Introduction to GNU Health

GNU Health
FEDERATION

The Free, Community-based, Hospital and Health Information System

Dr. Axel Braun

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About GNU Solidario

"Delivering Health and Education with Free Software"

GNU Solidario first project :Santiago del Estero, Argentina, 2006

GNU Health
The Free Health and Hospital Information System.
(health.gnu.org)

GNUHealthCon - IWEEE
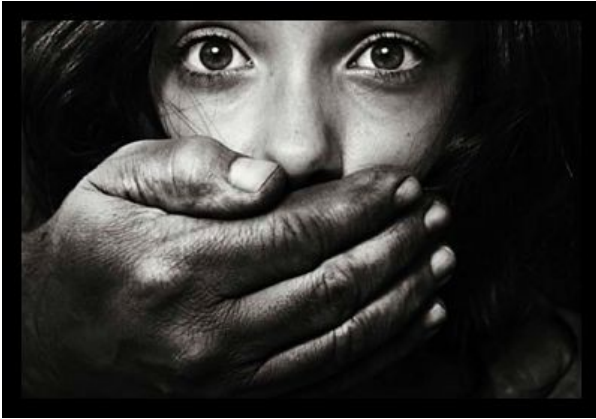International Workshop on E-Health in Emerging Economies.

The System of Disease

Axel Braun

Les Misérables

Over 20.000 Children die every day from Social Diseases – in misery

Human Trafficking
Contaminated Water
Malnutrition
Cholera
Drug abuse
Prostitution
Chagas
Tuberculosis
Child Labour
War
Family Violence
Malaria
HIV /AIDS

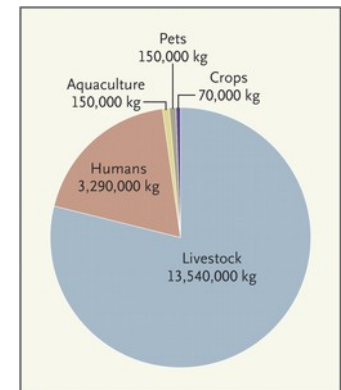# The other Miserables: Those who cause misery

The business of war

Harvard-MIT Division of Health Sciences and Technology
HST 936 - Global Health Informatics to Improve Quality of Care, Feb 27 2015

Luis Falcon
Gnu Solidario . CC-BY- NC-SA 3.0

80% of diseases in LMICs due to poor sanitation / unsafe water (UN)

GIZ, Bonn
27 Feb 2019

Dairy and Meat : Inhumane, Cruel and Unhealthy

* Extremely cruel

* Stress → immunocompromise → ATB → Resistance

* Bacteria contamination

* Milk / meat full with ATB, Hormones, …

* Linked to cancer, cardiovascular disease in humans

* Global warming

Factory farming accounts for 37% of methane (CH_4) emissions, 20 times the global warming potential of CO_2.

New England Journal of Medicine
Dec 26, 2013

GNU Health : Freedom and Equity in Health

- *"La medicina sin humanismo médico no merece ser ejercida."*
Professor Dr. Rene Favaloro -

The System of Health Paradigm

System of Disease

- biological
- Meds
- Disease
- Reactive
- Sophisticated
- Patient
- Invasive
- curing
- Acute

System of Health

- Community
- Family
- Nutrition
- Person
- Education
- Housing
- Exercise
- Affection
- Proactive
- Bio Psycho Social
- Trans disciplinary
- Healing
- Work
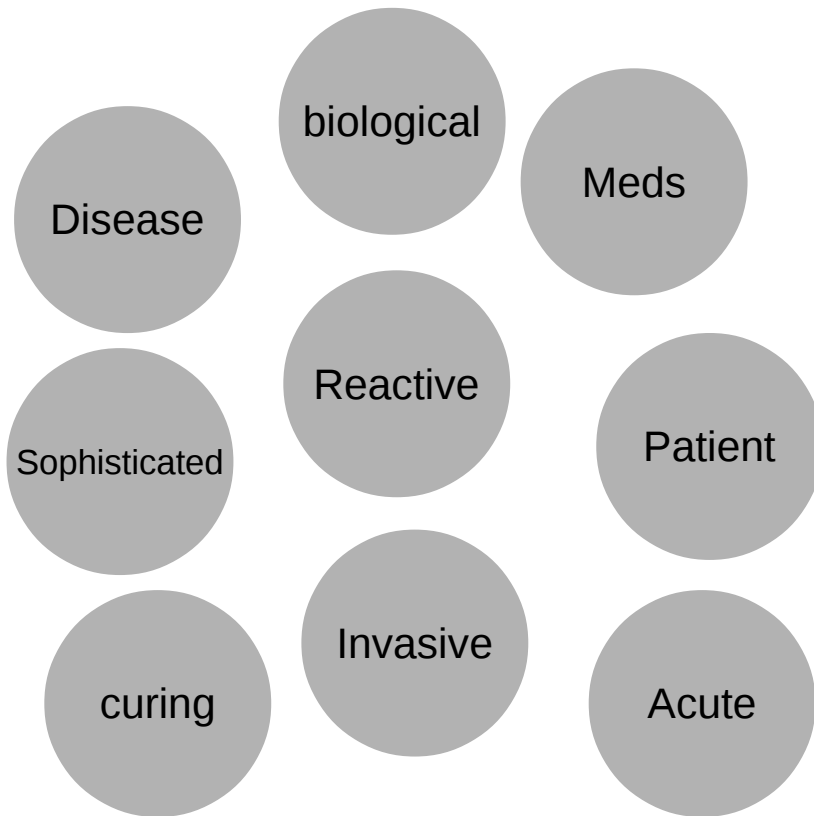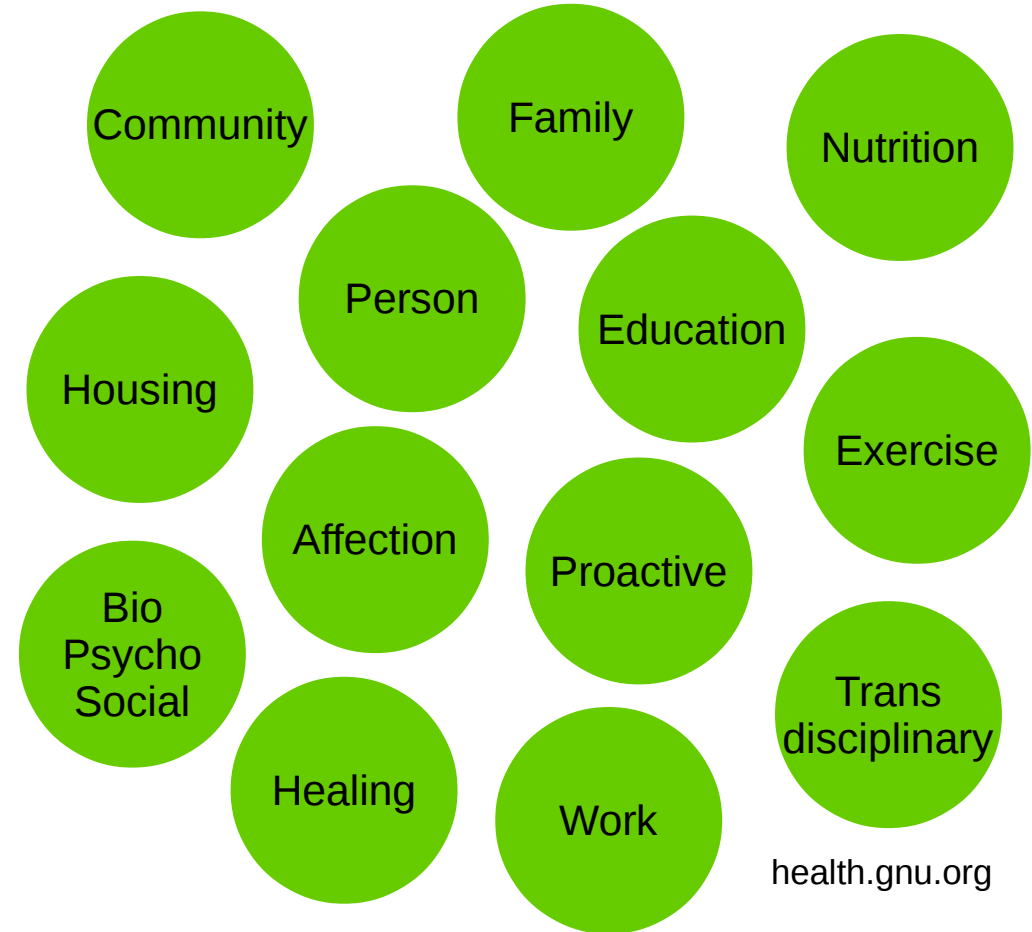
health.gnu.org

GNU Health : Functionality Areas

Person and Community

Person, family, Socioeconomics, lifestyle ...

Domiciliary Units, Operational Areas, Institutions,

Patient

Evaluations, Genetics, prescriptions, History, surgeries...

Health Institution Management

Hospitalizations, Finances, Laboratory, stock, HR, ..

Health Authorities / MoH

Health campaigns, epidemiology, ...

GNU Health is Free/Libre Software

Freedom to **run , adapt, improve and redistribute**

Official GNU Package, from the Free Software Foundation

Open Documentation

Relies on free technology

International community (100+ language teams)
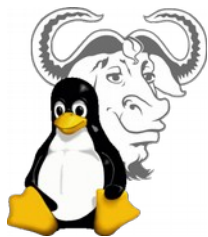
Introducing GNU Health Federation

GNU Health Federation Model
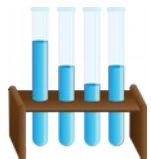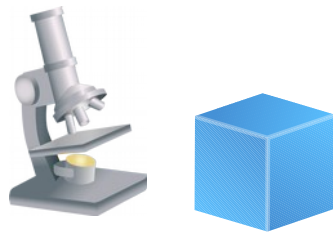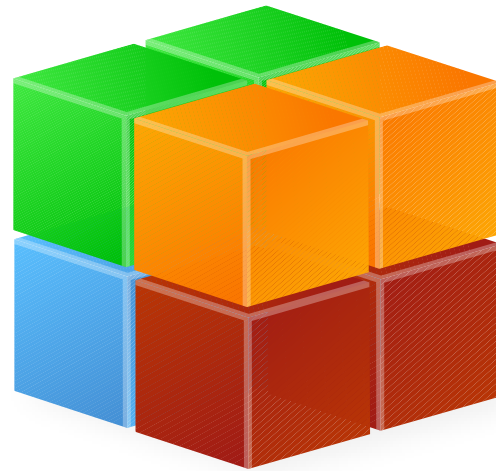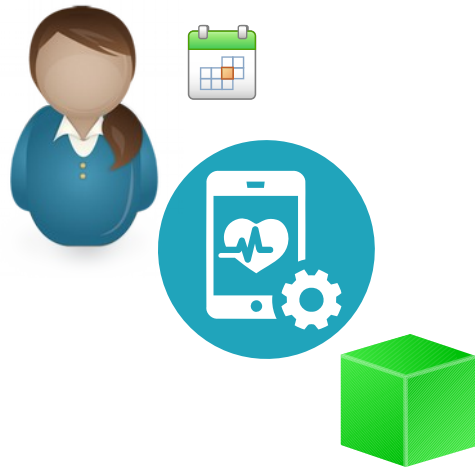
Axel Braun
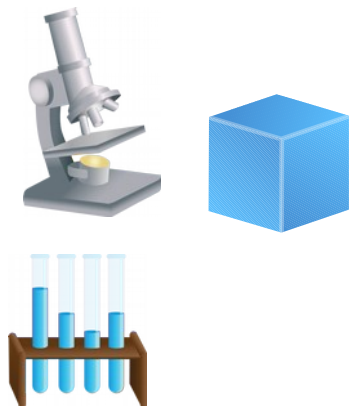
GNU Health Federation Model

Autonomous

Distributed

Heterogeneous

Scalable

High availability

Secure

Thalamus – GNU Health Federation Message Server

HL7 support - FHIR

GNU Health adopts HL7 FHIR standard
New standard FHIR in upcoming version.

Modularity

GNU Health Modular Design

Epidemiology	Laboratory	Socioeconomics
Genetics	**GNU Health** (core module)	
Family	**Localizations** (Brazil, Germany, India...)	Hospital

Pediatrics
Surgery
Radiology
Hemato
Oncology
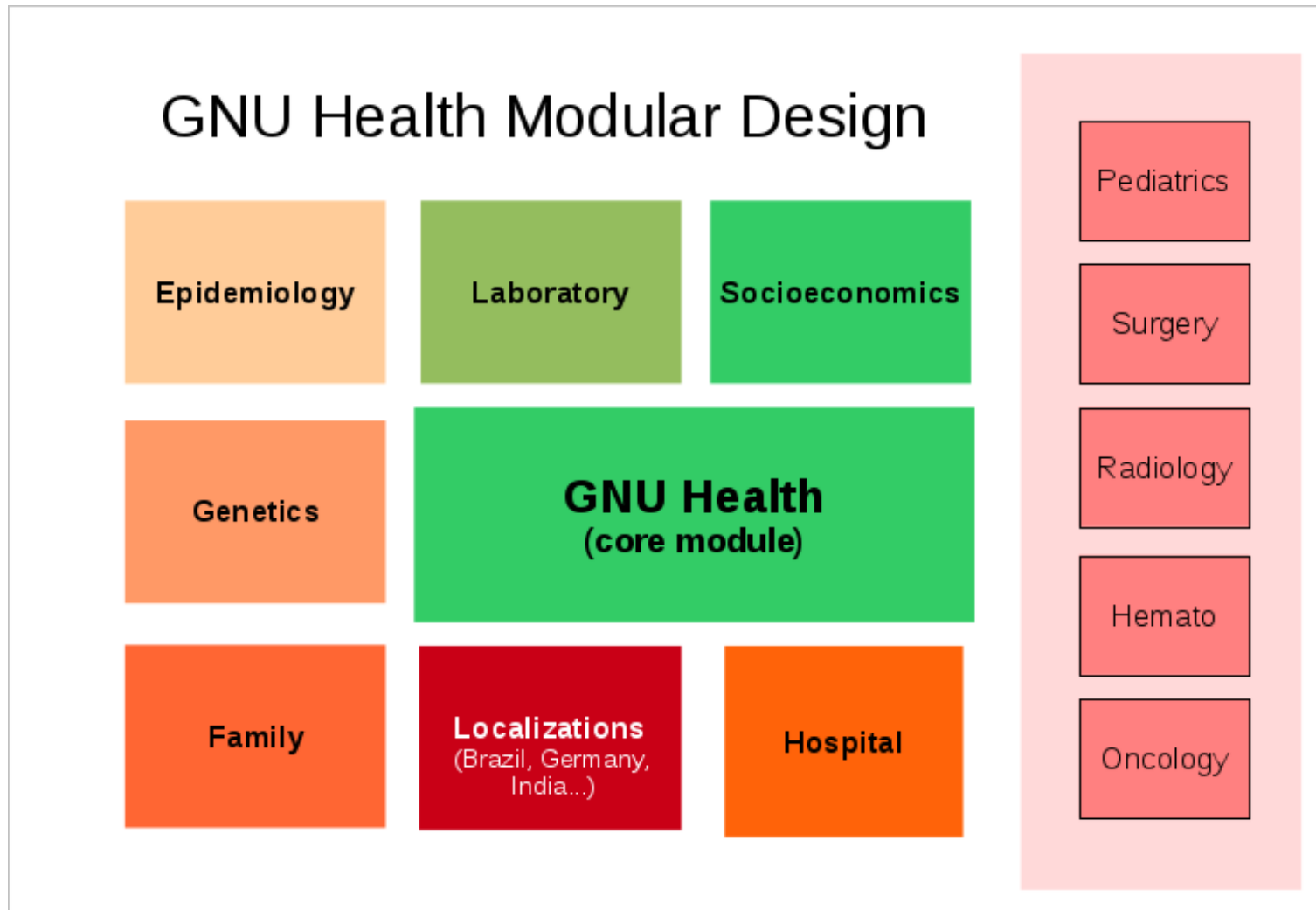
Modularity

GNU Health' modularity allows

- tailor installations according to need

- flexibility

- easy adaption to changed needs

- modular extentions (OO approach)

People before Patients
Social Medicine

The Domiciliary Units (DUs)

Address / Location
Construction material
Number of rooms

Sanitary conditions

Bathrooms
Sewers
Electricity
...

The DU shows the people currently living in it at any given moment
The DU can be geolocated / linked to OpenStreetMap

People Before Patients : Demographics

Families

Example of a "nuclear family" . They may or may not share the same Domiciliary Unit

Empowering the person, family and community

Name : Betz, Ana

DoB : 1985-10-04

Blood Type : A +

55567890

Female | Universal Person Identifier

Socioeconomics
Education
Lifestyle
Physical exercise
Nutrition
Working conditions
...

Family Members and their roles
Family Affection / Functionality Level
Domiciliary Units conformants
Contacts info : Key for quickly locating them in outbreaks
...

GNU Health promotes transdisciplinary work, and makes the person an active member of the system of health

GIZ, Bonn
27 Feb 2019

Axel Braun

GNU Health WHO modules to fight against social diseases

MDG 6 : Fight HIV, Malaria & Tuberculosis
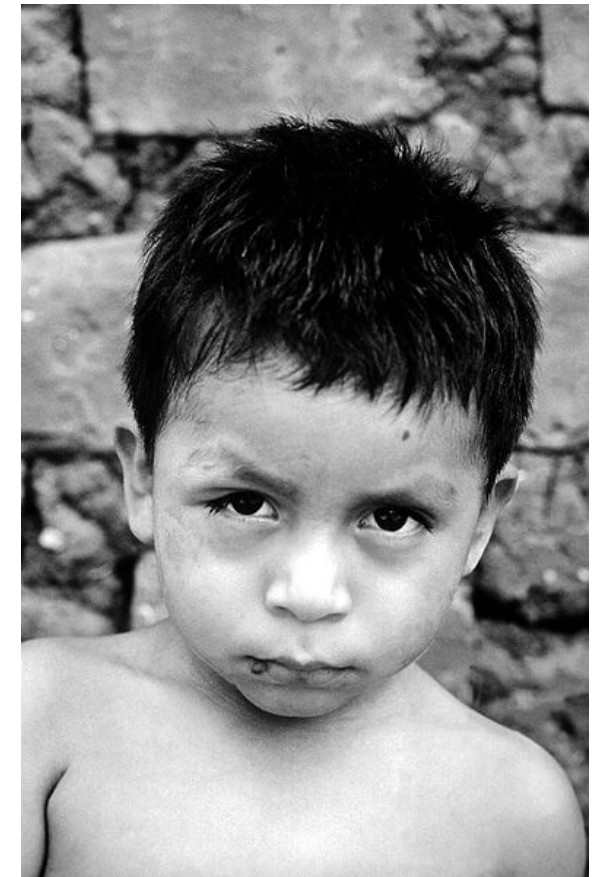
NTD: Fight Neglected Tropical Diseases(Chagas, Dengue...)

Domiciliary Units Survey / Vector Control

health.gnu.org

Medical Practice and
Health Center Management

Axel Braun

Health Institutions and Operational Sectors

Centralized Patient Information
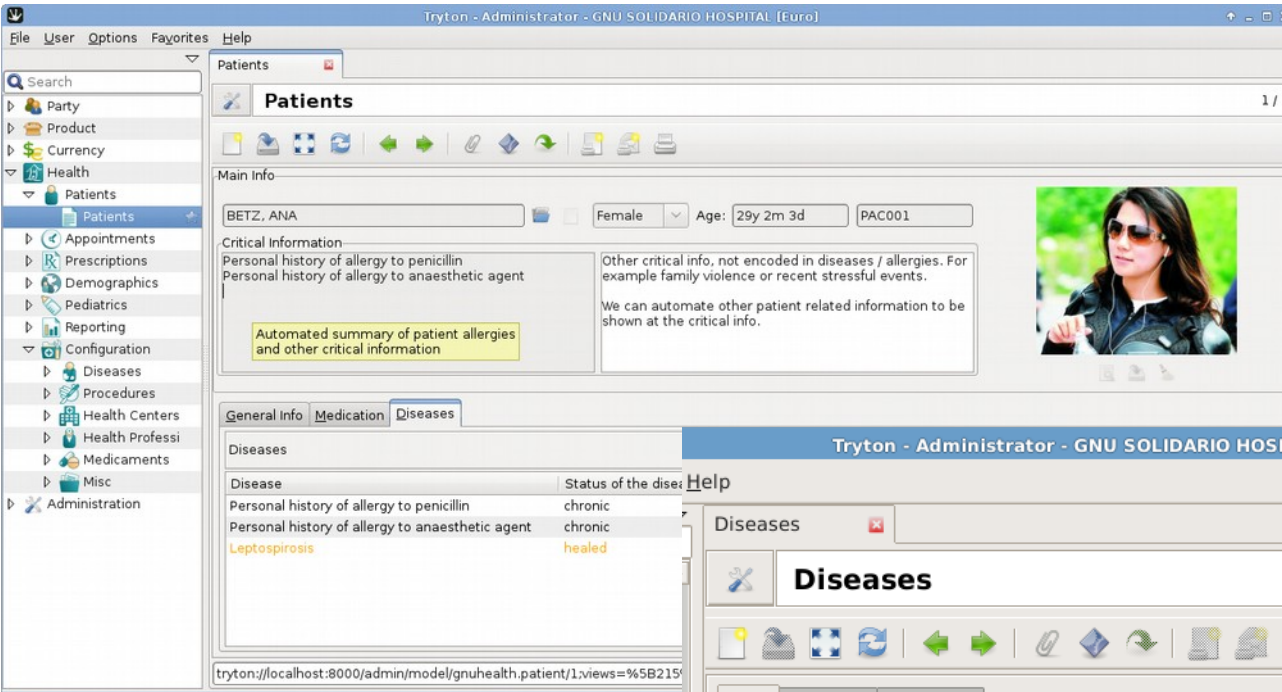
Interoperability : Labs

Obstetrics & Pediatrics

Preconception and Prenatal Care

Genetic Risks and counseling

Obstetric evaluations / imaging

Nutrition and growth charts

Socioeconomics

Neonatology

Immunizations

Family Functionality and Affection level

Psychosocial Risk (Mass General Hospital PSC)

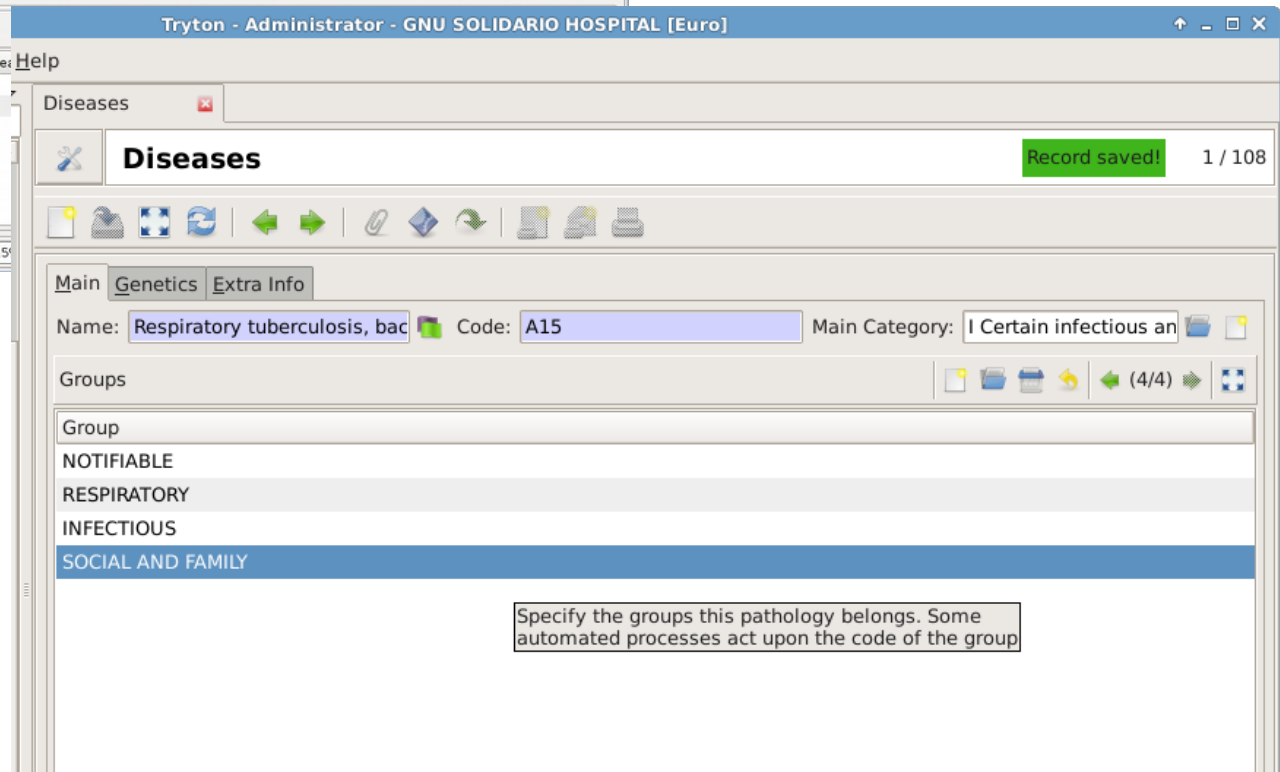# Disease Groups

Tuberculosis example

Automatic triggers

Patient Critical Info

Reporting

Nature vs Nurture

Tuberculosis : ⅓ of the world infected. Who gets sick ?

"Epidemia de Injusticia" Dr. José Caminero

"Bernard avait raison. Le germe n'est rien, c'est le terrain qui est tout."

Louis Pasteur

Some Social and Lifestyle screening tools

CAGE Alcoholism screening

Smilkstein Family functionality test

Henningfield recreational drug classification

Pediatric Psychosocial risk (PSC from MGH)

NIDA recreational drugs Database

Quick retrieval of Person and Patient Info

Name : Betz, Ana

DoB : 1985-10-04

Blood Type : A +

55567890

Female

Critical Info : T1D

Demographics

PUID

Contact Information

Critical Information
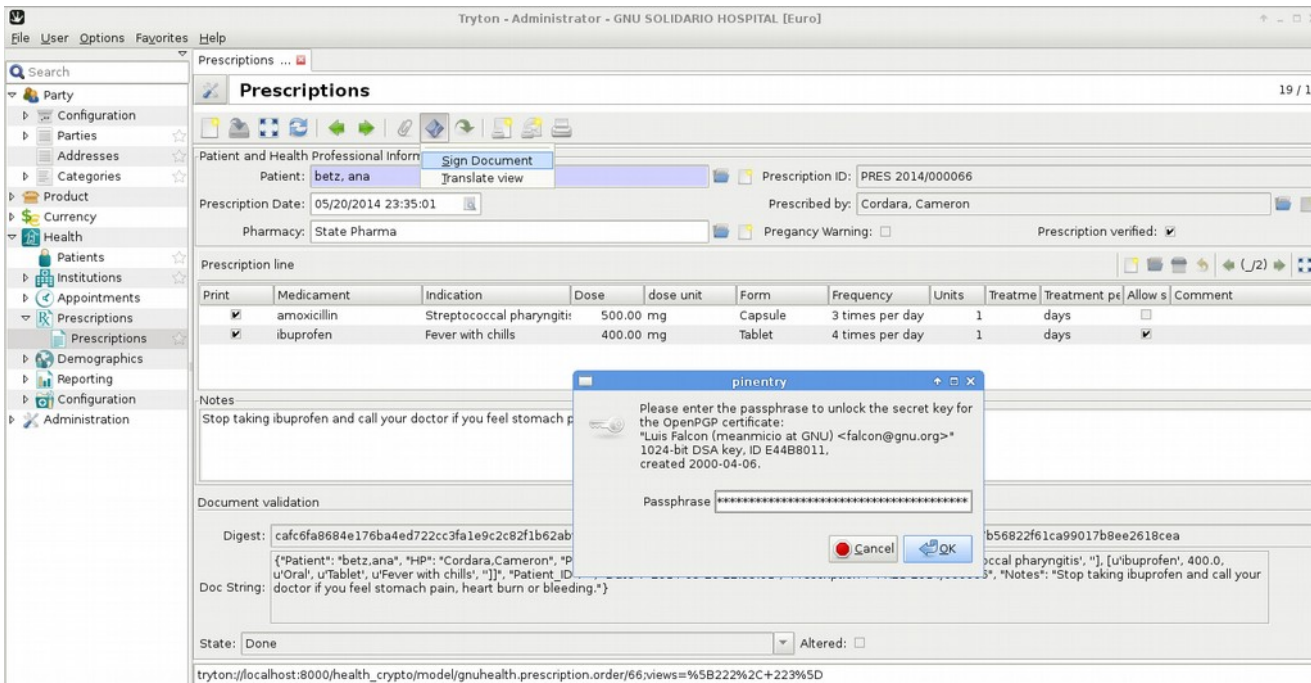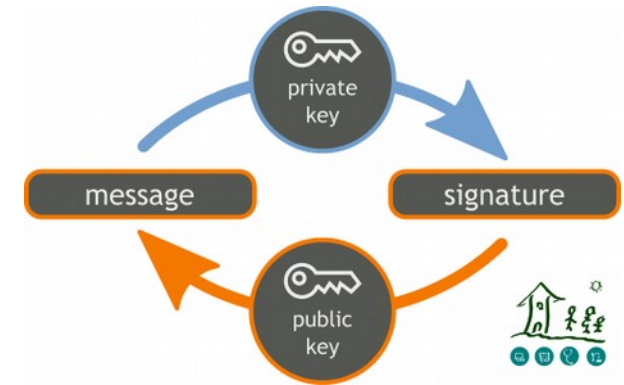(allergies, diseases)
….
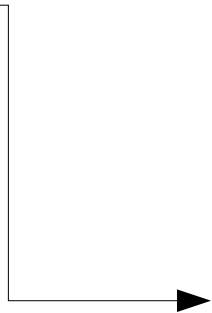
Person ID Card
QR Codes
Wearables

Digital Signatures & ePrescriptions

Digitally sign documents and medical acts

GNU Privacy Guard (GNUPG) Integration

Authenticity, accountability & non-repudiation
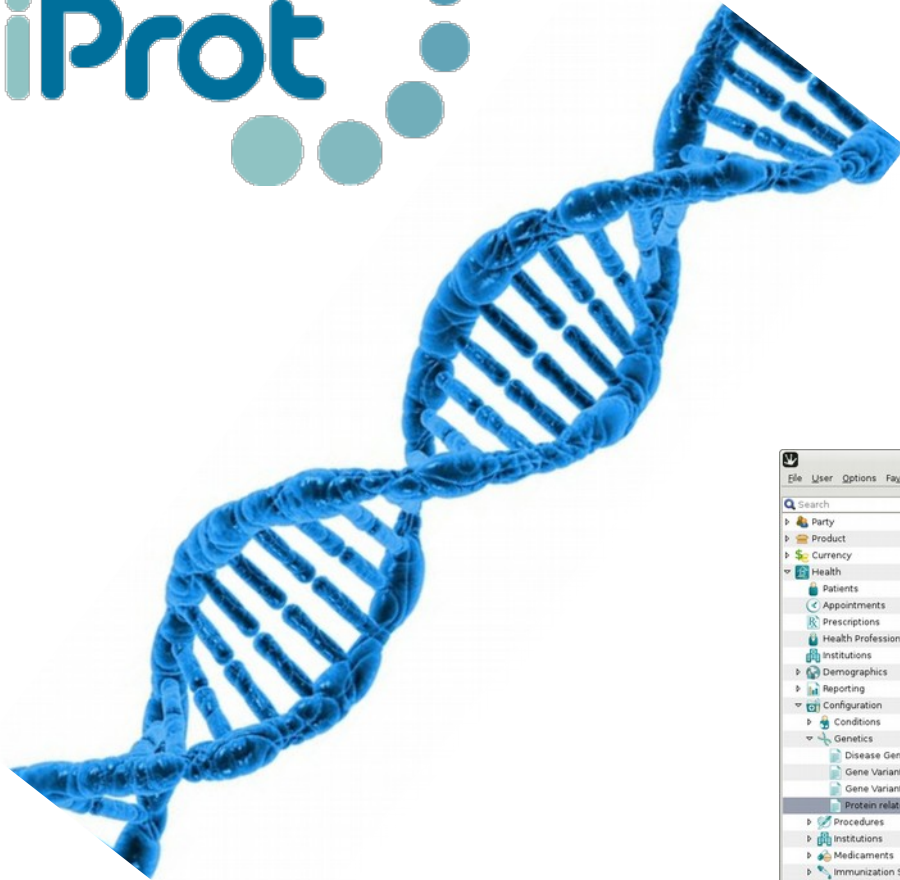
Document validation

ePrescriptions

Evaluations / Encounters

Birth and death certificates

Lab Tests, ...

GNU Health : Genetics & Research Institutions

- Linking clinicians with research
- Personal genetic information & family history
- Work with Uniprot
- Protein related diseases
- Gene Natural Variants & phenotypes
- GNU Health Federation to interact with scientific community

Tools for the Health Authorities

One person, one history : PUID

Demographics, Epidemiology, Early Warning

Data aggregation

Demographics

People without health coverage

Vital Records Sytem

Outbrake early warning

Geolocalization (OSM)

Notifiable diseases

Injury Surveillance System

GNU Health Injury Surveillance System integration with Open Street Map

http://health.gnu.org

Records violent injuries (accidents, robberies, self harm, sexual assaults,...)
Georeferenced
ICD 10 encoded
Contextual information (place, time, subjects involved, …)
Thanks to Jamaica MoH !

Health Campaigns

Personalized campaigns (age, sex, social conditions, …)

Immunization status of the population

Risk groups (obesity, diabetes, …)
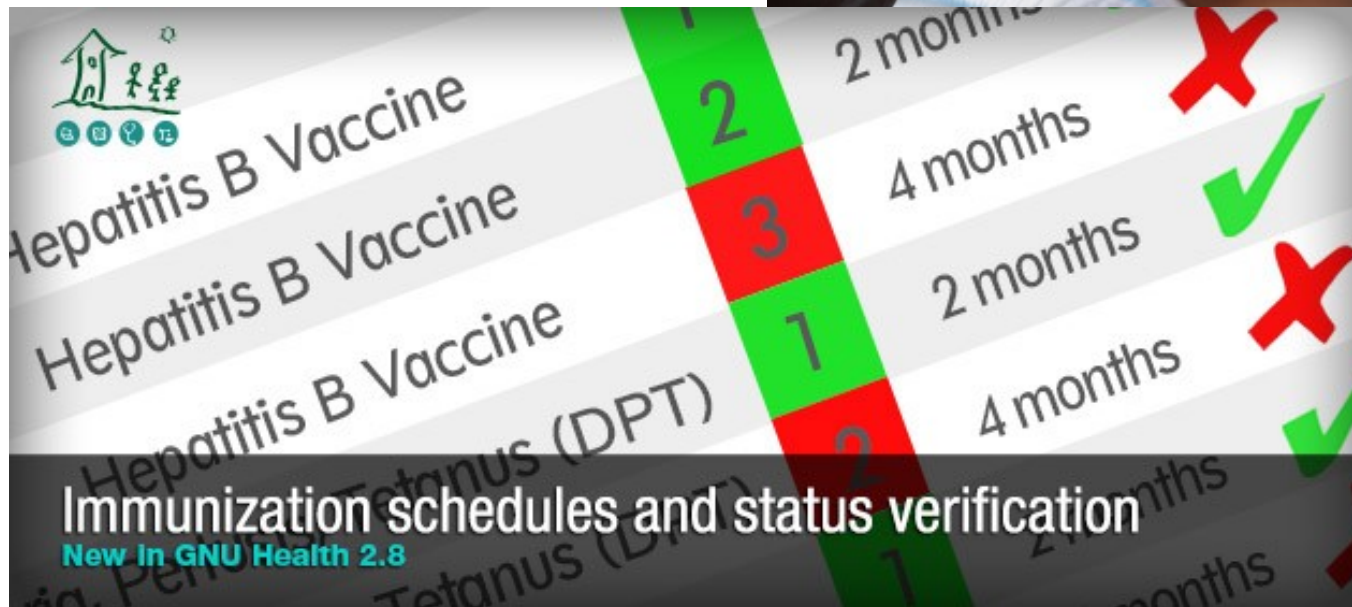
VRS : Birth and Death Certificates

Death certificate document as a digitally signed legal, administrative, epidemidemiological document

Hardware and Connectivity

Free Hardware

Oxymeter / ECG & Arduino interface (WIP)
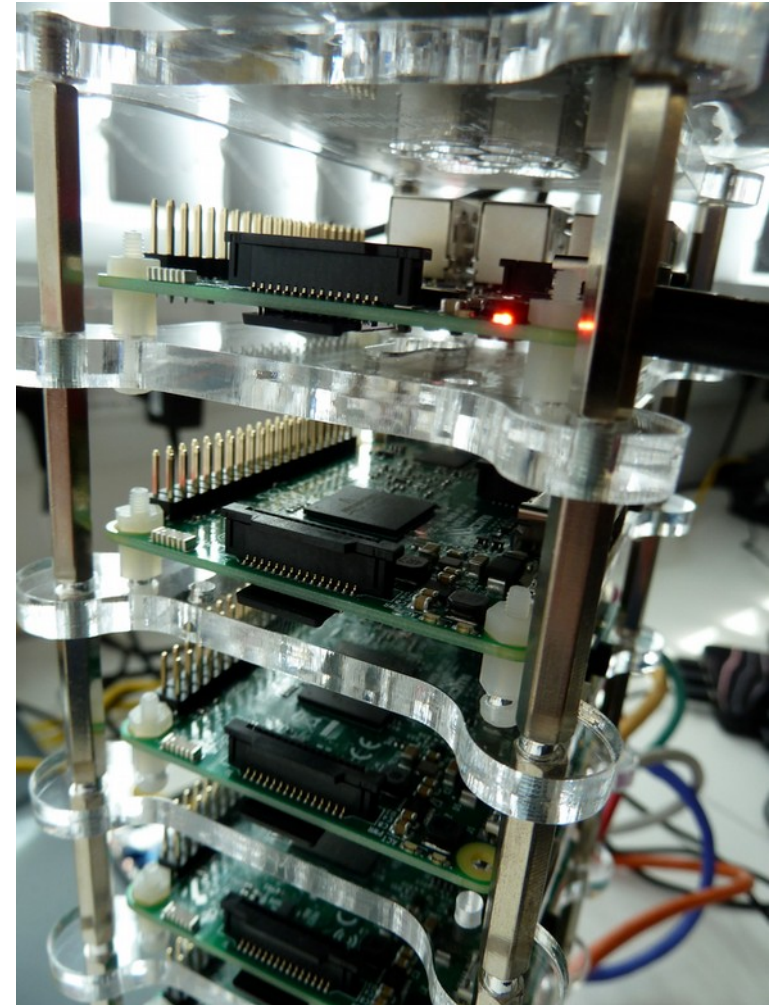
The tower of ten Raspberry Pi 3 systems with the 10-port hub

Euan Livngstone / Dr. Tom Kane, Napier University, Scotland

GNU Health & Raspberry Pi
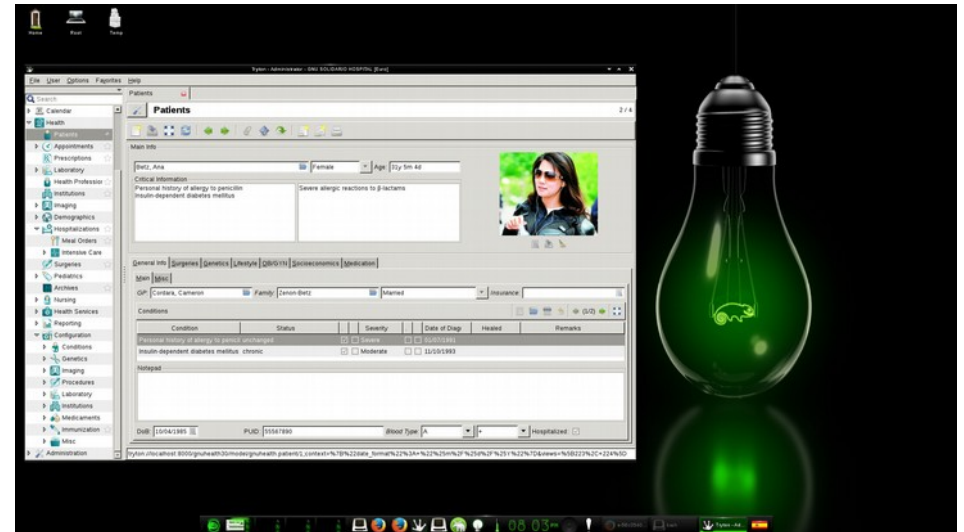
My GNU Health

Axel Braun
Gnu Solidario . CC-BY- NC-SA 4.0
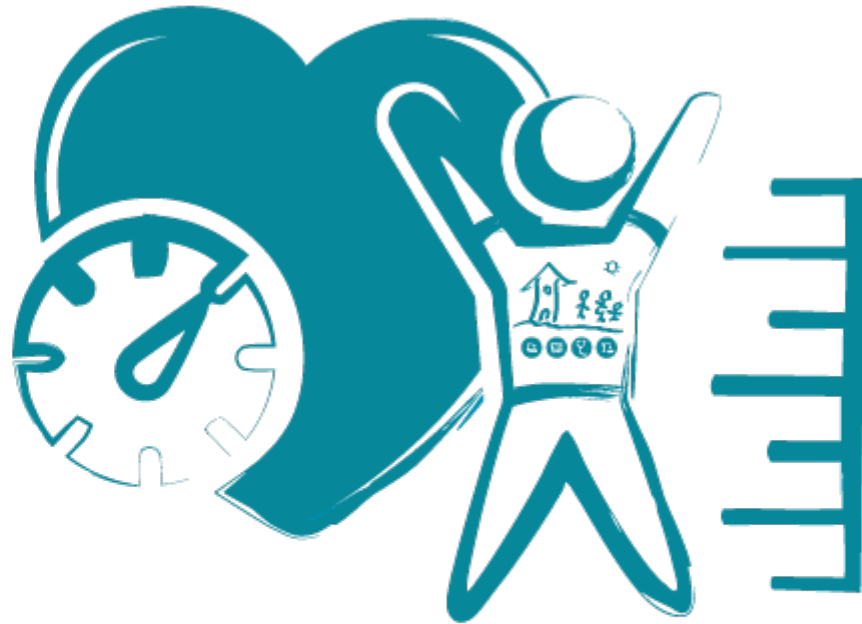
MyGNUHealth : PHR

Personal Health Record Application

Demographics
Appointments
Telemedicine

BMI
Excercise
Vitals
Blood Glucose levels
Nutrition
Socioeconomics

Health History

Mobile and Desktop application

GNU Health Camera

Person / Patient Registration

DUs Surveys

Dx Imaging

Histology / Pathology

…
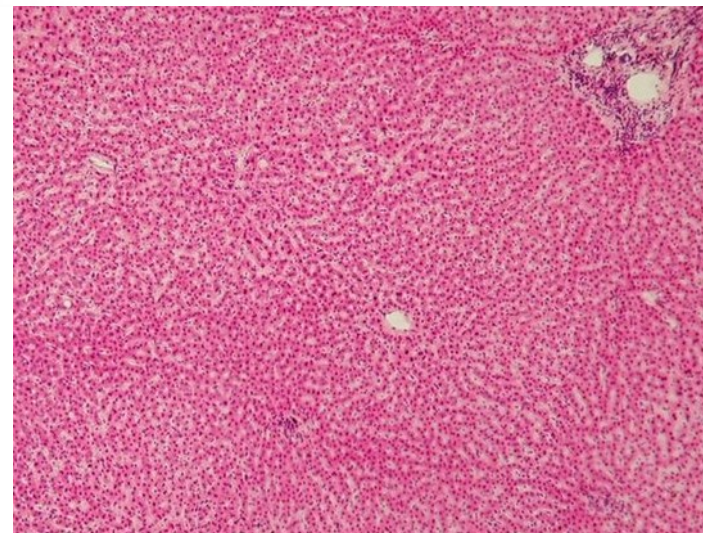
Community

Role of the Academia

United Nations University, Kuala Lumpur, Malasia

University of Entre Rios, Argentina

HST.936: Global Health Informatics to Improve Quality of Care

The 2015 iteration of our course will focus on **Public Health Emergencies and Humanitarian Crises.**

Classes begin: February 6, 2015
Fridays 9am – 11am ET (GMT -5)
Room: **09-057**
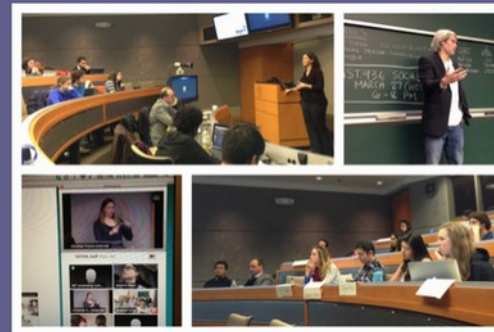
Harvard–MIT, Boston, United States

GNU Health & WHO

GNU Health presentation at WHO and ITU
ICT for Improving Information and Accountability for Women's and Children's Health

MDG6 : Malaria, TB, HIV

Essential list of medicines

Neglected Tropical Diseases

ICD-10 ICPM

MDG4 : Reduce Child mortality

Immunization schedules

Pediatric growth charts

GNU Health at WHO Global Forum on Medical Devices
GNU Health: Interfacing and Interoperability. 22-24 November 2013, Geneva, Switzerland

GNU Health at the Government of Jamaica

Started as a joint project between Government of Jamaica Ministry of Health and GNU Solidario

Local team

Sustainability and independence

Unique ID for each individual across the country

GNU/Linux on both workstations and servers
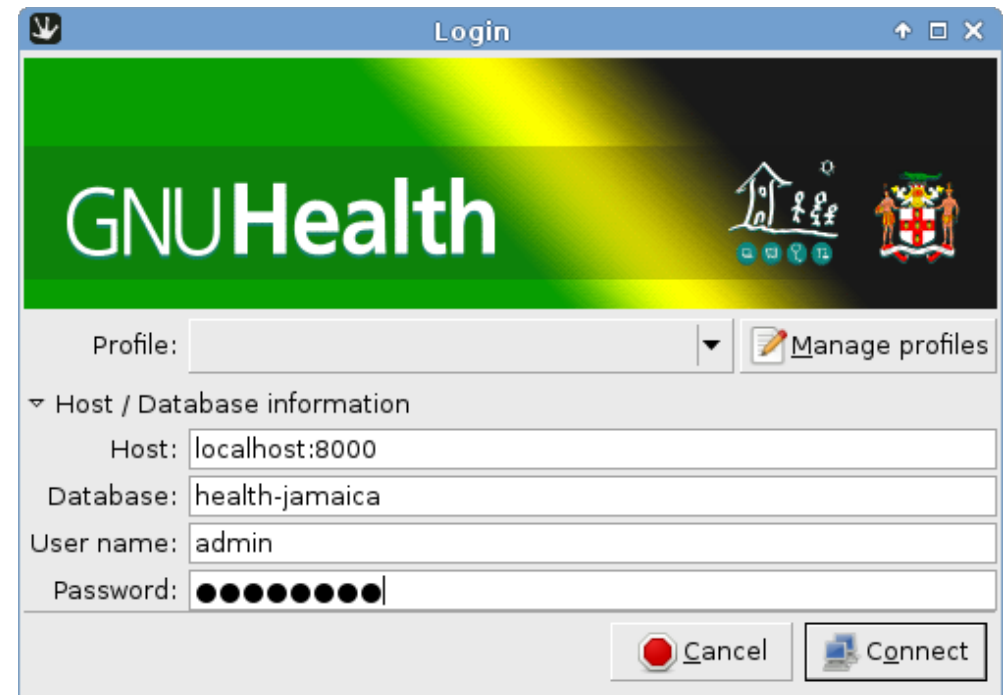
350+ "GNU" Health facilities nation-wide

Cornwall Regional Hospital

St. Anne's Bay Hospital

Mandeville Regional Hospital

Kingston Public Hospital

GNU Health in Argentina

New project in Public Health in Entre Ríos, Argentina!
Hospital Lister, Segui, Entre Rios.
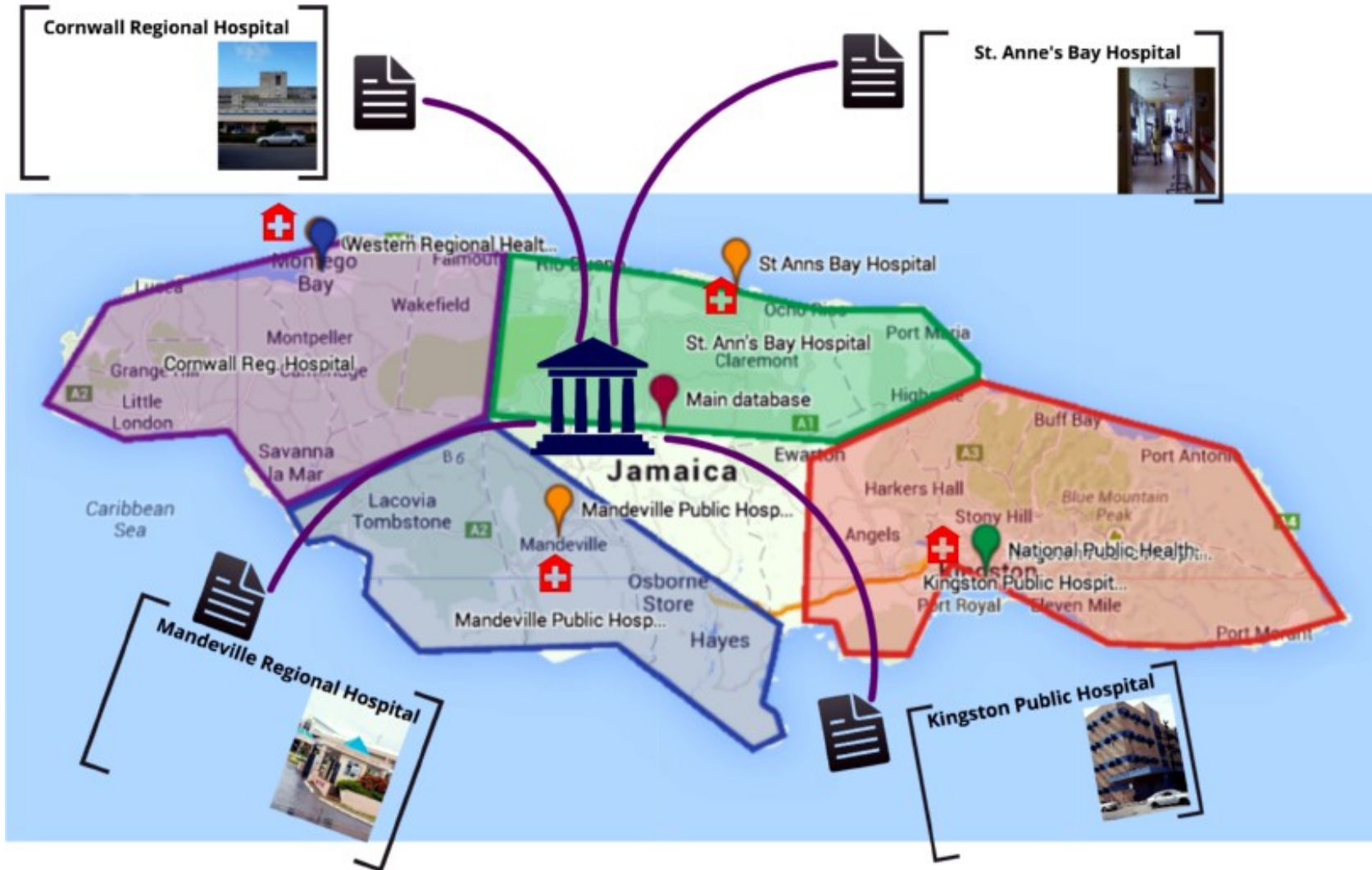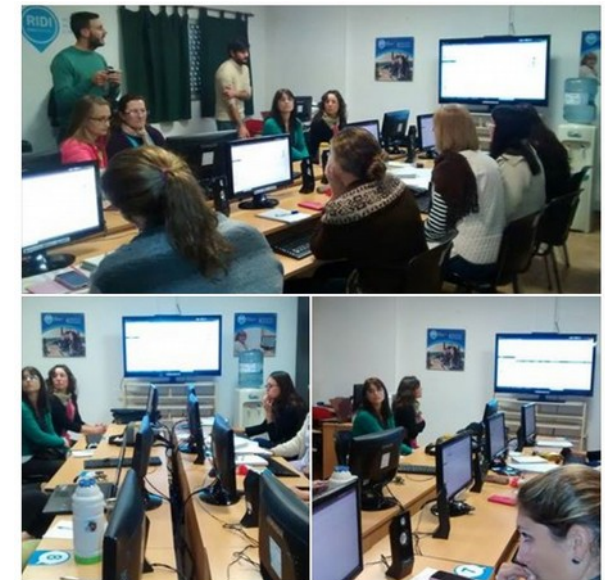
GNU Health at Laos Public Health System

South Africa : Visit to Nelson Mandela Children Hospital

GNU Health in Mexico Morelos Public Health

People before Profit

From the GNU Health Code of Conduct …

"GNU Health is, first and foremost, a social project to bring freedom and equity in health care around the World. GNU Health involves much more than just technology. We strive to generate a friendly, welcoming and positive environment around the GNU Health community".

From the GNU Health Social Contract ...

"Ethical Software Agreement : For GNU Solidario, Ethical Software is a philosophy, that places people before profit, and which main goal is to respect the non-negotiable human right to health care.
This agreement provides an extra level of protection to the Health Center, Health Professional and the population around them. Your organization will never use lock-in policies, such as not releasing part of the code; not providing the upgrade scripts; hiding documentation or any other malicious, ill-intentioned action."

Rudolf Virchow on Medicine and Politics

Medicine is a social science, and politics is nothing else but medicine on a large scale

See you at GNUHealthCon 2019

III International GNU Health Conference - "10 Years of Freedom and Equity in Healthcare"
Nov 23-25, Las Palmas, Spain #GNUHealthCon2018

GNUHealthCon 2019 – TBA

Las Palmas de Gran Canaria, Spain

www.gnuhealthcon.org

Twitter : @gnuhealth