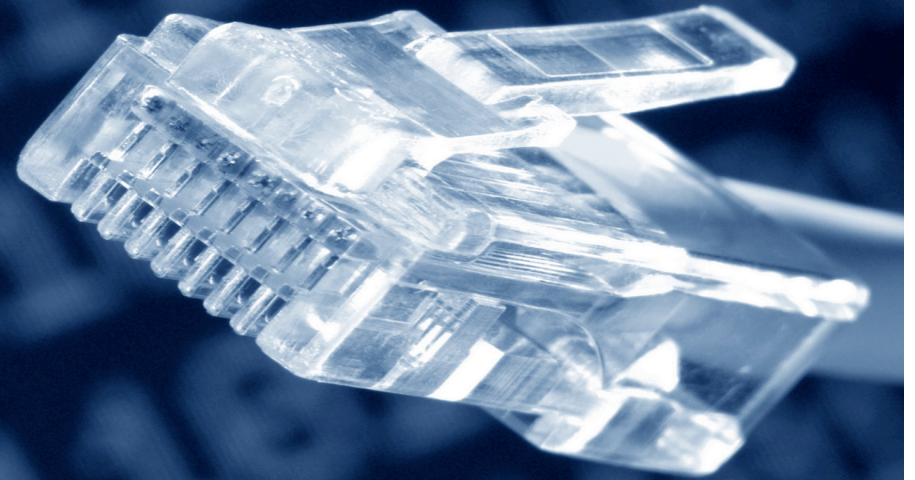


# Hardware and Connectivity: Sustainability and sovereignty over technological infrastructure



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**FLOK**  
s o c i e t y

# Outline

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- Introduction
- Technological Sustainability
- Building a Sustainable Open Source Hardware
  - Initiatives
  - Licenses
  - Distributed workspaces
- Open source Hardware in the community
- Manufacturing models
- Free Networks

# Ecuadorian National Plan association with the research

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- **Objective 11: To ensure the sovereignty and efficiency of strategic sectors for industrial and technological transformation.** 11.3 *To democratize public telecommunications service provision and information and communication technologies (ICTs), including radio and television broadcasting and the radioelectric spectrum, enhancing universal usage and access*
- **Diagnosis:** Internet access, fiber optic connectivity, broadband connection density, e-government, I+D+i Investment

# Ecuadorian National Plan association with the research

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- **Goals:**

- Achieve a digitizing rate of 41.7
- Achieve an e-government rate of 0.55
- Decrease digital illiteracy to 17.9%
- Increase the percentage of people using ICTs to 50.0%

- **Research Goal:**

- Limiting the dependence on centralized infrastructures under foreign control; supporting the construction of more autonomous distributed networks

# Introduction

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- Innovation and production are considered as basis tools for achieving sustainability
- collaboration and community are keywords that should help this implementation to increase common and open knowledge

Innovation is a catalyst of progress towards a knowledge society while information technology communications (ICT) are the backbone

# Introduction

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- The terms “free” and “open source” are equivalent words originally applied to software projects
- Open-source software allows users to modify, improve, compile and distribute its source code
- A similar open-source culture movement, has taken shape among people involved in electronic hardware design efforts on a collaborative basis: the idea of **Open Source Hardware (OSH)**

# Introduction

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- Sustainable society based on open source technologies
  - all industries tend to open source development
  - over the last six years the Ecuadorian government had invested in the technology and telecommunication sector

It is necessary to facilitate more effective, collaborative and communitary efforts, to create sustainable economic opportunities in the country creating knowledge



# Technological Sustainability

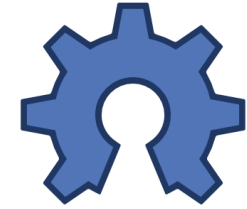
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- Social challenge that involves policies and change of individual lifestyles
- Technological advancement needs rare earth elements (REEs)
- By 2010 = 136,100 tons → by 2015 = 210,000 tons
- Open Source Appropriate Technology (OSAT)
- World's needs for energy, transport, water, healthcare, among others, being aware of the limits of the environment



# Open Source Hardware

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open hardware

*“Open source hardware is hardware whose design is made publicly available so that anyone can study, modify, distribute, make, and sell the design or hardware based on that design. The hardware’s source, the design from which it is made, is available in the preferred format for making modifications to it. Ideally, open source hardware uses readily-available components and materials, standard processes, open infrastructure, unrestricted content, and open-source design tools to maximize the ability of individuals to make and use hardware. Open source hardware gives people the freedom to control their technology while sharing knowledge and encouraging commerce through the open exchange of designs”*

# Building a Sustainable Hardware

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- Problem statement
  - High production costs
  - Foreign technological dependence
  - Redundant design (reinventing the wheel)
  - Digital rights management
  - Privatization of knowledge
- Challenges
  - Renewable energy research and production
  - Data connectivity
  - Recycling
  - Sovereignty

# OSH Projects and initiatives

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- OHANDA, OSHW, OSHWA
- 84 research groups in 17 countries
- 71 countries commercializing it
- OSHW industry: EEUU (68); Europe (19); Asia (7)
- engineers (83%); designers (17%); professors (14%); entrepreneurs (7%)
- electronic industry (63%); manufacturing (15%)  
transportation, architecture and energy (<5%)

# Open Hardware Licenses

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- Free and Open-Source Software licenses (FOSS)
- The TAPR Open Hardware
- Balloon Open Hardware
- Hardware Design Public
- The Solderpad
- CERN Open Hardware (OHL)

# Distributed workspaces

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- Temporary working spaces
  - Unconference
  - Hackathon
  - Booksprint
- Permanent coworking spaces
  - Hackerspace
  - FabLab
    - Barcelona FabCity project
    - FabLab Manchester
    - FabLab@School

# Open source Hardware in the community

## *Arduino*

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- “Attribution ShareAlike 3.0” Creative Commons (2010) license

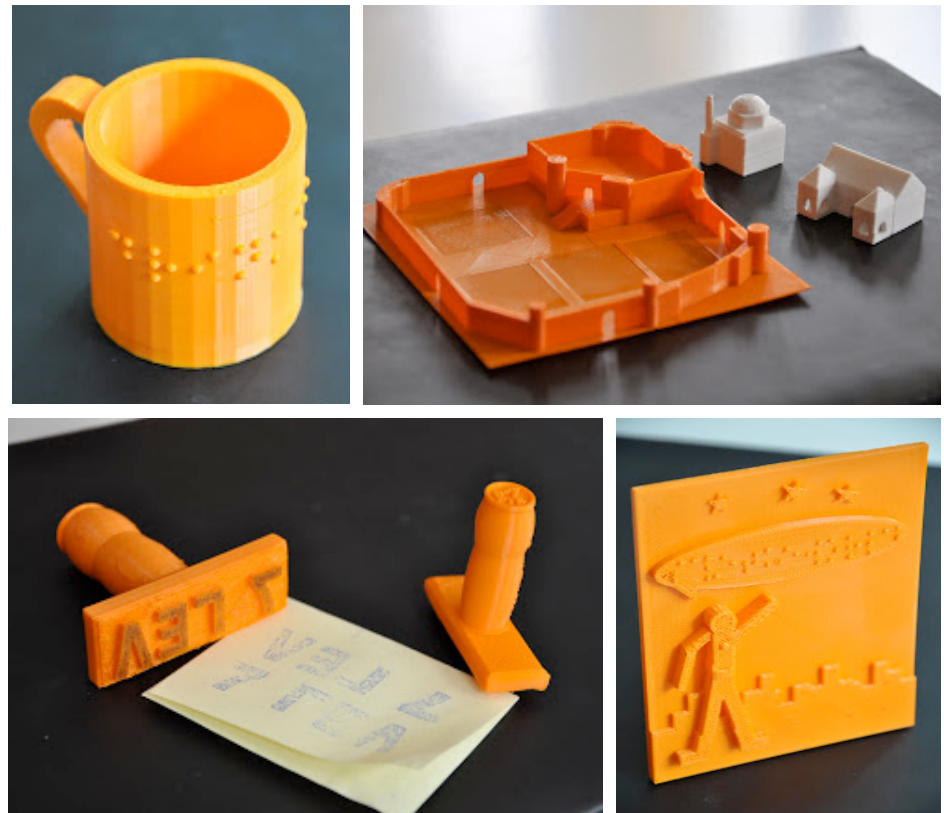


# Open source Hardware in the community

## *3D printing: Learning*

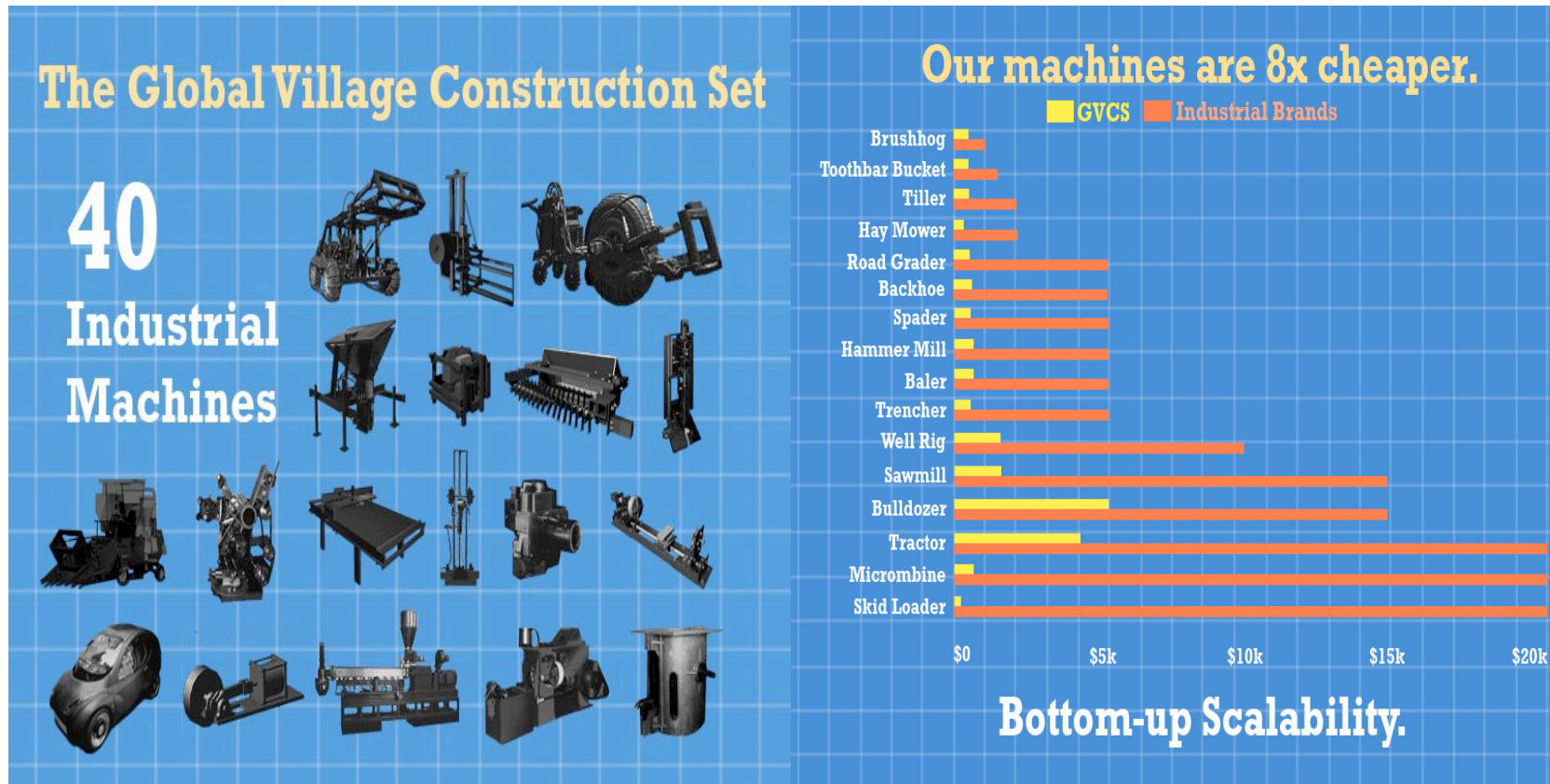
### Challenges:

- Training the teachers
- Differences at the level of technological literacy among students
- Artifact diversity
- Costs



# Open source Hardware in the community

## 3D printing: Agriculture





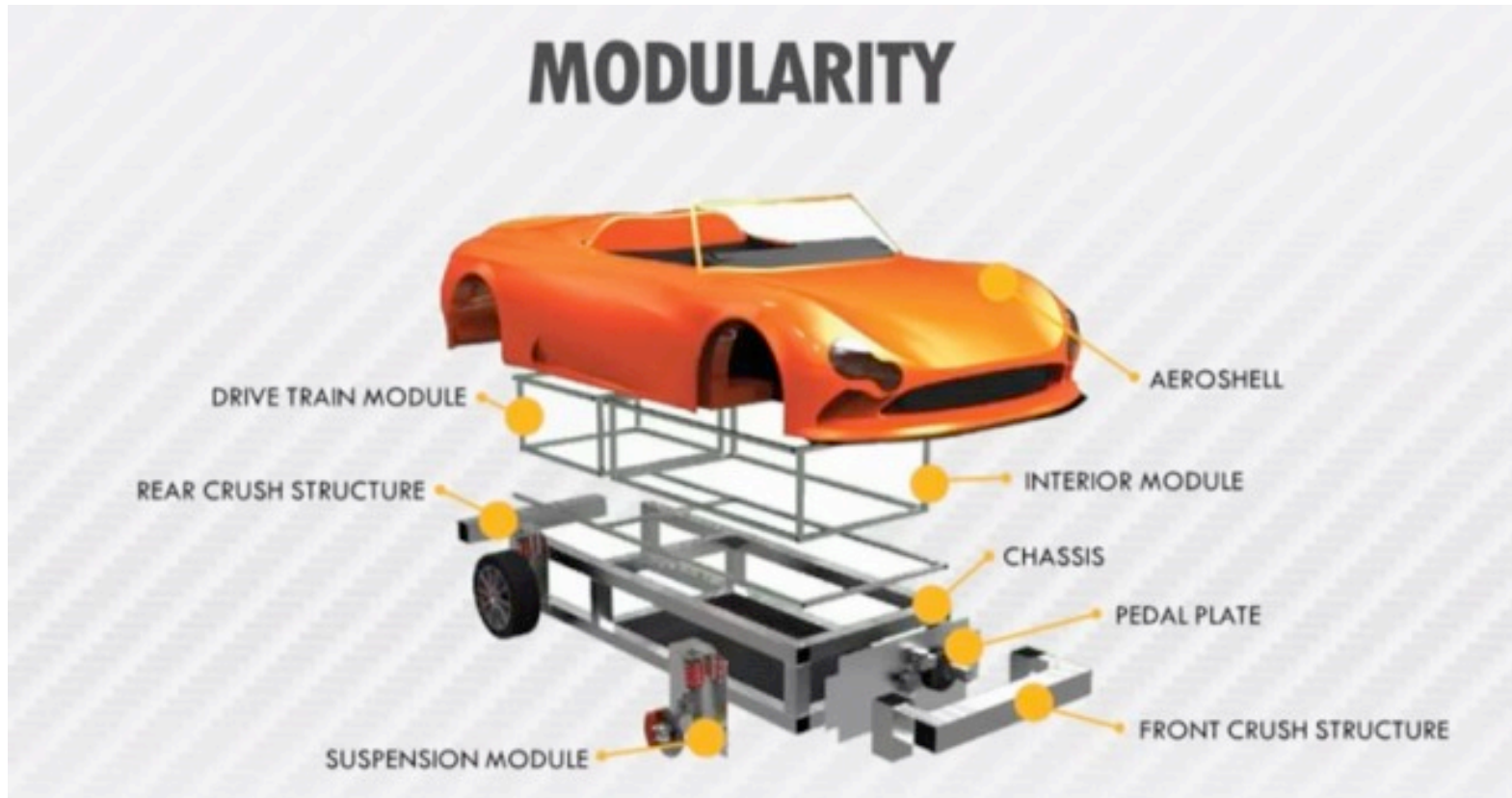
# Open source Hardware in the community

*3D printing: Telephone*



# Open source Hardware in the community

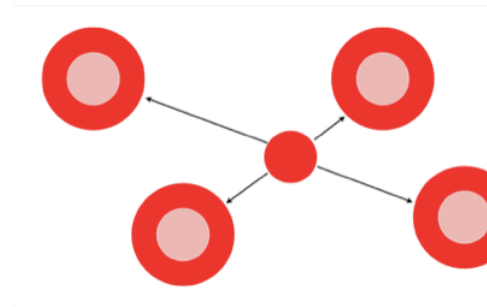
*Wikispeed*



# Manufacturing models

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- Centralized



- Artisan



- Distributed



# Free Networks

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- Wireless commons model
- Infrastructure sharing among several participants, granting an open and free access to each of the participants
- Each participant contributes with:
  - fixed broadband Internet service
  - access points
  - rules or charter governing the infrastructure sharing
- Champana-Urbain (USA)
- Austin Wireless (USA)
- Guifi (Spain)

# Guifi.net

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- 2006 – 1000 nodes
- 2009 – 9000 nodes
- 2013 – 20000 nodes
- In the last three months Guifi.net has made Internet usage grow to 74,6% in the Osona region.
- **Wireless Commons License**
  - Is the basis for joining the community
  - Promotes: auto-regulation, abuse control, sharing and placement of devices
  - Traffic analysis only for management purposes
  - Basic rules for QoS and security management

**Thank you !**  
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