

# ***BOINC to the People!***

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***BOINC***

***Crowdsourcing Science.***



***BOINC***

***Crowdsourcing Science?***

# **BOINC2WEB**

***Turn every web user into a BOINC user.***



# **IDEA** | **BOINC2WEB**

- Easy for Devs:** *BOINC already uses web standards*
- Easy for Projects:** *Simply port project code*
- Easy for Hosts:** *C&P*
- Easy for Users:** *No download*
- Great for Science:** *Huge new user base*

# **PROBLEM** | **Code - Data - CPU - Time**

***Web uses JavaScript***

***BOINC needs to save persistent data***

***Provisioning / controlling of CPU loads***

*No consistent benchmarking*

***Relatively low retention period on websites***

*Too high WU sizes / CPU time*

***No direct GPU availability***



# SOLUTION | C/C++ for Web

## How to use existing code base in Web?

### **Emscripten converts C/C++ to JavaScript (ASM.js)**

- Libraries (Zlib, Ffmpeg, eSpeak, ccv)
- Programs (Unity, Unreal, Bullet Physics)

### **Modern browsers can use WebAssembly**

- Fast and efficient binary instruction format for Web
- Compilation of languages like C/C++/Rust via emscripten
- Memory-safe, sandboxed execution environment

<https://github.com/kripken/emscripten/wiki/Porting-Examples-and-Demos>

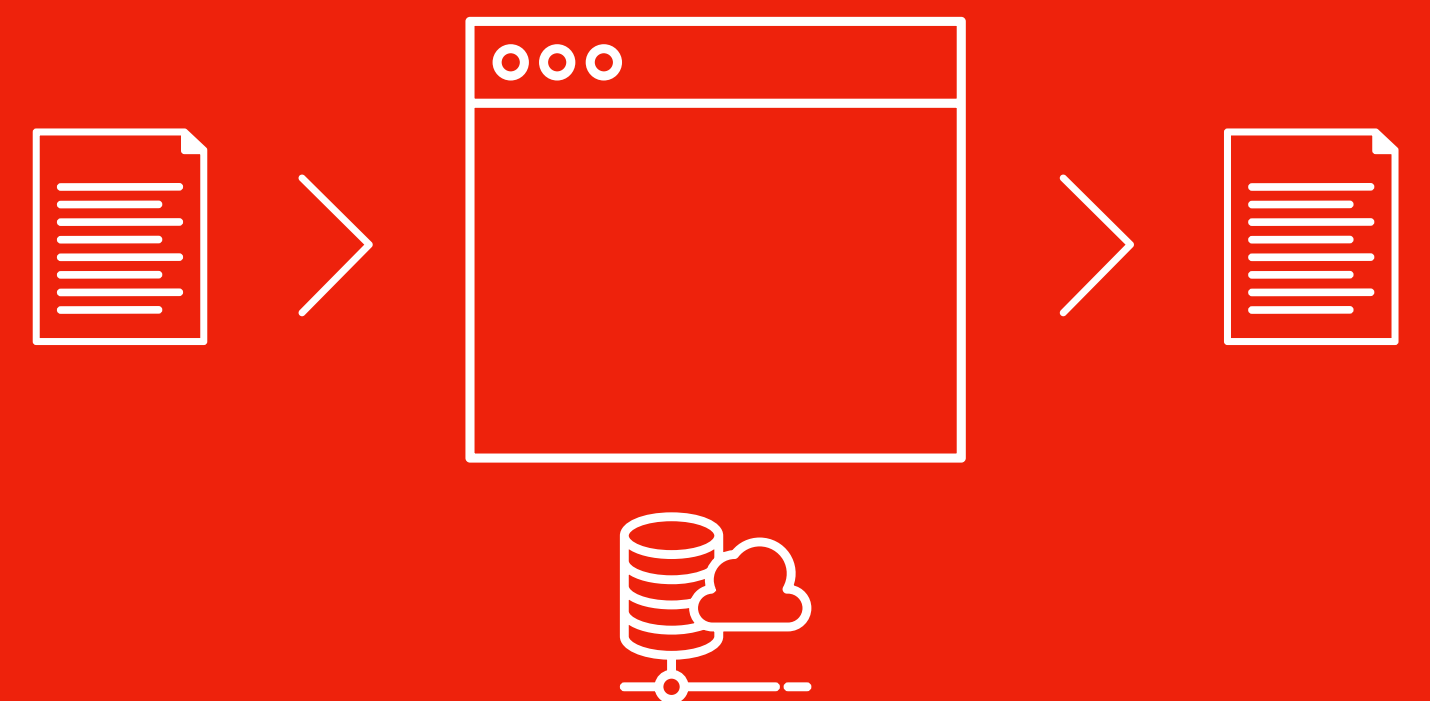


# **SOLUTION** | **Persistent Data**

**How to save data even if user navigates?**

**Several web APIs can save workunits, results, checkpoints, scheduling, project data on device**

- Web Storage
- WebSQL
- IndexedDB





# **SOLUTION** | **CPU Load Management**

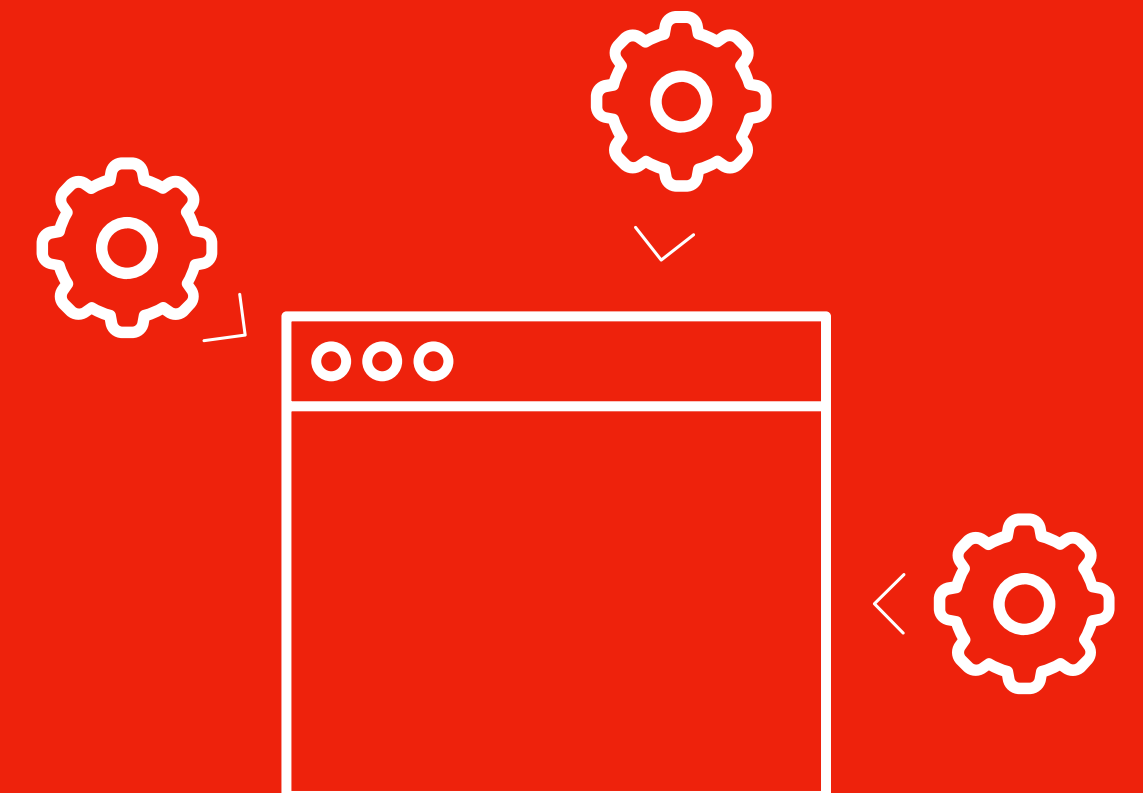
**How to deal with varying CPU load?**

**Not possible to ensure specific CPU load**

**JS / WebAssembly single threaded**

*Use WebWorker to prevent freezes*

**Cap CPU load by limiting amount of active WebWorker**



# **SOLUTION** | **Retention Periods**

***How to deal with relatively short website visitor retention time?***

***Lower checkpoint interval***

***Potentially shrink down WU***

***Employ service to save WU and CP to compensate absent users***

***Approach websites with long retention periods (streaming, one pager etc.)***

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# **POTENTIAL** | *Why and How*

## **Why should people participate?**

- Users:** *doing good, simple, opt-in*
- Websites:** *longer retention, positive image, incentives*
- Researchers:** *more computing power, public interest*

## **How can we get websites to participate?**

- Promotion / PR**
- Approach publishers directly**
- Incentives by brands / sponsors**

# ***POTENTIAL*** | ***Next Steps***

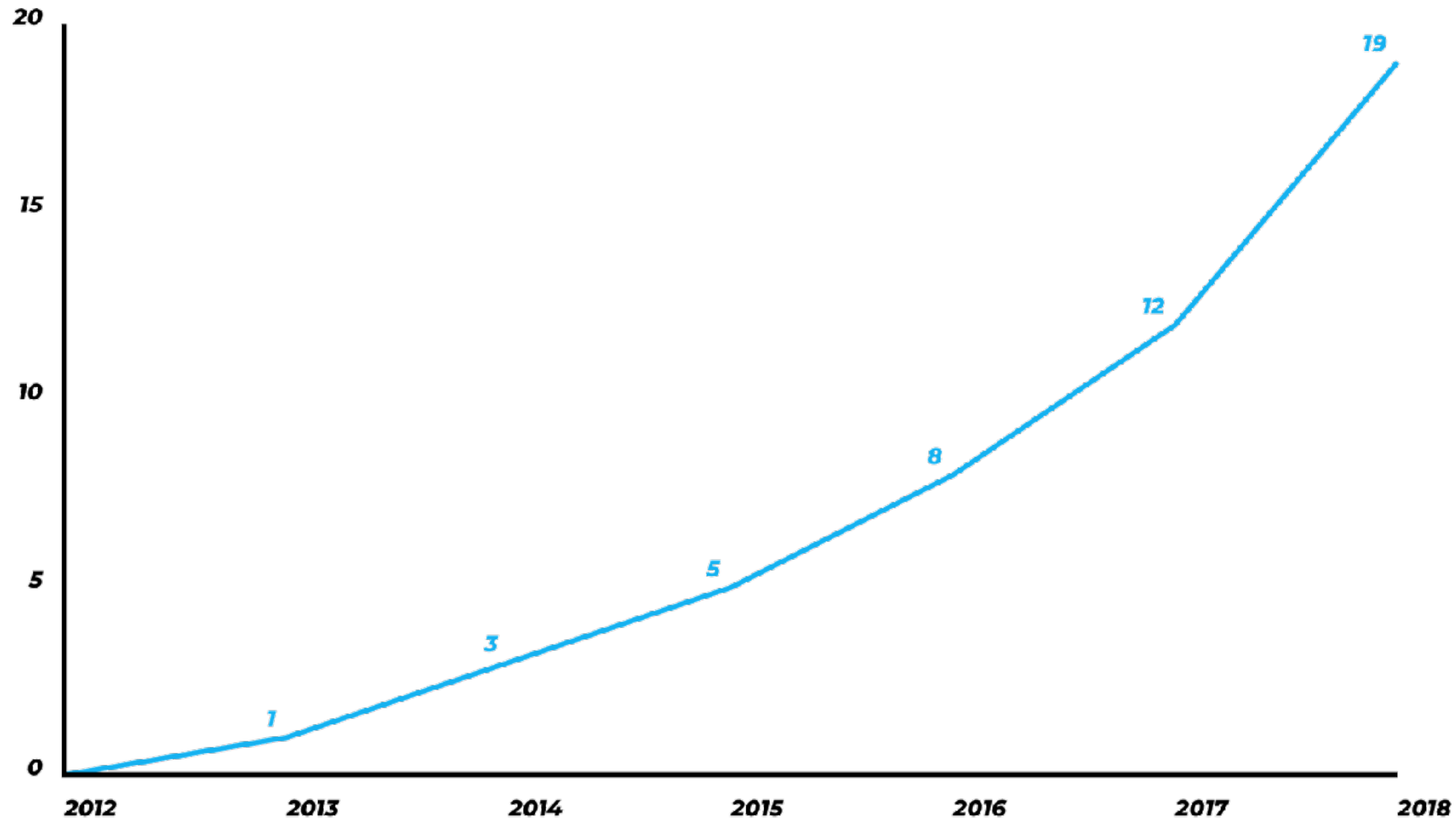
***POC available soon***

***Potential pilot project for Rare Disease Research***

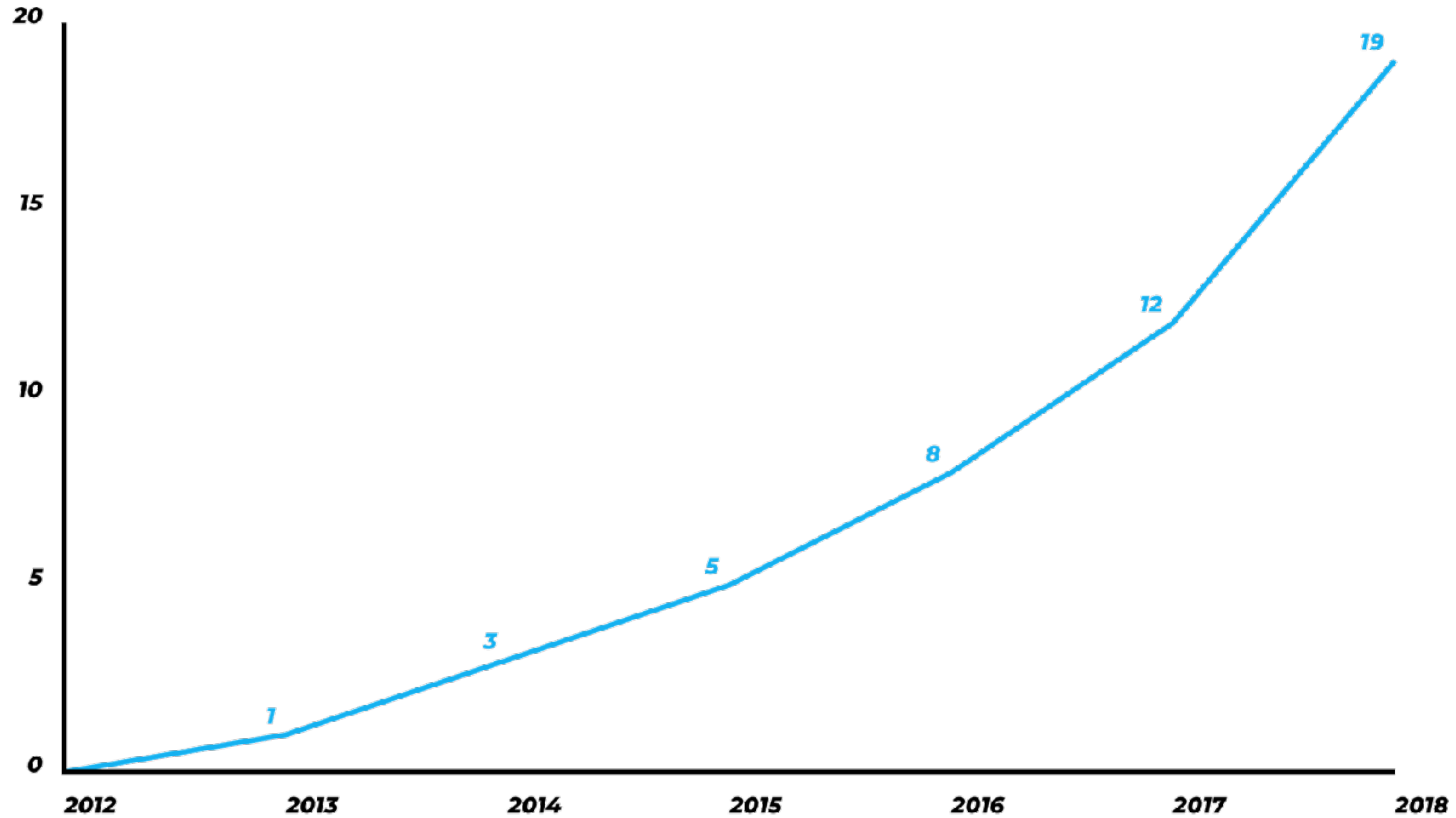
***Will you help us?***



**There's another *untapped* emerging platform...**



# **Raspberry Pi ~20 million units sold**



# **ARM BOARDS** | *Small but tough*

***ARM is another growing target platform for BOINC projects***

***Low energy consumption and high efficiency (5V, 2Amps)***

***Designed for 24/7 usage***



# **PiGrid** | **Plug-in Grid Computing**

## **Yet another All-in-One BOINCer**

- Research + Wallet Combination
- Optimized for user-incentivation (more BOINC time!)

## **Linux software stack on Raspberry Pi (ARMv7+)**

## **Delivers citizen science to consumers**

## **Join BOINC projects from a gallery**

## **Reward research by participating in Gridcoin**

## **Automated setup and secure payments**



## Gridcoin rewards Science



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**BOINC**

<http://boinc.berkeley.edu>

## Get Coins for Calculations



[www.pigrid.com](http://www.pigrid.com)

# ***Increase your BOINC Audience with BOINC2Web & PiGrid***

**BOINC2Web**     *deliver WUs to web browsers*

**PiGrid**         *deliver WUs to single board computers*

***Thank you for listening.  
We are happy to serve.***

