

Towards FAIR and Open Hardware

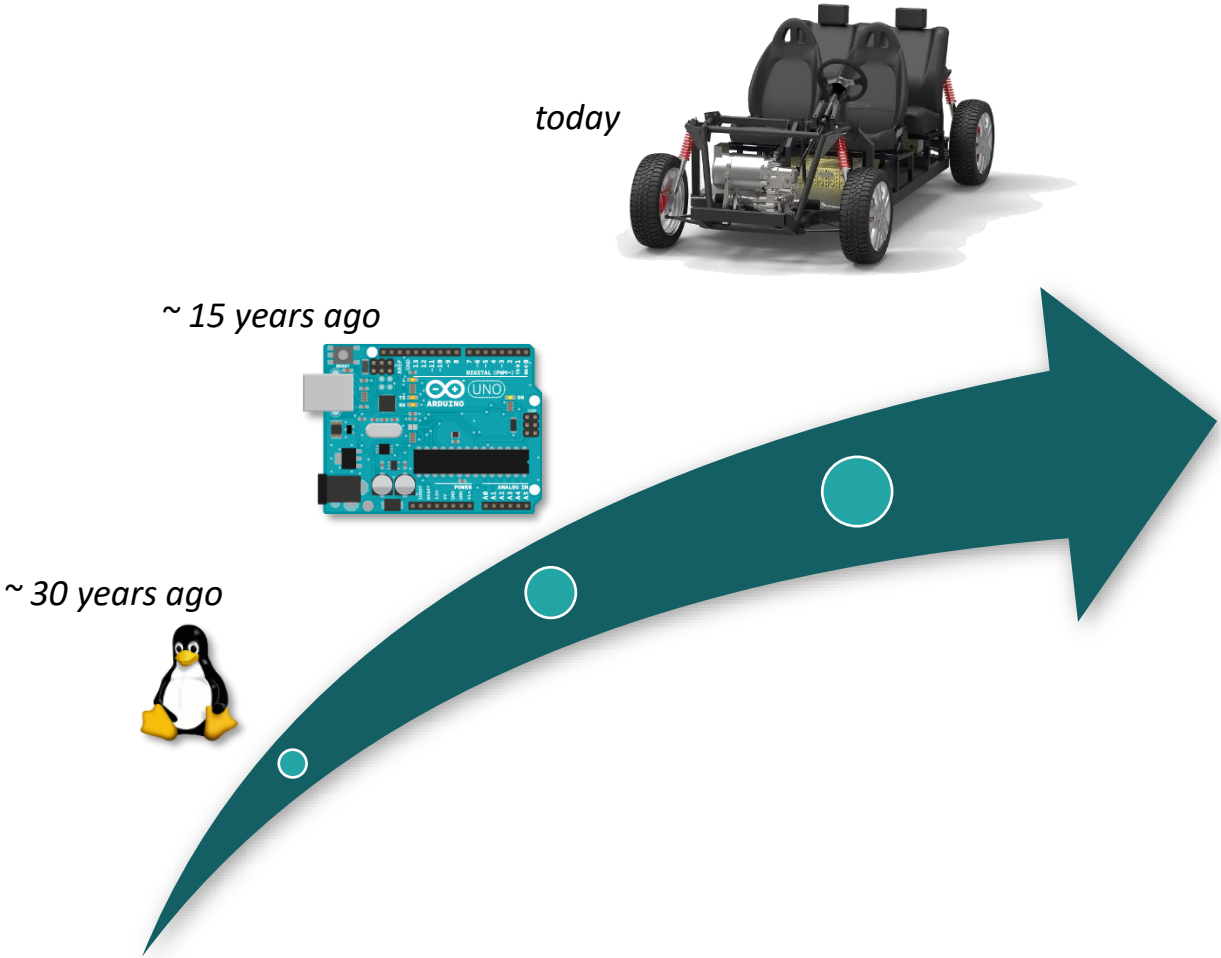
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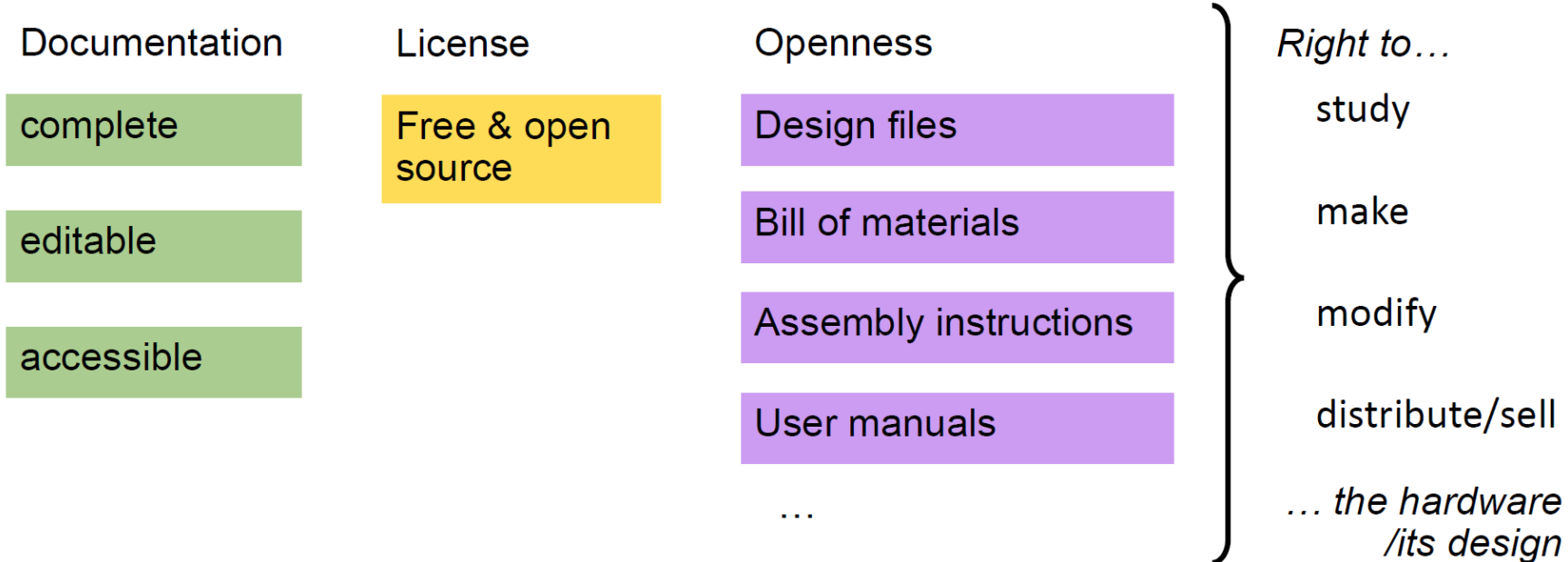
Emergence of open hardware



Hardware documentation

- ▶ “Open hardware” is a well-defined (practice-driven) concept

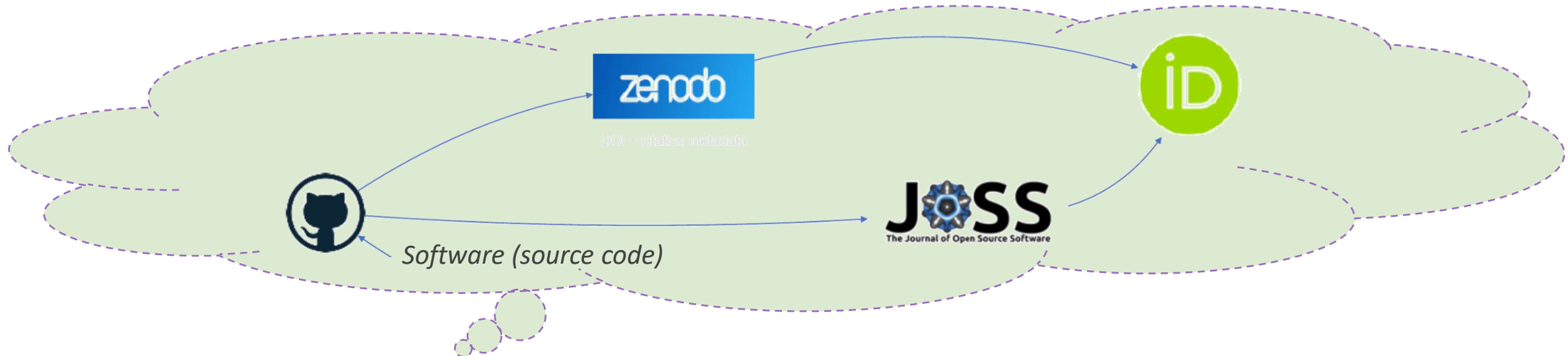
- ▶ Original definition by the *Open Source Hardware Association (OSHWA)*
- ▶ DIN SPEC 3105-1 elaborates openness requirements



- ▶ “FAIR hardware” not defined

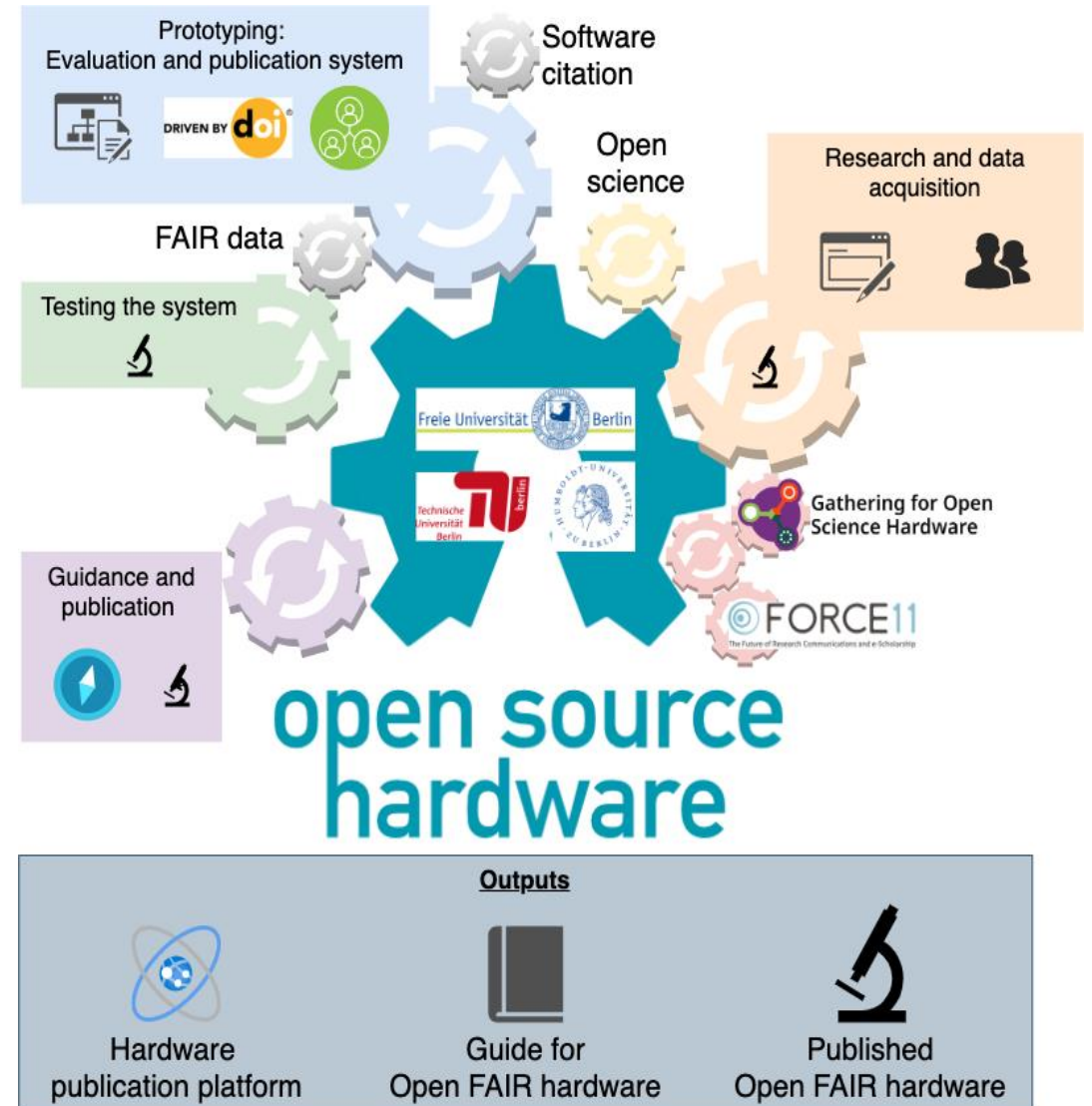
Hardware as a research output

- ▶ RDM as part of hardware making in academia
 - ▶ Product data (“the source”)
 - ▶ Information products (CAD files, BOMs, assembly instructions, etc.)
 - ▷ *design rational, specifications, product architecture, search and retrieval data, etc.*
 - ▶ Persistent identifier (DOI), accreditation systems
 - ▶ Increased recognition of hardware engineers (hardware publishing)

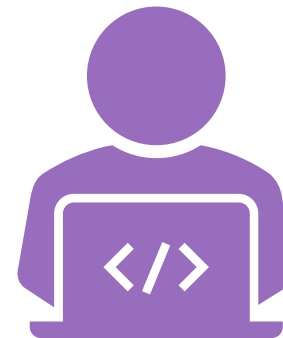


Project goals

- ▶ Research & investigation
 - ▶ Understand current practices and community needs for open hardware publishing, documentation and evaluation
- ▶ Hardware publication platform (implementation)
 - ▶ Gather a community of interest to co-create an ecosystem for hardware publication, including a peer review system, that will provide recognition for the hardware makers
- ▶ Impact maximisation
 - ▶ Produce guidance for makers and PIs in their path to open and FAIR hardware production (e.g. as part of an open access book)
 - ▶ Interact closely with the community to drive further acceptance of the developed workflows

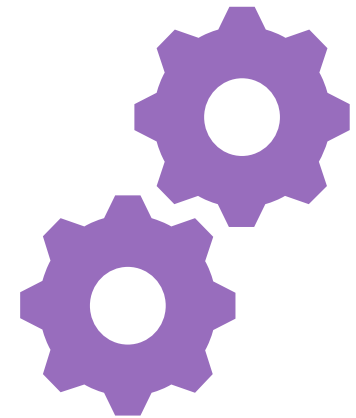


- ▶ Overall aim of fostering hardware as a research output
 - ▶ Presently not widely acknowledged in the scientific community
 - ▶ E.g. through an RDA interest group „FAIR for research hardware“ (recently initiated) and the publishing platform to be developed
- ▶ Hardware as a career path in the future
 - ▶ Understanding of different roles of hardware makers
 - ▶ Future job profiles expected to emerge (e.g. open hardware engineer)



Challenges and barriers

- ▶ Short-term: lack of standards & limited understanding of workflows for hardware making/design in academia
 - ▶ Different types of research hardware
 - ▶ Domain-specific practices
- ▶ Long-term: considerations of IPR protection logic
 - ▶ Revise traditional incentive structure and targets for research outputs (e.g. beyond patents)
 - ▶ Integrate hardware in open science strategies at universities - and hopefully encourage other adopters (e.g. TU Delft, University of Belgrade, etc.)



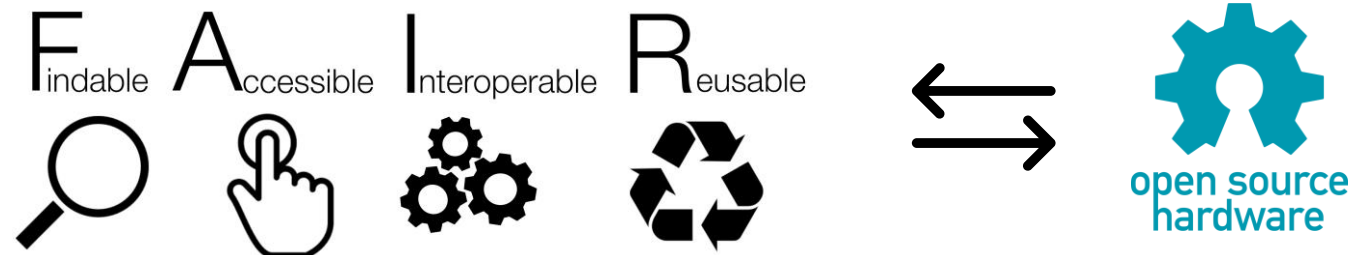
Join our „FAIR for research hardware“ RDA interest group

Open.
Make

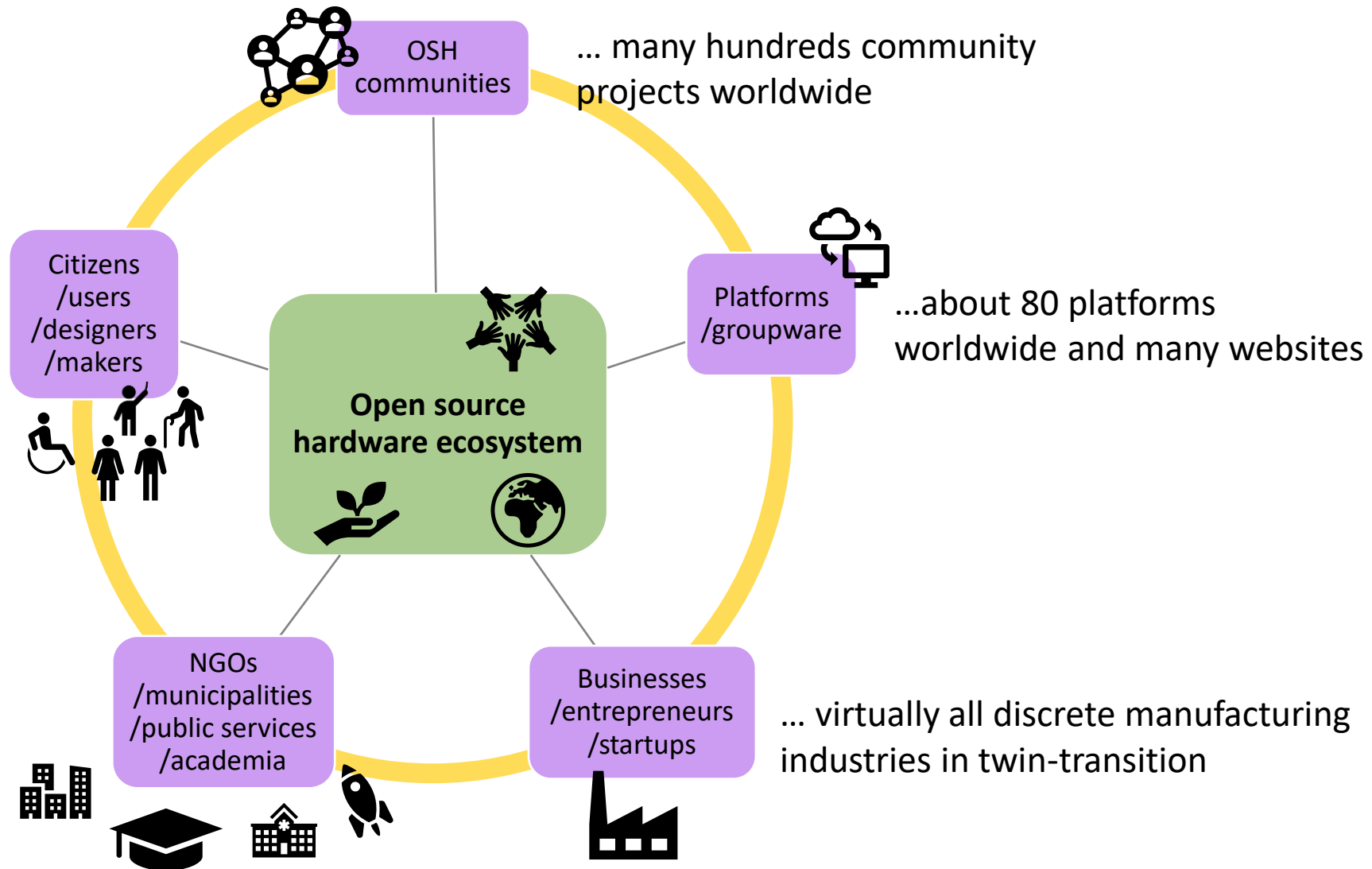
- ▶ FAIR4RH interest group - motivation and aim
 - ▶ Redefinition of FAIR principles for the domain of research hardware
 - ▶ Facilitate and improve (open) hardware dissemination practices
- ▶ Outputs
 - ▶ Start - Charter
 - ▶ Final - Declaration endorsed by RDA



Learn more: <https://www.rd-alliance.org/groups/fair-principles-research-hardware>



Open hardware ecosystem



Open hardware projects (1 of 2)

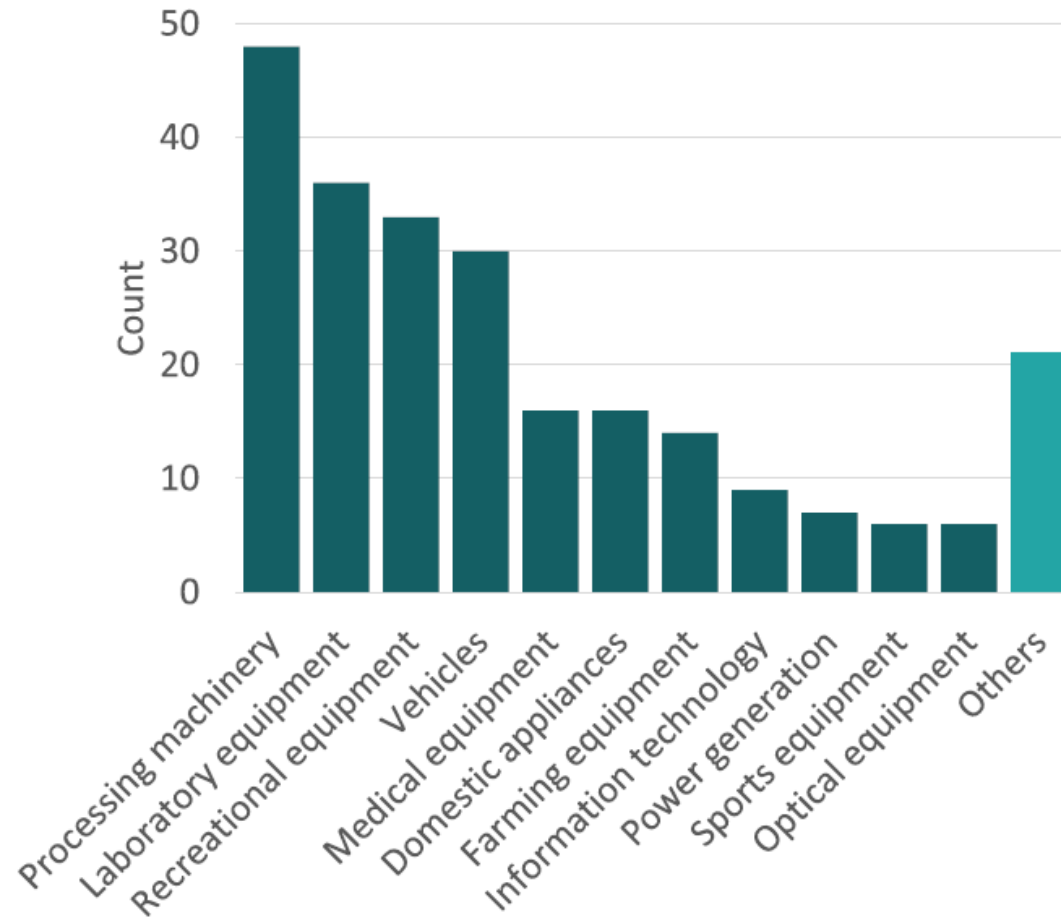
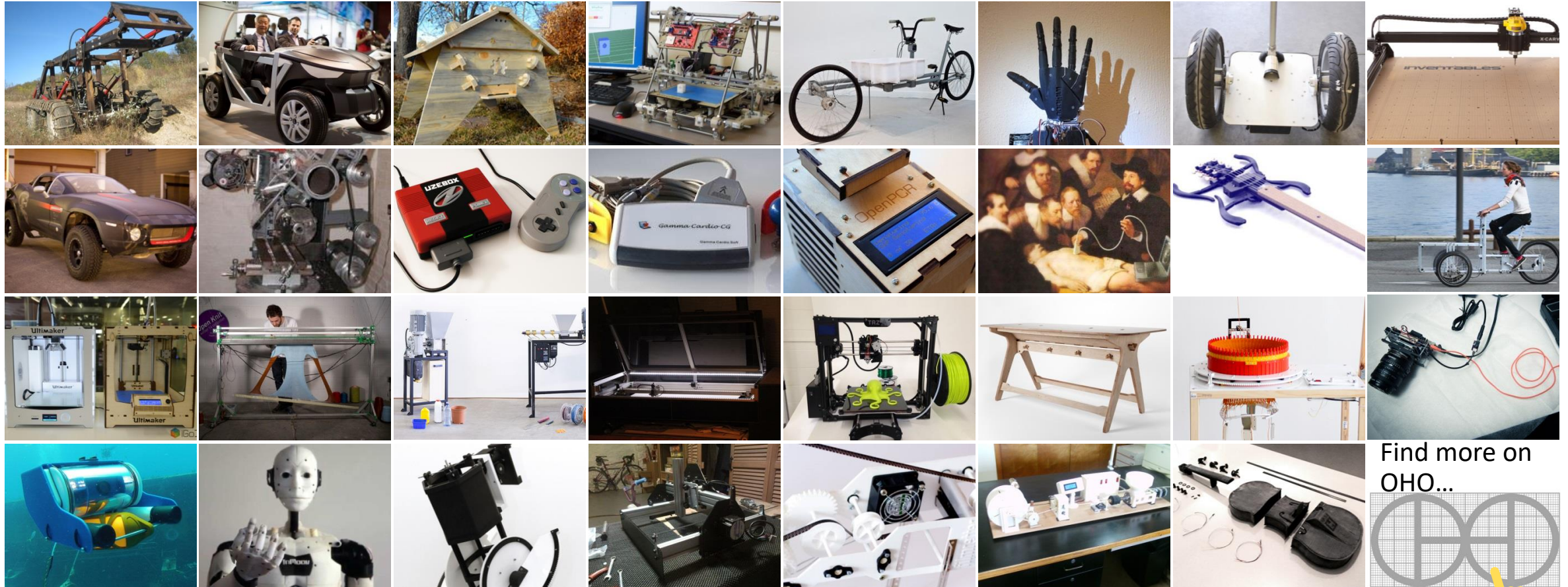


Figure 8. Classification of the selected product into product categories.

Source: Bonvoisin, J., Buchert, T., Preidel, M., & Stark, R. (2018). How participative is open source hardware? Insights from online repository mining. Design Science, 4, E19. DOI: 10.1017/dsj.2018.15

Open hardware projects (2 of 2)

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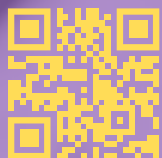


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Thank you for your attention!

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Learn more
www.openmake.de



**Berlin University
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