From Trash to Treasure through a Fablab

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On behalf of the community of Smart Open Lab.

#FAB23

"Designing Resilient Futures"

Overview

- The global problem of waste management.
- Who we are?
- What can we do?
- How to do it?
- Some examples.
- Conclusions.

The global problem of waste management

- All around the world, waste is wildly produced.
  - Construction waste
  - Industrial waste
  - Household waste
  - Plastic waste
  - Textile waste
  - Electronic waste
  - Radioactive waste
  - Sewage
  - Run-off waste (fertilizers, pesticides, and oil from for example farms running off into groundwater, rivers, oceans).

The global problem of waste management

- Public policies to protect environment are being developed while industries are quickly evolving.
- Private companies pave the way for public adoption of protocols (i.e., in Spain: clothes, e-waste, oils, PET..).

- Own collection network. In some agreement with policy makers (public spaces, schools,...).
- Own “opaque” reselling, or recycling system.

The global problem of waste management

- European laws enforce municipalities and companies to correctly process their waste. They will be fined if they do not fulfill some criteria.
- Lots of room for improvement at several levels:
  - With biological waste, city councils are committed to classify and process properly since 2022. Work in progress...
  - The same with textile waste. Now in Cáceres, Spain, they released the public contest to cover the service.

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- **Extremadura: tiny economic study**
  - Region rich in resources (water, minerals, food, energy...).
  - Primary economy now sifting to services: tourism and new technologies.
  - Still some problems of centrism/colonialism, even with nuclear waste.

  - Inside Spain we are comparatively underdeveloped:
    - Much unemployment, specially for young people.
    - Few industries.
    - Aging and loss of population, specially in small cities and villages.

Who we are?

University of Extremadura (UEx). From 1971.

Public institution with around 10k students and 3k staff.

Around 150M€ of annual budget.

Cost around 1.5k€/year for each new student.

School of Technology in Cáceres. Since 1974.

- Degrees and Masters:
  - Informatics and Telecommunication.
  - Civil engineering and Construction.
- Around 2k students.
- Very active in R&D and contracts with companies.

Escuela Politécnica

Responsability with our environment

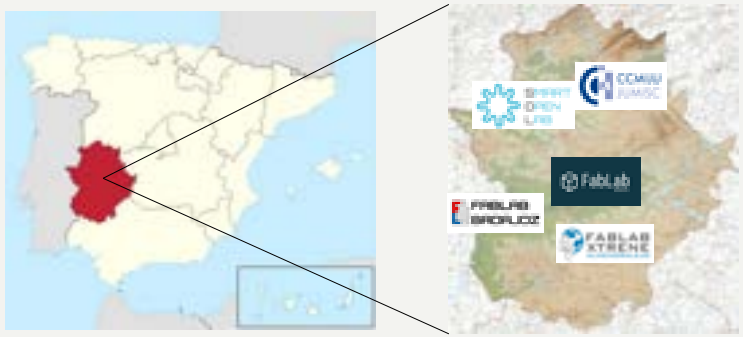
Who we are?

Makerspace (2014): since the beginning around 80(!) people (10% professors, 90% students from ICT degrees).

- From the beginning one person, one vote.
- Everyone knows something that others can learn.
- Symbolic quote of 10€/year and much activity.

Non-Profit Cultural Association (2016): formal constitution, normative (Statutes). Assembly style. Fiscal ID and possibility of billing.

Full Fablab (2018): obtaining European funds (~500k€) we defined FabNEX. 4 labs in 3 cities.



Who we are?

Small demographic study in our fablab:

Approximately 240 associates today.

- Only 25% women, but continuously rising.

<u>Profiles</u>:

- Students: ~33 %
- Professors: ~8%
- Employed workers: ~30%
- Liberal professionals: ~26%
- Retirees: ~3%

There are teenagers, unemployed, migrants, handicapped people....

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What can we do?

Many things...

- Reach economical sustainability.
- Fix as much as we can.
- Become a real node of “Circular Economy”.
- Durable design with disposable materials.
- Show decision makers “new ways” of using waste.

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How to do it?

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How to do it?

- Reach economical sustainability.

  In our case, sustainability is based on community support.

  - Symbolic annual fee, 25€/year (the power of number).
  - Educated glocal community. Tech & Ethics.

    “Leave the space better than you found it”

    “Every course starts with cleaning and calibrating…”




  - Shared knowledge and documentation.

    Each project in our web is a complete guide for future makers (www.smartopenlab.com).

How to do it?

- Reach economical sustainability.
- Durable design with disposable materials.
- Fix as much as you can.
- Become a real node of “Circular Economy”.
- Show to decision makers “new ways” of using waste.

How to do it?

- Durable design with disposable materials.

Think a lot in the application.

  - What will be the usage environment?
  - Can you reuse previous work?
  - Can you obtain materials locally?
  - What material will you use for prototyping?
  - What material will you use for the final version?
  - How will you document it for the future?

How to do it?

- Reach economical sustainability.
- Durable design with disposable materials.
- Fix as much as we can.
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How to do it?

- Fix as much as we can.
  - Fixing something has high pedagogical value.
  - Fixing never was so accessible.
  - It is a real community resource.
    - In an informal ambient:
      - Repair Café : highly recommended.
    - In a formal ambient:
      - Quite valid as a way of learning Electronics, textiles, woodworking, mechanics...
      - Successfully applied in engineering degrees at School of Technology in Cáceres.

IFIXIT

Right to Repair

Conclusions

When we fix something we do three goods:

1) A good for our environment.

   We rid Nature of more waste.

2) A good for our pocket.

   We can spend less and better.

3) A good for our spirit.

   We overcome apathy and learn something useful with our effort.

How to do it?

- Reach economical sustainability.
- Durable design with disposable materials.
- Fix as much as you can.
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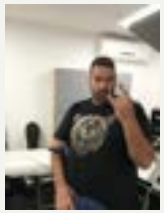
How to do it?

- Become a real node of “Circular Economy”.

  Circular comes from Circulation (like blood…)

  Materials in → *Materials out*

  - Since the beginning we did not spend any money in furniture. It all comes from trash.
  - We have become a waste reception point:
    - For institutions
    - For companies.
    - For associates.



  - We give it for free to any person willing to use it.

How to do it?

- Become a real node of “Circular Economy”.

  The clue: *Fruitful relationships with regional actors*

How to do it?

- Reach economical sustainability.
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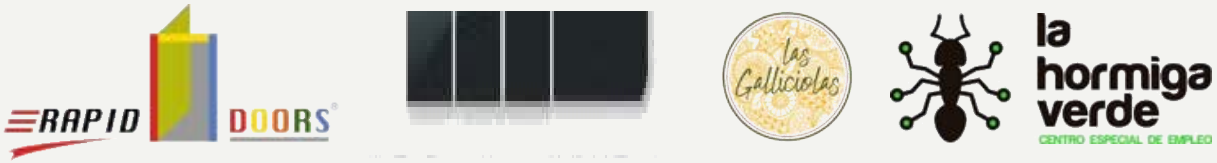
How to do it?

- **Show decision makers "new ways" of using waste.**
  - Through relationships with companies:



  - Through projects:
    - Erasmus+ "*ESCUTA: Social and University Entrepreneurship*"
    - ECOTELECO: "*Promotion of sustainable development in students through the service-learning methodology*"
    - Erasmus+ "*PLAYACT: Placemaking for youth activism*"

How to do it?

- Show decision makers “new ways” of using waste.
  - Through direct actions:
    - PreciousPlastics:

    - Composting biological waste inside university

    - Recovering construction and industrial wastes

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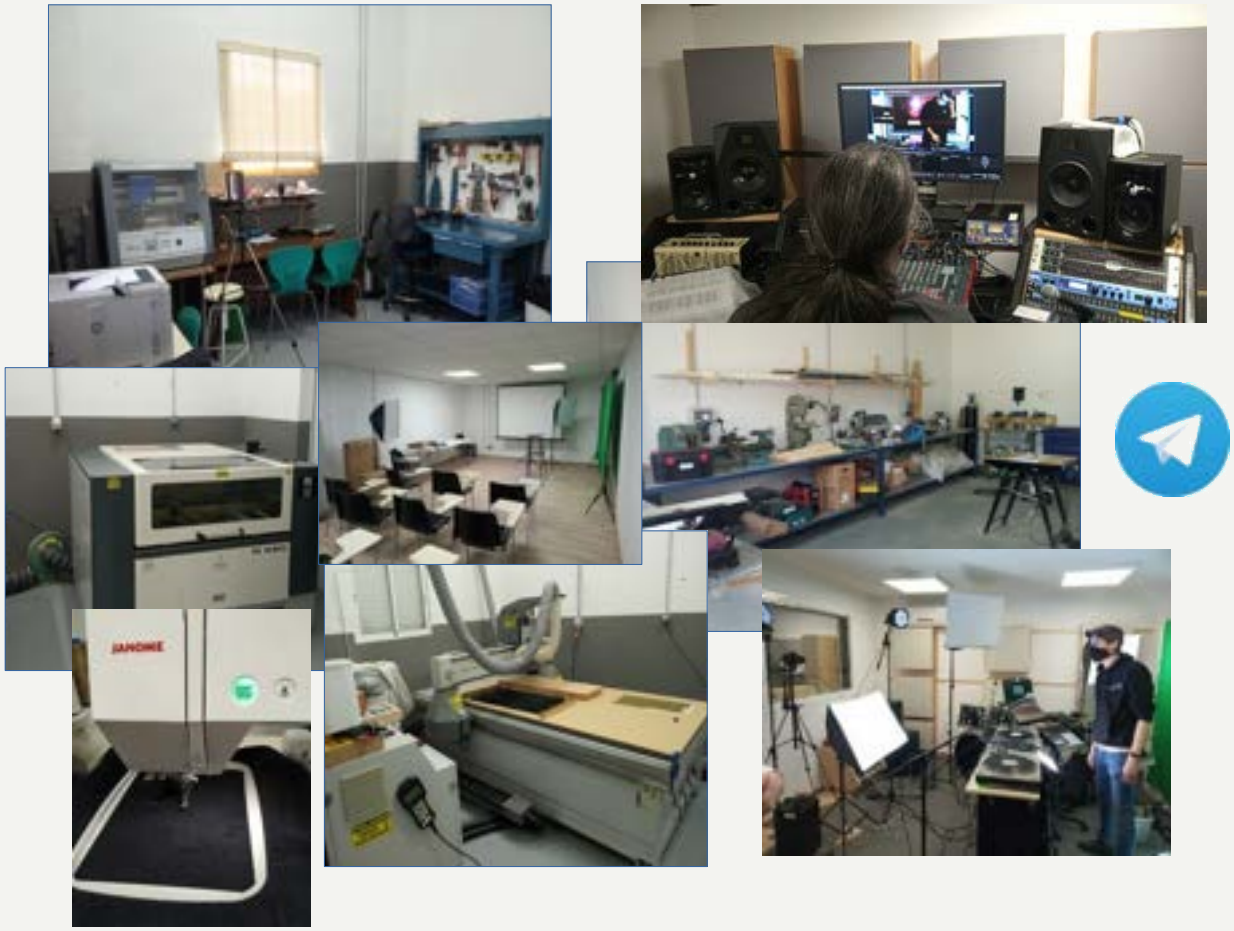
Some examples

Our spaces:

- 3D Lab
- Electronics Lab
- AV Lab
- Garaje Lab
- Tex Lab
- Paint Lab
- ChemistryLab
- FoodLab

6 groups of interest, sharing 10 rooms

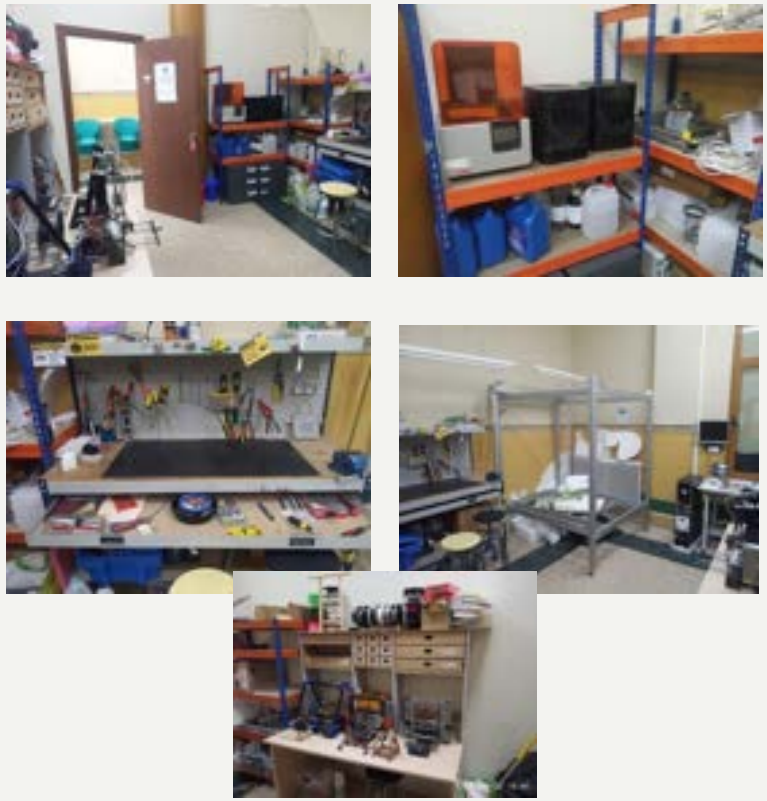


A fast tour inside our lab:

- Electronics Lab: **every associate can enter these two rooms.**

Electronics, software and meetings:

"Soft" 3D lab:



Some examples

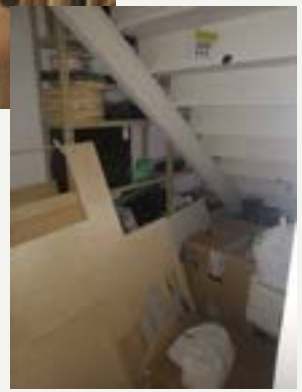
A fast tour inside our lab:

Let's go underground!

- 3D Lab : only for people with training.

Entrance, kitchen, and bathroom:

Storage zone:



Message to new associates: *"Do not buy materials, first learn with offcuts and then liberate us space."*

A fast tour inside our lab:

- AV Lab : **only people with training.**

Recording room:




Control room:




Each room was carefully constructed and sonorized.

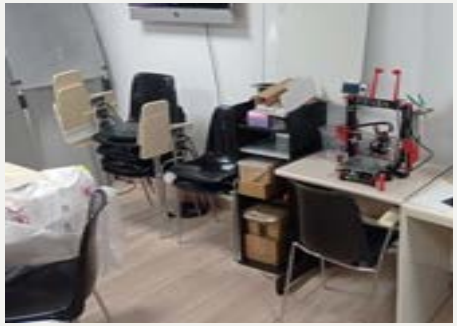
Probably the most complex equipments in the labs.

A fast tour inside our lab:

- Tex Lab : **only people with training. Above the recording studio.**





Also serves as aula for courses during weekends (the underground is accesible 24/7).

A fast tour inside our lab:

- Garaje Lab : **only people with training.**




All kind of “analog” tools. Quite dangerous some of them. Use PPEs!

A fast tour inside our lab:

- Paint Lab & The Tunnel of Hell: **only people with training.**













- **Managing materials:** *Order is Power*

If you want to make "almost" anything,

you need "almost" every material.

We have thousand of materials and components

Our storage for different flat materials, ready to be used. Mostly cut-offs.

- **Managing materials:** *Order is Power*

If you want to make "almost" anything,

you need "almost" every material.

We have thousand of materials and components

Storage for different screws and bolts.

Restored and redistributed drawers.

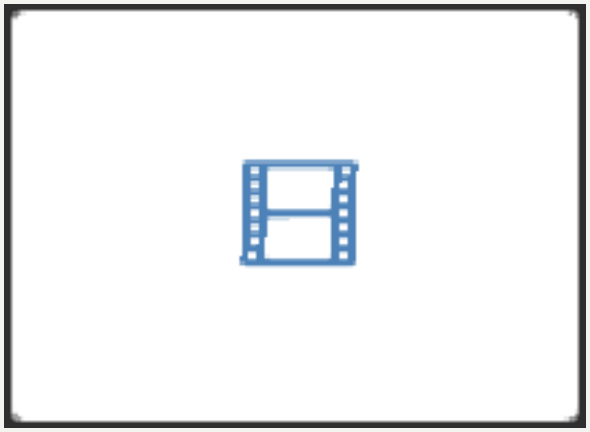
Some examples

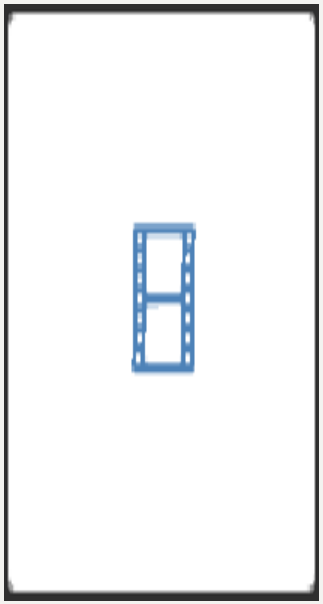
- **Managing materials:** *Order is Power*

If you want to make "almost" anything,

you need "almost" every material.

We have thousand of materials and components





The **unique** drawer for electronics:

"One drawer to rule them all"

Some examples

- Who need to buy new furniture?










Some examples

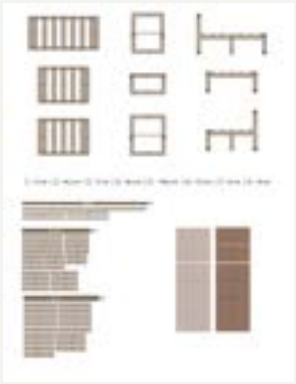
- ## Who need to buy new furniture?

Furniture recovered from companies:




Furniture with pallets:







Some examples

- **Who need to buy more wood?**

Tube amp cabinet from cut-offs:



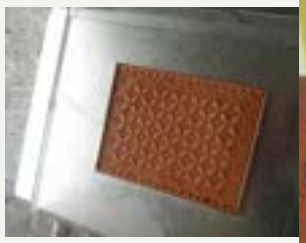

Composting, circular economy inside UEx:

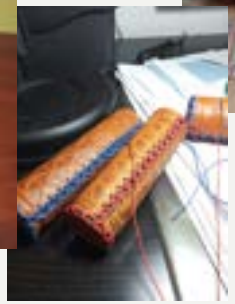


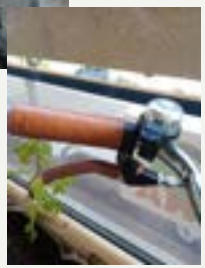

Some examples

- **Who need to buy more leather?**

Bikes restorations (I love them):







Some examples

- **Who need to buy more plastics?**

Trash for one is treasure for other...

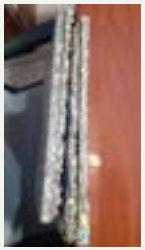
- In our region:

la hormiga verde
CENTRO ESPECIAL DE EMPLEO

  - Increasing collection network of e-waste containers.
  - Disarm e-waste till minimum, separating by materials.

- Fablabs have much to win with this industries:
  - Getting a source of primary valuable materials.
  - Revalorisation through design and fabrication.






Some examples

- **Who need to buy more electronics?**

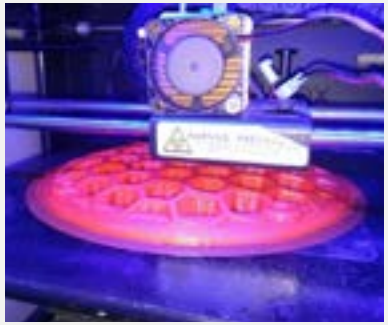

Musical instruments




Toasters, owens, irons, heaters...

All the same circuit...



Custom audio amplifiers

Some examples

- **Who need to buy more electronics?**

Arcade machines

Re-energyzing things...

Tube amp workbench

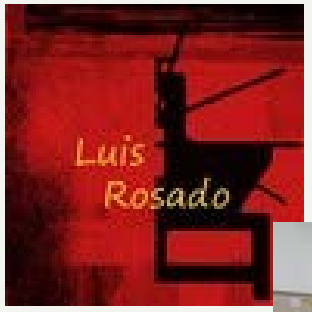
“Old” IoT devices from R&D

Open Wheel-Chair

Some examples

- Who do not need more arts?

Art from Garbage



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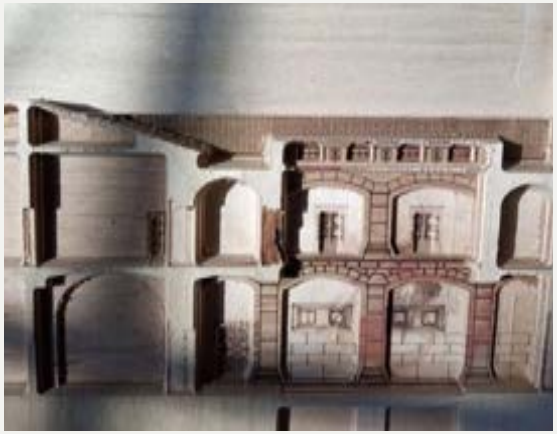
Some examples

- **Who do not need more arts?**

Haptics help for monuments:



Andrés Talavero

"Artivism" with International Amnesty:

Radio studio at Agora Secondary School:

Chencho: alluminium origami

Some examples

- **Who do not need arts?**
  A very special trophy

"Insight, humility, strength, generosity.
Pepe owns them and spreads them to the rest of the family.
In difficult times we think:
What would our uncle Pepe do?"

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Conclusions

- We started 9 years ago a journey which was clearly reinforced by the idea of fablabs and all the resources around.

  Many thanks to all of you!

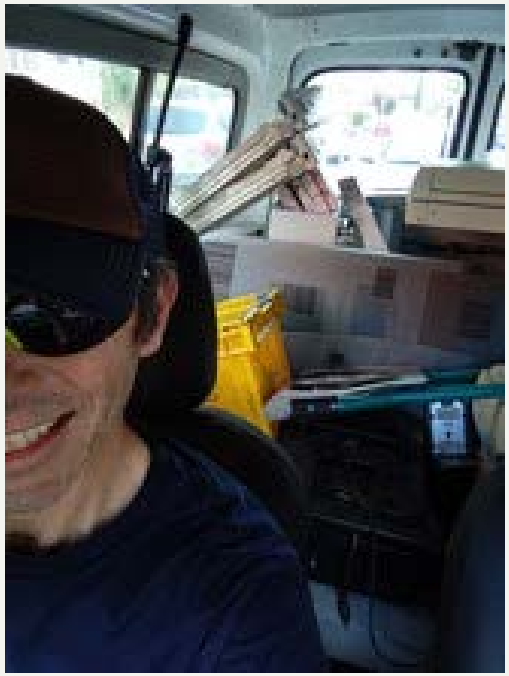
- We reached self-sustainability based on *community support* and *fruitful relationships*.

- We have learned the value of waste:
  Since the beginning of Life:

  "Trash for one is treasure for other"

- Final clues:
  - Devote many spaces to storage.
  - Put many efforts in order.
  - Have a good *"sherpa"* team (you the first).
  - Invest in transport more than in materials.

Conclusions



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¡Muchas gracias!

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