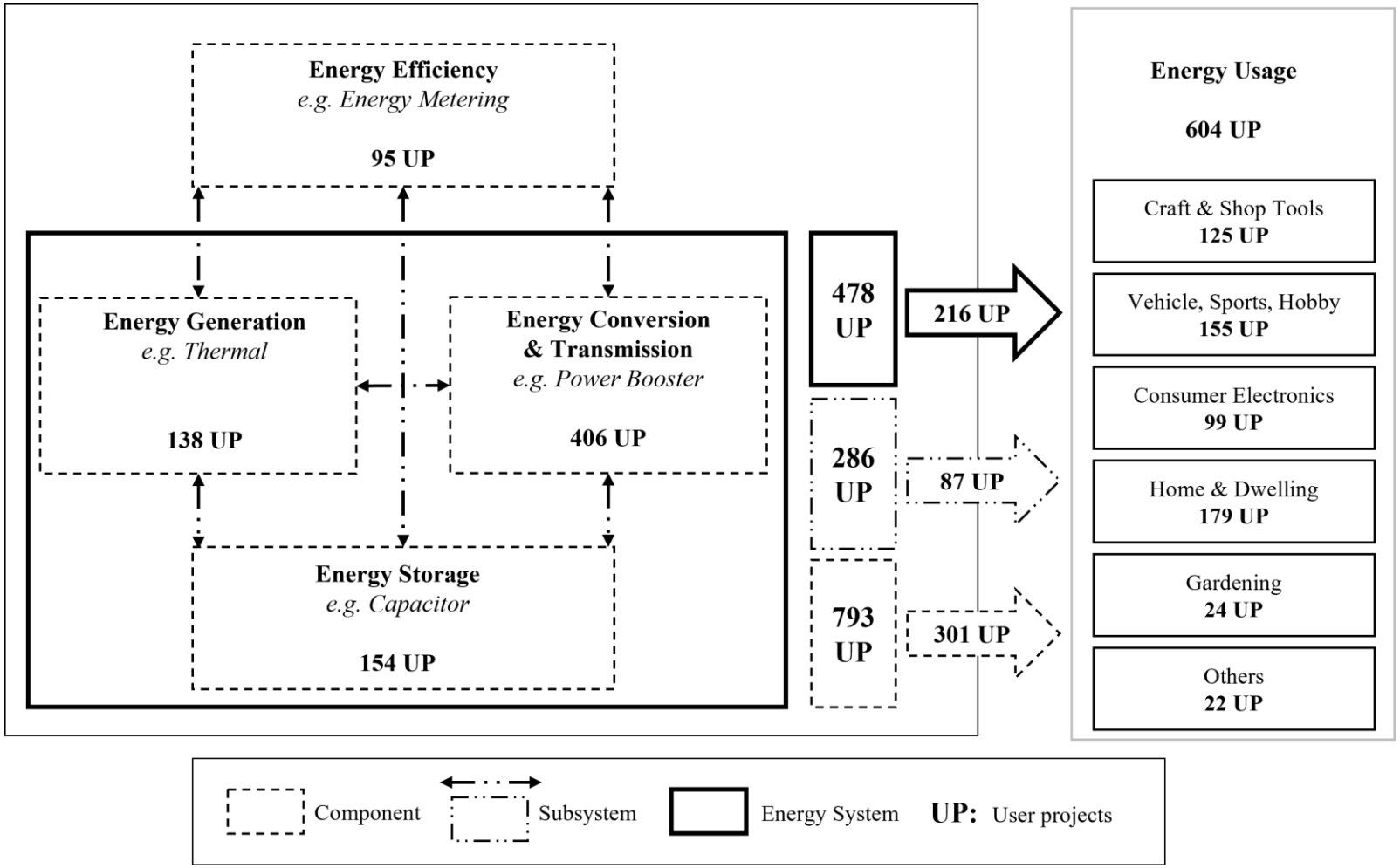
1. Instructables (2022): https://3dprint.com/wp-content/uploads/2014/11/logo-instructables-01.png
2. Electricity generating shoe (2015): https://www.instructables.com/id/Electricity-Generating-Footwear/
3. Electricity generating swing (2009): https://www.instructables.com/id/A-Swing-Set-that-Generates-Electricity/
4. ATX based power supply with lightning and LCD monitor (2014): https://www.instructables.com/id/ATX-Super-Easy/
5. Home-made Microbial Fuel Cell (2009): https://www.instructables.com/id/Simple-Algae-Home-CO2-Scrubber-Part-III-An-Algae/
6. Electricity generating kite (2015): https://www.instructables.com/id/Enjoy-a-nice-cup-of-kite-powered-tea/
7. Bicycle wheel windmill (2014): https://www.instructables.com/id/Bicycle-Wheel-Windmill/
8. Imitation of Shawn Frayne's winbelt (2008): https://www.instructables.com/id/Windbelt-Redux--21st-Century-Micro-Power-Generatio/
9. Wind turbine based on salvaged and recycled materials (2011): https://www.instructables.com/id/How-To-Build-A-wind-Turbine-From-Recycled-Scrap-Me/
10. Award-winning Copper – Zinc AA battery (2015): https://www.instructables.com/id/DIY-AA-Batteries/
11. Mister Davis wind turbine system (2008): https://www.instructables.com/How-I-built-an-electricity-producing-wind-turbine/

Backup

ML process project identification



Categorisation of energy-related projects



Modified HHS lifecycle