Update of electronics in ecoinvent

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Agenda

- Introducing the ecoinvent Association

- New in ecoinvent version 3.6

- Plastic from consumer electronics

- Electric and electronic cables

- The sector in ecoinvent: overview and way forward

The ecoinvent Association

- A **not-for-profit organisation** that supports life-cycle-based approaches world-wide with **data** and **data solutions**

- ecoinvent is a **data publisher** -> **background database** which contains **average data** on different materials and services

- Tens of thousands of **users from over 80 countries**

- Primary users are **consultants**, **industry**, **researchers**, **policy makers**

- Most common use is **Life Cycle Assessment (LCA)** and **Carbon Footprinting**
  - Also used in EPDs (e.g. EN 15804), PEF, Circular Economy efforts, water footprints, resource criticality, Social LCA, and other sustainability assessments

ecoinvent 3.6

ecoinvent version 3.6 (Sept. 2019)

- Version 3.6 contains over **17'000** datasets for more than **3'000** products
- Datasets for up to **140** countries

The Sustainable Recycling Industries (SRI) initiative funded by SECO

- Setting up regional LCI networks
- Developing local LCI/LCA expertise
- Building background LCI data

Created with mapchart.net ©

■ SRI data in v3.6   ■ SRI local collaborators & data in v3.6
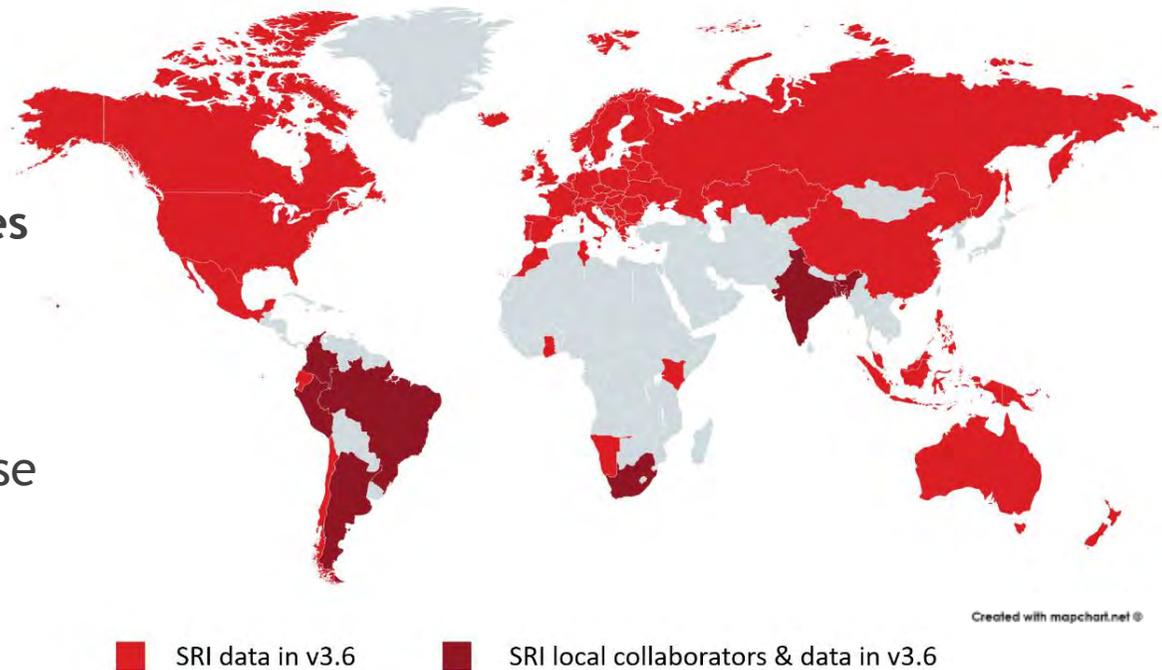
Latest electrical and electronic data

Formal and informal recycling:

- Waste plastic from consumer electronics

Worst-practices in metal recovery:

- Open burning of electrical and electronic cables
- Controlled & uncontrolled dismantling of refrigerator

Waste tool:

Starting from chemical and physical composition

New treatment technologies:

- unsanitary landfill
- open burning
- open dumping

Pictures: from SRI and WRF in Safaei et al. 2018

Informal vs formal recycling in India

unsorted plastic
waste

Red text = only in informal sector
Red text = only in formal sector

recycled
granulates

LPG
hydrozine

black carbon
colouring agent

| market for unsorted waste plastic from electronics | collection, sorting, dismantling and segregation | shredding | extrusion/ granulation | market for recycled plastic granulate |

dirt
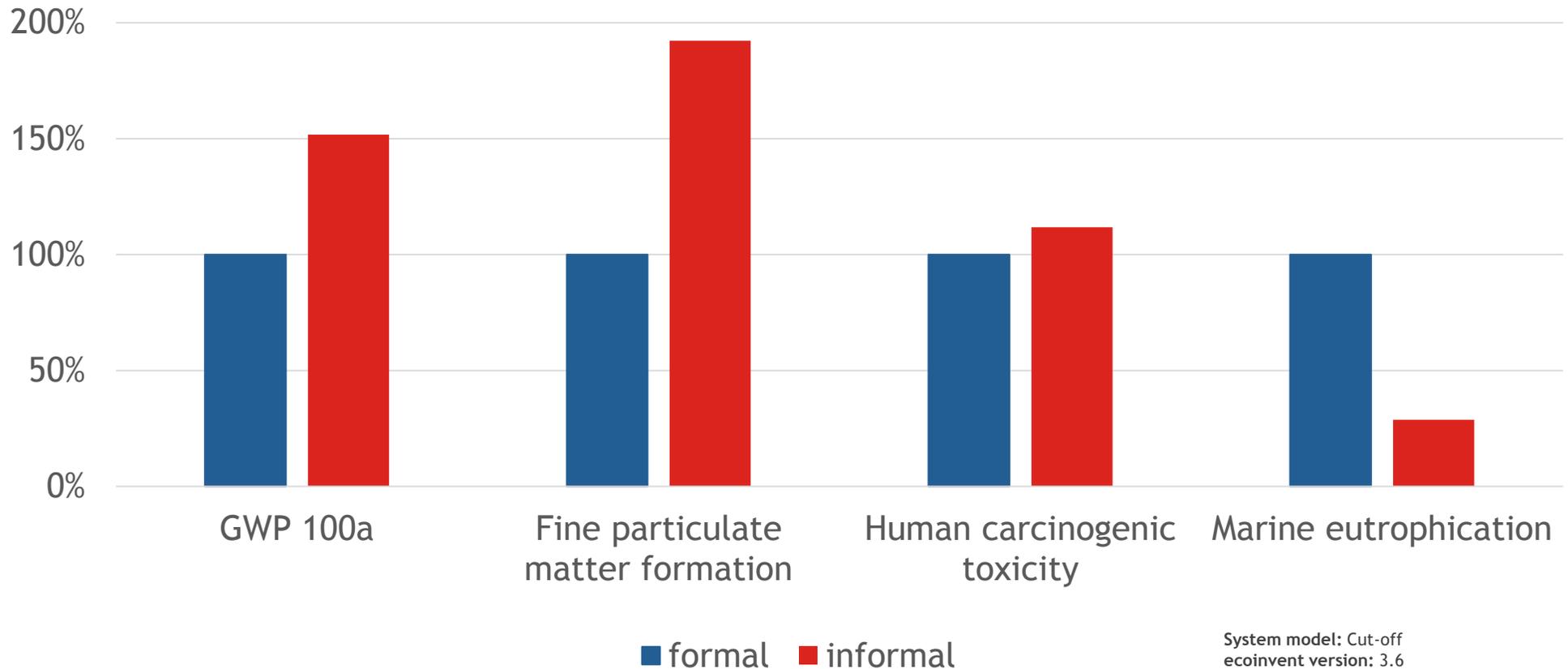waste foam
metal pieces

plastic rejects

open burning

sanitary landfill

Data collection & pictures: Muthusezhiyan et al. 2017

Informal vs formal recycling: results

formal vs informal recycling of plastic from consumer electronics

System model: Cut-off
ecoinvent version: 3.6
LCIA methods: ReCiPe Midpoint (H) V1.02

Waste tool: the example of cables in Ghana

Inputs:

Composition at the element level

Climatic conditions represented in 5 infiltration classes based on:

- Precipitation
- Temperature
- Evaporation

Table 2: Composition of waste electrical and electronic cables (Doka, 2009; Amoyaw-Osei et al., 2011) used for this study*
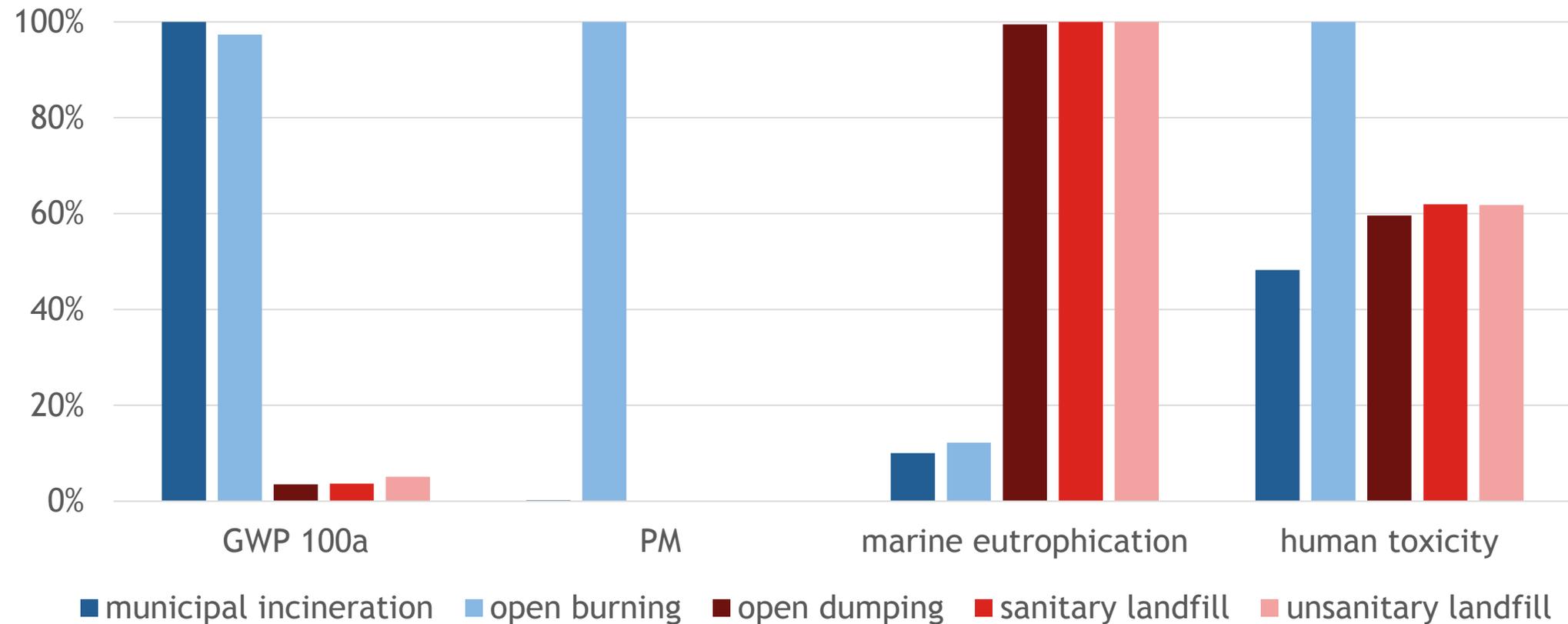
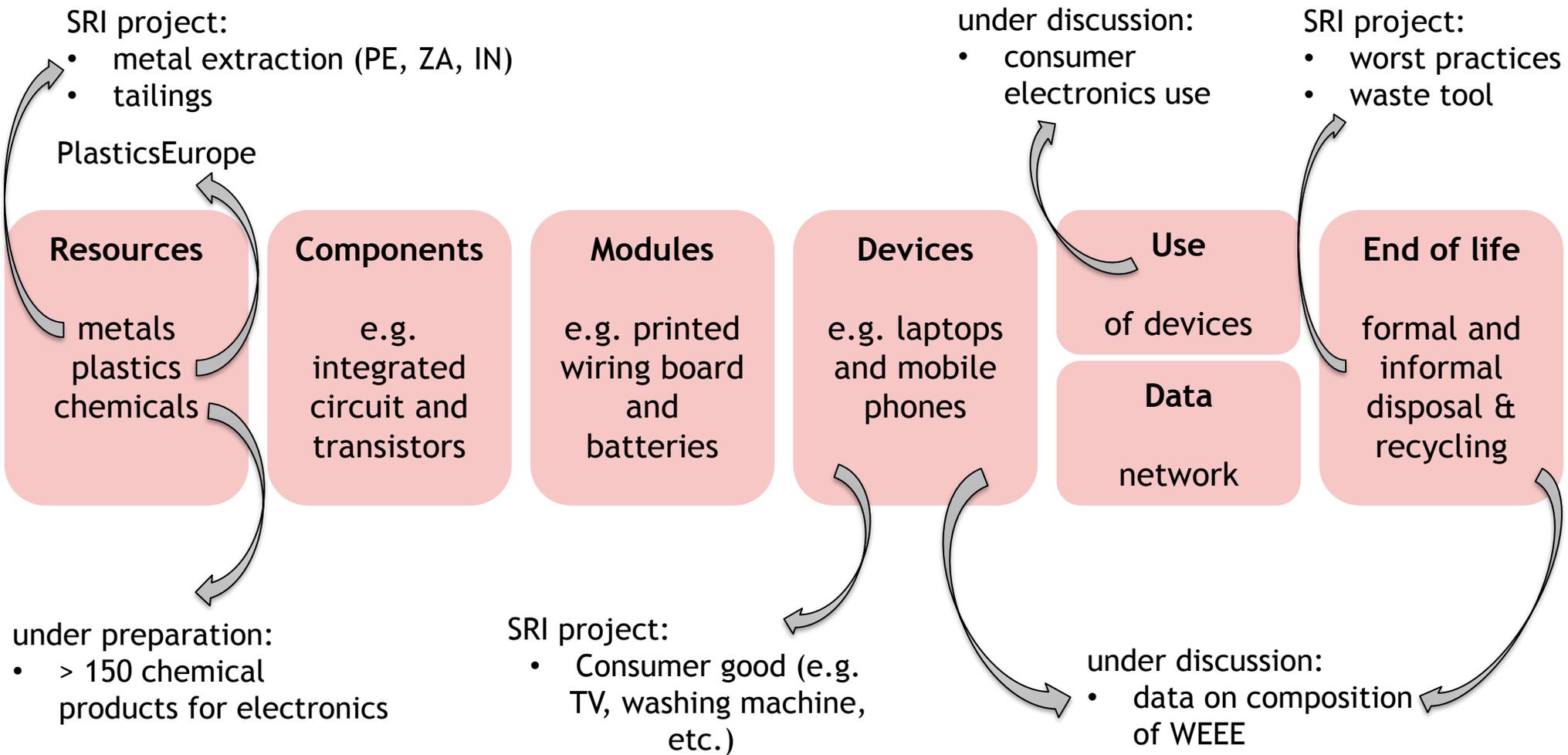| Element	g/kg waste cable	Element	g/kg waste cable
O	8.818E+00	Ni	5.590E-03
H	2.836E+01	Pb	6.710E-03
C	2.085E+02	Sb	1.260E-02
S	3.170E-01	Se	7.970E-04
N	4.200E-01	Sn	9.910E-02
Cl	1.199E+02	V	3.380E-01
Br	1.970E-02	Zn	5.560E-02
F	5.610E-03	Be	1.900E-04
As	7.210E-04	Sr	3.360E-02
Ba	7.800E-02	Ti	3.790E-01
Cd	4.720E-03	Tl	1.520E-04
Co	8.590E-03	Fe	1.172E+00
Cr	1.230E-02	Ca	3.070E-01
Cu	6.295E+02	Al	7.590E-02
Hg	2.310E-04	Mg	1.140E-02
Mn	2.480E-02	Na	5.560E-01

*water content used for this study: 9.780E-01 g/kg

Waste tool: Doka 2017
Cable composition: published in Safaei et al. 2018

Waste tool: the example of cables, results

Comparison of 5 technologies for treatment of electrical and electronic cables

Legend:
- municipal incineration
- open burning
- open dumping
- sanitary landfill
- unsanitary landfill

Sector overview and way forward

SRI project:
- metal extraction (PE, ZA, IN)
- tailings

PlasticsEurope

under discussion:
- consumer electronics use

SRI project:
- worst practices
- waste tool

Resources	**Components**	**Modules**	**Devices**	**Use**	**End of life**
metals plastics chemicals	e.g. integrated circuit and transistors	e.g. printed wiring board and batteries	e.g. laptops and mobile phones	of devices	formal and informal disposal & recycling
				Data network	

under preparation:
- > 150 chemical products for electronics

SRI project:
- Consumer good (e.g. TV, washing machine, etc.)

under discussion:
- data on composition of WEEE

We appreciate your feedback

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References & links

References:

- Muthusezhiyan, N., Gangane P., Samuel, S., (2017). **Life Cycle Inventories of Plastic Recycling – India**. ecoinvent Association, Zürich, Switzerland. Full report

- Safaei, A., Symeonidis, A., Valdivia, S., Ottiger, F., (2018). **Life Cycle Assessments of Selected Worst Practices in Secondary Metals Recovery and Recommendations to Move Towards Good Practices**. Full report

- Doka, G. (2017). **LCI calculation tools for regionalised waste treatment - General introduction**. Doka Life Cycle Assessments, Zurich, Switzerland. Available at http://www.doka.ch/publications.htm

Pictures:

- Plastic: SRI. India. Retrieved from: https://www.sustainable-recycling.org/recycling-initiatives/india/, accessed 8March 2019

- Fridge: World Resources Forum. Printed May 2018 www.wrf.org

- Cables: World Resources Forum. Printed May 2018 www.wrf.org

- Waste plastic recycling: Muthusezhiyan, N., Gangane P., Samuel, S., (2017). **Life Cycle Inventories of Plastic Recycling – India**. ecoinvent Association, Zürich, Switzerland. Full report

SRI project:

- Learn more about the SRI project on the SRI website https://www.sustainable-recycling.org/ and on the dedicated page on the ecoinvent website https://www.ecoinvent.org/about/projects/sri-project/sri-project.html, here you can also find the full list of all the contributors.