

Trazendo a pesquisa acadêmica para o século XXI

Como o acesso aberto e o código aberto estão
devolvendo a ciência para os pesquisadores

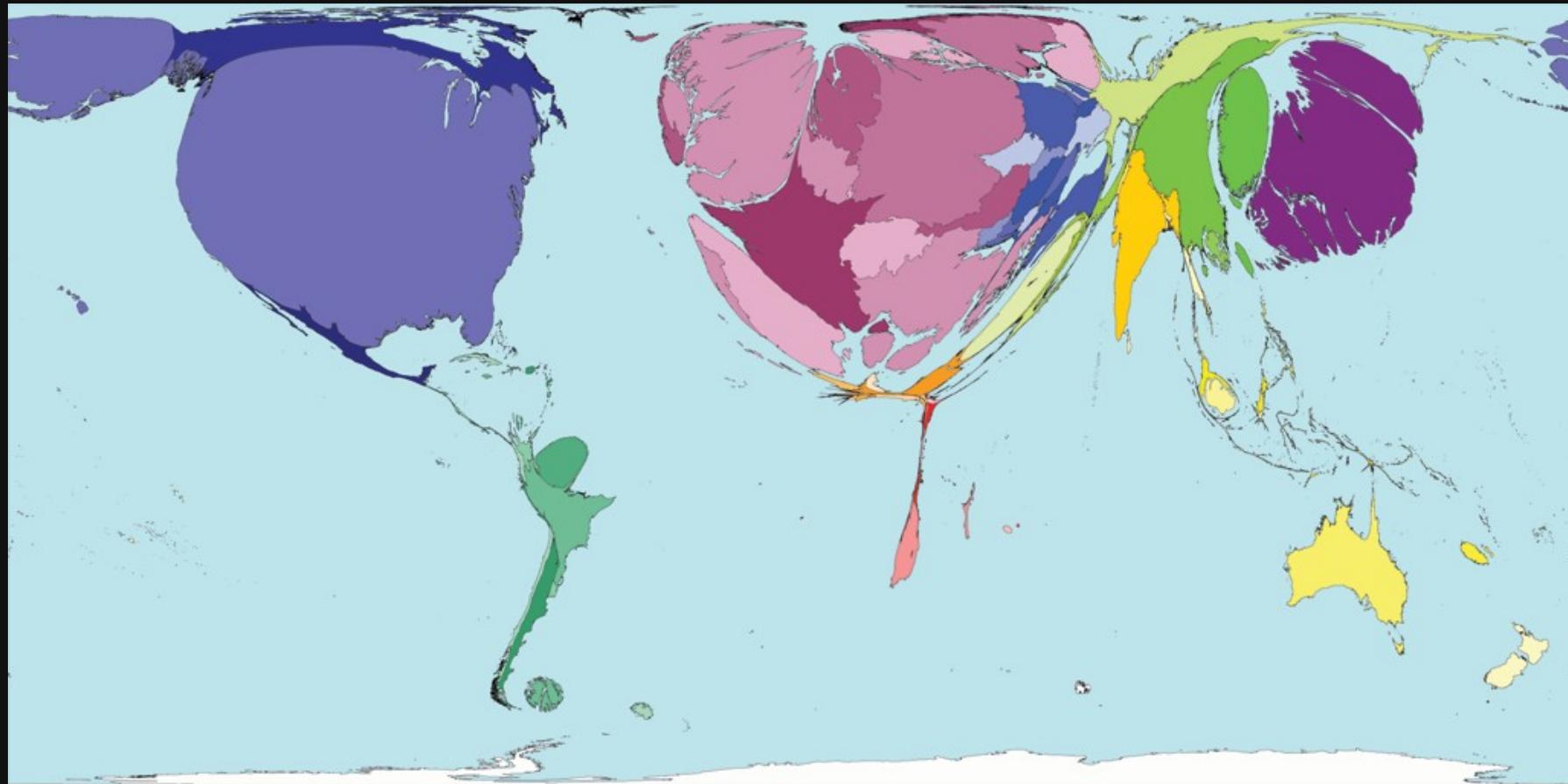
Dep. de fisiologia 15.12.2016
André Maia Chagas



EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

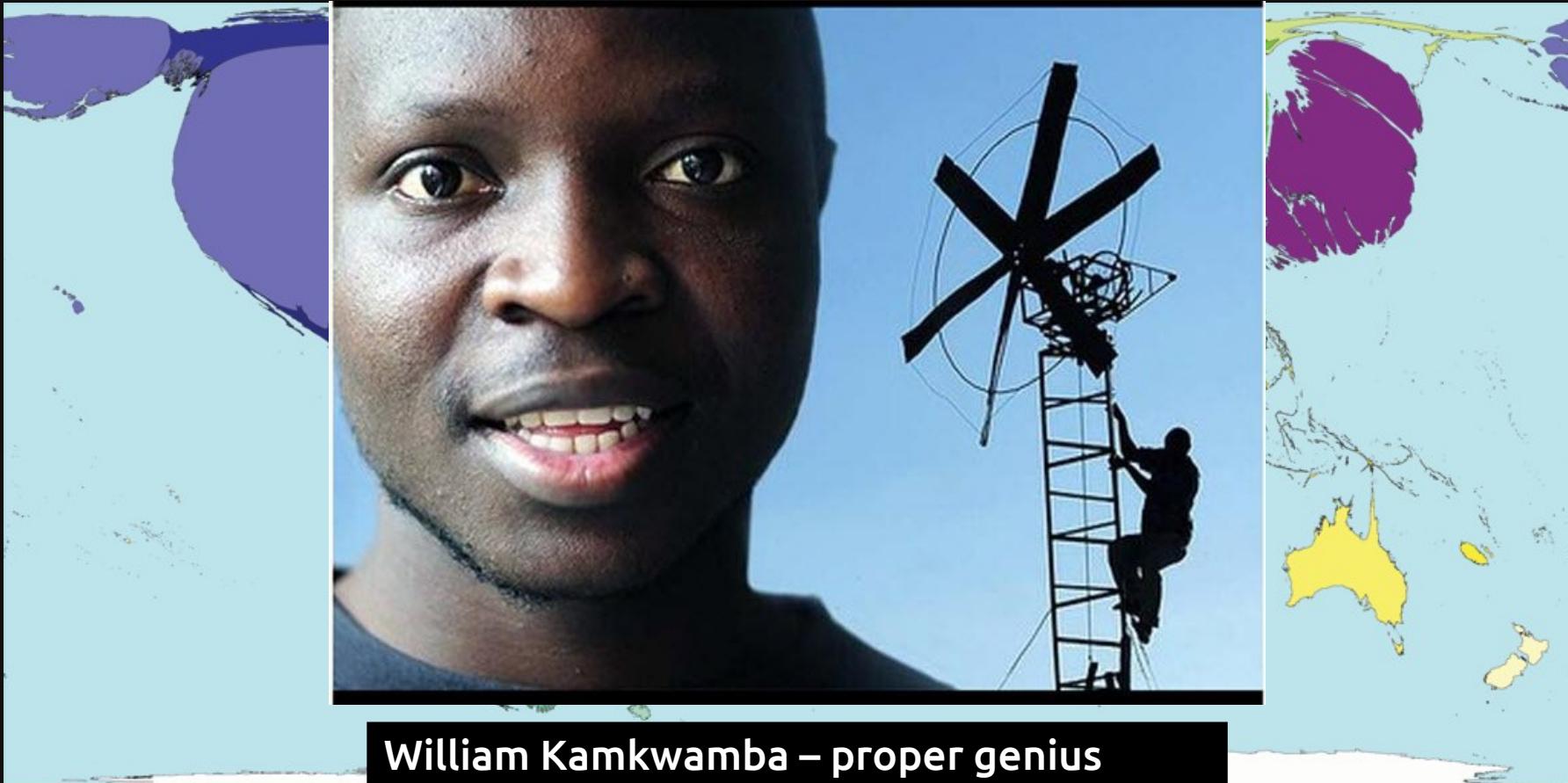


Ciência e educação



[http://
worldmapper.org](http://worldmapper.org)

Ciência e educação



William Kamkwamba – proper genius

Um pequeno investimento tem longo alcance

Barreiras na literatura

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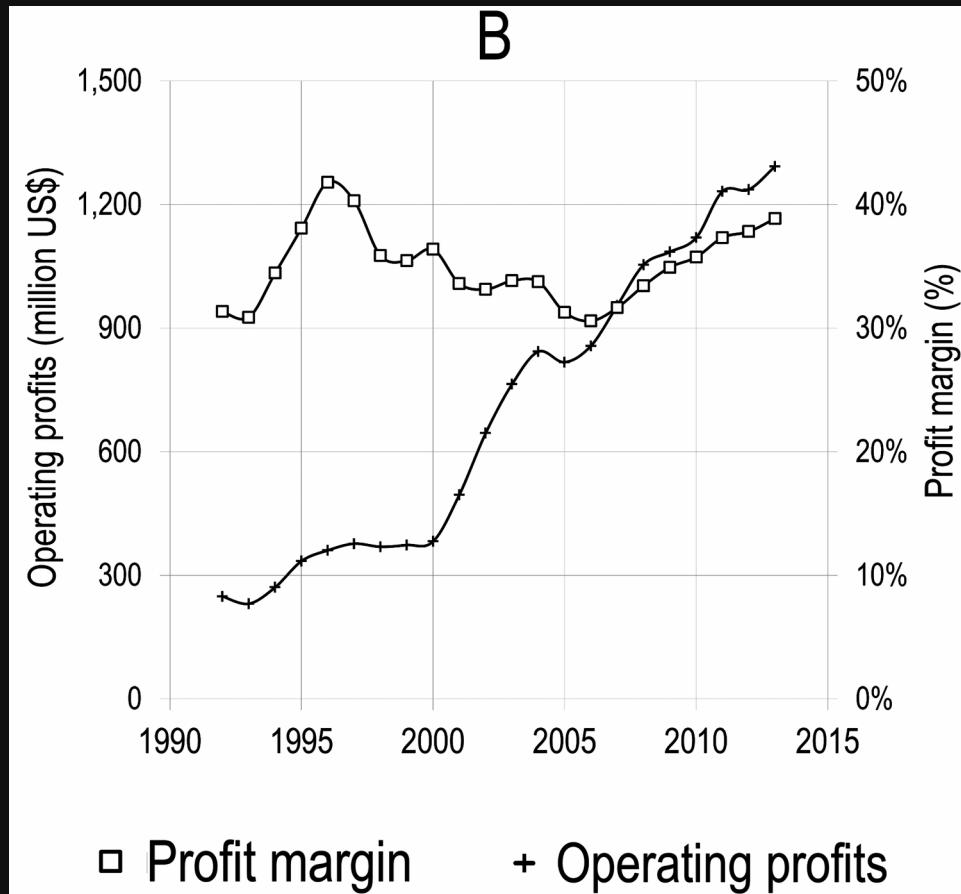
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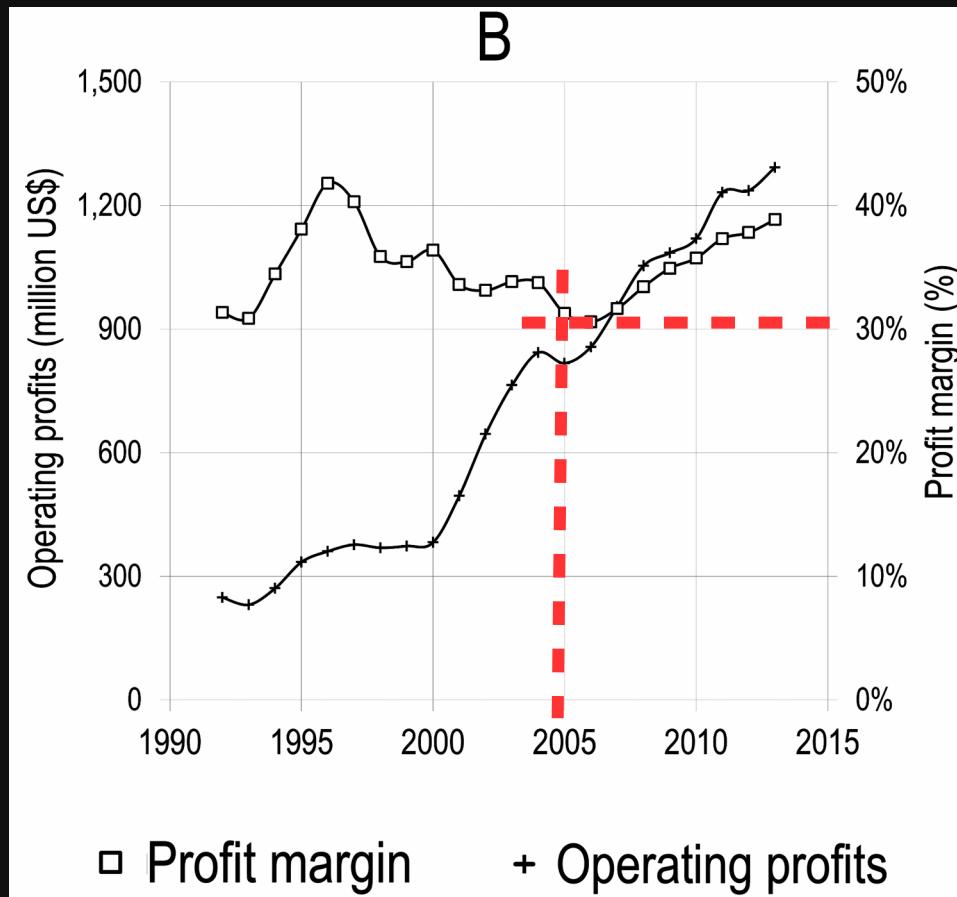
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É sempre muito dinheiro...



Intermediários fazem muito dinheiro por:
- Algo que eles não criaram!
- E que já foi pago com dinheiro público!

...indo para poucos bolsos



No mesmo nível:
Bancos
Farmacêuticas
Automobilísticas

Larivière *et al* 2015

Intermediários fazem muito dinheiro por:
- Algo que eles não criaram!
- E que já foi pago com dinheiro público!

...indo para poucos bolsos

The screenshot shows a news article from the BBC website. At the top, there is a navigation bar with links for UK, world, sport, football, opinion, culture, business, lifestyle, fashion, environment, tech, and travel. Below the navigation bar, the URL 'home > science' is visible. The main headline reads 'Open access scientific publishing' and 'Harvard University says it can't afford journal publishers' prices'. A subtext below the headline states 'University wants scientists to make their research open access and resign from publications that keep articles behind paywalls'. At the bottom of the article, there is a chart showing a sharp increase in profit margins and operating profits between 2009 and 2010. The chart has a Y-axis labeled 'B' with values 1,500 and 50%, and an X-axis with years 1990, 1995, 2000, 2005, 2010, and 2015. The legend indicates that the blue line represents 'Profit margin' and the red line represents '+ Operating profits'. The chart shows a significant jump in both metrics around 2010.

B
1,500 50%

UK world sport football opinion culture business lifestyle fashion environment tech travel

home > science

Open access scientific publishing

Harvard University says it can't afford journal publishers' prices

University wants scientists to make their research open access and resign from publications that keep articles behind paywalls

1990 1995 2000 2005 2010 2015

Profit margin + Operating profits

Larivière *et al* 2015

Intermediários fazem muito dinheiro por:

- Algo que eles não criaram!
- E que já foi pago com dinheiro público!

E pior, o produto é ruim...

The image shows a white rectangular box with a thin black border. At the top right, it says "Open access, freely available online". Below that is a green horizontal bar with the word "Essay" in white. The main title "Why Most Published Research Findings Are False" is in large green letters. Below the title, the author's name "John P. A. Ioannidis" is in smaller black text.

The image shows a white rectangular box with a thin black border. At the top left, it says "NATURE | NEWS". On the right side, there are three small icons: a share symbol, an envelope, and a printer. The main title "Over half of psychology studies fail reproducibility test" is in large black text. Below the title, a subtitle "Largest replication study to date casts doubt on many published positive results." is in smaller black text. Underneath that, the author's name "Monya Baker" is in blue text. At the bottom, the date "27 August 2015" is in black text. A cursor arrow is visible on the right side of the box.

Estudos começam a mostrar que o atual sistema não permite
reprodutibilidade

Uma solução possível...

- Código e acesso aberto:
 - Modelo de desenvolvimento que promove o acesso universal dos “planos de construção”, através de licenças que permitem qualquer pessoa estudar/alterar/redistribuir os planos
- Afinal, a pesquisa acadêmica é paga com dinheiro público!

...que já está no nosso dia-a-dia



Periódicos de acesso aberto



Os “grandes” periódicos já tem opção de acesso aberto (nov 2015)

Pre-publicação/Revisão por pares pós publicação



Artigos são publicados online antes de qualquer revisão. A partir de então, são revisados de maneira aberta pela comunidade de modo contínuo

Dados abertos



Dados se tornam entidades citáveis e rastreáveis através de
“digital object identifiers” (DOIs)

Software de código aberto

Retraction: Hires et al, Whisker Dynamics Underlying Tactile Exploration

At the request of the authors, *The Journal of Neuroscience* is retracting “Whisker Dynamics Underlying Tactile Exploration” by S. Andrew Hires, Alexander L. Efros, and Karel Svoboda, which appeared on pages 9576–9591 of the June 5, 2013 issue. The authors report, “After publication we discovered that higher-order eigenmodes were incorrectly summed when calculating the time-dependence of whisker shape during touch with a rigid object. Correction of this error revealed that our boundary conditions were inappropriate for the whisker-object interactions treated in our paper. Modification of these boundary conditions will alter the results presented in Figures 6–11. We therefore wish to withdraw the article. A corrected treatment will be published in the future. We apologize for any confusion caused by this error.”

Análises foram feitas utilizando rotinas X em software Y

Software de código aberto

```
1 # script to generate a file for storing data from the posner test run in arduino:  
2  
3 #import necessary libraries:  
4 import os #library that enables system operations  
5 import datetime #library to get the current date  
6 import serial #import library to read/write serial port  
7  
8  
9 #serial port address  
10 portName="/dev/ttyACM0"  
11 #check to see if there are any devices connected to the serial port:  
12 if os.path.exists(portName):  
13     #create the serial comm object (first par is the serial port and the second,  
14     #the baud rate)  
15     ser = serial.Serial(portName, 115200)  
16     serFlag=1  
17 else:  
18     serFlag=0  
19     print("no serial devices connected!")  
20     print("continuing without serial communication \n")  
21  
22
```

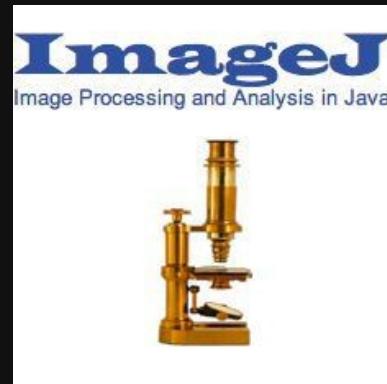
“Given enough eyeballs any problem becomes trivial”
Com olhos suficientes, qualquer problema se torna trivial

Software de código aberto

Análise



python



Resumo 01

- O sistema de publicação atual:
 - Montado para beneficiar editoras
 - Quantidade em vez de qualidade
 - Lucro acima do benefício de muitos
- Perguntas?

Barreiras em equipamentos

Fisher Scientific
A Thermo Fisher Scientific Brand

Product Certificates Safety Data Sheets Order Status Special Offers & Programs Order By Catalog Number

Score Big With Savings Up To 75% ▶

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Home ▶ Products ▶ Furniture, Storage, Casework, Carts an... ▶ Racks ▶ Microtube Racks ▶ Fisherbrand™ 96-Well PCR Racks

Fisherbrand™ 96-Well PCR Racks

Designed for preparing and storing 0.2mL thin-walled PCR tubes and strip tubes before or after PCR sample processing applications

\$91.00 - \$101.00

Specifications

Dimensions (L x W x H)	5 x 3.5 x 1.375 in. (12.7 x 8.9 x 3.4cm)
Material	Polypropylene
Quantity	5/pack

[View More Specs](#)

Includes : Translucent polypropylene cover that protects samples

Equipamentos de laboratório sofrem do mesmo problema

Barreiras em equipamentos

SimpliAmp™ Thermal Cycler



Katalognummer: A24811

Applied Biosystems™ Verwandte Anwendungen PCR

	Katalognummer	Packungsgröße	Listenpreis (EUR)	Menge
★	A24811	1 instrument	4.990,00	<input type="button" value="Warenkorb hinzufügen"/>

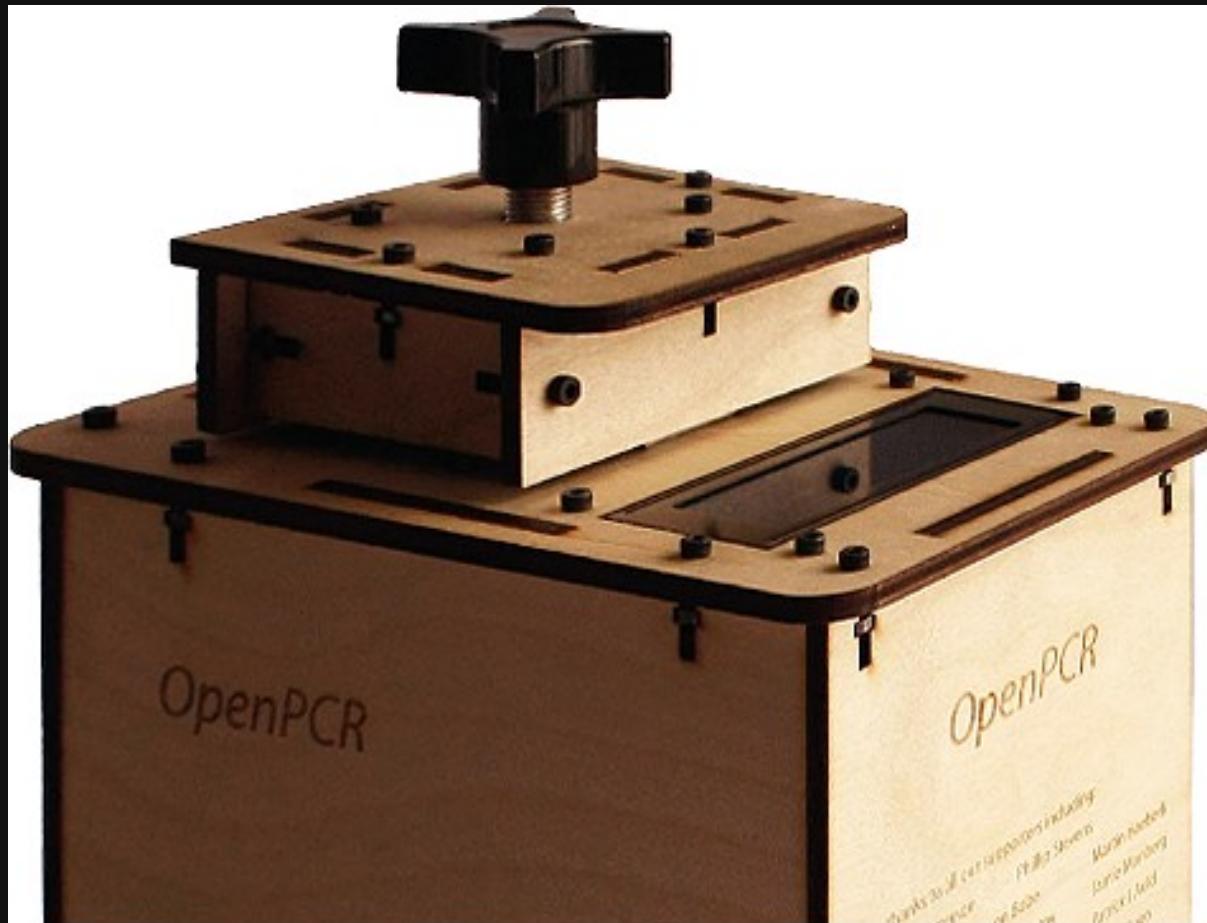
[Mein Preis & Verfügbarkeit >](#)

[Zum Warenkorb hinzufügen](#)

Benötigen Sie ein Webangebot? >

Equipamentos de laboratório sofrem do mesmo problema

Equipamento de código aberto



\$649 termociclador

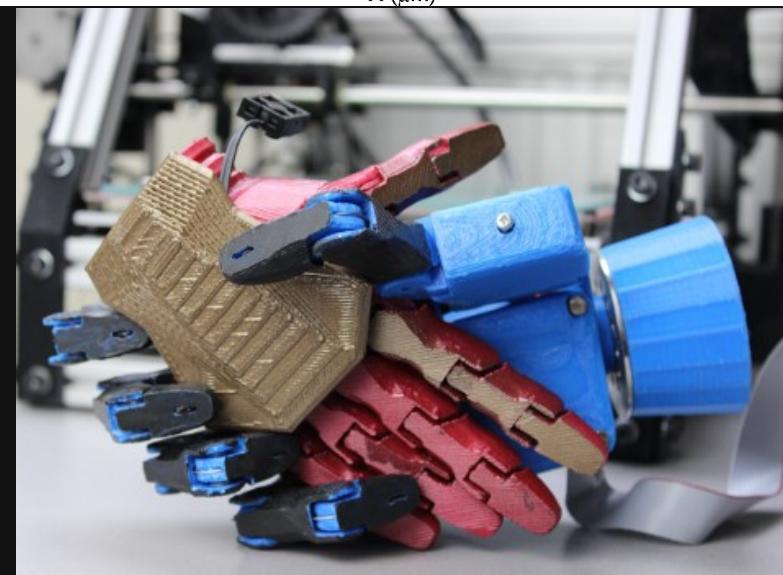
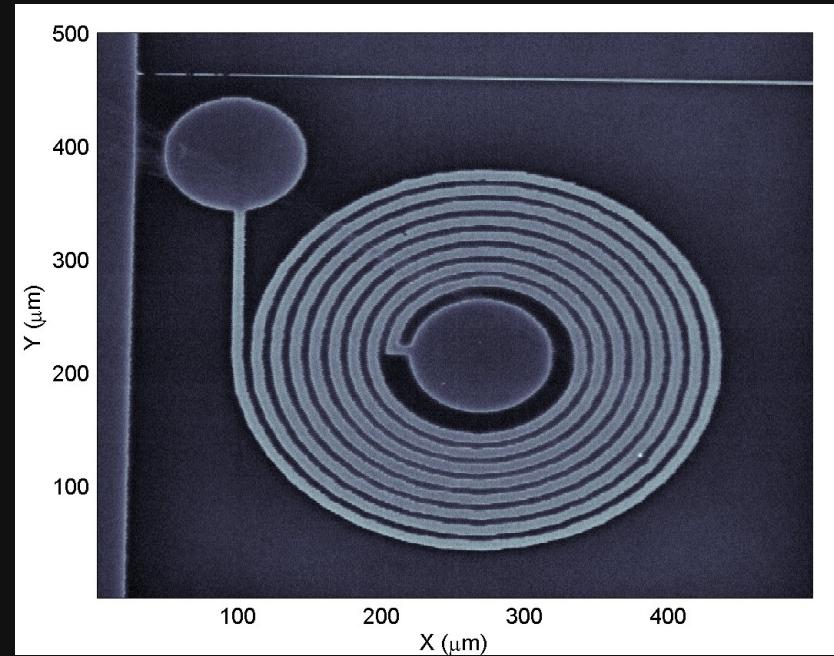
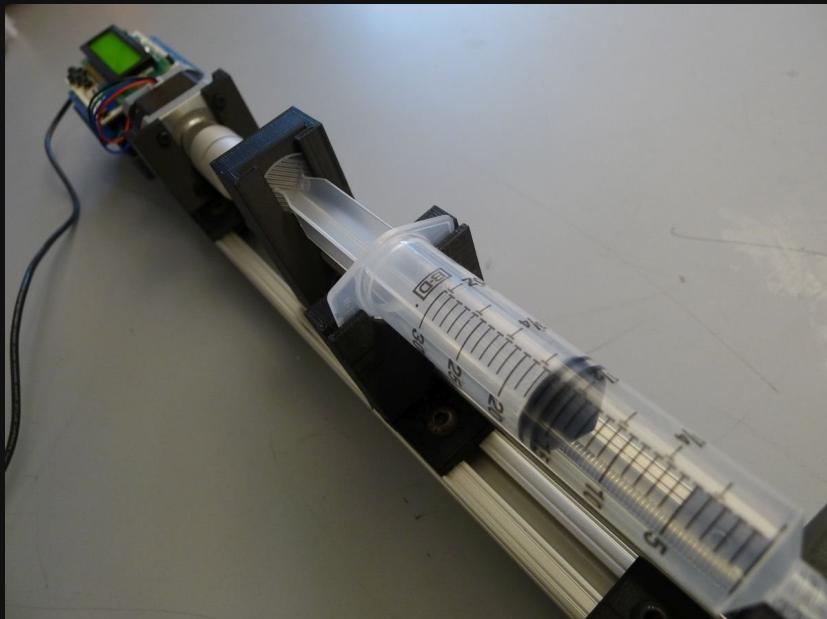
Termociclador Tupiniquim

Todas as mensagens do blog Meu blog [+ Adicionar](#)

 Termociclador PCR do Lab de Garagem
Postado por [Marcelo Rodrigues](#) em 1 dezembro 2015 às 17:00
[Exibir blog](#)

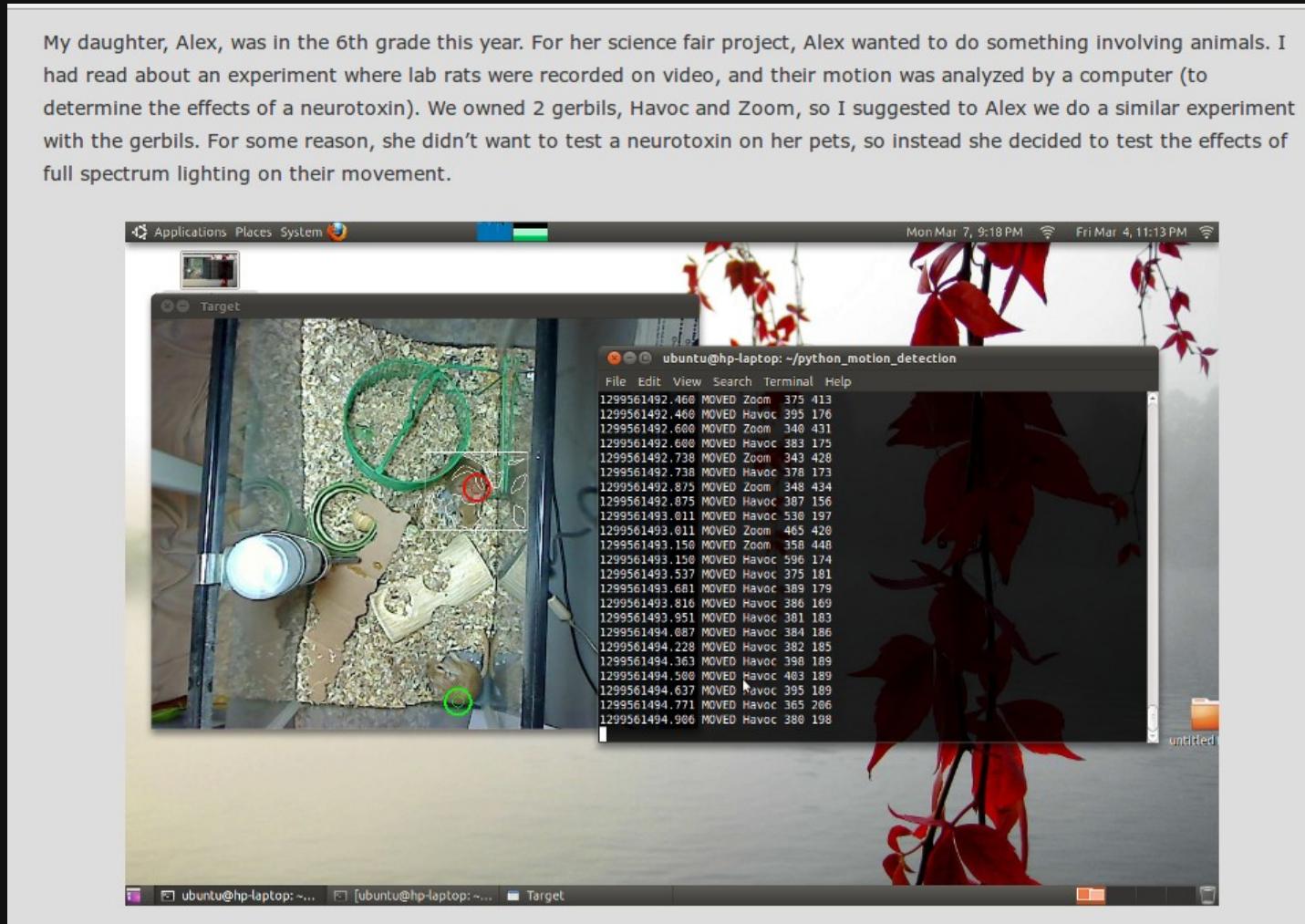


Equipamentos de código aberto



Ciência cidadã = Competição?

My daughter, Alex, was in the 6th grade this year. For her science fair project, Alex wanted to do something involving animals. I had read about an experiment where lab rats were recorded on video, and their motion was analyzed by a computer (to determine the effects of a neurotoxin). We owned 2 gerbils, Havoc and Zoom, so I suggested to Alex we do a similar experiment with the gerbils. For some reason, she didn't want to test a neurotoxin on her pets, so instead she decided to test the effects of full spectrum lighting on their movement.



Ciência cidadã = Competição?

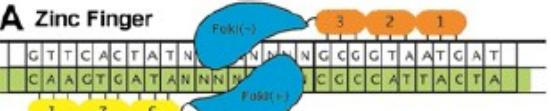
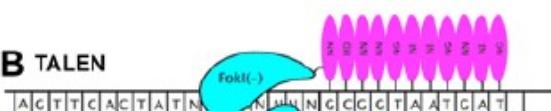
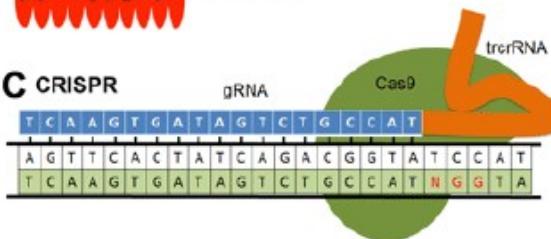
HEALTH

THESE BIOHACKERS ARE CREATING OPEN-SOURCE INSULIN

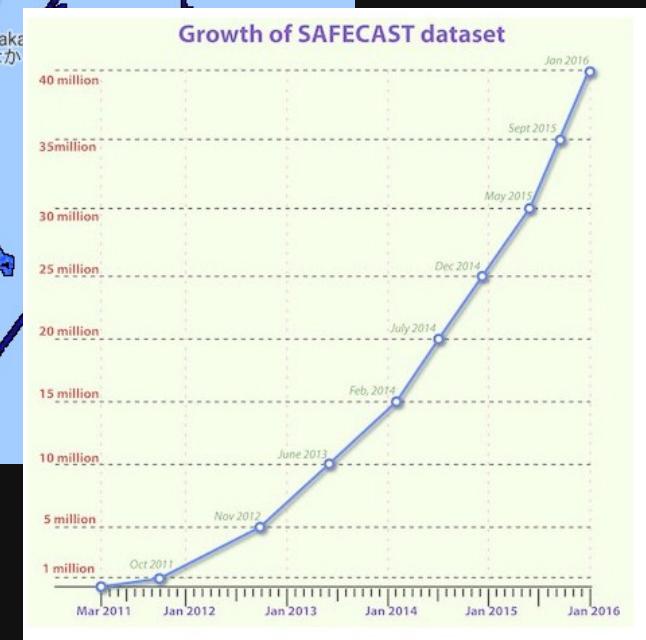
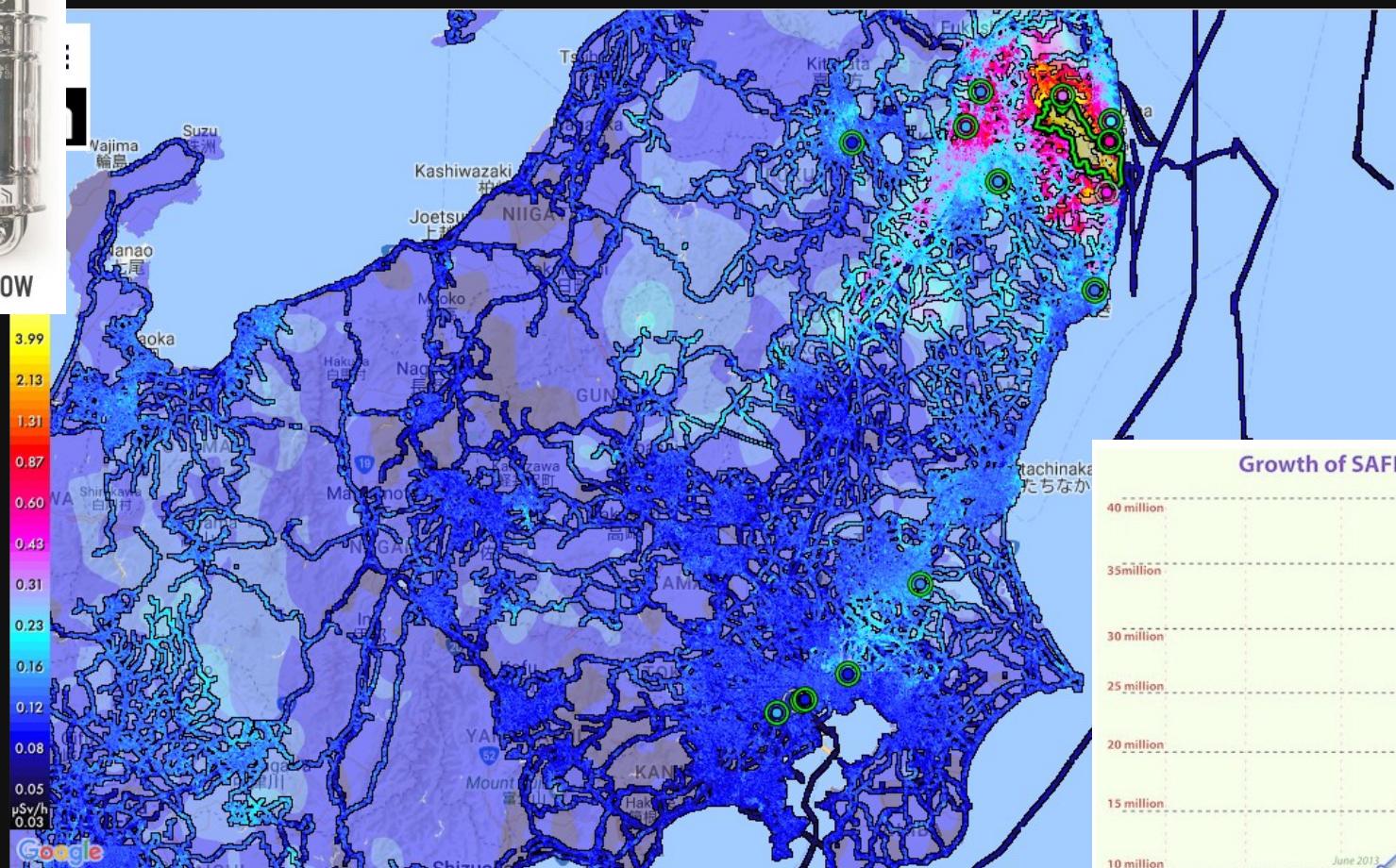
TO MAKE THE DRUG AFFORDABLE FOR MILLIONS OF DIABETICS WORLDWIDE

By Alexandra Ossola Posted November 18, 2015

Gene editing

	Cost	Production time
A Zinc Finger 	\$ 10000 – 25000:	3 months > 2009
B TALEN 	\$ 500 – 5000:	1 month > 2010
C CRISPR 	\$ 18:	1 week > 2014

Ciência cidadã = Competição?



Equipamentos de código aberto

Repositórios

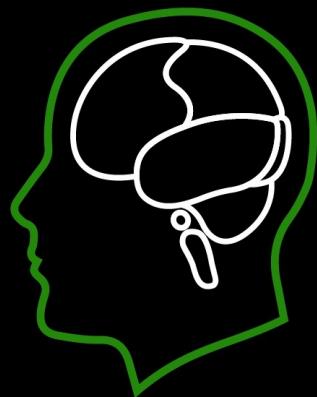
The screenshot shows a web page from PLOS Collections. At the top, there are navigation links for "About", "Browse", and a search bar. Below the search bar is a link to "advanced search". The main content area features a large image of a blue 3D-printed robotic hand. To the left of the image, there is a sidebar with the title "Open Source Toolkit: Hardware". The sidebar contains a brief description of the Open Source movement and its impact on computer systems and business. A "More >" link is at the bottom of the sidebar. At the bottom of the page, there are social media sharing icons for Facebook, Twitter, and Email, along with a "Sections" dropdown menu.



The screenshot shows the homepage of Appropedia. The header reads "Welcome to Appropedia" and "Sharing knowledge to build rich, sustainable lives.". There is a "edit watch" link in the top right corner. Below the header, there is a photograph of three people working at a table with a laptop. A "Read about..." link is next to the photo. To the right, there is a section about the site's mission: "Appropedia is for collaborative solutions in sustainability, appropriate technology, poverty reduction, and permaculture." Below this, there is a paragraph about contributing: "You are welcome to add to and edit Appropedia - your site to find, co-create and improve the solutions we need. Our vision and mission." At the bottom, there is a statistic: "Contributors have made 346,284 edits and uploaded 27,555 files. Browse our categories or all 7,429 articles." To the right, there is another photograph of a person working in a workshop, with a "Read about..." link below it.

Repositórios

Jaba nº01 e convite nº01



Open**Neuroscience**

~100 projetos em áreas diferentes (software, hardware, simulações, etc)
“other interesting projects” - projetos de áreas além da neurociências
~1100 seguidores (Lista de email, Twitter, Facebook)

Equipamentos de código aberto

Empresas



Um sistema completo

Setup experimental comportamento (Jan 2015)

- Regular (proprietário)
 - 2 PCs (2 x 250€)
 - Placas de aquisição (610€)
 - Windows (130€)
 - MATLAB (500€)*
 - Microsoft office (100€)
 - Total: 1840€
- Open source
 - 01 Raspberry Pi (31€)
 - Arduino (10€)
 - Linux (0€)
 - Python (0€)
 - LibreOffice (0€)
 - Total: 41€
 - Totalmente portável

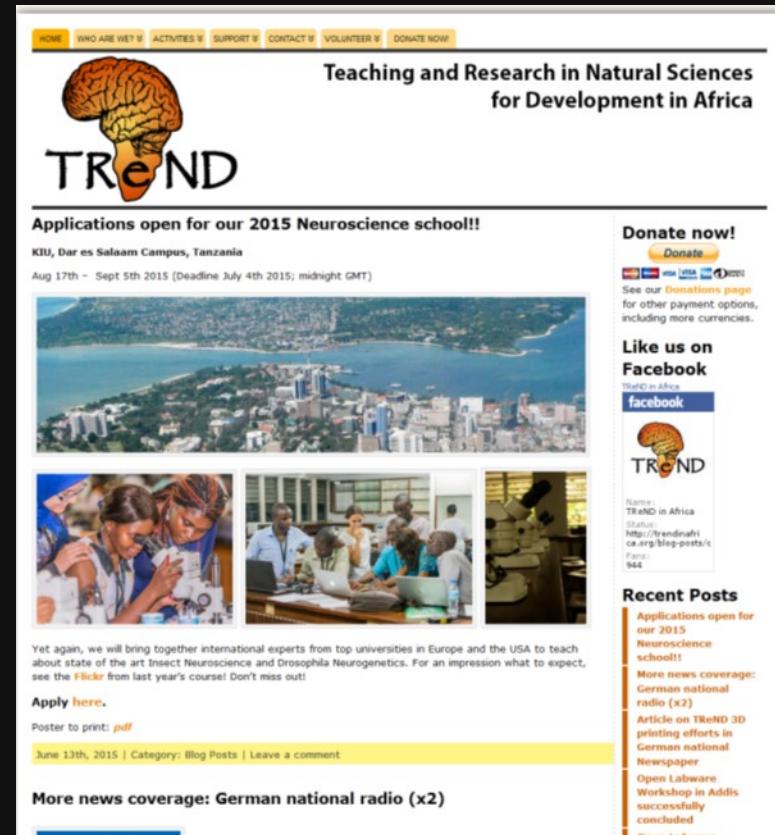
Resumo 02

- **Equipamentos de código aberto:**
 - Iteração rápida e evolução orgânica
 - Maior conhecimento e controle
 - Acessibilidade (custo) e inovação
- Perguntas?

Aplicabilidade

Jaba nº02 e convite nº02

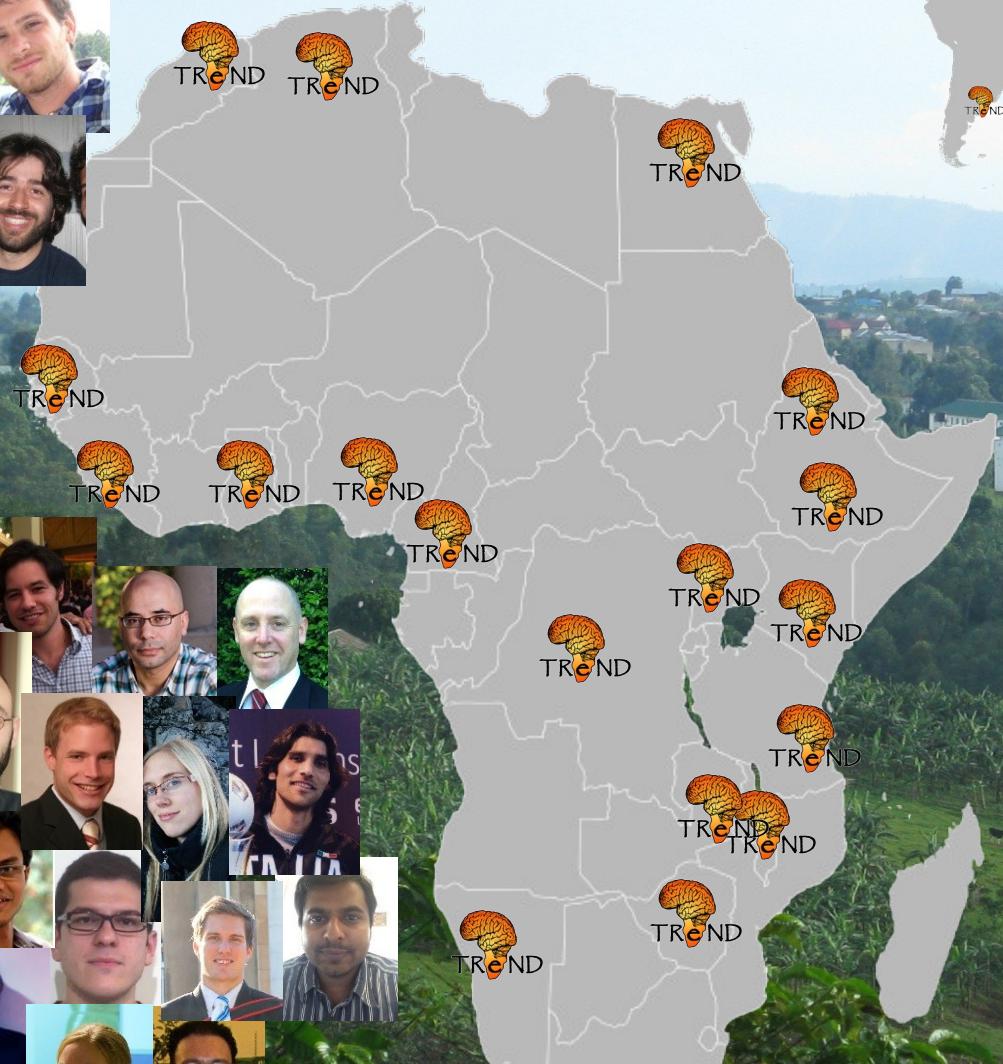
TReND in Africa:
A volunteer-scientist-run NGO dedicated to fostering Science education and research on the African continent



The screenshot shows the homepage of the TReND in Africa website. At the top, there's a navigation bar with links for HOME, WHO ARE WE?, ACTIVITIES, SUPPORT, CONTACT, VOLUNTEER, and DONATE NOW. The main header features a stylized brain icon and the text "TReND". To the right, it says "Teaching and Research in Natural Sciences for Development in Africa". Below the header, a banner announces "Applications open for our 2015 Neuroscience school!!" and specifies the location as "KIU, Dar es Salaam Campus, Tanzania" with the dates "Aug 17th - Sept 5th 2015 (Deadline July 4th 2015; midnight GMT)". There are three images: a large aerial view of a coastal city, two people working at a microscope, and a group of people in a lab. A sidebar on the right contains a "Donate now!" button with payment method icons, a "Like us on Facebook" link, and a "Recent Posts" section with links to news articles.

www.TReNDinAfrica.org

2015



MRC Laboratory of Molecular Biology

THE COMPANY OF
Biologists

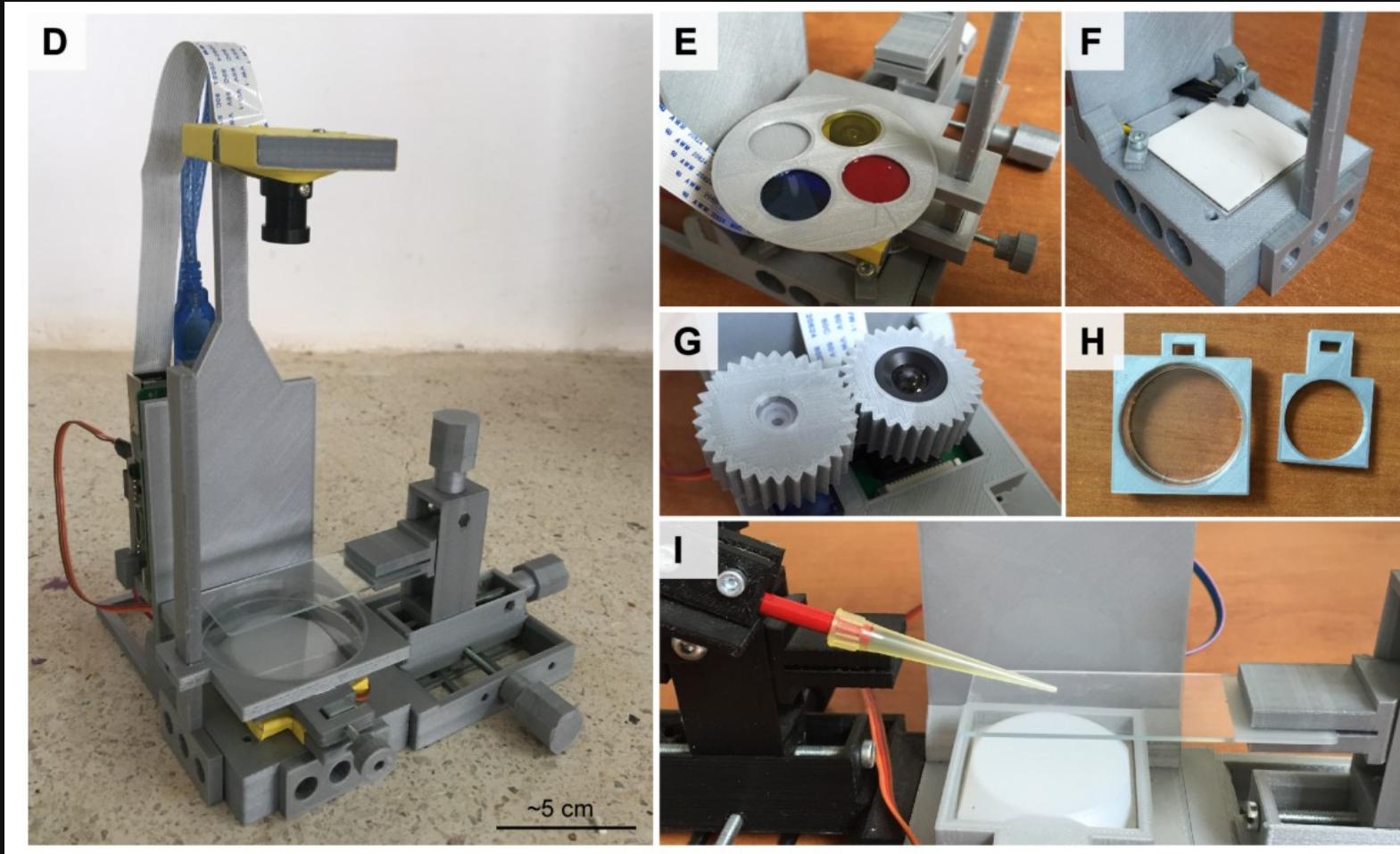
ISN
International Society
for Neurochemistry



www.TReNDinAfrica.org

Slide from Thomas
Baden

Flypi



OpenNeuroscience

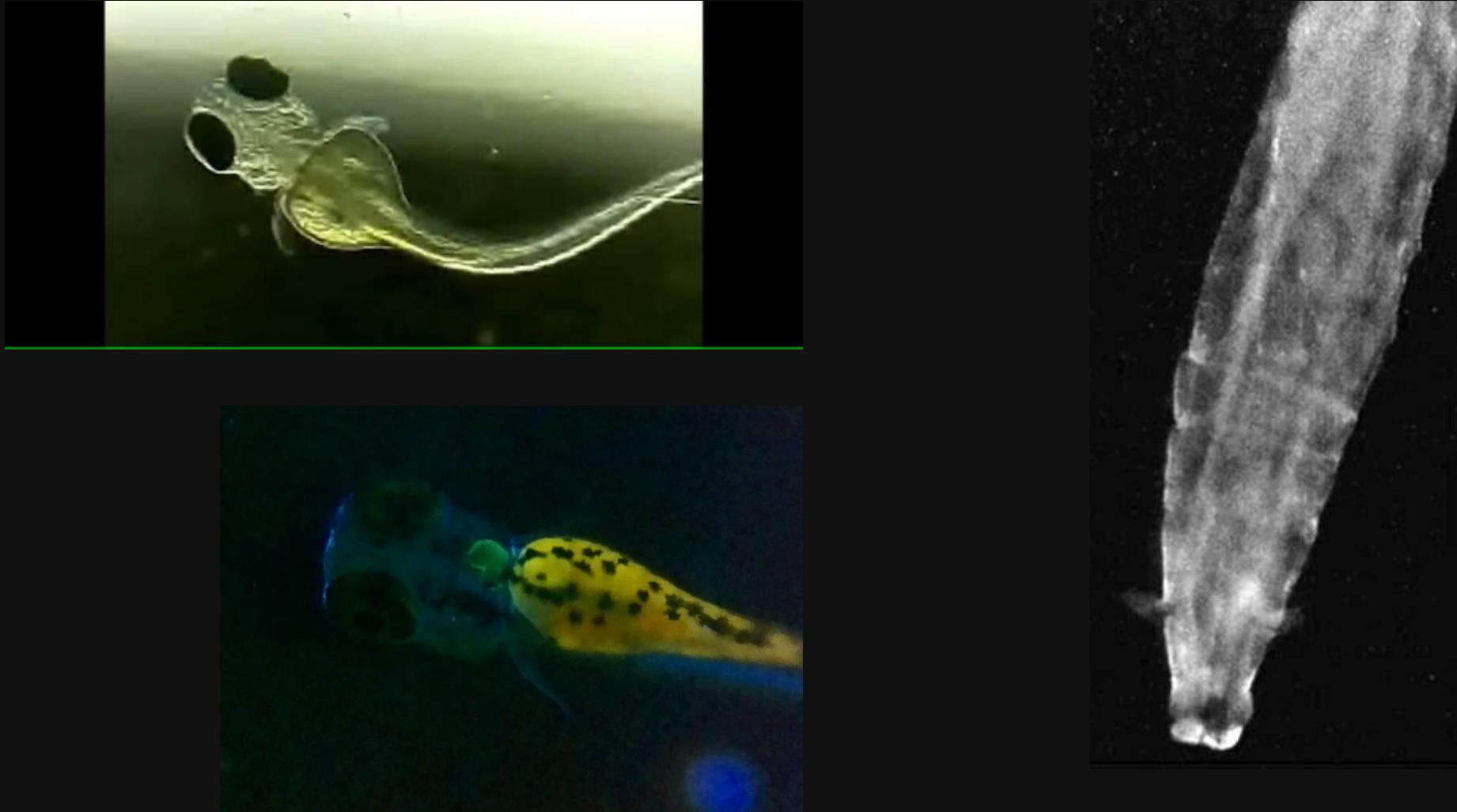


Flypi



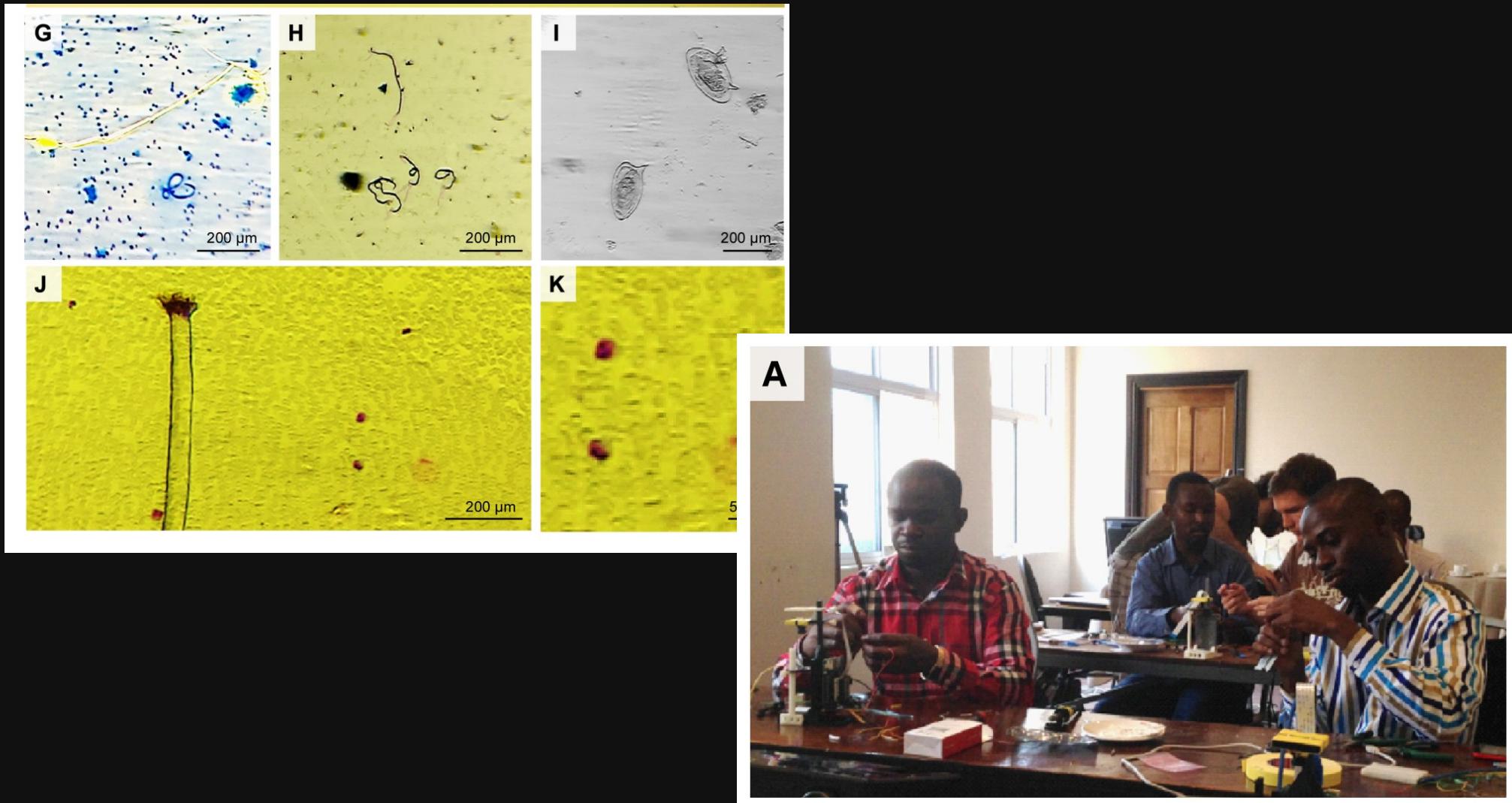
Disponível online @
hackaday.io/flypi

Flypi



Disponível online @
hackaday.io/flypi

Ensinando a construir varas de pescar



Disponível online @
backaday.io/flypi

Ciência do Século XXI

- Feita por todos, dentro e fora da academia
- Trabalho transparente e reproduzível
- Barato, faça você mesmo, acessível e livre



Obrigado pela atenção!

Open source is good for me. I will fully embrace it.
Open source is good for me. I will fully embrace it.
Open source is good for me. I will fully embrace it.
Open source is good for me. I will fully embrace it.
Open source is good for me. I will fully embrace it.
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