

Why we feel that is a liberation experience to take part in the Open Hardware PowerPC Notebook project

Roberto Innocenti - Power Progress Community



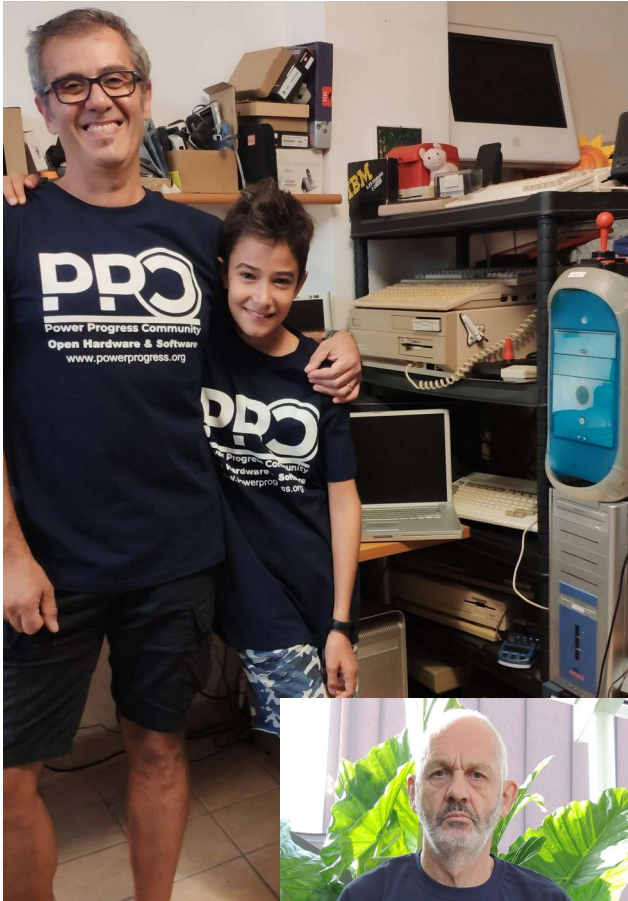
About Living Liberation

- is not a life for those who want to sit at the armchair and watch as a spectator the world and life flowing
- Freeing oneself from being used as an object, from being manipulated
- Freeing oneself from conditioning is an uphill path
- tasty for those who are not afraid to struggle
- because we feel life growing
- a sweet joy and sense of meaning within ourself.



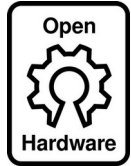


- We desire a notebook designed from scratch for GNU/Linux
 - We desire a PowerPC based notebook
 - We desire an Open Hardware design
 - We desire to decide and guide the design
- **We have joined together to converge in actions**
 - **We have defined gentle way to collaborate** where the positive experience for everyone its the most important thing to realize
- Together we have started to setup an association a website and to present our projects around
 - We have invited to collaborate others
 - We have studied which capabilities of the notebook was possible and nearer our need and desire
 - We have started donation campaign
 - We have engaged hardware engineer and paid thanks to the donations



Power Progress Community founders and the core team

Power Progress Community Missions



Design Open Hardware, accessible to the widest range of people.



Facilitate the re-use of dismissed or low-cost hardware by means of free software.



Encourage people to use free software.



Open Science: practice of science in such a way that others can collaborate and contribute, where research data, lab notes and other research processes are freely available, reuse, redistribute, reproducible data and methods



Brief history

2014	powerpc-notebook.org first published
2015	Becomes Open Source Hardware
2016	Established PowerProgressCommunity association
2017	List of hardware requirements
2017-2018	Donation campaign for Electrical Schematics
2019-2020	Donation campaign for Printed Circuit Board design
2020	Donation campaign for Fast SI bus simulations
2021	Donation campaign for three Prototypes
2022	Donation campaign for Hardware Test
2022	Donation campaign CE Certification



Our DNA

- The association is run by hobbyists that work for fun on the project on their spare time, no one is getting paid, only the funded electronic engineers
- We have a very flexible business plan, no tight time-to-market strategy
- We can afford to run a donations campaign for an unlimited amount of time, and that is not allowed by any crowdfunding platform.



Our Open Source Hardware Path

Objective: Certification of Oshwa

<https://certification.oshwa.org/>

Steps taken:

- Advice from the NYU Technology Law and Policy Clinic to make the project as open hardware as possible.
- Contact with Chip manufacturers for authorization to distribute the project as Open Hardware
- Publication of the electrical schematic (Orcad source) with Cern 1.2 License
- Publication of PCB source (Mentor Expedition) and export in Altium and Kicad



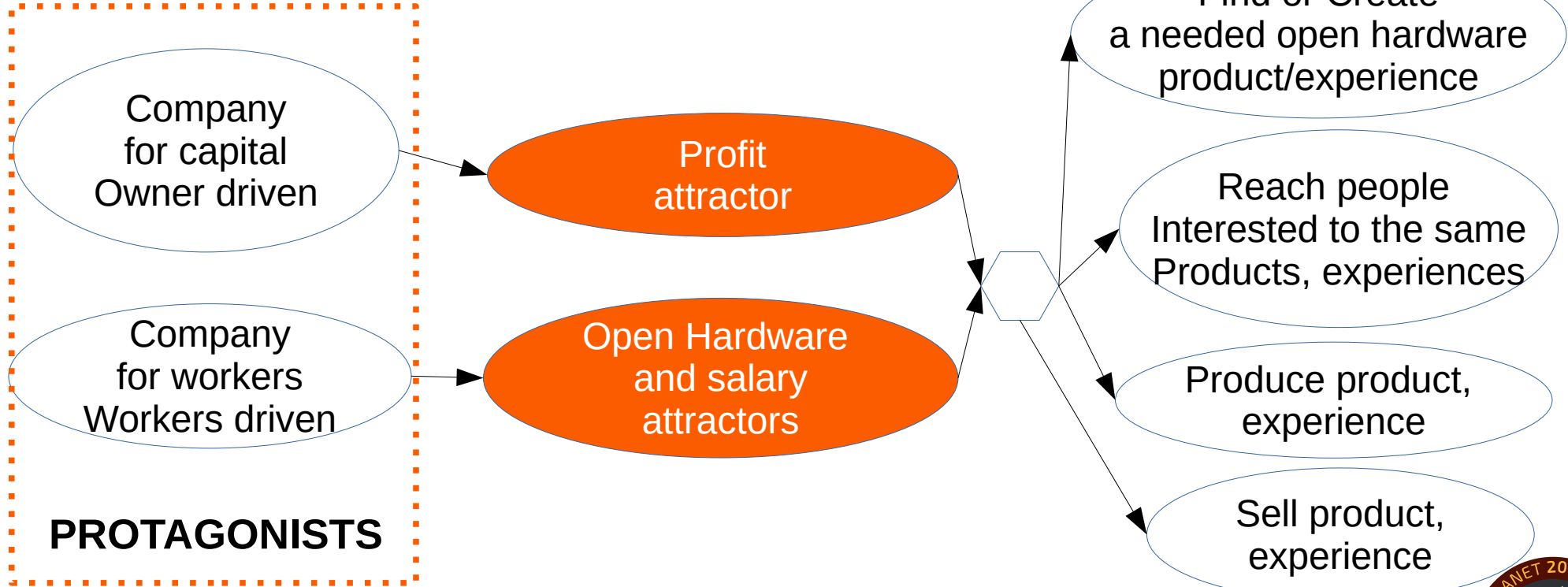
open source
hardware



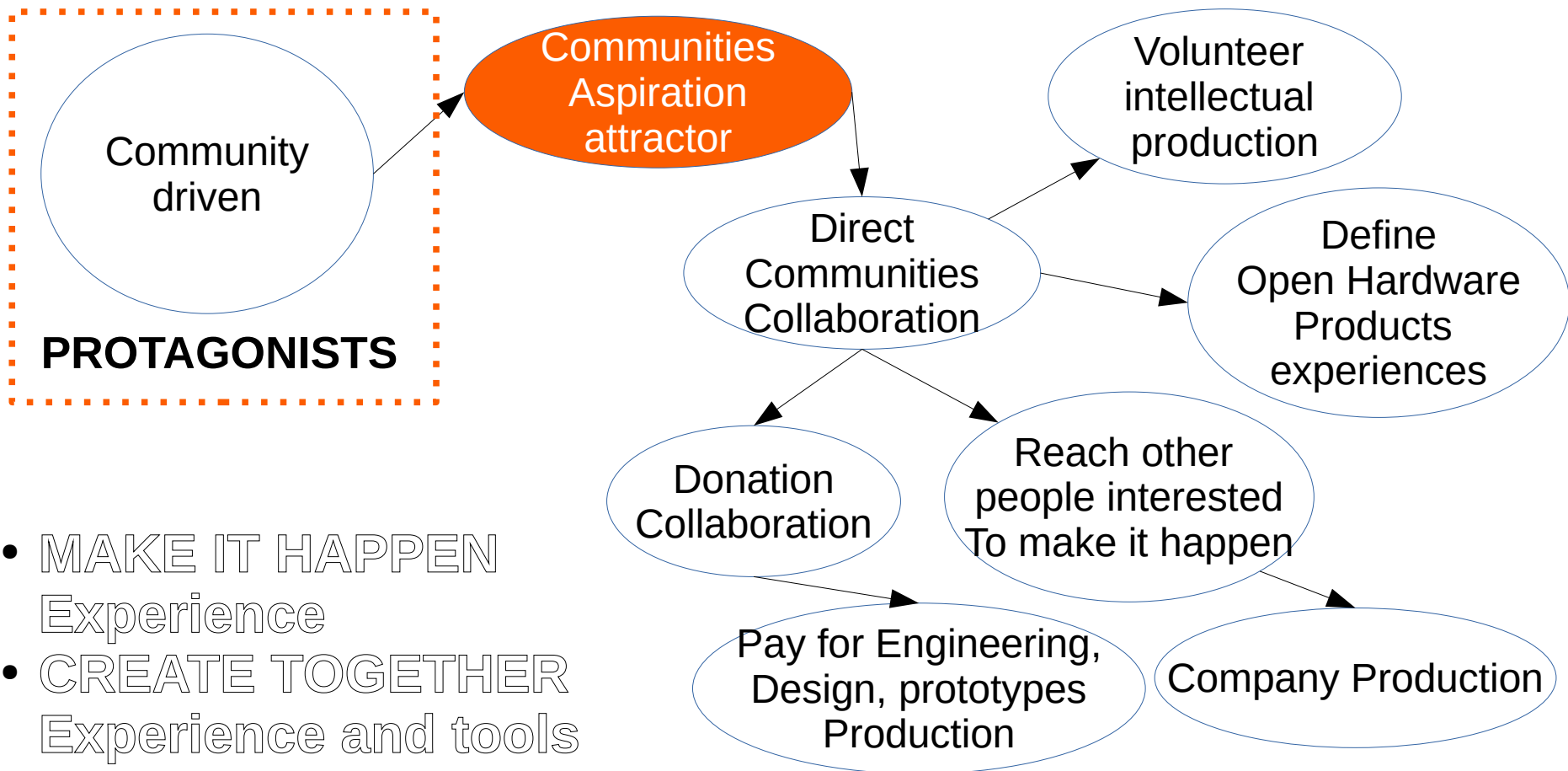
What Matters is Who is Driving



Company Driven Open Hardware Project



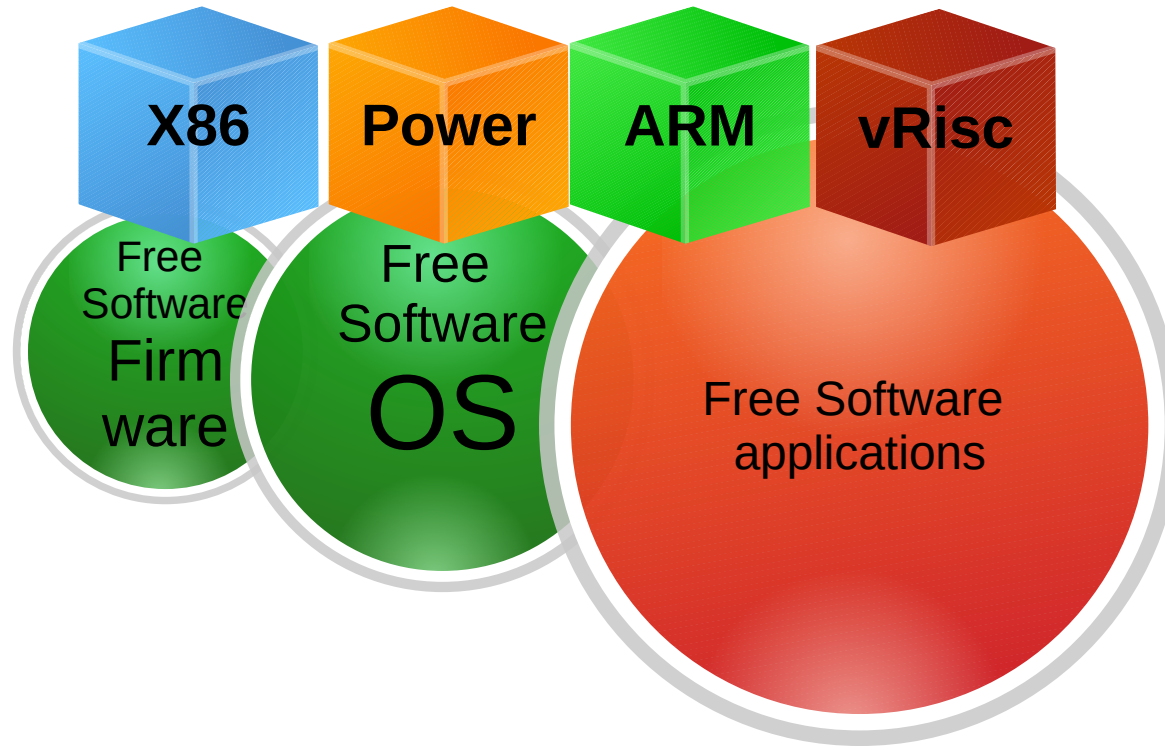
Community Driven Open Hardware Project



The Community has a Great Responsibility to Grow Sharing Culture in the companies and professionals of which it makes use



free software permits to use different CPU Architectures







Why donation campaigns?

- We cannot make use of commercial crowdfunding platforms
 - is required a working prototype
- We are not making or selling a product.
- We do and support research and development.
- To achieve this we have collected donations to pay the engineering process of design and make the prototypes
- We have divided the project into micro donations campaign in order to always be able to realize single finished sections
- Donations are free and non-returnable (Italian law)



Donation campaigns

	1 Electrical schematics 2 July 2017 - 7 June 2018	€ 12.600
	2 PCB Printed Circuit Board 12 October 2019 - 8 September 2020	€ 19.000
	3 Fast SI bus simulations 9 September 2020 -12 December 2020	€ 5.000
	4 3 prototypes 12 December 2020 – 22 October 2021	€ 13.500
	5 Hardware Tests 23 October 2021 - 28 January 2022	€ 14.000
	6 CE Certification 29 January 2022	€ 12.500

+ 2 MXM
Video Card
700 €



2016: founded the association



- We registered our association needed to ask donations
- We have made an signed with ACube the contract to design the Mobo
- We had setup the bank account
- We have continued searching a viable solution for the notebook chassis
- The T2080 RDB devkit runs with Video Card

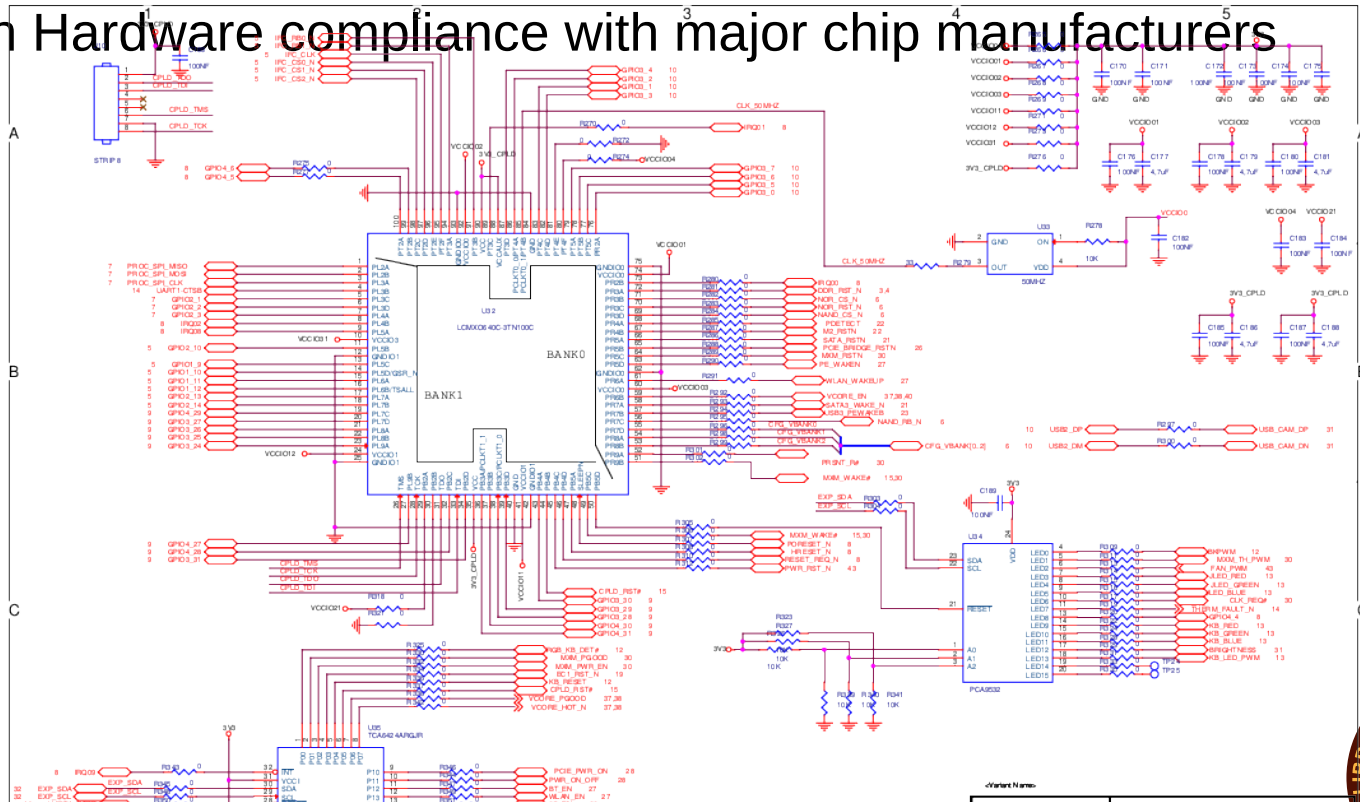
2017: Start Donation Campaign

- We had setup our platform to collect donations
- Donations started to arrive
- Defined List of hardware requirements
- Debian PPC64 run on our T2080 RDB Devkit
- Start improve PPC64 BE packages
- **Select components that have free software drivers**



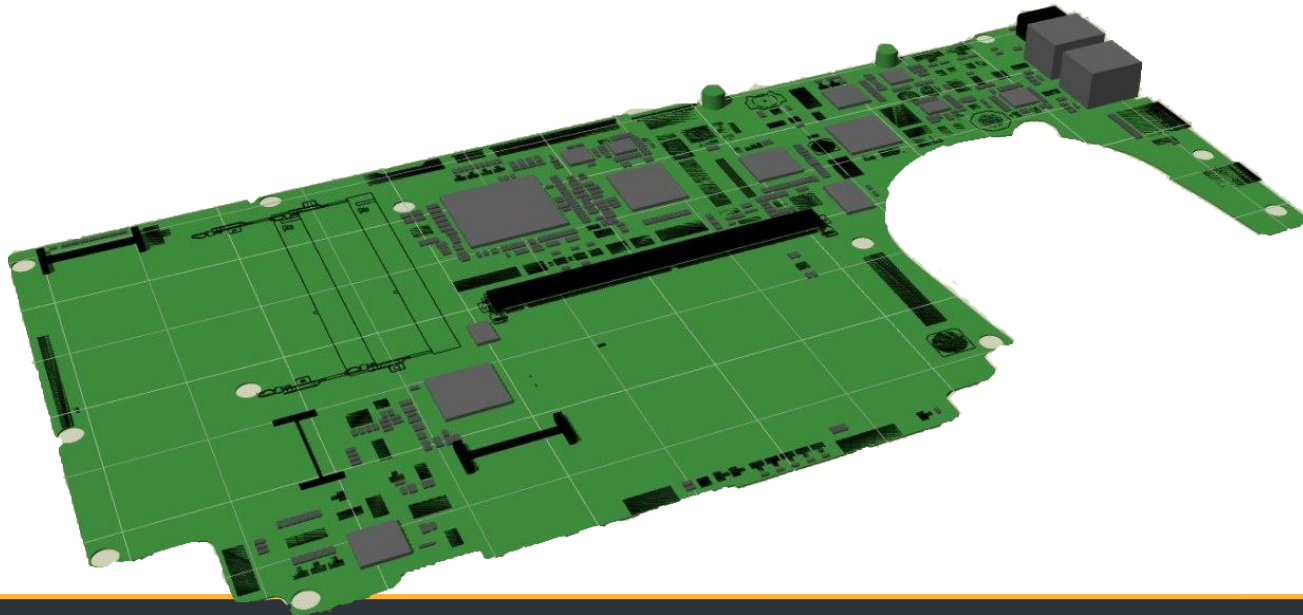
2018: Start Electrical Schematics

- Collected the donation to design of Electrical Schematics
- Electrical Schematics design was in progress
- Check for Open Hardware compliance with major chip manufacturers



2019 - 2020: PCB design

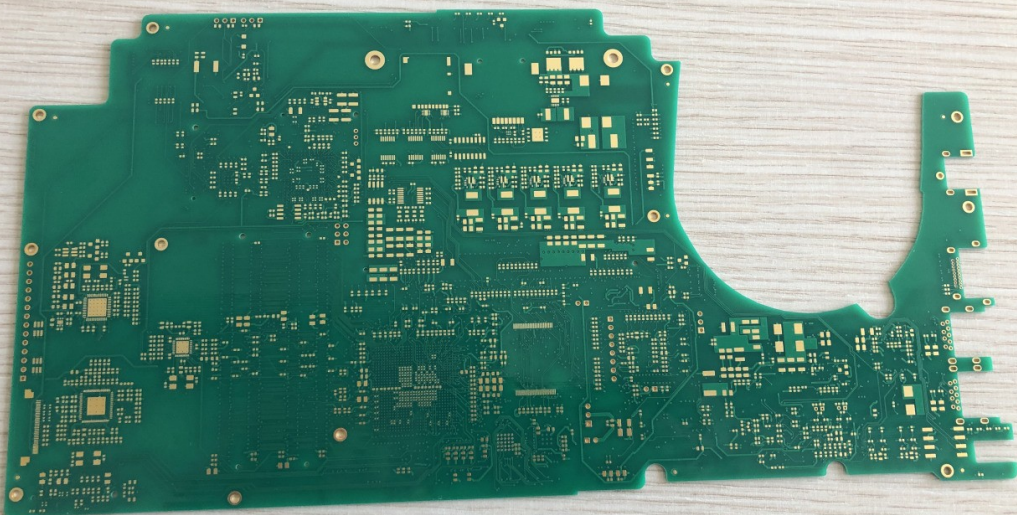
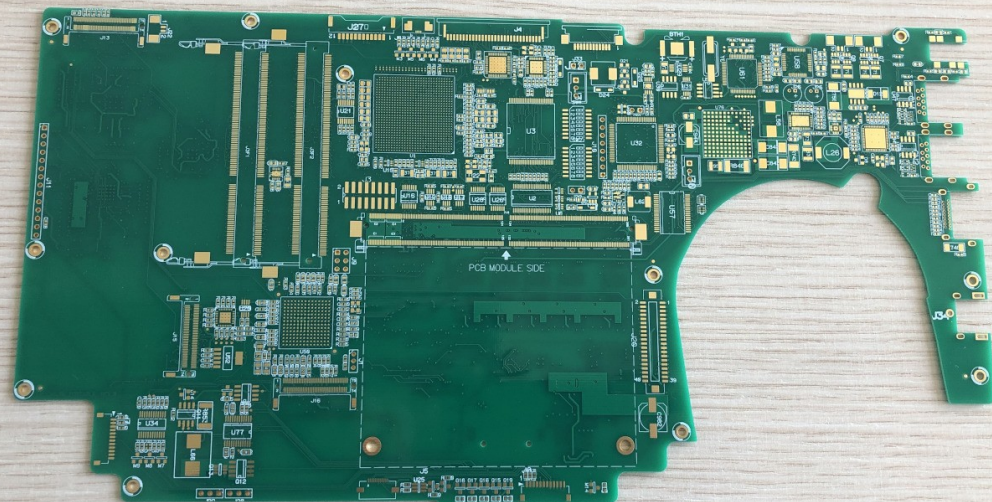
- Agreement with Slimbook regarding the notebook body
- Electrical Schematics design completed
- Collected the donations to design of Printed Circuit Board
- The Printed Circuit Board design is completed



2021-2022: Prototypes

- Donation Campaign for the three prototypes
- Slimbook gives us two Slimbook Eclipse bodies, to "dress" the three prototypes.
- Production of the PCB Dummy to verify to refine the measurements to accommodate the motherboard in the Slimbook Eclipse body
- Order of more than 2000 components under the global shortages of electronic components (we still have not all in our hands)
- **[todo] Design of the new Heat Sink Pipes**





PCB Dummy 2 layer

2022: Hardware Test on Prototypes

To be performed all the Hardware tests are needed

- 1) the three prototypes produced
- 2) an u-boot that work with our prototypes
- 3) an PPC64 Big Endian GNU/Linux OS

What we have?

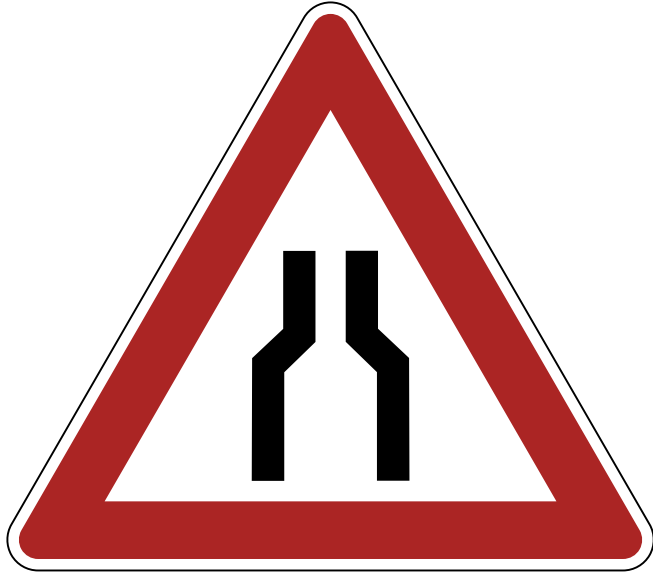
- 1) old u-boot patched and tested with our processor devkit and with our SATA3 controller, Audio chip and few PCI video card
- 2) tested with GNU/Linux Debian unstable PPC64 BE with the same controllers

Volunteer are Welcome:

- 1) to repatch a newer u-boot and check if work good with our mobo , with USB3 controller and AMD MXM video cards
- 2) to test GNU/Linux Debian unstable PPC64 BE with the same controllers and AMD MXM video cards



Bottlenecks



- 2015 Big Endian Altivec-only NXP T2080 chip
- Decreasing number of GNU/Linux Distributions with PowerPC Big Endian support
- Some source code are not cross endian, i.e. they need to be patched to run on both big-endian and little endian
- Notebook chassis few pieces
- Notebook chassis for MXM board
- Global shortage of electronic components: few early end of life components force us to study a redesign of a small part of the motherboard
- U-boot support for NXP T2080
- AMD have early end of life our ordered MXM Video card (EOF of GDDR5)

Electronic Global Shortage Consequences

- As of June 2021 the MXM AMD Radeon E9172 (2GB) and E9174 (4GB) video cards was available for order, but now EOF not available for our first production
- As of July 2021 98% of the over 2000 electronic components of which our motherboard is composed have been ordered
- As of July 2021 about 40 components are missing
- At the end of July 2021 the components related to power management are not available
- In July 2021 the hdmi connector is missing
- August-September 2021 PCB with new energy components is designed
- September 2021 price increase of electronic components of our board
- October 2021 not all ordered components arrived: still no hdmi connector and some components available
- March 2022 : 7 components are not available any more we need to re-design a small part



The open space of possibilities

- Open ISA , open instruction set
- OpenPower Foundation ecosystem
- Power Architecture Softcore
- Collaboration with Slimbook
- Support from many donators
- Relationship with other free software projects
- Talks to present our projects in events



Slimbook Eclipse body



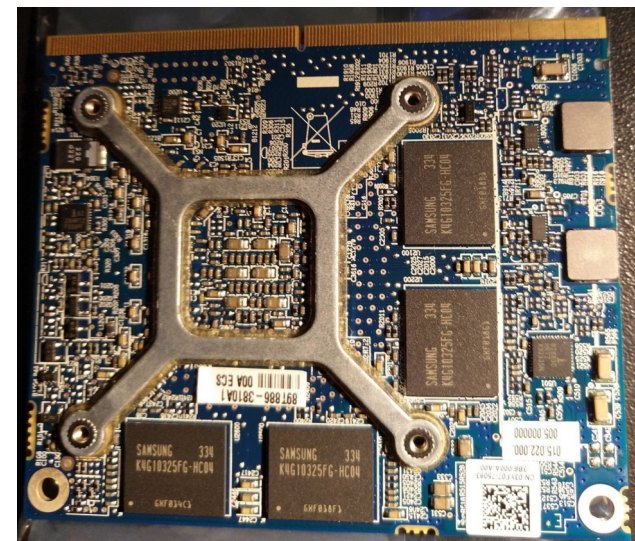
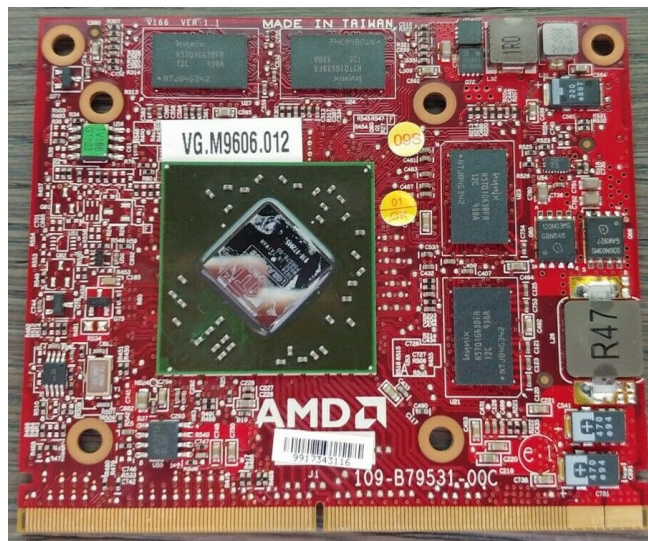
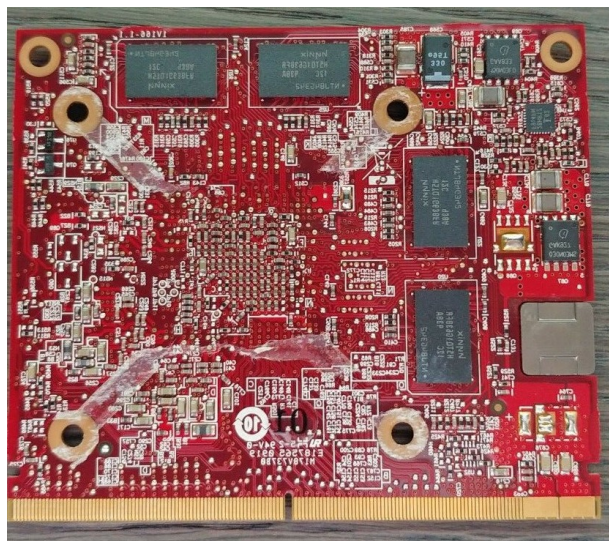
notebook body from scratch for a small production batch is not financially feasible.

Slimbook provides us the notebook body

Gaming Oriented
Allows us to use **MXM**
graphics

The body of the laptop is actually the entire case, the cooling system, the screen, the keyboard, the backlight, the webcam, the speakers and the battery.

Various Donated MXM Video Card to test



In the mean time waiting new AMD MXM video card will be available

Make Free Software code truly CPU agnostic



- We commonly encounter free software tight to Little Endian CPUs and that cannot be compiled on Big Endian CPUs.
- When a library or a framework cannot be compiled, it causes troubles to all software depending on it, and that compromise the usability of the entire system.
- Let's fix endianness issues to source codes, it's a huge task that need a huge group of volunteer
- Starting from those packages and libraries that solve the dependencies to a multitude of others packages.

Enjoy with us with the bootloader

- **Newer U-boot needed to be configured for our motherboard**
Reapply our patches to latest U-Boot last release and add an u-boot graphic support on boot.
- Appreciated pioneer that want to make **Grub** or **Coreboot** works with our motherboard



For the pre-production run

- After Hardware test and CE certification will start pre-production run
- Entirely managed by Acube Systems that should start this year (2022) pre-order for the pre-production run

What to Expect

- 1) expensive notebook as is a small production
- 2) run a Big Endian GNU/Linux PPC64 distro without few important software that run only on PPC64 Little Endian (like Docker)
- 3) have a motherboard with the specs based on the chips inside like: CPU Power Architecture 64 Bit with AltiVec in Big Endian with 4 core dual threaded at 1,8Ghz,SATA3, USB3, MXM video card,2 DDR3L memory card, M.2 , etc
- 4) u-boot bootolader





New Scenarios to live with us

- Complete the Donation Campaigns
- Involve additional volunteers, especially hardware expert and anyone able to fix endianness issues and boot loader configurations
- Support forks of our designs to the newer Power Architecture processors based on the Power Open ISA
- In-source Design of new mobo based on OpenPower Open ISA processors
- Seminars in Tech High Schools and Universities to encourage study and improvement on our Open Hardware designs and Power Open ISA CPU/GPU
- University projects to develop new open hardware Power Architecture based mobo



Express creativity to feel good and grown up

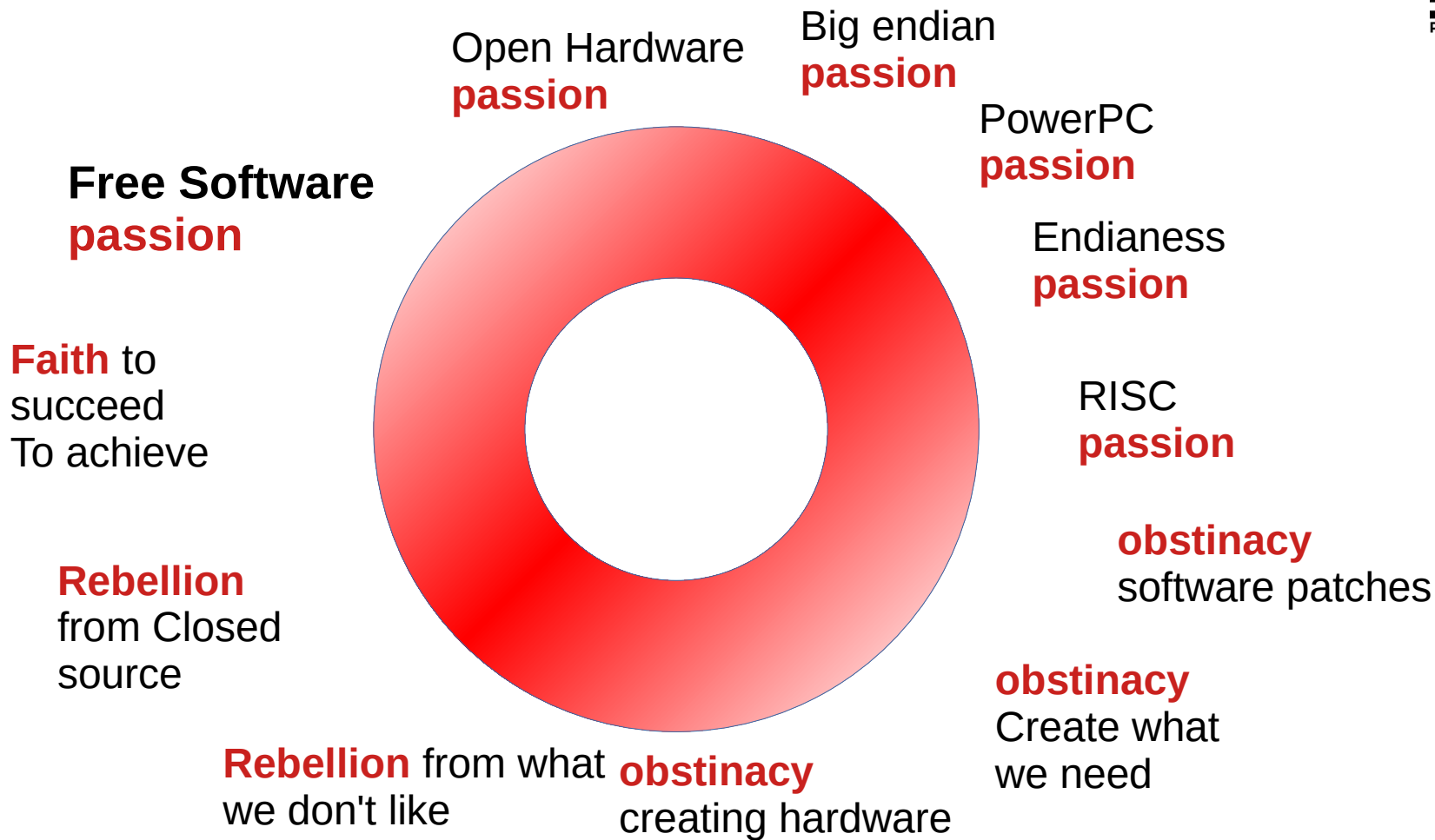
- Creativity on solve problem on Hardware design or electronic shortage
- Fix endianness issues to source codes (starting from libraries most used)
- Creation of multimedia design to advertise (video, animations, images, articles, etc...).
- Help on translations of posts in our websites
- Spreading the project on blogs, forums, socials
- Law Assistance to support the Open Source Hardware License
- Maintain, update, manage our software tools and services
- Outreach, seminars in High Schools and Universities



But who made us do it?

- Passion and knowledge sharing in the Free Software and Open Hardware declination
- Risc and/or PowerPC/Power and/or big endian processors
- Diversity in cpu architectures
- The ambition to own computers that were designed inspired by our passions
- The obstinacy to create what didn't exist yet
- The obstinacy to make Free Software work on these future computers
- The faith that something good would come of it
- The taste in creating what we need
- A certain amount of **rebellion** against a situation we didn't like (**closed source, closed hardware, monopolies, surveillance capitalism, etc..**)



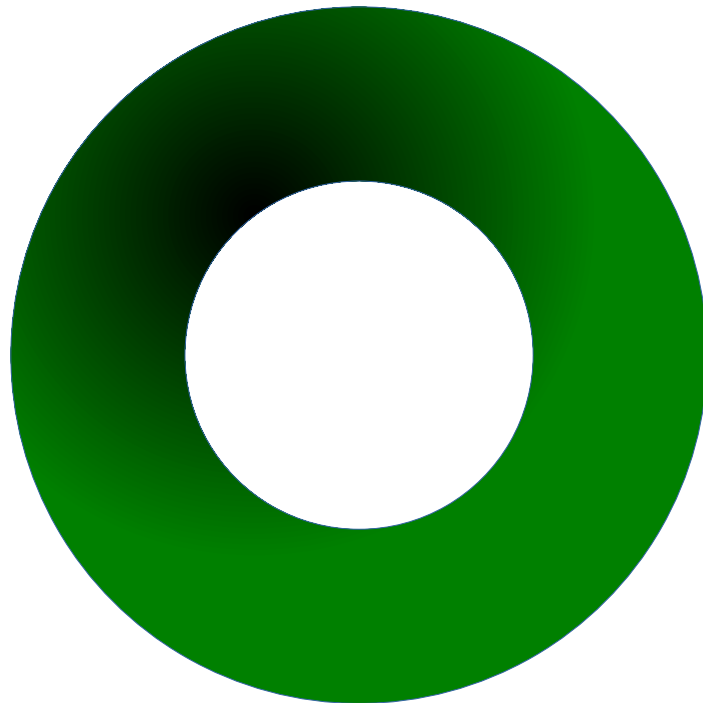


What has changed in our lives?

- We are catapulted to be protagonists
- We are no longer spectators
- We have discovered a world of interesting people
- We have collaborated with other interesting people
- We have realized something that wasn't there before
- We have seen that our help counts for others and vice versa
- We feel more like protagonists
- We have learned:
 - to overcome various difficulties
 - to find solutions
 - to accept difficulties and complexity
 - to open up hope even when it seemed we couldn't
 - to collaborate with people who agree with us
 - direct our energies towards what is edifying, what builds up



- be protagonists
- Realized what was not there
- Good use of energies
- Harmony with others
- Open hopes
- accept Complexity
- discovered interesting people
- collaborated with other interesting people
- Our action count
- more agile to overcome difficulties



What matters

is that the difficult, improbable, partly frustrating journey, full of negative and positive twists and turns,

have made us

people who make the world a happy place to live for everyone



Our Resources

Association	https://powerprogress.org/
Association Forum	https://forum.powerprogress.org
PPC Notebook updates	https://powerpc-notebook.org/
Wiki PPC Notebook	https://wiki.powerpc-notebook.org
Forum PPC Notebook	https://forum.powerpc-notebook.org
Survey to collaborate	http://survey.powerpc-notebook.org/
Our Repositories	https://gitlab.com/power-progress-community/



Thank You!

Q&A

