

# Project Cauã And Caninos Loucos: Planning For The Future

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# Nobody Buys Software



# Nobody Buys Software

Nobody Buys Hardware Either.....

# People Buy Solutions!



# People Buy Solutions!

Even if the “problem” is to play a game....

# History of Project Cauã

- Started in 2007 – Jon “maddog” Hall, Linux International
  - To answer question: “How Do I make money with Free Software”
- Joined in 2010 – Douglas Conrad, OpenS Tecnologia
- Joined in 2014 – Renata Silveira de Costa
- Joined in 2015 – Rio Hacker Space

# Goals of Project Cauã

- Create *millions* of new, *private sector* high-tech jobs in Latin America (Brazil first), many millions more worldwide
- Make computers easier to use
- Create more environmentally friendly computing
- Decrease cellular wireless contention
- Create gratis WiFi bubble over urban areas
- Create low-cost or gratis Super Computing capability
- Using *sustainable*, private sector funding



# Structure

- Millions of “Project Cauã Professionals”
  - Each independent business person
  - Supplying good support to local customers
  - Income generated from monthly service charge
  - Income augmented by various additional jobs
- Project Cauã a non-profit educational organization
  - Gives education and upper-level support



# Priority-Based Push Down Stack

- Processing something
  - New thing pushes current process down
    - Newer thing pushes “New thing” down
    - Newer thing finishes
  - New thing starts processing again
  - New thing finishes
- Original processing continues....

*So it is with Project Cauã's various proposals...*

# V1.0

- Servers and Thin Clients in high density areas
  - Tall residential and business buildings
  - Computing as a service



# V1.0 “Pushed Down”

- Servers and Thin Clients in high density areas
  - Tall residential and business buildings
  - Computing as a service
- Did not proceed
  - Too much capital needed
  - Too long a lead time for income generation
  - Hard to retrofit existing buildings (Since solved)



# V0.5 and V0.1

- V0.5 – Home media centers
- V0.1 – Raspberry Pi as media center/access to Internet





# V0.5 and V0.1: “Pushed Down”

- V0.5 – Home media centers
  - Too much capital needed
  - Service Level Agreement not desired for “appliance”
- V0.1 – Raspberry Pi as media center/access to Internet
  - Not enough installed base for needed hardware discounts



# Proposal V0.0

- Provide local, entry-level support and services for small businesses
- Short-term:
  - Part-time job for university students
  - Generate money for students to attend university
  - After university, full-time or sell off
- Long-term, “pushed down”, goals remain the same

# What Types of Services?

- Install new hardware
- Install new software (OS, Drivers, Layered Products)
- Set up networking (wired or wireless)
- Remove viruses, SPAM
- Set up small server systems, web sites, etc.
- Re-cable office for greater efficiency
- Educate end users in how to use their system
- Provide end-user support

# Why University Students?

- Students already have much of training needed to do the job
- Students often need money to continue with university
- Project Cauã better fits student's future career path than other “student jobs”
  - Create a “portfolio” of skills for future employers
- Could also be part/full time job for single parents or physically challenged
- Many students already doing this, but informally (and illegally).



# Benefits To Small Business

- Computer hardware and software are kept up to date
  - Latest security and bug fixes
- Computers tend to work faster and better
- Business may save money on purchasing software and hardware
- Downtime of computer systems reduced
  - “Preventive medicine”
- Free and Open Source Software used whenever possible to meet needs of customer
- Local support that “comes to you”
- Better secondary backup than “skinny geek kid”

# Benefits To Community

- Allows greater number of good students to participate in university education
- Develops local high-tech jobs
  - Keeps support money in local environment
  - Helps to develop good local support infrastructure for new businesses
- Allows Small Business to be more efficient in the use of their computers

# Target Market For Professionals

Small business, emphasis on “small”

- 1- 10 people in office
- Can not afford full-time administrator
- Professional forms contract with business person for set amount of time per month
  - Estimate five-eight companies, three hours a week each
    - Local to home or school
    - Transportation time not included
  - Estimate 800 USD – 1200 USD per month/Professional
    - 200 USD per month per customer
- Professional can also take “walk-in” business

# Steps To Becoming Professional

- Go to [www.projectcaua.org](http://www.projectcaua.org)
  - Read about program (no login required)
  - Determine your skill set from suggested skills
- Register for an account (gratis)
  - Download skeleton contract
    - Update with contact info and skill set
  - Download skeleton advertising materials
    - Update with contact info
- Register as Brazilian Micro-entrepreneur
- Start Selling
  - Alternately contact Hacker Space

# Steps To Becoming *Project Cauã* Professional

- Project Cauã is a **brand**, a guarantee of quality....
  - Agree to set of ethics
  - Agree to quality of service
    - Number of hours per customer
    - Number of hours per week
    - Limited number of customers (5-7)
  - Agree to keep learning throughout service
    - LPI and other certifications

# Training Required

- Minimal technical training to get started
  - Most computer students know these things already
  - Project Cauã would help guide Professionals with upper-level tasks, or sub-contract
- Project Cauã would supply business management training needed

# Over Time

- More skills are learned by Professional
- Professionals will have new services and products to offer to their existing customers
  - Existing customers allow for quantity purchase of equipment and software
- Professionals build up a business that could be:
  - expanded to “full time”
  - sold to new university Professionals

# Project Cauã: Non-profit Education

- Provide backup infrastructure and support to Professionals
  - Bug tracking systems
  - CRM/ERP systems
  - Forums
  - Technical manuals
  - Documentation
- Develop new products and services
- Help with issues like professional insurance





# Recently...

- Universities interested in:
  - Using Project Caua in Entrepreneurial studies
  - Giving university credit in students setting up real business instead of “toy” businesses
- Cities and townships giving courses in entrepreneurship
- High Schools Who Teach Computers
  - Create part time jobs for students preparing for university
- Linux Professional Institute (LPI) taking notice

# Linux Professional Institute

- Linux Professional Certification
  - Systems Administration
  - Knowledge Workers
  - Security and Database
  - IoT (Estimated Q1CY19)
- World-Wide
- Vendor and Distribution neutral
- Separates Training from Certification
  - Knowledge Objectives and sample tests posted on website

# What Was Missing?

- Turnkey solutions for Professionals to sell
- Solution to long selling cycle/retrofitting
- Local mentors to Professionals – to help them gain confidence
- Decently priced hardware

*Enter Caninos Loucos*

# Caninos Loucos: Creation of a National IoT Innovation Platform

by

Jon "maddog" Hall

Co-Founder of Caninos Loucos,  
Board Chair Linux Professional Institute,  
Chairman Emeritus, WIT/



# Project Goals

- Lower cost of computers for education
- Create access to computer education for all
- Stimulate Single Board Computer (SBC) design and manufacture in Latin America
- Stimulate Open Designs of SBCs
- Reduce “Brain Drain” of CS and CE graduates
- Reduce Balance of Trade deficit for computer components and software

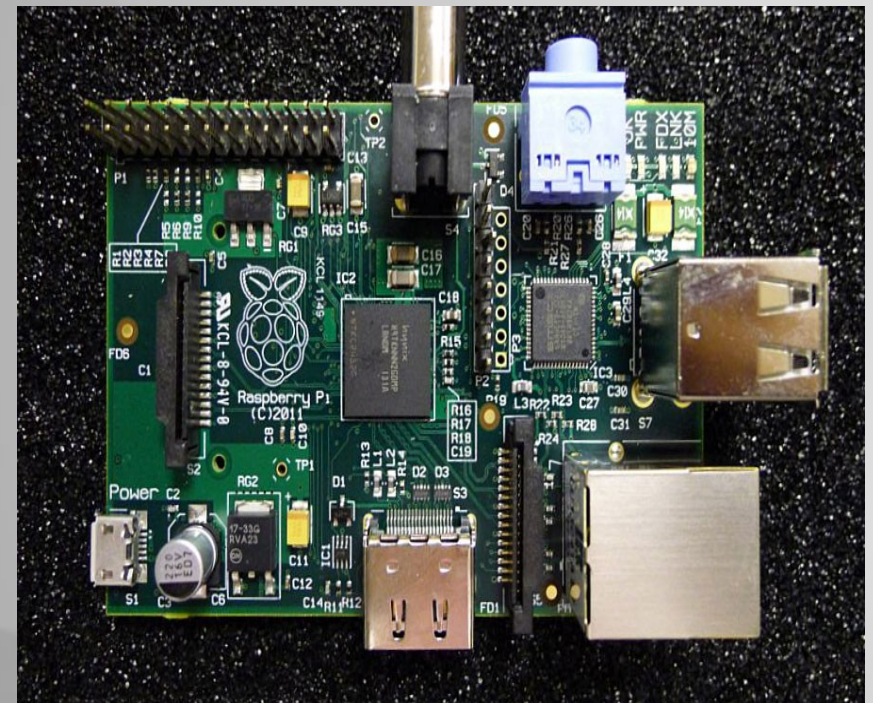
# The “Cambridge Problem”:

Entering Computer Science Students Less Knowledgeable than 20 years ago.

- VIC-20s and Bulletin Board Systems
  - Source Code and objects
  - Syntax Errors
- Laptops and Warranties
- Games and HTML

# The “Cambridge Solution”: The Raspberry Pi - 2011

- Simple Computer
  - Small enough for a (large) pocket
  - Cheap enough that anyone could buy it (35 USD)
  - $1000 \Rightarrow 10,000 \Rightarrow 1,000,000$





# The Problem In Brazil (And a lot of Latin America)

- Import Duty on electronics products is 100% of value of (product plus shipping)
  - RPi 1 Model B – (35 USD + 20 USD shipping) x 2 plus “uplift” is (typically) 110-150 USD
  - Customs clearance takes time and is “risky”
- Certification by ANTEL (and other “FCC” organizations)
- Import Duty of components is 6% of (cost plus shipping)
  - RPi 1 Model B – (28 USD + 20 USD shipping) x 1.06 is 50.08 dollars
- Bulk shipping reduces shipping costs
- 200 Million people in Brazil, 500 Million in Latin America, most at lower PGDP than USA
- USP – part of Federal University System – 100,000 students, 16,000 PhDs.
- Brazil has some of the largest FOSSH conferences in world



# The Insights

- SMT robots in Latin America are not paid any higher wages than SMT robots in Taiwan
- Given the same components, robots produce the same product (Trademarks can go across continents)
- Overhead of people spread among thousands of boards per day
- Boards can be manufactured in Latin America for one or two dollars more expense than Taiwan

# Why Little Manufacturing (and even less design)?

- High Risk – fear of failure
  - Complex and expensive to design
  - No proven market
- Lack of VC investment money
- “Easy” to go to Taiwan
  - “Pass through” taxes to consumer
- SMT lines do exist
  - Make Memory SIMS/DIMS, Flash, Arduinos
    - “Low Risk” and “Proven Market”

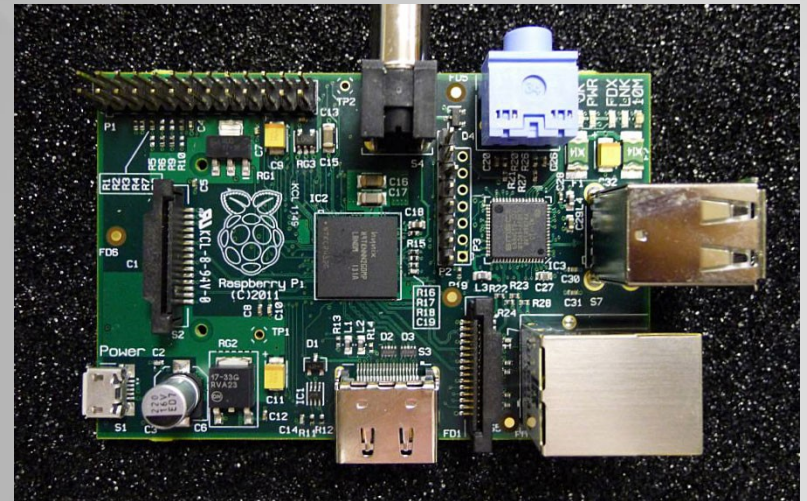
# LSITEC – NGO of USP

- Circuit Diagrams to finished product
- Surface Mount Technology – large robots
  - Through board holes in PCBs
  - Surface mount
- CAD Files
  - Printed Circuit Board (PCB) layout
  - “Gerbers” for SMT lines



# Raspberry Pi

- 700 MHz Single core Broadcom chip
- 512 Mbytes RAM
- HDMI
- Audio out
- USB 2.0
- 10/100Mbit ETHERNET
- Micro SD card
- 5W
- Sold by millions for 35 USD....except in Brazil...
  - Complex PCB – Gerbers not available
  - Components not readily available



# Contacted RPi Foundation: And Farnell

- RPi Foundation studied situation
  - Tried to reduce taxes for “education” - refused
  - Worked with USP/LSITEC to produce in Brazil
    - Created 15 systems which worked
  - Worked with small SMT company in Curitiba
  - Worked with Farnell
- After two years decided “no SMT line in Brazil”
- Opened SMT line in Wales, a UK country.....
  - Later Japan and a couple of others

# Technical Issues with Raspberry Pi 3

- One GB of RAM for four core processor
  - 64-bit uses 30% bigger code
- USB 2.0 instead of USB 3.0 or 3.1
- Operating Temperature of 40-50 degrees C
- No IR control on board
- ElectroStatic Discharge (ESD) protection poor
- No flash on board, uses Micro-SD card instead
- Single board design makes design flexibility poor



# Commercial issues with Raspberry Pi

- Single board design makes commercial designs expensive
- WiFi on board makes import to different countries expensive
  - Moves certification to distributors/retailers
- Finished product makes importing expensive
- Artificial scarcity of product

# Overall Plan

- LSITEC designs systems
- LSITEC produces first 20,000 units
- LSITEC partners with “Small SMT Company”
  - help with production
  - Company taked over production under license
- Utilize existing distributors – (Arrow? Farnell?)
- Start doing same with other system designs
  - Introduce new system designs
  - Follow same path



# Additional Parts to Plan

- Export to Mercursol Countries at no additional import duties (recover duties paid on components)
- Export to rest of world as opportunities evolve
  - Respect MSRP, pay royalties
- Export Brazilian ideas
- Open Business Model
  - Multiple “Small companies”
  - Multiple distributors

# Additional Sales and Innovations

- Industrial (temperature, humidity, dust, vibration) boards
- Specialized motherboards
  - De-populate
  - Replace components
  - Design new boards
- Customized solutions (hardware, software, services)

# ....and It Gets Better!

- The program could develop the start of a “blobless”, no-firmware computer
  - ARM or RISC-V chip
  - Free Software
  - Open Hardware
    - Open GPU
    - Open FPGA
  - FOSS Bios

# Labrador

- 4 core, 32bit 1.2 GHz
- Two Gbytes RAM
- Wireless/Bluetooth on mother board
- System On Module (SoM) and motherboard
- IR receiver on motherboard
- 16 GB emmc memory on SoM - much faster than SD card
- USB 2.0 and USB 3.0
  - Can give SATA support easily
- MSRP – 80 USD (est. 300 reais in Brazil)



# Labrador V1.0



# Technical Superiority to Raspberry Pi

- Two GB of RAM for four 32-bit core processor
- USB 2.0 and USB 3.0
- Operating Temperature of 70 degrees C
- IR control on mother board
- WiFi chip on mother board
- ElectroStatic Discharge (ESD) protection good
- 16 GB flash on SoM, Micro-SD on motherboard
- Dual board design makes design flexibility and *longevity* good

# Commercial Superiority to Raspberry Pi

- Dual board design makes commercial designs less expensive
  - Can use SoM by itself
  - 204 pin DIMM interface allows different motherboard designs and *longevity*
- WiFi on mother board allows import of SoM to different countries
- Mercosul agreement allows Latin America savings
- Multiple manufacturers helps avoid scarcity





# Brazilian National IoT Program

- Recognized 200 Billion USD market in IoT
- Investing in developing IoT in Brazil
- Needed hardware and software platform



# “Caninos Loucos” National IoT Hardware Platform

- Three *initial* designs:
  - Labrador (“the friendly dog”) for prototyping and flexibility
  - Bankhar (“the guard dog”) for IoT gateway, Broadband Router, NAS Server, PMOD expansion
  - Pulga (“the flea”) for sensors and transmission of data
- More designs and flexibility to come
- Open Software as base

# Pulga: The Sensor Computer

- ARM Cortex – M4F CPU (could be RISC-V)
- 512K Flash and 128K SRAM
- 18mm diameter and 2.6mm height (ten cent piece)
- Weight 8.6g
- Bluetooth 5.0 and Mesh and/or Lorawan
- Sensors: Accelerometer (9 axis), gyroscope, light, temperature, pressure and more
- Two-board design



# Pulga: The Sensor Computer

- Power
  - supercapacitor
    - Solar, RF or temperature differences
  - Battery (CR1616)
- Voltages 1V-4.2V
- Nine GPIO pins, COM UART, I2C, SPI, PWM, I2S
- JTAG UART
- 1 x ADC

# Example Applications For Labrador

- ODOO – Open Point of Sale and ERP system
- KODI – Open Media Center, Security and IoT
- Freedombox – Small home/business server
- Frets on Fire – Guitar Hero

# Example Applications for IoT

## Three Governmental Areas:

- Agriculture
  - Sick Cows
  - Fertilizer
- Health
- Smart Cities
  - Crisis Traffic Control – Floods, Riots
  - Hospital Capacity
  - Crowded bus metering

# Partners, Many Partners

- ARM is a corporation that designs CPUs, GPUs, FPGAs, DSP and SoCs
  - ARM licenses their designs and tools to companies like Broadcom, Samsung and others
  - ARM licensees produce these chips and port GNU/Linux to them
- Linaro is an association of these companies that collaborate together to make sure GNU/Linux works well on the ARM architecture SoCs
- SMART – very large memory and flash company
- BNDES – investment bank in Brazil
- Many others....



# You As A Partner....

- Conceive of new solutions
- Design new motherboards
- Conceive of and design new sensors
- Research on supercapacitors and batteries
- Help other people learn IoT and Open Source
  - Debian will be default distribution

# Resources

- Caninosloucos.org
- Codeiot.org.br
  - Free Online IoT class
  - Currently Arduino based
  - Will add Labrador
- lpi.org – Certification in Open Source



# Project Software Status

- V3.10 kernel – all drivers other than InfraRed (IR)
- Debian 10 support
  - V4.19 kernel – drivers missing for
    - Imagination PowerVR
    - HDMI
    - IR
    - Audio – ATM 7059
    - MIPI DSI/MIPI CSI

# What Is Needed

- Update uboot to have
  - PowerVR (framebuffer only) support
  - USB Keyboard
- Updated Device Tree
- Test stock 5.x kernels to see if any work
  - To come up with serial support
- Port or create drivers for
  - Audio
  - HDMI
  - IR
- Upstream code (both uboot and kernel)



# What Is Desired

Debian (and especially Debian Latin America)

- Embrace Caninos Loucos Program
- Join Caninos Loucos Community
- Innovate with Caninos Loucos

# If You are Willing to Help Caninos Loucos....

- Contact: Augusto  
(augusto.machado@lsitec.rog.br)
- Website: [www.caninosloucos.org](http://www.caninosloucos.org)
- Telegram Channel: Comunidade Caninos Loucos  
(or just message @augrm)
- Supply Contact Information and Expertise

# Project Caua: Solutions

- POS and ERP System
  - Labrador
  - USB Peripherals
  - ODOO – Open Source POS and ERP system
  - First line of support
- Home Entertainment/Digital Inclusion
  - Labrador
  - KODI
  - Multimedia/Home Security/IoT gateway
- Leveraging Labrador mass production “fixes” quantity discount problem

# Retrofitting

- Students seek out new buildings during first year
  - Consult with architects
  - Install networking as building is built
  - Install servers and thin clients when building finished
- Old buildings use twisted pair copper for networking

# Enter: LPI Membership

- Doing good works
- Mentors/Trainers for student Professionals (some from favelas)
- Gathers local data for help in formulating marketing materials

# Hacker/Maker/Student Spaces

- How is the Hacker/Maker/Student space funded?
  - At first, volunteers
  - Then grants from government, benevolent groups
  - Then sales of “business devices” through PCPs
    - Prototyped
    - Manufactured
- Project Caua funding:
  - Web site advertising
  - Grants
  - Service Creation



# Advertising of Project Cauã

- How do businesses learn about Project Caua and the Professionals?
  - University Alumni Association Contacts
  - Rotary Organizations
  - Small Business Associations
  - Word of Mouth
  - Door to door sales
  - Hacker/Maker Space
  - LPI Membership

# Benefits to Hacker/Maker Space

- Good project for community benefit
- Attracts “new blood” to Hacker/Maker Space
- Can further develop/produce new products for PCPs to sell to their customers
- Justifies equipment for Hacker/Maker Space
  - 3D Printers
  - Laser Cutters
  - Specialized circuits

# Next Steps

- Continue to build web site with training materials and forums
- Enlist more student Professionals
- Enlist more mentors (hacker/maker space and LPI membership)
- Document success stories

# University Notes

- PCPs can get certificates
  - LPI
- PCPs can develop portfolios
  - Start in last year of High School
  - Work during summer
- Learn from Certifications' objectives

# University Notes (Cont.)

- Different universities
  - Private high school => Public University
  - Public high school => Private University
- Both universities can be free of tuition

# University Notes (Cont.)

- How do students learn about Project Cauã?
  - Admissions Office
  - Financial Aid Office
  - Alumni Association Grants
  - Project Cauã going to (needy) High Schools
  - Favella outreach

# Board Of Directors

- Daniel Coletti – Xtech
- Douglas Conrad – OpenS
- Dionara Conrad – OpenS
- Marlon Dutra – Facebook
- Denis Galvão – Isolve
- Rodolfo Gobbi – 4Linux
- Jon “maddog” Hall - LI
- Kauê Linden – HostNET
- Jody Newman – Ibex Group
- Raphael Peregrino da Silva – Linux Professional Institute
- Dr. Marcelo Zuffo – USP

# How To Find Project Cauã: [www.projectcaua.org](http://www.projectcaua.org)



Questions?