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# Crowdfunding methodology TEMPLATE

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## NOTES:

Fundraising is regulated within the Sensorica OVN, see more on [Funding methodology](#). Please take seriously into consideration the norms about the handling and the distribution of funds!

See if Jaime has improved [his own document](#). If so, please update this version.

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## 0. Stigmergy

Use this sheet to coordinate with your peers, make it easy for them to understand what has been done, where we're going and what they can do now.

Please refer to Sensorica's

Future activities

...

What you can do now

...

What has been done

...

## 1. Before the campaign

### Chose a crowdfunding platform

We can categorize crowdfunding platforms in different ways.

#### Type of currency

- **Fiat-based crowdfunding platforms:** use the traditional banking system to transfer fiat (\$, €, etc.) from the crowd to you. These platforms are subject to censorship and may not be useful in the developing world where people don't have easy access to financial services foreign currencies. The user experience is pretty straightforward.

- **Crypto-based crowdfunding sites:** use blockchain-based transaction systems to transfer cryptocurrency (BTC, ETH, DAI, etc.) from the crowd to you. Some of these platforms are censorship-proof and are more easily accessible by people in the developing world. Unfortunately, user experience is not as straightforward as fiat-based platforms. Examples: Gitcoin.

## Type of activity

- **Donation-based crowdfunding:** best used to raise money for personal needs as well as community-based projects. You can share your fundraiser with your own network and on social media as a way to amplify awareness and encourage more donations. Examples of donation-based crowdfunding include raising money to cover medical expenses or an unexpected financial crisis, or raising funds for local projects like a community garden or new park. Examples: GoFundMe.
- **Reward-based crowdfunding:** typically used to raise funds for a new startup or organization that offers a product or service. Donors can earn rewards based on the amount they donate. Common rewards include handmade items, prizes donated by partner companies, or free products or services offered by the fundraiser organizer. For example, an artist raising funds to start an art collective and gallery could offer original signed artwork, replica prints, or even a free art workshop based on the amount donated. Example: Kickstarter.
- **Equity crowdfunding:** Also known as crowd-investing, investment crowdfunding, and crowd equity, equity crowdfunding is best for small to medium-sized companies that are seeking a large amount of capital to launch or grow their business. In exchange for donations, donors receive a percentage ownership in the company. This percentage varies depending on the business, and can be a great way for companies to quickly raise funds without the headache of a traditional business loan. Usually, equity fundraising requires large fundraising minimums, typically into the thousands of dollars.
- **Debt Crowdfunding:** Also known as peer-to-peer lending and crowdlending, debt crowdfunding is a fast and easy way for both individuals and businesses to raise the money they need, when they need it. Debt crowdfunding works by collecting donations with the promise to pay them back at a later date. Debt crowdfunding is usually used by businesses that need capital, and that prefer to pay back the funds rather than give out equity. Individuals also used debt crowdfunding when they needed money to pay off a loan or other financial obligation. With a debt fundraiser, make sure to clearly state what the money is needed for and when donors can expect repayment.
- **Real estate crowdfunding:** Among the recent types of crowdfunding models, real estate crowdfunding is becoming more popular for investors who want to put their money in real estate, without the hassle of getting a traditional loan or the obligation of owning all of a single property. Typically, an individual or a real estate company will collect funds from investors to pay for a large property, like an apartment building. With real estate crowdfunding, investors can contribute much smaller amounts of money—usually starting at \$5,000—depending on how much of the property they would like to own.

Investors will then receive payouts each quarter, depending on how much revenue the property generates.

## Define your project

Defining what your vision is the first step for every ideator. Challenge prizes can be very effective when a goal can be defined in concrete terms, and the means for achieving that goal are unknown or too speculative for a traditional research programme, grant programme or procurement.

Challenge prizes are a very simple idea. You identify a problem, publicise the challenge and offer a reward to the person who can find the best solution. You'll attract the interest of the people with the right knowledge and expertise. and, will tap into the promise of a reward, the opportunity to learn and develop new skills, the satisfaction of helping people and to contribute to a change in the world.

Explain why you are the person or team who can lead this project. Why should people want to back you?

What is the most concise message you can craft to communicate the big idea behind your project? What about the most tangible outcome? How will your backers benefit from being a part of the project?

With a precisely defined goal, expectations are transparent for both the creator and potential backers. Backers can judge how realistic the project's goals are, as well as the project creator's ability to complete them. And for creators, the practice of defining a project's goal establishes the scope of the endeavor, often an important step in the creative process.

Kickstarter thrives on these open exchanges and clear explanations of goals. Make sure your project does this!

The more open you are and the more transparent your explanations of goals, the bigger chances your challenge will have!

## Setting the value of a cash prize

Some crowdfunding schemes all-or-nothing, meaning that the challenges must be fully funded, or no prize will be kept for the challenge and no money will change hands.

Challenge prizes offer a financial reward to whoever can first or best deliver a solution to a problem. There is no exact science to setting the value of a cash prize, but it should be proportional to the scale of the challenge.

To determine the prize you'll have to estimate the capital costs and people resources involved, and the level of complexity and timescales. A rough rule of thumb is that the prize is equal to or greater than the value of the investment you might expect one person or team to make, probably with an added bonus.

Prizes can come in all shapes and sizes. Here are some ranges you use:

£50k–£250k/Medium level of complexity: BIGGER, HIGHER, FASTER SOLUTIONS

**The prize aims to stimulate innovation and make improvements in existing markets.**

The market is well-served but there is scope to create bigger, higher and faster solutions by involving new innovators in problem-solving.

£250k–£1 million/ Medium-High level of complexity: ACCELERATED NEW SOLUTIONS

**The prize aims to find innovation with the potential to disrupt or advance the market.**

The market is not fully established or is poorly served, but with the right encouragement and support, innovators can be encouraged to find solutions.

£1 million +/High level of complexity: DRAMATIC LEAPS

**The prize aims to extend market boundaries and create new markets.**

The market does not exist or current innovations are high cost and there is limited supply and demand.

### **Non-financial incentives**

Cash rewards grab headlines and are often the first thing that captures the interest of would-be innovators. But financial incentives are not the only thing that motivates people to participate in prizes.

#### **What motivates participants?**

- Satisfaction of solving a difficult problem
- Satisfaction of helping people
- Satisfaction of applying skills and expertise
- Opportunity for enhanced professional credibility
- Opportunity for increased brand recognition
- Opportunity to share risk attached to research and development
- Cash reward
- Opportunity to win new contracts
- Satisfaction of applying skills and expertise
- Opportunity to learn and develop new skills

How will you tap into the passions and interests of innovators and understand what will push their buttons? Will people be compelled by a moral purpose and the chance to make a difference in the world? Or is it professional credibility that drives their interest (what scientist or research group wouldn't want it known that they had cracked an important problem for NASA)?

From the launch of a challenge to the award of the prize and beyond, you can create lots of opportunities for publicity and recognition. Don't overlook how attractive it can be to participate in a prize that is linked to an ambitious and challenging mission. Richard Branson continues to flag his entry in the Ansari X-Prize as part of a story of the birth of the Virgin Galactic brand, linking his endeavours to a powerful history of prize-driven entrepreneurship. Sometimes just participating in a prize can validate effort and enhance professional credibility.

**Recognise that the benefits of prizes are mutual. If you are smart in the way you engage and recruit participants, you will find a way to align their passions, energy and commitment with the bigger aims of your prize, so that what drives people to solve the problem you set is never just the money.**

## Developing your prize

What should you do next? How do you begin the real work of scoping and designing a prize?

### Scoping your prize

It helps to begin by doing four things:

1. Clarifying your own strategic aims and constraints.
2. Investigating the problem, need or opportunity more deeply and checking that you have the right conditions for running a successful prize.
3. Thinking about likely innovators – the people you would want to participate in your prize – and how you might encourage their participation.
4. Discussing your ideas and research findings with experts and if necessary, undertaking further research and enquiry based on their feedback.

Below is a set of prompts for planning these initial scoping activities. We find that this phase of work is critical to checking that we have the right conditions for a prize and that we are focussing our thinking on the right kind of problem and the right kind of 'solvers'.

### Expect to deliberate and iterate

It is highly likely that in this phase of initial scoping your challenge prize idea will change. With a deeper enquiry into your prize area, you are likely to shift and refine the focus of your prize. This is to be expected. Sometimes you will need to investigate a different angle on or aspect of the

problem or opportunity. Sometimes you might need to redraft your aims because new insights emerge about the opportunities and constraints around the work. You might also find the conditions are not right for a prize. You may need to undertake more than one research and analytical exercise to follow up additional questions that arise.

See this work as iterative and plan a series of events and activities (roundtables, workshops or focus groups) that help you to test your early thinking with different people. We sometimes like to assemble written provocations to take into these events based on our early ideas, so that it is easy for others to challenge, ask questions and help to develop our thinking.

### **What are your aims and constraints?**

Your strategic aims and the constraints of your operating environment will shape decisions about how you focus and frame the prize.

Key questions for you and your team:

- What is driving the project? Why is it important to tackle this issue? Why do we think a challenge prize could work?
- What are our aims and what kind of impact do we hope to have through the prize? Looking at the list below could help clarify your aims (and remember, you may have more than one aim).

We want to:

- Solve a problem.
- Prompt a major breakthrough in thinking and practice.
- Bring new products and services to market.
- Shine a light on a neglected issue or problem.
- Encourage other people to invest in solving a problem or making advances.
- Prompt new collaborations and partnerships.
- Gather new information and data on an issue.
- Identify great ideas.
- Identify great practice.
- Build the capacity of new innovators and support their entry into the market.
- What would be an acceptable outcome for your commissioners and sponsors?
  - How important is it to demonstrate a radical leap? How important is it to show an immediate impact or to bring products to market?
  - How important is profit generation through the new solution? Will you want to retain the IP of any solutions developed?
- What are the budget, timing, legal factors that will shape the program? Do the timings and budget seem appropriate given your level of ambition?
- Will you need to seek additional strategic partners to deliver on your aims (either to bring in additional funding for the prize, to provide support to innovators as they develop solutions, or to offer advanced market commitment as part of the incentive)?



## What is the problem, need or opportunity?

### **You will want to develop a thorough understanding of your challenge area that includes:**

- Awareness of existing innovation efforts and activities in your area of interest, so that you do not launch a prize in search of a solution that already exists, or into an already crowded research and development space.
- Understanding the barriers to progress in relation to your issue, so that you can check whether the incentives you have in mind would stand a chance of resolving these blockages.
- Analysis of the market for the kinds of solutions you might create – are there ready commissioners, purchasers and customers for the innovation?

### **Your research might ask:**

- What are the priorities, trends and issues in this challenge area?
- What are the barriers to progress (market, cultural, technical or financial)?
- What efforts are already in place to tackle the problem or explore the opportunity? How effective are they? Why have past efforts failed?
- What are the recent or imminent breakthroughs in your challenge area?

Your research should help you to check that you have spotted a genuine opportunity for innovation and provide you with the evidence you need to be confident that you could make progress with a prize.

## Who are the experts on this?

### **You will want to identify and engage a range of people who can:**

- Help you to understand your challenge area and the relevant past, current and future activities.
- Identify and reach out to potential innovators, and understand what might motivate them.
- Be actively involved in helping you to make the right choices about the focus and design of the prize.

### **Imagine expertise in its broadest sense and reach out to people who:**

- Research and think about the issue (academics, researchers and thought leaders).
- Need and would use the new solutions (citizens, service users, consumers).
- Commission or purchase solutions (commissioners, policymakers and businesses).
- Create solutions (engineers, designers, social innovators).
- Create problems or suffer the problems you are trying to address.

These people can play a variety of roles through both your design and operational phases. They can become your advisers and advocates, your judges of performance, and the people who encourage and support the adoption and use of the solutions you create.

## Who might be the likely innovators?

**The following are questions that you could explore, either through a research exercise or through your discussions with experts:**

- Who has the knowledge and experience to tackle this issue (think laterally and explore unusual options)?
- If it is easy to identify likely participants, what's stopping you from commissioning them directly? What difference could the prize incentive make to interest and activity?
- Are there any particular collaborative arrangements that you could support that could be powerful in generating different kinds of solutions?
- If it is difficult to identify likely participants, what research and investigations could you undertake to identify innovators?
- Are there any online platforms that have active 'solver' communities whose expertise is relevant?

**Once you have developed a picture of potential innovators:**

- What is the best way of reaching and engaging innovators?
- What might motivate them to get involved?
- What support and resources might they need and how likely are they to have access to these?
- What level of risk will entrants be taking by entering?
- What are the potential costs associated with creating a solution?

## Outcomes of your scoping exercise

If you've undertaken the activities above, you will probably have made progress in the following areas:

### **Clarifying strategic aims and constraints**

You should have clear aims for the prize and a sense of the impact you would hope to see, and any specific outcomes that sponsors and commissioners expect. You might also have assembled a set of strategic partners to take the work forward and have clear sense of the budget and timescales for the program.

### **Clarifying the problem, need or opportunity**

You should have developed a solid understanding of the context around your challenge area including past and current innovations efforts. You have judged that the conditions seem right for a prize – it looks as though an inducement could stimulate the right kinds of innovators to

develop solutions and that there could be a market for these.

### **Engaging experts**

You will have engaged an expert or stakeholder group, and hopefully inspired their interest and commitment to your project. They have helped you to clarify your initial assumptions and make some decisions about a firm focus for your prize.

### **Identifying innovators**

You may not know exactly who your innovators are but you have a sense of the kinds of people you need to reach out to and engage. You have also given thought to what might motivate them to participate and what level of finance and support they might need.

## **Making design decisions**

Once you have developed your understanding of your challenge, it is time to make some precise design decisions. We usually prepare our prize design according to the checklist of details below – a completed checklist becomes the basis for design.

You will find a worksheet for recording your own decisions [here](#). You can use it with colleagues to develop and check your thinking about prize design.

### **Checklist for prize design**

You can find a worksheet for recording your own decisions [here](#). You can use it with colleagues to develop and check your thinking about prize design.

#### **1. What is your rationale for a prize?**

Describe the context for your prize and the need you are trying to address, problem you are trying to solve or opportunity you are aiming to take.

Explain your theory for why the prize will work and what you expect it to achieve. Include the evidence you have gathered from research and engagement to substantiate your account.

#### **2. What is your prize statement or question?**

Define the challenge to which you want people to respond in a single sentence or two. The sentence may also suggest the method you have chosen for judging successful performance against the goal.

Make sure you have considered:

- What constitutes success in the eyes of your commissioners and sponsors.
- The period of time over which success will be realistically (but still ambitiously) achieved.
- How success could best be measured (whether as the achievement of a specific target

or as the best result over time).

- What kind of test environment or judging process you might need to create.

### **3. What are your eligibility criteria?**

Define who can and cannot participate in the competition. This will reflect the decisions you have made about the kind of innovators you need to target (and whether you will be highly targeted or very open).

### **4. What is your prize (and other incentives)?**

Define the exact value of the cash prize (if there is one) and any other financial or non-financial incentives, such as a commitment to purchase solutions or to provide developmental support.

**Your choices should be informed by the evidence you have gathered about:**

- What will motivate the specific groups and individuals you'll target.
- The support and resources they might need and whether it is likely that they have access to these.
- The level of risk people will take by entering (and the likely cost of the investment they will make to develop a solution).

### **5. What is the prize structure?**

Describe how your prize process will work as a program, including whether you will have interim prizes or stage gates, and whether you will provide support.

**Your choices should be informed by the evidence you have gathered about:**

- What will motivate the specific groups and individuals you'll target.
- The support and resources they might need and whether it is likely that they have access to these.
- The level of risk people will take by entering (and the likely cost of the investment they will make to develop a solution).

### **6. How will you assess and judge prize winners?**

Define the criteria you will use to judge performance against the goal, outline any test environment you might need to create and describe the kind of expertise you will need on an assessment and judging panel.

**Make sure you have considered:**

- What constitutes success in the eyes of your commissioners and sponsors.
- The period of time over which success will be realistically (but still ambitiously) achieved.
- How success could best be measured (whether as the achievement of a specific target or as the best result over time).

## **Reflecting on your design sketch**

Capture your initial thoughts about prize design using the [Challenge Prize Design Worksheet](#).

Having arrived at some answers to the questions above, what kind of challenge prize have you sketched?

- Are you happy with all aspects of the design? Do you need to undertake some additional research and engagement to develop or check aspects of the design?
- How feasible is your challenge prize? Do you have the time, expertise and resources to run a prize like this? What additional expertise and resources might you need to enlist to run the challenge prize? What kind of strategic and delivery partners might you need to approach?

If you are happy that your prize design is robust and feasible, you might be ready to develop a plan for running your challenge prize.

Plan for almost all aspects of delivery of your challenge prize before you launch. This is important for all programs, but especially for prizes where all your key players need a clear and precise understanding of the rules of engagement (this includes participants, judges and assessors, any support providers and your communications specialists). Well-planned briefings and communications are critical across the board, so that everyone understands your vision and the role you'd like them to play in meeting the challenge.

## 2. Build a community around your project.

Here are some practical steps you can follow:

- Consider your close network of friends, family and community
- Start a blog where you share progress on the challenge. This will hold you accountable and let people know and get excited about the vision you're working on
- Let your supporters leave their mark. You will want them to actively get involved in your project, but they will only get involved when they feel included as part of the project or the mission
- Talk about your project. Whether it's a conference, meetup or just a friends gathering, forcing yourself to write down your project and talk about it in public
- Start an e-mailing list for those who want to be notified about the progress of your challenge, it can be very valuable when you launch your campaign

## 3. Tell the story of the Challenge

Creating a Prize challenge should take some time to be done correctly. Most successful crowdfunding campaigns take around two weeks to craft their project before launch. Here are some important steps:

### **Titling your project**

Your challenge title should be simple, easy to understand, and impactful, and it should include the title of the leading project you're raising the prize for. Make your title differentiating your identity. Avoid words like "help", "support", "provide" or "fund". They imply that you're asking someone to do you a favor rather than creating something that will make the world a better place. Here is a [great article](#) on the importance of wording in Crowdfunding campaigns.

### **Picking your project image**

Your project image is how you will be represented on Kickstarter and the rest of the web. Avoid banners announcing stretch goals or benchmarks, as they can cause confusion among backers. Pick something that accurately reflects your project and that looks nice, too!

### **Writing your short description**

Your short description appears in your project's widget, and it's the best place to quickly communicate to your audience what your project is about. Stay focused and be clear on what your project hopes to accomplish. If you had to describe your project in one tweet, how would you do it?

### **Writing your bio**

When you let people know about yourself, your work and your background, it is a great way to strengthen the connection with those supporters who will trust your project with their money. Your bio is a great opportunity to share more about you. Write a little bio, share some links to your previous work.

### **Get feedback**

Send your challenge preview to friends and family and get feedback before the campaign starts. This will bring some very helpful insights.

## **4. Make a video**

Videos are important. There is so much information on the Internet that we all welcome a play button that makes all the effort for us. Videos are also great for conveying the emotions, motivations, character of the project, and shows the effort and enthusiasm you put in your idea.

Making a video can be tough, and it can be intimidating for those who don't get often in front of a camera. But it is a great challenge to achieve, and it shows that you are willing to put yourself out there for what you're doing. The video can be just yourself telling your story to the camera made on a Sunday or a huge Hollywood montage where you have spent quite some time filming and editing.

Whatever you decide, you should at least include:

- Who you are
- What is the story of the challenge? How did it come up to you? How evolved is the idea? Why are you excited about it?
- Why the support of everyone is so important, explaining how the prize will help pay those who develop an Open Source solution available for everyone.
- Explanation of how bringing this idea to the world is going to create so much awesomeness, using examples, images, or whatever you come up
- Explanation of what crowdfunding is. Crowdfunding is a fairly new concept some people still don't know, and Prize Crowdfunding is even newer, so everyone will be grateful for an introduction of the platform and of the reasons why you are putting your challenge on it.
- Explanation that if the goal isn't reached, nobody will look to solve the problem you are talking about, and the solution won't benefit anyone, making the world a poorer place.
- Invite and thank everyone for joining ;)

And be careful not to use copyrighted music in your video without permission. Copyright is not fun and can lead to lawsuits. You can check these resources in the meantime: SoundCloud, Vimeo Music Store, Free Music Archive, and ccMixter.

## 5. Promoting your challenge

Projects who are meant to make a contribution to the world are incredibly capable of attracting great attention and support through the internet, but it has to be done wisely. **An exceptional project can lead to outpourings of support from all corners of the web, but for most projects, support comes from within their own networks and their networks' networks. If you want people to back your project you have to tell them about it. More than once! And in a variety of ways! Here's how:**

**Smart outreach**

**A nice, personal message is the most effective way to let someone know about your project.**

Fundraising is regulated within the Sensorica OVN, see more on [Funding methodology](#).

Send an email to your close friends and family so they can be first to pledge, then use your personal blog, your Facebook page, and your Twitter account to tune in everyone who's paying attention. Don't overwhelm with e-blasts and group messages, but be sure to remind your networks about your projects a few times throughout the course of its duration. Take the time to contact people individually. It makes a big difference.

### Meeting up

Don't be afraid to take your Kickstarter project out into the real world. Nothing connects people to an idea like seeing the twinkle in your eye when you talk about it. Host pledge parties, print posters or flyers to distribute around your community, and organize meetups to educate people about your endeavor. Be creative!

### Stopping the presses

Contact your local newspaper, TV, and radio stations and tell them about your project. Seek out like-minded blogs and online media outlets to request coverage. Writers are always looking for stories to write about, and the media has a big soft spot for DIY success stories. Choose three successful Kickstarter campaigns in your category and find out who wrote about them.

List all of the influential people in your network and send them a personal e-mail about your project prior to the launch.

### Keeping it real

Whatever channel you use to tell your project's story, don't spam. This includes posting your link on other Kickstarter project pages, @messaging people to beg for money on Twitter, link-bombing on Facebook, and generally nagging people you don't already know. Over-posting can alienate your friends and fans, and it makes every other Kickstarter project look bad too. Don't do it!

## Define which license the project will have:

We hope you aim for an Open Source Challenge that is as inclusive as possible, but the choice is still in the hands of the solver, but anyone should be able to **study, modify, distribute, make, and sell the design**.

Using a permissive license, like the [Apache Software License \(ASL\)](#), or a weak copyleft license, like the [Eclipse Public License \(EPL\)](#), Berkeley Software Distribution (BSD), makes it easier for a wider range of companies to engage.

Licensing a product may imply several consequences, especially regarding the actual use that



people will make of your inventions and the derivative works that are created: license shapes the community in some ways.

For example, if you are addressing the makers movement, a good choice could be to adopt [CC-BY-SA](#), as [Arduino](#) does with its hardware designs implying that all the Arduino ecosystem will stay Free and Open.

On the other hand, the [openPicus](#) team – targeting a slightly different customer segment – mostly made of OEMs, System Integrators and companies that look for enabling intelligent connected functionalities to their products – allows for the technology to be embedded in **final**, **boxed**, **commercial** and event certified products with more ease, by adopting a [CC-BY](#) (no copyleft clause) license.

**CERN OHL** was developed to be used on the Open Hardware Repository, a huge open hardware repo used within the CERN to develop open hardware products and encourage reuse and external contributions. Here's the detail: <http://www.ohwr.org/projects/cernohl/wiki>

## During the campaign

### Spend time to take care of the campaign and share updates

When planning your deadlines don't calculate on getting anything done towards the project while running the campaign.

Make a press kit in advance. Answering similar questions, looking up photos and organizing interviews takes a lot of time.

Prepare to change campaign midway if something isn't working or to introduce new elements. The last days have a lot of urgency, so plan actions towards them.

## After the Campaign

### Documenting the project:

If you are developing hardware you should make it possible for anyone who wants to access the project as easily as possible **to study, modify, distribute, make, and sell the design**. You can find below the best practices established by the [Open Source HardWare Association](#):

# Elements of an Open-Source Hardware Project

Here are some files that you should consider sharing when publishing your open source hardware project. You are not required to post them all, but the more you share the more the community benefits and the higher the likelihood the community will pick up your project.

## Overview / Introduction

Your open-source hardware project should include a general description of the hardware's identity and purpose, written as much as possible for a general audience. That is, explain what the project is and what it's for before you get into the technical details. A good photo or rendering can help a lot here.

## Original Design Files

These are the original source files that you would use to make modifications to the hardware's design. The act of sharing these files is the core practice of open-source hardware.

Ideally, your open-source hardware project would be designed using a free and open-source software application, to maximize the ability of others to view and edit it. For better or worse however, hardware design files are often created in proprietary programs and stored in proprietary formats. It is still essential to share these original design files; they constitute the original "source code" for the hardware. They are the very files that someone will need in order to contribute changes to a given design.

Try to make your design files easy for someone else to understand. Organize them in a logical way; comment complex aspects; note any unusual manufacturing procedures; etc.

Examples of Original Design Files include:

- 2D drawings or computer-aided design (CAD) files, such as those used to describe two-dimensional laser cut, vinyl cut, or water-jet cut part, in their original format.
- Example formats: Native 2D design files saved by Corel Draw (.cdr), Inkscape (.svg), Adobe Illustrator (.ai), AutoCAD, etc.
- 3D designs that can be 3D printed, forged, injection molded, extruded, machined, etc. Example formats: Native files saved by SolidWorks (.sldprt, .sldasm), Rhino, etc.
- Circuit board CAD files such as capture files (schematics) and printed-circuit board (layout) design files.
- Example formats: Native files saved by Eagle, Altium, KiCad, gEDA, etc.
- Component libraries (symbol, footprint, fastener, etc.) necessary for native modification of CAD files.
- Additional technical drawings in their original design formats, if required for fabrication of the device.

- Additional artwork that may be used on the device and is included as part of the OSHW release, such as an emblem, or cosmetic overlay in the original design format.

In the event that a design was originally created in an alternative format, even one that might normally be considered as an auxiliary design file (as discussed in the following section), that original design in the original format could be considered the “original design files”.

Examples of alternative formats that could constitute original design files under special circumstances include:

- Hand-coded G-code for a machined part. (G-code)
- Scans of hand-drawn blueprints. (JPEG)
- Detailed 3D scans of a hand-carved resin-casting mold. (STL)
- Mask pattern for etching a single-side circuit board, as drawn in MS Paint. (PNG)

## Auxiliary Design Files

Beyond the original design files, it is often helpful to share your design in additional, more accessible formats. For example, best practice open-sourcing a CAD design is to share the design not just in its native file format, but also in a range of interchange and export formats that can be opened or imported by other CAD programs.

It is also helpful to provide ready-to-view outputs that can easily be viewed by end users who wish to understand (but not necessarily modify) the design. For example, a PDF of a circuit board schematic, or an STL of a 3D design. These auxiliary design files allow people to study the design of the hardware, and sometimes even fabricate it, even without access to particular proprietary software packages. However, note that auxiliary design files are never allowed as substitutes for original design files.

Examples of auxiliary design files include:

- 2D drawings or CAD files, in a 2D export or interchange format.
- Example formats: DXF, SVG
- 2D drawings or CAD files, in an easily viewable 2D export format.
- Example formats: PDF, JPEG, PNG, etc. (Where possible, vector formats are preferred over bitmap formats.)
- 3D designs or CAD files, in a 3D export or interchange format.
- Example formats: STEP, IGES
- 2D or 3D designs in manufacturing-ready export formats
- Example formats: G-code, STEP-NC, STL, AMF
- Circuit board design files in export or interchange formats.
- Example formats: EDIF, Open JSON
- Circuit board designs in manufacturing-ready formats
- Example formats: Gerber RS-274X, Excellon
- Additional technical drawings in their original formats, if required for fabrication of the device, in a commonly-readable format such as PDF.
- Additional artwork, for example different colored skins for an instrument panel.

## Bill Of Materials

While it might be possible to infer from the design files which parts make up a piece of hardware, it is important to provide a separate bill of materials. This can be a spreadsheet (e.g. CSV, XLS, Google Doc) or simply a text file with one part per line. If your CAD package has integrated or add-on BOM management tools, those are also a good option. (Examples include the built-in tools in SolidWorks and bom-ex for Eagle.) Useful things to include in the bill of materials are part numbers, suppliers, costs, and a short description of each part. Make it easy to tell which item in the bill of materials corresponds to which component in your design files: use matching reference designators in both places, provide a diagram indicating which part goes where, or otherwise explain the correspondence.

## Software and Firmware

You should share any code or firmware required to operate your hardware. This will allow others to use it with their hardware or modify it along with their modifications to your hardware. Document the process required to build your software, including links to any dependencies (e.g. third-party libraries or tools). In addition, it's helpful to provide an overview of the state of the software (e.g. "stable" or "beta" or "barely-working hack").

## Photos

Photos help people understand what your project is and how to put it together. It's good to publish photographs from multiple viewpoints and at various stages of assembly. If you don't have photos, posting 3D renderings of your design is a good alternative. Either way, it's good to provide captions or text that explain what's shown in each image and why it's useful.

## Instructions and Other Explanations

In addition to the design files themselves, there are a variety of explanations that are invaluable in helping others to make or modify your hardware:

***Making the hardware.*** To help others make and modify your hardware design, you should provide instructions for going from your design files to the working physical hardware. As part of the instructions, it's helpful to link to datasheets for the components / parts of your hardware and to list the tools required to assemble it. If the design requires specialized tools, tell people where to get them.

***Using the hardware.*** Once someone has made the hardware, they need to know how to use it. Provide instructions that explain what it does, how to set it up, and how to interact with it.

***Design rationale.*** If someone wants to modify your design, they'll want to know why it is the way it is. Explain the overall plan of the hardware's design and why you made the specific choices you did.

Keep in mind that these instructions may be read by someone whose expertise or training is

different from yours. As much as possible, try to write to a general audience, and check your instructions for industry jargon, be explicit about what you assume the user knows, etc. The instructions could be in a variety of formats, like a wiki, text file, Google Doc, or PDF. Remember, though, that others might want to modify your instructions as they modify your hardware design, so it's good to provide the original editable files for your documentation, not just output formats like PDF.

# Open-Source Hardware Processes and Practices

## Designing your Hardware

If you're planning to open-source a particular piece of hardware, following certain best practices in its design will make it easier for others to make and modify the hardware:

- Use free and open-source software design (CAD) tools where possible. If that's not feasible, try to use low-cost and/or widely-used software packages.
- Use standard and widely-available components, materials, and production processes. Try to avoid parts that aren't available to individual customers or processes that require expensive setup costs.

## Hosting your Design Files

A basic way of sharing your files is with a zip file on your website. While this is a great start, it makes it difficult for others to follow your progress or to contribute improvements.

We recommend using an online source-code repository (like [GitHub](#), [Gitorious](#), or [Google Code](#)) to store your open-source hardware projects. All files (design, bill-of-materials, assembly instructions, code, etc) should be version controlled where possible. If you want to develop your hardware publicly, online repositories make it easy to publish changes to your files as you make them. Or, you might publish updates in conjunction with releases of the hardware.

Most online repositories also include issue trackers, which are good way to keep track of the bugs in and future enhancements planned for your software in a way that others can view and comment on. Some include wikis, which can be good places to document your project.

As an alternative to an online repository, you might develop your project in an online CAD tool (like [Upverter](#)). Or, you could share your files on a site like [Thingiverse](#).

## Licensing your Designs

While licensing is a complex subject, use of licenses is an important way of signalling how others can and should use your work. By explicitly applying an open-source license to your hardware design files and other documentation, you make it clear that others can copy and

modify them. When licensing your project, keep in mind that someone who makes a derivative of your hardware will probably also want to build on your software, instructions, and other documentation; you should license not just the hardware design files but also these other elements of your project.

Note that copyright (on which most licenses are based) doesn't apply to hardware itself, only to the design files for it – and, then, only to the elements which constitute “original works of authorship” (in U.S. law) and not the underlying functionality or ideas. Therefore, it's not entirely clear exactly which legal protections are or aren't afforded by the use of a copyright-based license for hardware design files – but they're still important as a way of making clear the ways in which you want others to use your designs.

There are two main classes of [open-source](#) or [free-software](#) licenses: copyleft (or viral) licenses which require that derivatives be licensed under the same terms; and permissive licenses, which allow others to make modifications without releasing them as open-source hardware. Note that the definition of open-source hardware specifies that you must allow modification and commercial re-use of your design, so avoid licenses with a no-derivatives or non-commercial clause.

Popular copyleft licenses include:

- [Creative Commons Attribution, Share-Alike \(BY-SA\)](#)
- [GNU General Public License \(GPL\)](#)
- Hardware-Specific Licenses: [TAPR OHL](#), [CERN OHL](#)

Permissive licenses include:

- [FreeBSD license](#)
- MIT license
- [Creative Commons Attribution \(BY\)](#)

It is good practice to include a copy of the license in the version control repository, and a statement in every file or at least the README specifying the author(s) and year(s) of non-trivial modifications, and the license.

## Distributing Open-Source Hardware

- Provide links to the source (original design files) for your hardware on the product itself, its packaging, or its documentation.
- Make it easy to find the source (original design files) from the website for a product.
- Label the hardware with a version number or release date so that people can match the physical object with the corresponding version of its design files.
- Use the open-source hardware logo on your hardware. Do so in a way that makes it clear which parts of the hardware the logo applies to (i.e. which parts are open-source).
- In general, clearly indicate which parts of a product are open-source (and which aren't).
- Don't refer to hardware as open-source until the design files are available. If you plan on open-sourcing the product in the future, say that instead.

## Building on Open-Source Hardware

- Respect the trademarks of others.
- Make useful improvements to a piece of hardware rather than simply selling copies of it.
- Share your changes and improvements with the creator of the original hardware.

Sources: [http://www.nesta.org.uk/sites/default/files/challenge\\_prizes\\_landscape\\_review.pdf](http://www.nesta.org.uk/sites/default/files/challenge_prizes_landscape_review.pdf)  
[http://www.nesta.org.uk/sites/default/files/challenge\\_prize\\_design\\_practice\\_guide.pdf](http://www.nesta.org.uk/sites/default/files/challenge_prize_design_practice_guide.pdf)  
<http://www.oshwa.org/sharing-best-practices/>  
<http://www.open-electronics.org/how-to-choose-your-open-source-hardware-license/>  
<http://ianskerrett.wordpress.com/2010/11/18/top-5-best-practices-for-a-successful-open-development-community/>

## {Signalization tools}



*{symbol for process/status updates - use this to signal important milestones in the process}*



*{symbol for notes - use this to post reminders or short messages for self or to collaborators}*



*{symbol for important information - use this to attract collaborators' attention}*



*{symbol for ToDos - use this to signal to your collaborators about what they can do}*



## Alternatives

The Alternatives box enumerates possible solutions to consider.

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## Reasoning

The Reasoning box presents arguments about possible choices.

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...



## Information

The Information box tells you how stuff works.

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...



## Growing consensus

The Growing consensus box is a summary of a section of this report

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