



# Global report 2014 · 2021



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### Events

2021

2020

2019

2018

2017

2016

2015

2014

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Hardware

GHF Open Village

Research

Publications

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Prepared by Fabio Balli – DOI: [10.5281/zenodo.1344080](https://doi.org/10.5281/zenodo.1344080)

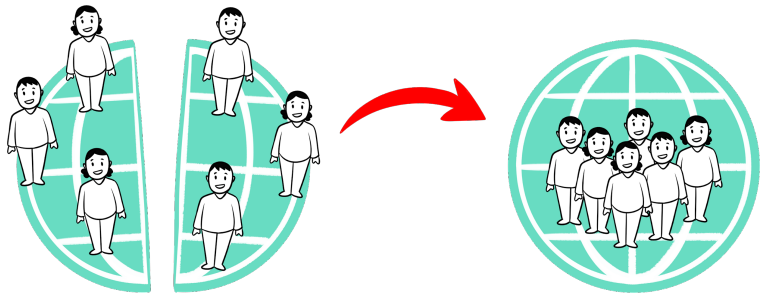
## In a nutshell

Ensuring that every human can afford a decent and healthy life is an individual duty.

It can be easily achieved if we mutualize resources to create knowledge and technologies that can be freely used, reproduced, adapted, improved.

### Aiming co-created collective health

Play is a natural way to experiment, socialize, learn. Our community invites people to collectively create libre and open-source games and game controllers to foster mutual and self-care in respiratory and mental health.



We bring together game designers, programmers, artists, people with respiratory and mental health experience, clinicians, and other passionate people. Together, we prototype games, develop an inclusive creation and research methodology, and mutualize resources to coordinate the initiative and root it local communities.

### Valuing access to care

- We create essential solutions with diverse communities who need them.
- We mutualize resources and collaborate to avoid alike projects.
- We ensure our work can be reproduced + improved freely by people.
- We ensure that outcomes generated are shared among the contributors.
- We validate accessibility and health outcomes with scientific methods.

### Facts and figures

- 450 professionals and researchers mobilized across five countries
- 450000 viewers reached through broadcast and documentary
- 30000 hours of contributions
  - 66 scientific communications
  - 15 media interviews including the documentary A new Economy
- 320 K research funds and donations received
- 22 co-creation events organized
- 22 games prototyped
- 8 game controllers prototyped

### Key affiliations

We are members of the

- Global Alliance against chronic Respiratory Diseases (GARD-WHO)  
a network of over eighty lung associations to reduce the burden of respiratory diseases, especially in poor regions.
- Open Source Initiative  
a network of over eighty organizations advocating for open-source
- International Geneva Welcome Center  
a support center for international civil servants and non-governmental organizations based in Geneva.

# Principles

Since 2016, Breathing Games is a signatory of the UN Global Compact. We celebrate human life and the right to do meaningful activities. The first article of the Declaration of Human Rights leads our vision:

*All human beings are born free and equal in dignity and rights.  
They are endowed with reason and conscience and should act  
towards one another in a spirit of brotherhood.*

We understand collectively created health knowledge and technologies as the way to promote self- and mutual care. To “ensure healthy lives and promote well-being for all at all ages” (UN Global Goal 3), we believe that all should become creators of the collective wellbeing, putting in *commons* our experience, and ideas.

We encourage individuals and peer-to-peer communities to build on our work through following principles.

## Free software and open-source hardware

We use tools that respect the users’ freedom to use and share them, and modify their source code and design, when such tools provide the functions we need, and do not require an excessive time to acquire them:

- GitLab for sharing our source-code and design
- GIMP for image edition
- NextCloud / OnlyOffice for collaborative documentation

## Copyfair licences

Instead of an excluding copyright, we use licences that preserve the right to reuse and enrich knowledge and technologies if reciprocity is provided:

- GNU Affero General Public License 3.0 (Free Software Foundation)
- Attribution-ShareAlike 4.0 International (Creative Commons)
- Open Hardware Licence Strong Reciprocal (CERN)
- Peer Production Licence (P2P Foundation)

## Accessible documentation

We document our co-creation process, the source code of software and designs of hardware created, and make this documentation freely accessible via:

- breathinggames.net
- gitlab.com/breathinggames
- full open access publications and repositories like Zenodo
- platforms to reach broad communities like Discord (gamer messaging)

## Participatory research

To reduce power inequalities and encourage social transformation, we do research *with* the participants rather than *on* or *for* them. We consider that not to have a positive impact when being privileged is unethical.

## Open governance and distributed data system

We log contributions in time, money and kind to acknowledge individual efforts towards the collective. This also provides a basis for traceability.

We aim to develop a distributed platform to mutualize and redistribute resources across a global community. This should help individuals find communities, merge ideas, develop global projects, do peer-reviewed quality control, and co-define how data is managed. See chart below.

## Agility




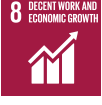




We foster transdisciplinarity. We take advantage of existing infrastructures, use a frugal approach, and develop low-tech products.

Thus, we build a coherent ecosystem: an open access commons increasingly capable of sustaining communities in developing and sharing health knowledge, fostering social justice, reducing inequalities.

Updated May 2021

# Global goals

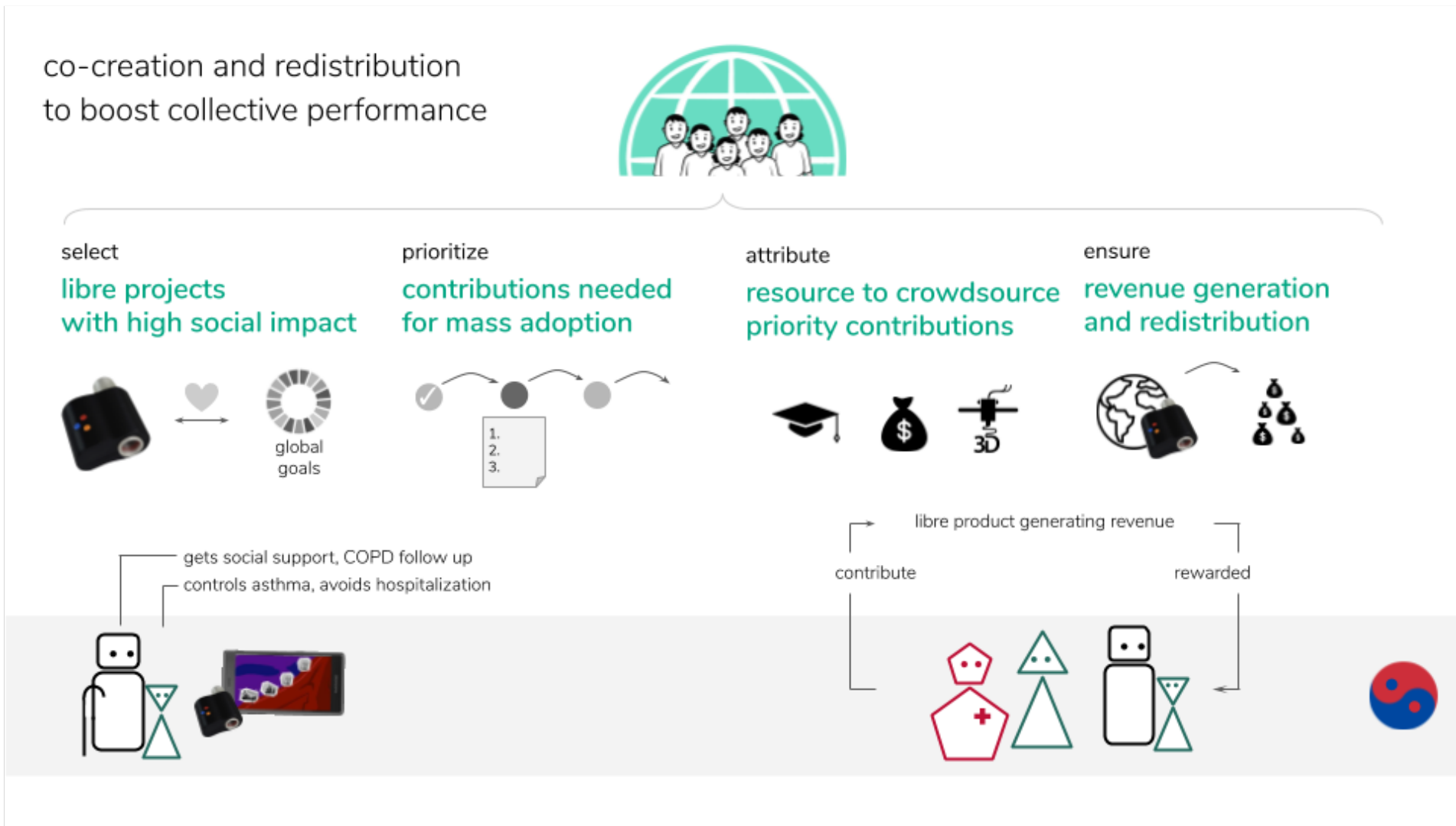
We contribute to the 2030 Agenda for Sustainable Development, adopted by the United Nations.

Goal	Target	Our contribution	
 <p><b>3</b> GOOD HEALTH AND WELL-BEING</p>	<p>Ensure healthy lives and promote well-being for all at all ages.</p>	<p>3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air [...].</p>	<p>We actively encourage the population to co-design solutions that meet their real needs, hence taking ownership of their health, and health technologies.</p>
	<p>3.d: Strengthen the capacity of all countries [...] for early warning, risk reduction and management of national and global health risks.</p>	<p>We provide members from the Global Alliance against chronic Respiratory Diseases with enjoyable tools that are easy to use, reproduce and adapt in low-resource settings.</p>	
 <p><b>1</b> NO POVERTY</p>	<p>End poverty in all its forms everywhere.</p>	<p>1.a: By 2030, ensure that all [...] have equal rights to economic resources, as well as [...] control over [...] appropriate new technology [...].</p>	<p>We provide a scalable, sustainable example of how people across countries, organizations and disciplines can cooperate to develop science-based innovation everyone can enrich.</p>
 <p><b>4</b> QUALITY EDUCATION</p>	<p>Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.</p>	<p>4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development [...].</p>	<p>We ensure free access to educational tools and co-creation methods, and encourage vulnerable populations to develop skills to locally produce cheap and adaptable open hardware.</p>
 <p><b>8</b> DECENT WORK AND ECONOMIC GROWTH</p>	<p>Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.</p>	<p>8.3: Promote [...] policies that support productive activities, [...] creativity and innovation [...].</p>	<p>We foster a fair redistribution of resources among autonomous contributors to a collective project.</p>
 <p><b>9</b> INDUSTRY, INNOVATION AND INFRASTRUCTURE</p>	<p>Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.</p>	<p>9.b: Support domestic technology development, research and innovation in developing countries [...].</p>	<p>We foster mutualized, open-source innovation across countries as a way to reduce redundancies, products unfit to users, and planned obsolescence.</p>
 <p><b>11</b> SUSTAINABLE CITIES AND COMMUNITIES</p>	<p>Make cities and human settlements inclusive, safe, resilient and sustainable.</p>	<p>11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality [...].</p>	<p>We provide gratis and fun educational tools to foster awareness and dialogue about respiratory health and air quality, from childhood and across generations.</p>
 <p><b>12</b> RESPONSIBLE CONSUMPTION AND PRODUCTION</p>	<p>Ensure sustainable consumption and production pattern.</p>	<p>12.8: By 2030, ensure that people everywhere have the relevant information and awareness for [...] lifestyles in harmony with nature.</p>	<p>We develop a data commons across countries, that is elaborated and managed with the participating communities.</p>
 <p><b>17</b> PARTNERSHIPS FOR THE GOALS</p>	<p>Strengthen the means of implementation and revitalize the global partnership for sustainable development.</p>	<p>17.6: Enhance [...] international cooperation on and access to science, technology and innovation and enhance knowledge sharing [...].</p>	<p>We create new mechanisms of cooperation based on participatory research, peer-to-peer production and distributed governance.</p>



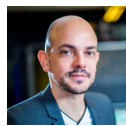
# Organization

One goal for the professionalization of our structure is to adopt an open governance model, and social impact indicators. This will allow us to scale up the initiative while keeping a structure that fosters open cooperation and transparent redistribution. Also read [breathinggames.net/openvillage](http://breathinggames.net/openvillage).

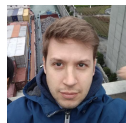


# Contributors

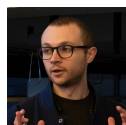
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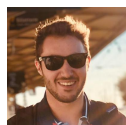
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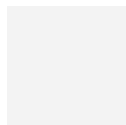
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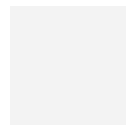
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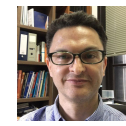
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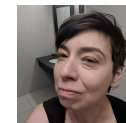
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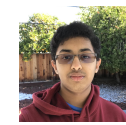
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## Medical support



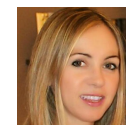
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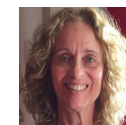
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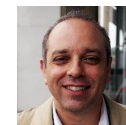
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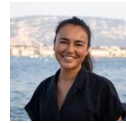
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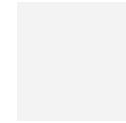
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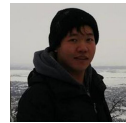
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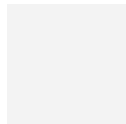
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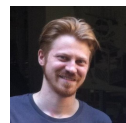
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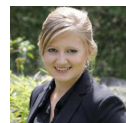
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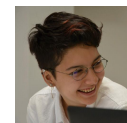
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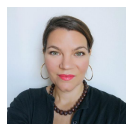
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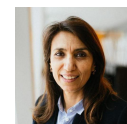
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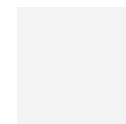
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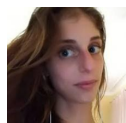
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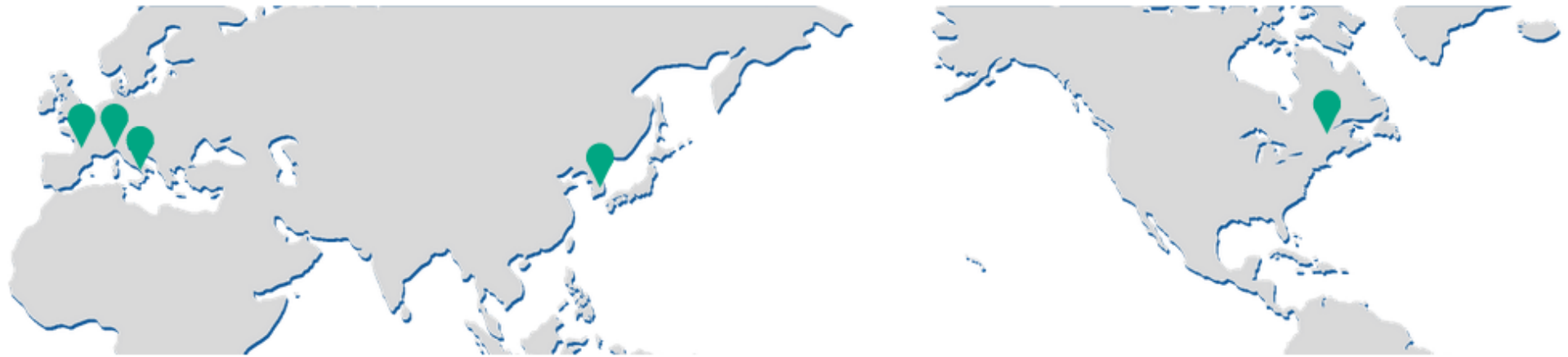
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please write us at  
[breathinggames.net](mailto:breathinggames.net)

# Collaborations



Country	Collaboration	Legend
France	Cochin university hospital	HX
	Necker university hospital	HX
	Fondation Arc-en-Ciel	HX
	La Maison des Parents	
	French Hospitals Fed. – Fonds FHF	\$
	Grand Besancon Metropole	
Italy	National Research Council – IBIR	HX
	WeMake Milan	CX
	OpenCare (European Union)	\$
Switzerland	Geneva university hospitals	H
	Geneva foundation against CF	\$X
	Geneva Health Forum	
	University of applied sciences HE Arc	IX
	Lift	IX
	Open Geneva Festival	
	Swiss Game Center	X
	University of Geneva	I\$X
	A foundation	\$
South Korea	Korea University	HX
	Karl Polanyi Institute Asia	IX
	SVS Fund	X
	Yonsei University	\$X
	CityPreneurs	\$
Canada	Blocksense	X
	Sainte-Justine university hospital	HI\$X
	Quebec university hospital	HX
	Sensorica	IX
	Haply	IX
	Ludociels pour tous	X
	Canada Institutes of Health Research	\$
	Concordia University	I\$X
Sustainability Action Fund	\$	

H hospital | infrastructure \$ funding X expertise provided



# Funding

The Breathing Games commons exists thanks to the time offered by our community – over four years full-time equivalent.

The funding received enabled us to organize co-creation events (mostly hosting, food, transportation), research, and ensure essential developments. The tables below give an overview of revenue and expenses by country since the beginning of the initiative. In-kind contributions are not included, except to a lesser extent for Canada (5630 CAD). Funds are managed via different structures, depending on the type of funding (donation, research grant, etc.).

## Switzerland

Grants for co-creation, managed by the Breathing Games Association.

External audit of accounting realized since 2019. CHF.

Expenses	49324.40	Revenues	49324.40
Game jams	42304.23	Foundation in Geneva	40000.00
Admin fees	1892.40	BG France	9324.40
Web presence	1805.75		
Development	1455.00		
Banking fees	210.95		
Covid loss	330.10		
Saldo	1325.97		

Funds managed by third parties. CHF.

Expenses	97600.00	Revenues	97600.00
Research	48400.00	Seed fund HE Arc	48400.00
Game jams	40000.00	Foundation in Geneva	40000.00
Co-facilitation	9200.00	Geneva U - partnership	9200.00

## France

Grant for co-creation, managed via Balli's structure (requirement). EUR.

Expenses	54000.00	Revenues	54000.00
Game jams	16800.00	Fonds FHF	54000.00
Development	22080.00		
Devices	3106.00		
Taxes planned	10294.00		

## Canada

Grants for co-creation and research, most managed by Concordia U. CAD.

Expenses	48556.27	Revenues	48556.27
Redistribution	23671.09	Forces Avenir	2000.00
Research	11418.00	CHU Ste Justine health pr.	2770.00
Travel	4580.24	CHU Ste Justine pneumo	3000.00
Food	3541.61	Concordia CCSL	4500.00
Electronics	3219.25	Concordia SAF	7800.00
Material	1477.08	Concordia GCBF	3000.00
Space	649.00	Concordia INDI	100.00
		Concordia CUAA	1000.00
		Can Instit Health Research	22530.00
		Breathing Games	2176.75
		Individual donations	420.00
		Transit BG	666.28

## Italy

Grant for hardware, managed by WeMake. EUR.

Expenses	472.56	Revenues	472.56
Electronics	472.56	OpenCare	472.56

## South Korea

Funds managed by third parties. KRW.

Expenses	12020000	Revenues	12020000
Co-facilitation	12020000	Yonsei U - partnership	12020000

2021

This year, we plan a series of small events for the GHF Open Village. Rise is further developed, and translations in 12 languages made for Asthma Heroes and Asthmonauts. An international pilot study is being prepared to test Asthma Heroes in different settings.



Co-creation events (all online)

- From May GHF Open Village
- ...

Communications (all online)

- Jan 28 Presentation, World Summit on the Information Society
- Feb 3 Panel, Young European Biotech Network
- Feb 7 Panel, FOSDEM
- Mar 23 Panel, World Summit on the Information Society
- April 2 Journée innovation santé Cité des sciences (Open Village)
- May 6 Poster, Colloque méthodes mixtes francophonie
- May 18-19 Workshop, Réseau mère-enfant de la francophonie
- ...

Play is, like oxygen, “all around us, yet goes mostly unnoticed or unappreciated until it is missing.”

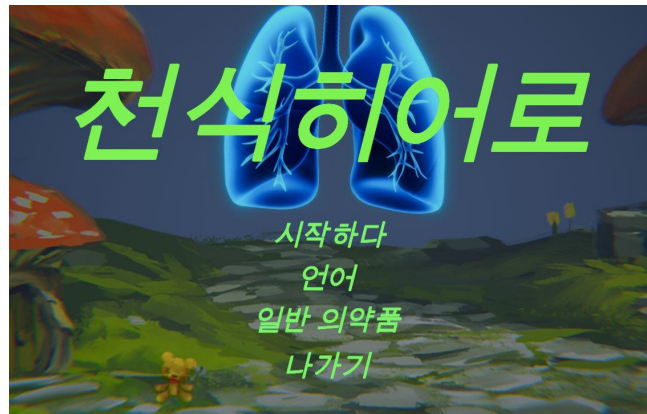
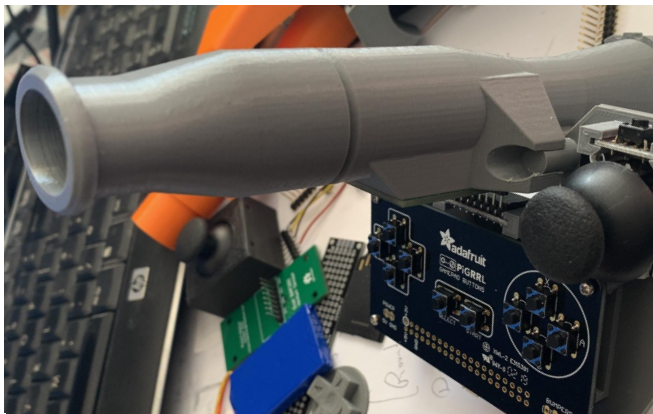
Dr Stuart Brown



2020

We were invited to host a joint event for the Geneva Health Forum (global health congress) and Open Geneva (civil society hackathons). We hosted the 'Open Village,' a hands-on event to promote freely reproducible material for health. We created [coronavirus-openkit.net](https://coronavirus-openkit.net) to list hackathons and open-source material against covid. We also interviewed Prof. Pittet, who spread the alcohol-based hand rub patent-free, which saves 8 million lives yearly.

Regarding the games, we focus on developing the Rise. Asthma Heroes was also translated in Korean. Co-creation events planned in Paris and Besançon as well as different communications were also cancelled or postponed. We are also professionalizing our structure, and asked for an external audit of the Breathing Games Association bookkeeping for 2019.



Co-creation events (all online)

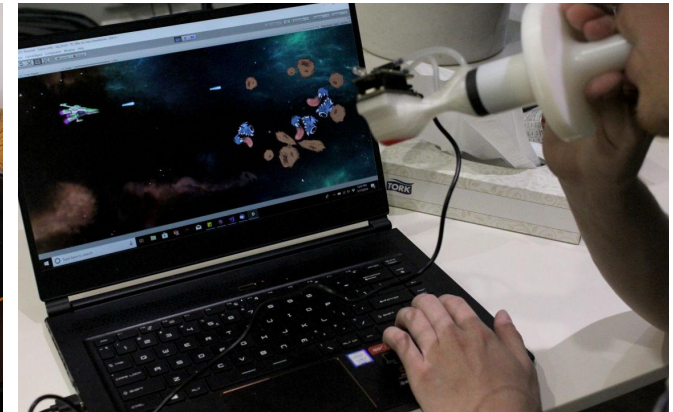
- Mar 21 Test of the Rise multiplayer, global
- Apr 03-05 VersusVirus, Zürich
- Apr 24-26 EuVsVirus, Brussels
- Oct 11 Test of the Rise multiplayer, global
- Nov 16-18 **GHF Open Village**, Geneva Health Forum, Geneva

Communications

- Feb 3-5 Open Hardware from Academia Incubator, Bath
- June 11 Workshop Public Health Schweiz, online

2019

We invite young adults in Paris to create games around their experience of cystic fibrosis. We clinically test games in Montreal and Palermo, and improve and validate our game controller in Paris, Geneva and Montreal. Our initiative is broadcasted on the Swiss telejournal (300000 viewers).



#### Co-creation events

- Mar 9-10 Clinical study, Sainte-Justine, Montreal
- Mar 17-18 **Game jam**, Necker hospital, Paris
- Mar 20-24 **Game jam**, OpenGeneva Festival, Geneva
- Apr 14-16 Hackathon team, Arkathon, Sion
- Jun 19-20 Micro game jam on virtual reality, Concordia U, Montreal
- Oct 13-17 **Game jam**, Fondation Arc-en-ciel, Besançon
- Oct 19-20 **Game jam**, Necker hospital, Paris

#### Communications

- Feb 27 Libraries colloquium on games and education, Montreal
- Mar 20 Panel, Meet the makers of a better world, Geneva
- Apr 11 Exhibition, World Summit on Info Society forum, Geneva
- Jul 5 Poster, Gamification & SG Symposium, Neuchâtel
- Jul 11 Serious Play Conference, Montreal
- Jul 31-Aug 5 Gathering Open Science Hardware, Toronto
- Aug 27-Oct 2 CityPreneurs, Seoul
- Sept 27 European nights of research, Palermo
- Oct 25-27 Poster, **general meeting of GARD**, Beijing
- Nov 25 Presentation, Tsinghua SDG OpenHack, Beijing

# 2018

This year, we continue to develop seven games – Asthmonautes, Respi Heroes, LungLauncher, Bloïd, PeakFlow, PeakLeap and TikiFlow, see page Games – that will be clinically tested in 2019.



## Co-creation events

- Apr 12-15 **Game jam**, OpenGeneva Festival, Geneva
- Nov 5-13 Residence, Eco2fest, Montreal

## Communications

- Jan 13 Presenting to the research collective OMNSH, Paris
- Apr 3 Webinar at McGill University Game Lab, Montreal
- Apr 10 Quebec innovation week Sainte-Justine, Montreal
- Aug 31 Poster, **general meeting of GARD**, Helsinki
- Oct 12 Poster, Canadian Arts Therapy Conference, Montreal
- Oct 26 Photograph for 50 years of planning at UdeM, Montreal
- Nov 5 Presenting to PME MTL during Eco2fest, Montreal

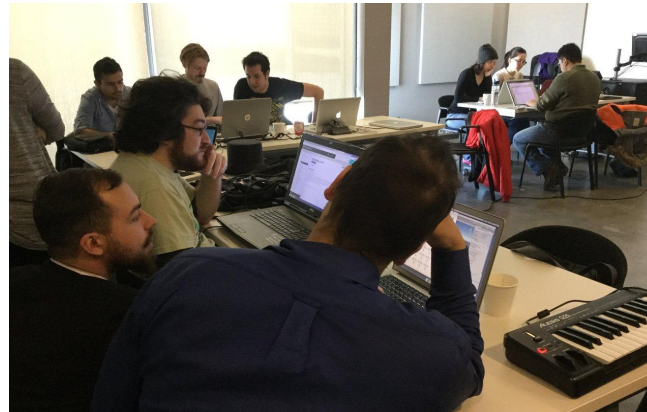


## 2017

Breathing Games is funded by the Canadian Institutes of Health Research (strategy for patient-oriented research) and by the French Hospitals Federation (research and innovation fund). The first is a collaboration with Concordia University and CHU Sainte-Justine, the latter with Necker and Cochin hospitals.

Three game jams are held, as well as many scientific communications. A 3d-printed modular bed to test pressure and flow sensors is developed during a two-week maker in residence funded by the Horizon 2020 program of the European Union.

80 participants attend a screening of A new Economy, followed by a panel with social innovation experts Marguerite Mendell and Jean-Martin Aussant. The documentary is also released on Netflix. Breathing Games is also presented in an audio interview broadcasted by Les jeux sont faits.



### Co-creation events

- Feb 18-19 [Game jam](#), Concordia U, Montreal
- Mar 1-3 [Game jam](#), Lift:Lab, Geneva
- May 25-26 Workshops on blockchain, C2 Mtl, Montreal
- Jun 3-10 [Game jam](#), Concordia U, Montreal
- Jun 21-Jul 8 Maker in residence OpenCare, WeMake, Milan
- Nov 30- Dec 2 Keynote and workshops Collaborate and learn/teach differently, Concordia U + CHU Sainte-Justine, Montreal

### Communications

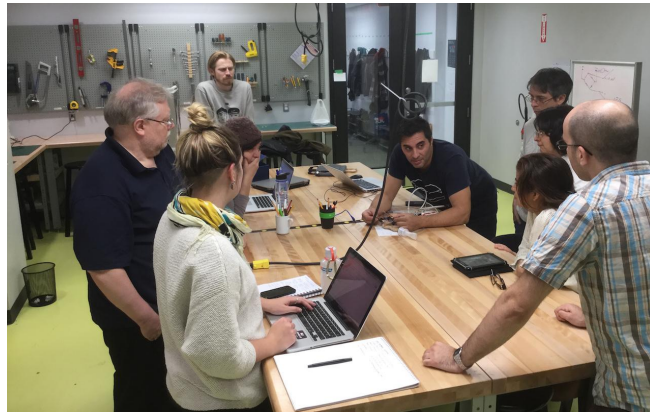
- Mar 24 Presentation, [Gathering Open Science Hardware](#), Chile
- Mar 24 Presentation, Global Goals Innovation Day, Geneva
- Mar 25 Presentation, Oxford U Global Challenge, Calgary
- Mar 25 Presentation, Concordia Education Symposium, Montreal
- Apr 12 Presentation, European Academy of Design, Rome
- May 10-12 Presentation and posters, ACFAS congress, Montreal
- Oct 6 Presentation on game jams, Lausanne U, Lausanne
- Oct 20 Presentation, OpenVillage Festival, Brussels
- Nov 3 Panel, [Canadian Science Policy Conference](#), Ottawa
- Nov 9 Poster, [general meeting of GARD](#), Brussels

## 2016

Breathing Games joins the [Open Source Initiative](#), and becomes a signatory of the [United Nations Global Compact](#), a commitment of organizations to “strive towards a world that benefits everyone, especially the future we borrow it from.”

Three game jams are held. An engineering student creates a core for different games, which centralizes data collection, settings and therapy patterns. Interviews from 16 contributors are released on our [YouTube channel](#).

In collaboration with the Lung Association of Québec, we apply to the Google Impact Challenge, a five million dollar grant to help ten initiatives tackle the biggest social challenges (not selected).



### Co-creation events

- Feb 10-12 [Game jam](#), Lift Conference, Geneva
- Aug 5-7 [Game jam](#), Concordia U, Montreal
- Aug 10-12 Workshop Health & Play, World Social Forum, Montreal
- Nov 7 Workshop Open Hardware, Concordia U, Montreal
- Nov 12-13 [Game jam](#), Concordia U, Montreal

### Communications

- May 12 Presentation, ACFAS congress, Montreal
- June 9 Presentation, European CF Conference, Basel
- Aug 17-19 Workshop, [Symposium on Open Collaboration](#), Berlin
- Oct 3 Poster, FRQS congress on respiratory health, Montreal
- Nov 21 Poster, [Quebec annual public health days](#), Montreal
- Nov 22 Presentation, Mobile health apps colloquium, Montreal



## 2015

Eight researchers from the University of Applied Sciences Western Switzerland (Arc) start a study to evaluate the adequacy and cost of a serious game to increase respiratory compliance. We also collaborate with Sainte-Justine hospital to develop and test games for children who have asthma.

Breathing Games collaborates with Sensorica, a peer-production network specialized in open source hardware. We adopt its Value Accounting System, a platform that allows to log contributions in time, money or material and to redistribute funds with an equation.

An engineering student documents the cystic fibrosis practice in Switzerland and does a thorough reflection on the game design. Another engineering student adapts a software library to capture the noise made by mouthpieces used in cystic fibrosis treatment.

News about Breathing Games appear in national and regional CF newsletters in Spain. The team of Domain 7 follows Sensorica and Breathing Games for a documentary about “people making a fresh start towards building a new Economy.”



### Co-creation events

- June 5-7 Hackathon, Arkathon, Sierre
- Aug 28-29 Hackathon, Sensorica, Montreal

### Communications

- June 11 Poster, European Cystic Fibrosis Conference, Brussels
- Oct 29 Presentation, symposium on collaboration, Montreal

## 2014

Begin of the initiative as part of graduate studies in game design at Montreal University. Fabio Balli and Yannick Gervais build on the work done previously by John Danger. After developing the first prototype, a preliminary study is realized with ten children at Sainte-Justine hospital. The team is a finalist of Forces Avenir, which aims to recognize socially conscious students.

A website is created, and receives the certification “Health on the Net,” which aims to foster quality, objective and transparent medical information.

A sociology student writes a dissertation about serious games, describing opportunities and limits of our initiative and another project. A blog article about the initiative is written by Canada Research Chair on Health Innovations.



### Co-creation events

- Feb 21-23 Hackathon, CHU Sainte Justine, Montreal
- Nov 5-6 Hackathon, Montreal Summit on Innovation, Montreal



# Games

Most games are developed on Unity as we have no resources to contribute to developing a free/libre engine like Godot.

## Asthma



Asthma Heroes  
Prevention and management of crises, 7-12 yo  
45 minutes, Unity, Windows computer  
Actively developed – beta, tested

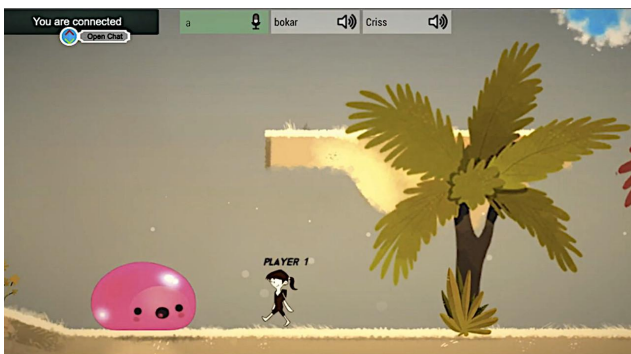


Asthmonautes  
Prevention and management of crises, 7-12 yo  
45 minutes, GameMaker, Windows computer  
Developed – RC, tested



LungLauncher  
Prevention of asthma crises, 7-12 yo  
4 minutes, Unity, Android smartphone  
Developed – RC, tested

## Peer support for all (with contents for COPD, cystic fibrosis)

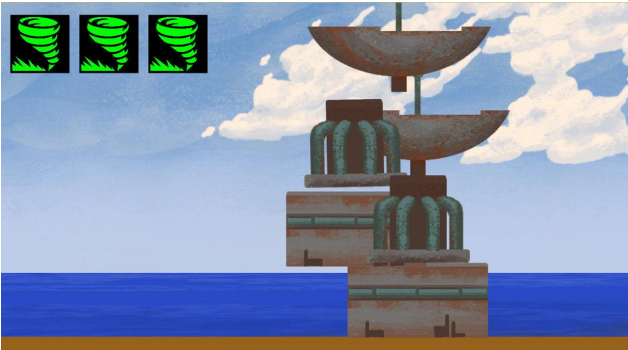


Rise  
Mutual care in respi and mental health, 8+ yo  
10 minutes, Unity, Windows computer  
Actively developed – alpha



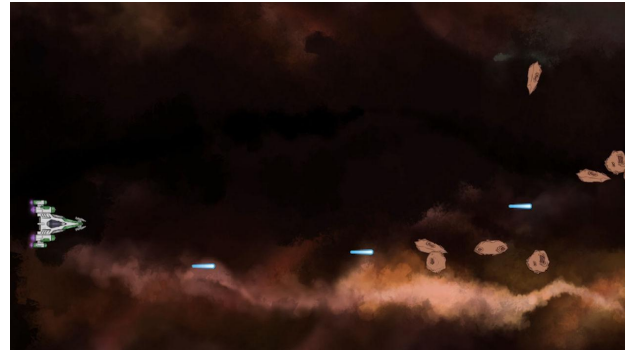
DicoSym  
Mutual care in respi and mental health, 16+ yo  
5 minutes, Unity, Android smartphone  
Actively developed – beta

## Breathing exercises and health promotion



TikiFlow

Self screening of lung capacity (peak flow)  
3 minutes, Unity, Android smartphone  
**Actively developed – beta, tested**



Bloid

Breathing exercise for stress reduction  
5 minutes, Unity, Windows computer  
**Actively developed – alpha, tested**



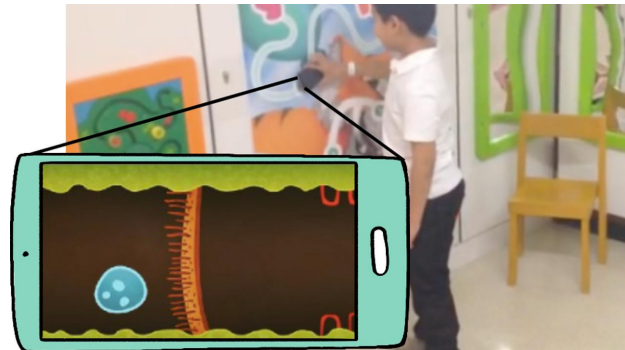
VR game

Exploring artwork related to breathing  
5 minutes, Unity, Windows computer  
**Actively developed – alpha**



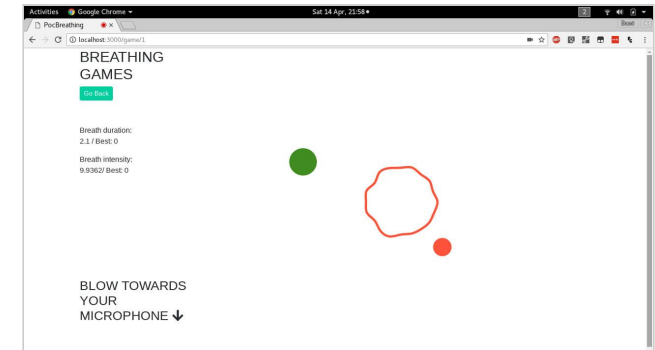
Mille-feuilles

Breath. exercise to increase lung volume (COPD)  
3 minutes, Unity, Windows or Mac computer  
**Prototyped**



Pulmo

Respiratory health awareness  
5 minutes, Unity, Android smartphone  
**Prototyped**

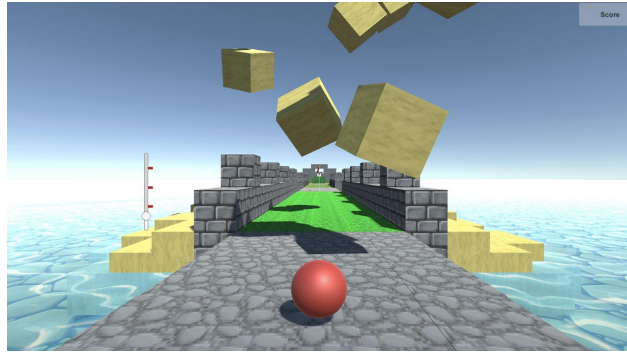


PocBreath

Breathing toy  
3 minutes, JS, Browser on smartphone  
**Prototyped**

## Discontinued prototypes

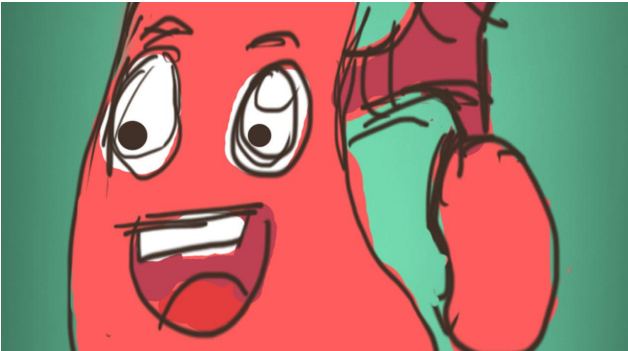
Following games were discontinued to the benefit of more functional games.



PeakFlow – Self screening of lung capacity



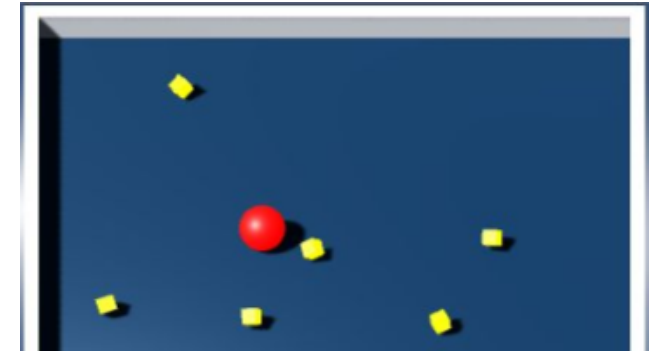
PeakLeap – Self screening of lung capacity



BreathingApp – Asthma medication follow up

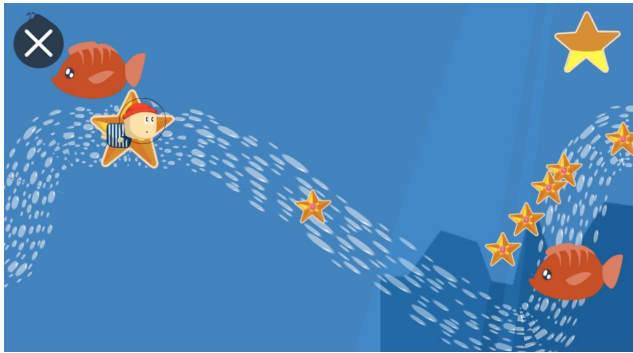


Pulmination – Removing allergens

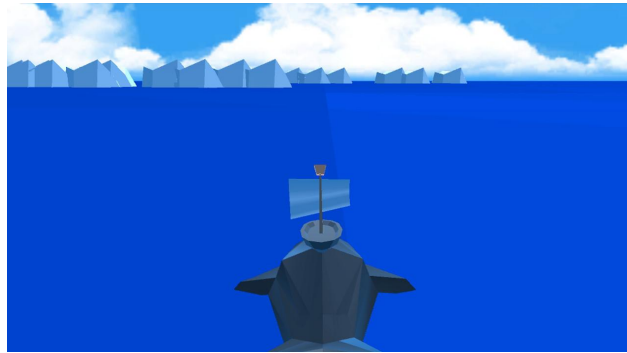


RollABall – CF airway clearance





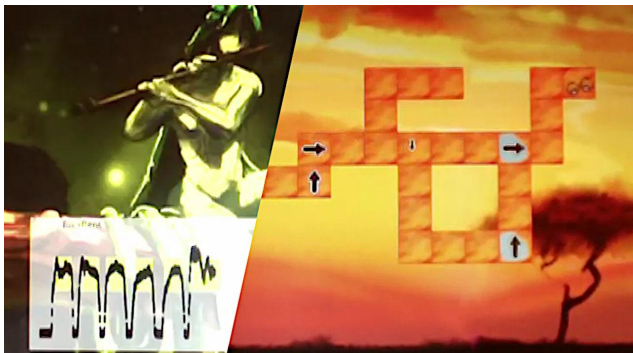
Heritages – CF airway clearance



Les aventures du Briand – CF airway clearance



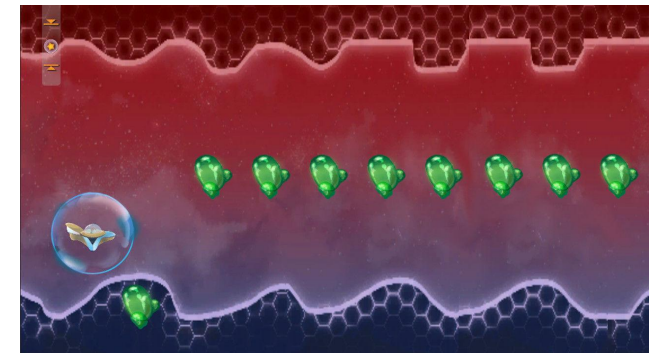
Celebrations – Respi health promotion (concept)



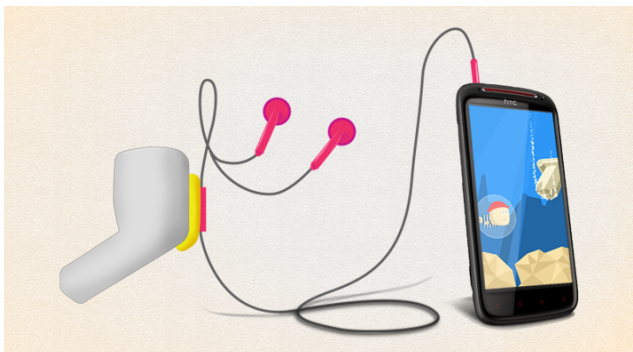
Globule – CF airway clearance



Ange-Gardien – CF airway clearance



PEP Hero – CF airway clearance



Sound library – Analyzing the noise

## Hardware



Breathing gamepad [K]  
Game controller measuring the flow and pressure, 3d-printed, Bluetooth and USB  
Direct use  
**Actively developed**



Spirotroller gaming [J]  
Controller measuring the flow and pressure, 3d-printed, Bluetooth, three buttons  
Direct use  
**Actively developed**



Spirotroller enhanced [H]  
Game controller measuring the expiratory flow, 3d-printed, Bluetooth and USB, three buttons  
Direct use  
**Prototyped and clinically tested**



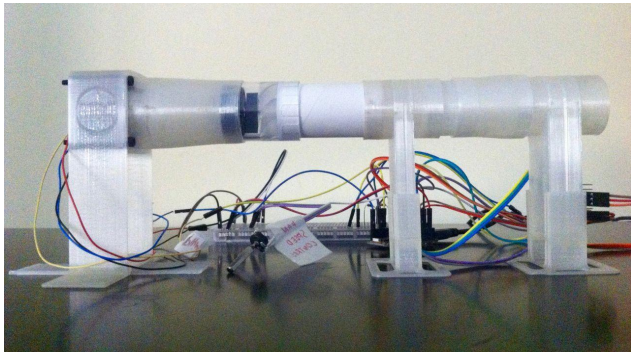
Spirotroller [G]  
Game controller measuring the expiratory flow, 3d-printed, Bluetooth and USB, one button  
Direct use  
**Prototyped**



Led box [C]  
Controller measuring the expiratory pressure, 3d-printed, Bluetooth and USB, 8x8 LED matrix  
Use with mouthpiece  
**Prototyped**



3D organic box [B]  
Controller measuring the expiratory pressure, 3d-printed, USB, 1 LED  
Use with mouthpiece  
**Actively developed**



Modular test bench [F]  
Bench including fan and modules to assess a variety of sensors in different settings

Direct use  
**Prototyped**



Calibration syringe [E]  
3 liter syringe for calibration

Use on controllers  
**Prototyped**



# GHF Open Village

A series of events initiated by Breathing Games and co-hosted with EchOpen, Aura, E-nable and LogAir to promote health technology as commons.

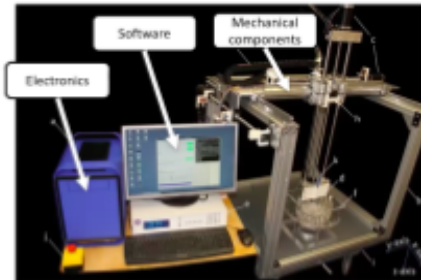
Download the synthesis in English, Français, Español, Português, русский, 中文, हिंदी, বাংলা, العربية.



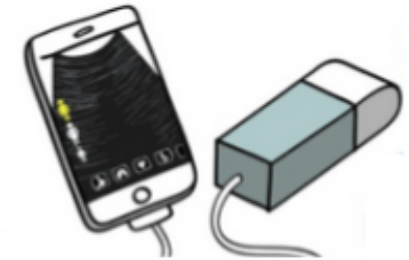
enablingthefuture.org – hand prosthesis



osdd.net – open-source drug discovery



opensourceimaging.org – affordable MRI scan



echopen.org – echo stethoscope



helpfulengineering.org  
quality process

open-source for health:

- trustable by design
- up to 90% cheaper

[www.openvillage.ch](http://www.openvillage.ch)

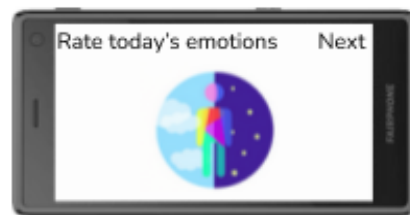
a ghf2020.org + opengeneva.org event with tondo.tech, joinseeds.com, santepop.qc.ca, yebn.eu



aura.healthcare, openhumans.org, cri-paris.org  
log and analysis of bio data to detect seizures



logair.io – crowdmap air quality



mindlogger.org – collect and visualize data



hoosh.space/fuga – gesture into sound



breathinggames.net – making care fun



## Research

Time	Activity	Team	Organizations	Major funding
2021-now	n children with asthma test a game in different settings	Sze Man Tse, Myriam Bransi (Canada), Valérie Crijns (Belgium), Isabelle Sermet-Gaudelus (France), Stefania la Grutta, Laura Montalbano, Giovanna Cilluffo, Velia Malizia (Italy), Guillaume Jeanmaire (South Korea), Youssef Mohammad (Syria)	Sainte-Justine + Quebec + Necker hospitals, IBIR-CNR, Korea + Tishreen universities	–
2019-now	Combining air quality (fine dust) and breath sensing	Changsoo Kim, Jean-Henry Morin, Emmanuel Kellner, Fabio Balli	Yonsei and Geneva Universities, LogAir	UNIGE-Yonsei Seed Fund
2019-now	Involving young adults with CF in creating games to foster self-care	Isabelle Sermet-Gaudelus, Pierre-Régis Burgel, Maya Kirszenbaum, Julie Valette, Marlene Clairicia, Aline Lustre, Damien Fangous, Fabio Balli	Necker and Cochin hospitals	French Hospitals Federation Fonds FHF
2019-2020	156 children with asthma test a flow-based game controller	Sze Man Tse, Myriam Bransi, Alena Valderrama, Fabio Balli	Sainte-Justine + Quebec hospitals, Concordia University	Canadian Institutes Health Research, Concordia U
2019-2020	Five children with asthma and their parent test four games	Sze Man Tse, Alena Valderrama, Maria Frangos, Fabio Balli	Sainte-Justine hospital, Concordia University	Canadian Institutes Health Research, Concordia U
2017-now	Interviews of contributors	Maria Frangos	Maria Frangos	–
2015-2016	Pre-study on serious games for cystic fibrosis → asthma	Christian Voirol, Aïcha Rizzotti, Typhaine Juvet, Gérald Huguenin, Stéphane Gobron, Nicolas Wenk, Calin Ionescu, Pauline Meyer, Fabio Balli	University of applied sciences Arc	Fonds d'impulsion HE Arc
2014	Ten children with CF test games with a pre-post survey	Annie Brochu, Nadia Marquis, Isabelle Tellier, Jacques-Édouard Marcotte, Sophie Laberge, The Thanh Diem Nguyen, David Duguay, Pascal Nataf, Yannick Gervais, Fabio Balli	Sainte-Justine hospital	–
2014-now	Documenting the co-creation	Various	Various	–

# Publications

## Book chapters

- Wu Ann, Tse Sze Man, Balli Fabio. Mobile Applications and Wearables for Chronic Respiratory Disease Monitoring. In Gomez JL, Himes BE, Kaminski N. **Precision in Pulmonary, Critical Care, and Sleep Medicine**. Humana Press 2020. DOI: 10.1007/978-3-030-31507-8.

## Scientific articles

- Balli F. Breath flow and pressure controller (spirometer) for respiratory games and lung volume screening: participatory prototyping of a non-medical device. Ongoing.
- Silva N, Balli F, Pelaez S, Bransi M, Valderrama A, Tse SM. Acceptability of serious games in pediatric asthma education and self-management. Ongoing
- Chelabi K, Balli F, Bransi M, Gervais Y, Marthe C, Tse SM. Validation of a game controller to assess peak expiratory flow against conventional spirometry in children: A cross-sectional study. *JMIR Serious Games* 2020; 9(1). DOI: [10.2196/25052](https://doi.org/10.2196/25052).
- Balli F. Developing Digital games to address airway clearance therapy in children with cystic fibrosis: participatory design process. *JMIR serious games* 2018; 6(4). DOI: 10.2196/games.8964
- Balli F. Game jams to co-create respiratory health games prototypes as participatory research methodology. *Forum: qualitative social research* 2018; 19(3). DOI: 10.17169/fqs-19.3.2734.

## Professional articles

- Balli F. Inspiring to play: Co-Creating Games for Respiratory Health in Montreal, Paris and Geneva. *Newsletter of the Global alliance against chronic respiratory diseases*; 2019; 2(2). [www.gard-breathefreely.org](http://www.gard-breathefreely.org)
- Brastaviceanu T, Lloyd T, Balli F. Production participative de matériel de recherche. In F Balli, J Lebel (eds). *Recherche et communs : vers des sciences ouvertes*. *ACFAS magazine* 2019.

## Reports and guidelines

- GARD members. **Beijing call to action for lung health promotion**. Global Alliance against chronic Respiratory Diseases 2019. [www.gard-breathefreely.org](http://www.gard-breathefreely.org).

## Scientific abstracts

- Wenk N, Balli F. Breathing Games – Free/libre and open source games for respiratory health. **Gamification & serious game symposium 2019**; Jul 24; Neuchâtel, Switzerland.
- Frangos M, Balli F. Breathing Games: Promoting Respiratory Health Through Co-creation. *The Design Journal* 2017;20(sup 1). DOI: [10.1080/14606925.2017.1352976](https://doi.org/10.1080/14606925.2017.1352976).
- Balli F. Health & Play – Addressing together the challenges of creating an open source standard for Breathing Games. In: **Companion to the proceedings of the 12th International Symposium on Open Collaboration; 2016** Aug 17-19; Berlin. New York: ACM. DOI: [10.1145/2962132.2962138](https://doi.org/10.1145/2962132.2962138).
- Balli F, Gomez V. Therapeutic adherence: exploring Open Collaboration to mobilize all stakeholders behind children with CF. *Journal of Cystic Fibrosis* 2017; 15(1). DOI: [10.1016/S1569-1993\(16\)30478-7](https://doi.org/10.1016/S1569-1993(16)30478-7).
- Brochu A, Marcotte JE, Marquis N, Laberge S, Duguay D, Nataf P, Gervais Y, Balli F, Nguyen T. 2015. Video games for positive expiratory pressure (PEP) therapy in children with cystic fibrosis: a pilot study. *Journal of Cystic Fibrosis* 2015; 14(1). DOI: [10.1016/S1569-1993\(15\)30030-8](https://doi.org/10.1016/S1569-1993(15)30030-8).

## Scientific presentations

- Kirszenbaum M, Lustre A, de Beauvais N, Hauterive M, Wenk N, Gervais Y, Clairicia M, Frangos M, Gomez V, Burgel PR, Sermet-Gaudelus I, Valette J, Balli F. Favoriser le soin autonome : encourager les jeunes vivant avec la mucoviscidose à partager leur expérience à travers la création de jeux collaboratifs. **Réseau Mère-Enfant de la Francophonie; 2021** May 19; Lyon, France.
- Balli F. Building communities around a cause. **SDG innovation Bootcamp; 2019** Oct 25; Beijing, China.

- Balli F. Breathing Games On Air: Co-Creating a Board Game around the Breath. **Serious Play Conference; 2019** July 12; Montreal, Canada.
- Balli F, Frangos M. Respiratory health and air quality: fostering self and mutual care. **Gathering for Open Science Hardware; 2019** July 31; Toronto, Canada.
- Balli F. Des jeux qui inspirent : bien commun et innovation en santé. **Colloque jeux et éducation des Bibliothèques de Montréal et de la BANQ; 2019** Feb 27; Montreal, Canada.
- Balli F. Game jams to co-design respiratory health games in Canada and Europe. Webinar. **Participatory Research at McGill Game Lab; 2018** Apr 3; Montreal, Canada. On [youtu.be/LATVTHMIK8Q](https://youtu.be/LATVTHMIK8Q).
- Balli F. Commons and Breathing Games. **General Assembly of Observatoire des Mondes Numériques en Sciences Humaines; 2018** Jan 13; Paris, France.
- Balli F, Dugas B. Everyone should be able to adopt (lifesaving) health innovation. **OpenVillage Festival; 2017** Oct 20; Brussels, Belgium.
- Balli F. Les game jams comme méthode d'apprentissage expérientiel et de co-création interdisciplinaire. **Colloque international sur le jeu vidéo comme objet de recherche et médium pédagogique de l'Université de Lausanne; 2017** Oct 7; Lausanne, Switzerland.
- Balli F, Caignon P. Apprentissage transformationnel en éducation de la santé : de la gestion de la maladie à l'appropriation de la santé par la communauté. **Colloque La mesure et l'évaluation des apprentissages complexes en éducation médicale : défis et enjeux du Congrès ACFAS; 2017** May 12; Montreal, Canada.
- Balli F, Simon L, Frangos M, Fan LT, Folie A. Take a deep breath. **Canadian Finals of the Oxford University Global Challenge; 2017** Mar 25; Calgary, Canada.
- Balli F. Ensuring Everyone's Right to Respiratory Health: Participatory Research and Knowledge Co-Creation. **INDI research day of Concordia University; 2017** Mar 16; Montreal, Canada.
- Balli F, Valderrama A. Création collective de jeux libres en santé : communs, recherche participative et blockchain. **Colloque Applications mobiles en santé : des usages aux enjeux éthiques, déontologiques et juridiques du Réseau de recherche en santé des populations du**

**Québec; 2016** Nov 22; Montreal, Canada. Video: [youtu.be/Mmx9GdQ8ZEA](https://youtu.be/Mmx9GdQ8ZEA).

- Balli F. Health & Play – Addressing together the challenges of creating an open source standard for Breathing Games. **12th International Symposium on Open Collaboration; 2016** Aug 17-19; Berlin, Germany.
- Balli F. Health & Play – Mobilizing citizens around breathing autonomy. **World Social Forum; 2016** Aug 3; Montreal, Canada.
- Balli F. Which psychosocial messages for a health game? **European Psychosocial Special Interest Group Meeting of the 39th European Cystic Fibrosis Conference; 2016** Jun 8; Basel, Switzerland.
- Balli F, Voirol C. breathinggames.net: vers un standard libre pour se soigner par le jeu. **Colloque Les sciences sociales et humaines au cœur de l'innovation – Innovation en santé du congrès ACFAS; 2016** May 12; Montreal, Canada.
- Thai M, Brastaviceanu T, Balli F. Nul n'est prophète en son pays - Pourquoi la Maison Blanche s'intéresse au modèle de Sensorica ? **Colloque de mobilisation des connaissances sur les thèmes de la collaboration et de l'innovation; 2015** Oct 15; Montreal, Canada.

#### Professional presentations

- Balli F. Co-creation during covid-19: prototyping health for everyone? **Public Health Switzerland; 2020** June 11; Bern, Switzerland.
- Balli F. Team-building and information flow for large groups such as online hackathons (Version 1.2). **EUvsVirus decision-making meeting; 2020** April 8, online. DOI: 10.5281/zenodo.3744376.
- Balli F. Coronavirus hackathons: less efforts, more lives saved. **coronavirus-openkit.net; 2020** April 2, online. DOI: 10.5281/zenodo.3737898.
- Balli F. Open Geneva and inclusion. **Fête de l'innovation; 2019** May 28; Geneva, Switzerland.
- Balli F. Breathing Games: population-driven health tech. **Eco2fest at PME MTL; 2018** Nov 5; Montreal, Canada.
- Dugas B, Balli F. Free/libre hardware. Conferenza OpenCare. **Digital Social Innovation and the Future of Care; 2017** Nov 22-23; Milano, Italy.

- Balli F. Jeux et matériel libres en santé respiratoire : enjeux de conception et de distribution. **Journée internationale du logiciel libre; 2017** Sept 16; Montreal, Canada.
- Balli F. Health & Play – Mobilizing citizens around breathing autonomy. **World Social Forum; 2016** Aug 3; Montreal, Canada.

### Scientific posters

- Kirszenbaum M, Lustre A, de Beauvais N, Hauterive M, Wenk N, Gervais Y, Clairicia M, Frangos M, Gomez V, Burgel PR, Sermet-Gaudelus I, Valette J, Balli F. Favoriser le soin autonome : encourager les jeunes vivant avec la mucoviscidose à partager leur expérience à travers la création de jeux collaboratifs. **Réseau Mère-Enfant de la Francophonie; 2021** Mai 18; Lyon, France.
- Balli F, Jeanmaire G, Chelabi K, Kellner E, Gingras S, Gervais Y. Méthodes mixtes, jeux, matériel ouvert et traduction en santé. **Colloque méthodes mixtes francophonie; 2021** May 6; Montréal, Canada.
- Chelabi K, Balli F, Bransi M, Gervais Y, Marthe F, Tse SM. Validation of a portable game controller to assess peak expiratory flow against conventional spirometry in children. **Canadian Respiratory Conference; 2021** Apr 9; Ottawa, Canada.
- Balli F, Matringe M, le Couedic C, Schull J, Gautam S, Jandard P, Kellner E, Anastasaki A, Serada K, Brahmachari SK, Winter L, Lonchamp P, Schoeller F, Krishnakumar A, Greshake B, Lhoste K, Parot C, Jeanmaire G. **Health technology as commons: trustable, affordable, adaptable. Geneva Health Forum Open Village; 2020** Nov 16-18; Geneva, Switzerland. DOI: 10.5281/zenodo.4327587.
- Balli F, Tse SM, Kirszenbaum M, Montalbano L, La Grutta S, Jeanmaire G, Gervais Y, Wenk N, Fangous D, Gaudy T, Marthe C, Bransi M, Gomez V, Robin JF, Clairicia M, Mendell M, Valderrama A, Kellner E, Martischang R, Caignon P. **Mutual care taking: collectively creating our respiratory wellbeing with open sciences. 13th General Meeting of the Global Alliance against chronic Respiratory Diseases – World Health Organization; 2019** Oct 25-27; Beijing, China. DOI: 10.5281/zenodo.3451506.
- Wenk N, Balli F. Breathing Games – Free/libre and open source games for respiratory health. **Gamification & serious game symposium 2019;** Jul 24; Neuchâtel, Switzerland.
- Balli F, Gingras S, Gervais Y. Air, breath and the co-creation of meaning. Can games help break free from limiting beliefs? **Annual Canadian Arts Therapy Conference; 2018** Oct 12; Montreal, Canada.
- Balli F, Gervais Y, Frangos M, Gaudy T, Valderrama A, Bransi M, Pache C, Tse SM. **Next-gen advocacy for respiratory health: fun, empowering, participatory, freely adaptable. 12th General Meeting of the Global Alliance against Respiratory Diseases – World Health Organization; 2018** Aug 31; Helsinki, Finland. DOI: 10.5281/zenodo.1344629.
- Balli F et al. **When populations care about their respiratory health: a scalable bottom-up model to foster self-care for all. 11th General Meeting of the Global Alliance against Respiratory Diseases – World Health Organization; 2017** Nov 11; Brussels, Belgium. DOI: 10.5281/zenodo.1344084.
- Balli F, Gomez V. Science ouverte : les données de santé gérées par des réseaux d'utilisateurs. **Colloque Dédouaner les données ! Accès, utilisation et retombées pour la recherche en santé du congrès ACFAS; 2017** May 11; Montreal, Canada. DOI: 10.5281/zenodo.1420487,
- Balli F, Maheu-Cadotte MA, Bouix J, Valderrama A, Vermeulen F, Wenk N, Tse SM, Burgel PR, Sermet-Gaudelus I, Martischang R, Kirszenbaum M, Frangos M, Ebnoether N, Gomez V, Gingras S. Évaluation par des méthodes mixtes de l'impact sociétal de Breathing Games, une communauté interdisciplinaire co-crétant des technologies libres en santé. **Colloque Les innovations en méthodes mixtes en sciences sociales et de la santé du congrès ACFAS; 2017** May 10; Montreal, Canada. DOI: 10.5281/zenodo.1406778.
- Frangos M, Balli F. Breathing Games: Promoting Respiratory Health Through Co-creation. **European Academy of Design Conference; 2017** Apr 12-14; Rome, Italy.
- Balli F, Fan LT. Health Education: Playing and Creating Games. **Graduate Symposium in the Department of Education of Concordia University; 2017** Mar 25; Montreal, Canada.
- Valderrama A, Balli F, Tse SM, Gomez V. Développer des compétences en maladies chroniques à travers une application mobile conçue de

manière innovante. **Journées annuelles en santé publique; 2016** Nov 21-22; Montreal, Canada.

- Tse SM, Valderrama A, Balli F, Gomez V. A free/libre mobile app in childhood asthma: knowledge transfer and self-assessment of symptoms and lung function. **Congrès québécois en Santé respiratoire; 2016** Oct 11-14; Montreal, Canada.
- Balli F, Gomez V. Therapeutic adherence: exploring Open Collaboration to mobilize all stakeholders behind children with CF. **European Cystic Fibrosis Conference; 2016** Jun 8-11; Basel, Switzerland.

## Panels

- Penjore S, Morenets Y, Balli F, Ekyarisiima C (panelists), Stankovic V (facilitator). The Coronavirus Response – ICT Case Repository. **World Summit on the Information Society; 2021** Mar 23.
- Balli F, Falcon L, Groh A (panelists), Sandler K (facilitator). Software and Hardware Freedom in Health Public Policy. **FOSDEM; 2021** Feb 7.
- Bastianelli G, Poughia E, Cossi M, Balli F (panelists), Nothnagel A, Moro L (facilitators). Hack your Science. **Young European Biotech Network; 2021** Feb 3.
- Balli F, Dosemagen S, Knäpper I, Niggli N, Nimkar R (panelists), Michel S (facilitator). **Geneva Solutions: Meet the Makers of a Better World 2019;** Mar 20, Geneva, Switzerland.

- Brastaviceanu T, Balli F, Frangos M. Open Science and Innovation. **9th Canadian Science Policy Conference; 2017** Nov 3; Ottawa, Canada. Video: [youtu.be/fP32bzSh-fs](https://youtu.be/fP32bzSh-fs).

## Exhibitions

- La Grutta S, Montalbano L, Gervais Y, Balli F. **Notte europea dei ricercatori; 2019** Sept 27; Palermo, Italy.
- Frangos M, Balli F. Gathering for Open Science Hardware. **Public demo and seminar at the University of Toronto; 2019** July 31; Toronto, Canada.
- Wenk N, Pierson A, Balli F. Breathing Games Free/libre and open source games for respiratory health. **Exhibition at the Gamification & serious game symposium 2019;** Jul 24; Neuchâtel, Switzerland.
- Balli F. Breathing Games. **World Summit on the Information Society Forum; 2018** Apr 11, Geneva, Switzerland.
- Frangos N, Frangos M, Gervais Y, Balli F. Breathing Games – Une planète où chacun peut respirer librement. **50e anniversaire de la Faculté de l'aménagement de l'Université de Montréal; 2018** Oct 26; Montreal, Canada.
- Balli F et al. Des jeux pour souffler ? Game jam Breathing Games. Series of five posters. **OpenGeneva Festival; 2018** Apr 15; Geneva, Switzerland.

