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ProGReSS

RRI - Best Practice in Industry

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Executive Summary

The Europe 2020 strategy outlines a vision of Europe as an economy that is smart, sustainable and inclusive. The Innovation Union aims to turn ideas into jobs, generate green growth and promote social progress. Central to this strategy are scientific research and an innovative capacity to turn research into technologies, products and services. Supporting the ambitions of the Innovation Union is the concept of Responsible Research and Innovation (RRI); research and innovation that are ethically acceptable, sustainable and societally desirable.

This report is about societally desirable innovations developed by industry. Which products and services are societally desirable can be a question of considerable complexity. To aim for societal desirability can be very challenging for developers of innovative and enabling technologies, not least because societally desirable goals can conflict. For example, privacy might collide with public health. For this report we chose to align societal desirability with addressing Grand Challenges of humankind. Taking this approach, one would prioritize those research and innovation efforts directed at resolving Grand Challenges over others and this would also apply in cases of irreconcilable conflicting values. Six innovations aligned to five Grand Challenges are introduced.

Fig. 1 Societally desirable innovations mapped against Grand Challenges

The report concludes with three reflections:

Reflection 1: responsible innovation linked to the Grand Challenges can open new market opportunities and ensure profitability.

Reflection 2: proving that ethically acceptable, sustainable and societally desirable innovation can be profitable is important to encourage more investment—reliable and transparent impact assessment procedures, standardized across all regions, are crucial.

Reflection 3: collective action is necessary for responsible innovation to take place and all actors must take collective responsibility for research and innovation *outcomes*.

Introduction

In Europe, the concept of Responsible Research and Innovation (RRI) has most prominently been defined as:

> "a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products" (von Schomberg, 2013:p.63).

RRI thus requires that research and innovation:

- are ethically acceptable,
- sustainable by avoiding significant adverse effects and
- driving towards the common good, i.e. aiming for societal desirability.

If one accepts the above definition of RRI, responsible research and innovation requires respect for ethical precepts, the protection of resource interests and health/safety interests of current and future generations, and an effort to use RRI to drive towards the common good. Presumably nobody would argue that research and innovation should be conducted *irresponsibly*. Or as Owen, Stilgoe, Macnaghten, Gorman, Fisher and Guston (2013:p.27) have put it:

> "Few would disagree that science and innovation should be undertaken responsibly. 'Responsible innovation' intuitively feels right in sentiment, as an ideal or aspiration."

However, if one presents more precise requirements for RRI, as the above von Schomberg definition does, agreement might not be as forthcoming. To demand that researchers' and innovators' efforts drive towards the common good is likely to be a major point of contention. As Michael Polanyi famously put it in *The Republic of Science* (Polanyi, 1962): "I appreciate the generous sentiments which actuate the aspiration of guiding the progress of science into socially beneficent channels, but I hold its aim to be impossible and indeed nonsensical."

One could maintain that this is especially true for industry. Most famously argued by Nobel Laureate Milton Friedman: "The social responsibility of business is to increase its profits" (Friedman, 1970:p.126). Since the 1960s and 1970s, corporate social responsibility (CSR) has come a long way. However, using von Schomberg's distinctions, it is reasonable to say that CSR is mostly concerned with ethical acceptability (or legal responsibilities of human rights instruments) and sustainability (e.g. reducing pollution), not with societal desirability. The UN Global Compact illustrates this clearly. It is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with ten universally accepted principles, which are (United Nations, 2014):

Table 1 UN Global Compact – The Ten Principles

Human Rights

1. Businesses should support and respect the protection of internationally proclaimed human rights; and
2. make sure that they are not complicit in human rights abuses.

Labour Standards

3. Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
4. the elimination of all forms of forced and compulsory labour;
5. the effective abolition of child labour; and
6. the elimination of discrimination in respect of employment and occupation.

Environment

7. Businesses should support a precautionary approach to environmental challenges;
8. undertake initiatives to promote greater environmental responsibility; and
9. encourage the development and diffusion of environmentally friendly technologies.

Anti-Corruption

10. Businesses should work against corruption in all its forms, including extortion and bribery

None of the above principles refers to the products and services research and innovation can develop in terms of societal desirability. The end product of the effort is not mentioned; all principles are process-driven.

In this report, we are interested in **industry examples of aiming for societal desirability** even though it may be difficult to capture exactly what societal desirability means or involves. For instance, on 21st August 2013, Facebook CEO Mark Zuckerberg announced that he considered connectivity to be a human right, and his next challenge would be to bring Internet access to the two-thirds of the global population that does not yet have it:

> "I'm focused on this because I believe it is one of the greatest challenges of our generation ... The unfair economic reality is that those already on Facebook have way more money than the rest of the world combined, so it may not actually be profitable for us to serve the next few billion people for a very long time, if ever. But we believe everyone deserves to be connected" (Rogowsky, 2013).

To face this challenge Facebook is spearheading Internet.org which, in partnership with mobile-device makers Samsung Electronics Co. and Nokia Oyj, and chipmaker Qualcomm Inc., will try to expand Internet access in emerging markets, and mobilize both industry and governments to enable more people to get online.

While internet access certainly has the potential to improve people's quality of life, when considered next to pressing global issues, such as extreme hunger and poverty, HIV/AIDS or malaria, the issue loses its urgency. Or, as Bill Gates puts it in response to both Zuckerberg's

announcement and Google's project LOON[2]: "When you're dying of malaria, I suppose you'll look up and see that balloon, and I'm not sure how it'll help you. When a kid gets diarrhea, no, there's no website that relieves that" (Stone, 2013).

Framework for the Report - Grand Challenges

How are we going to avoid the issue of defining exactly what societal desirability means for whom and when prior to giving any good practice RRI examples from industry? Philosophers have long established that societies are too complex to define what the "good life" is and expect it to apply across all sectors of our increasingly cosmopolitan societies (Rawls, 1999). However, it has been argued that one possible foundation for societal desirability with democratic legitimacy could be constitutional values (Ozolina, Mitcham, Schroeder, Mordini, McCarthy and Crowley, 2012) or what might be termed normative anchor points from the European Treaty (von Schomberg, 2013: p.58). "Rather than pre-empting views and concepts of the 'good life', the European Treaty [Treaty of Lisbon] on the EU provides us then with some normative anchor points" (ibid:p.57). These normative anchor points (which von Schomberg summarizes in Fig 1), such as sustainable development or equality, could provide a legitimate basis for outlining what is societally desirable.

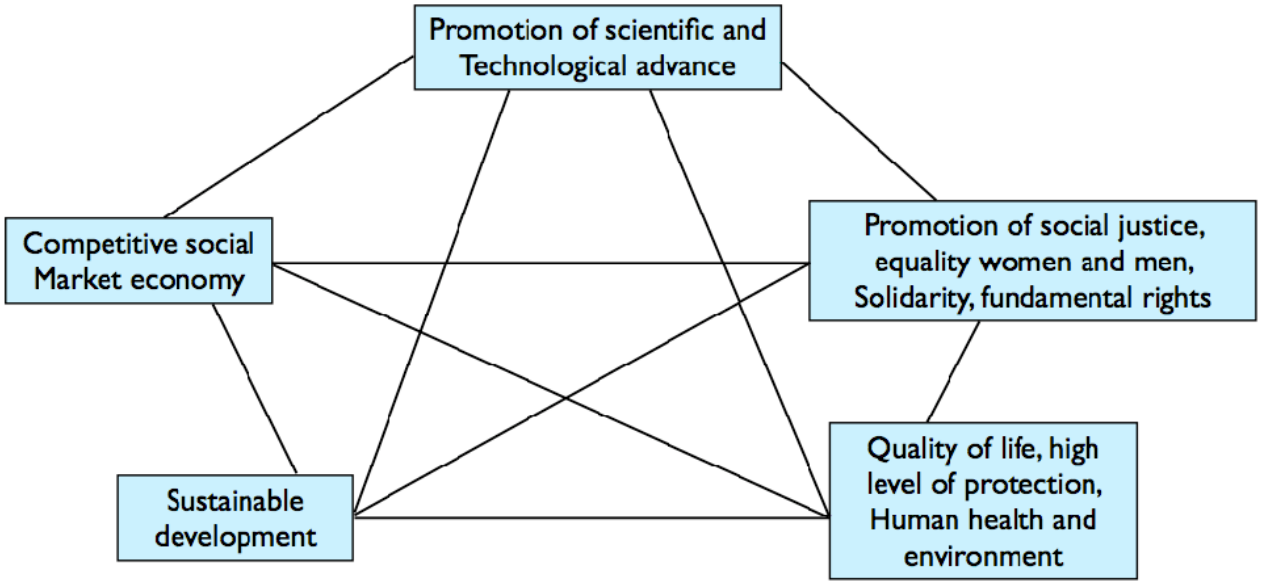


Fig. 2 Normative anchor points derived from the Treaty on the European Union (von Schomberg, 2013:p.58).

However, prior to further research being undertaken on how normative anchor points could be made more concrete for research and innovation, especially in the industrial context, another foundation might be more helpful, especially if one adds another complication in the search for what societal desirability means, which also needs to be resolved.

To aim for societal desirability can be very challenging for developers of innovative and enabling technologies, not least because societally desirable goals can conflict. For example, privacy might

[2] "Project Loon is a network of balloons traveling on the edge of space, designed to connect people in rural and remote areas, help fill coverage gaps, and bring people back online after disasters." (Google, 2014a).

collide with public health as in current UK National Health Service's (NHS) Care.data initiative to use - without informed consent - every patient's medical records held by General Practitioners (GPs) to improve both public and private medical research and services. The benefits may be improved healthcare but the cost is largely an unauthorised loss of autonomy and privacy over what many consider to be their most personal data (Chand, 2014). In this case, the question becomes which is the more societally desirable goal, privacy or public health?

It has also been suggested that Grand Challenges could be useful as a foundation for societal desirability (von Schomberg 2013,p.51), topics that are relevant to all humankind and that need resolving. Taking this approach, one would prioritize those research and innovation efforts directed at resolving Grand Challenges over others and this would also apply in cases of irreconcilable conflicting values. For this report, we shall apply this approach and link our examples to the Grand Challenges, as formulated in the Lund Declaration. Within Europe, it has been suggested to turn Grand Challenges into opportunities for sustainable recovery and growth (Barroso, 2010).

According to the **Lund Declaration** (2009), the "grand challenges" or "major societal challenges" of our time are:

Tightening supplies of energy, water and food: How to improve efficiency in consumption, as well as the recycling rate and waste reduction?

Pandemics: How to improve the prevention and management of wide spread, contagious diseases to avoid considerable impact on the economy and social stability?

Ageing societies: How to address the challenges of ageing societies, which include issues of economics, but also questions of social inclusion?

Global warming: How to improve the prevention and management of natural disasters such as flooding, forest fires, hurricanes, and dry area extensions?

Public health: How to provide medical care to everyone without discrimination?

Security: How to improve the security of citizens within but also outside of Europe?

The above challenges will be used to search for innovations that are societally desirable, in the sense of addressing grand challenges. As ProGReSS is a global network, we are interested in innovations that are globally desirable. One could therefore maintain that the Lund Declaration challenges were formulated from a European perspective. Two are indeed not pressing across the globe. Ageing societies are not a problem in, for instance, India. India is expected to be the most populous country on the planet in 2025 and its demographics are interesting. "In 2020, the average age of an Indian will be 29 years, compared to 37 for China and 48 for Japan" (Basu, 2007). However, ageing societies are a problem in China. In fact, it has been argued by Wang Dewen of the World Bank that "China is unique: she is getting older before she has got rich"

(Branigan, 2012). Given that China is affected as well as all affluent countries, this challenge will be included (for more information on global ageing, see also below). On the other hand, the security of citizens, seen as an additional institutional investment after the satisfaction of basic needs (food, water medicines) is not as globally invested in. The security challenge will therefore be exempted from the search. After introducing our six cases—one for each of the challenges and one from China—we shall end with some reflections.

RRI in Industry Cases

The case sections consist of three elements: a quote from the company's mission statement, a description of context as well as a relevant product or development and a table summarizing the main points. The cases selected are presented with a view to addressing the following questions:

- What is the major challenge addressed; i.e. why can the project launched or the product proposed by a specific company be considered desirable from the societal point of view?
- What is the solution proposed by the company, i.e., how does the company intend to provide a solution to one or more major challenges?
- Who are the end-users, i.e., for whom is the solution desirable?
- Where does the revenue come from, i.e., who are the customers, are they also the end-users?

Case 1 - Tightening of Water Supply and Pandemics: Vestergaard's LifeStraw® Water Filter

> *Vestergaard operates according to a humanitarian entrepreneurship business model, whereby doing good is good business. Following this model, the company devotes its entire innovative platform to producing breakthrough products and solutions for disadvantaged people. In doing so, we make money and improve human welfare at the same time.*
> *(*Rader 2013*)*

Specializing in emergency response and disease control products, the company Vestergaard is headquartered in Switzerland and operates according to a humanitarian entrepreneurship business model and follows the principles of the UN Global Compact. Vestergaard's efforts are led by the company's will to accelerate progress towards the Millennium Development Goals (MDGs). The MDGs are a United Nations campaign aimed at improving the situation of the poorest and take action on eight specific global societal challenges:

MDG 1: Reduce extreme poverty and hunger
MDG 2: Achieve universal primary education
MDG 3: Promote gender equality and empowering women
MDG 4: Reduce child mortality rates
MDG 5: Improve maternal health

MDG 6: Combat HIV/AIDS, malaria, and other diseases
MDG 7: Ensure environmental sustainability
MDG 8: Develop a global partnership for development

With its LifeStraw®, Vestergaard aims to contribute to MDG 7 and its sub-aim (target 7C) to halve the proportion of people without sustainable access to safe drinking water and basic sanitation (between 1990 and 2015).

LifeStraw® is a water filter that incorporates novel methods and technologies to remove particles and bacteria from drinking water. The filter is not only small and light (only 54 grams), it also does not require batteries or feature any moving parts. As a result, the product is ideal for developing countries and emergency situations (such as a response to natural disasters and preventing the spread of diseases such as diarrhoea). The user simply places the filter in water and sucks through it like a straw. Designed to address the societal need for clean, safe drinking water, the filter has been used in many locations, including Haiti, Pakistan, Peru, Kenya, Indonesia, DR Congo, South Africa, Mexico and Bangladesh. LifeStraw® has received numerous awards since it was introduced in 2005, such as "Best Invention of 2005", by *Time Magazine*, and "Innovation of the Year" by *Esquire*.

Although Vestergaard now sells the LifeStraw® directly to end users (such as hikers or campers), the product was originally, and still primarily, sold in bulk to groups such as governments, NGOs and crisis response units, who then distribute the filters as needed amongst populations.

Table 2: The LifeStraw® water filter

Product	LifeStraw® water filter	
Company	Vestergaard Frandsen	
Company's Website	http://www.vestergaard.com/	
Challenge addressed	Tightening of water supply Pandemics	
Product end-users	The product has been developed to help deprived communities around the world, including in case of natural disasters.	
Organization's income	Governments, aid agencies, NGOs, faith-based groups and the private sector	

Case 2 - Ageing Societies: Google's Silver Surfer Towns Project

> *We wanted to build a programme that had the potential for real social impact, that aligned with the business we're in and that would engage our staff. From 2010 to mid-2013, we implemented phase one of this project. We taught Internet skills to over 4,000 people; we co-founded the INDIE network, bringing together digital inclusion stakeholders from across the voluntary and academic sectors; and we launched www.GetYourFolksOnline.ie, a resource to empower younger people in Ireland to pass on Internet know-how to the older folks in their lives. (Google, 2014b)*

Our global population is ageing and a UN report called this development (United Nations, n.d.: p. xxviii):

- unprecedented ("without parallel in the history of humanity")
- pervasive ("a global phenomenon affecting every man, woman and child")
- profound (with "major consequences and implications for all facets of human life") and
- enduring (ibid.).

A phenomenon, which had occurred in developing countries in 1998, will have spread across the globe, namely that "the number of older persons in the world will exceed the number of young for the first time in history" (ibid.).

As the number of people retiring increases in tandem with reducing numbers in the workforce, welfare systems across the EU, and other regions globally, will face greater strain. According to the Lund Declaration ageing is "perhaps the most important long-term challenge for the European welfare states". In addition to pension and care reforms, the Lund Declaration claims there is a need for workplace and labour market reforms that would provide the "younger elderly" with an opportunity for productive contributions to the society (Lund Declaration 2009). As such reducing the digital divide between generations, such as with long-term investment in training of "younger elderly", is of vital importance (see also Progress Deliverable 5.1, section on ICT and elderly citizen; Engelhard et al. 2013).

Google's "Silver Surfer Towns" initiative in Ireland is an example of an innovative approach to address the aims of digital inclusion and social cohesion in an ageing society[3]. Operated in partnership with Age Action[4], the company has selected towns across the country where they are

[3] One of the authors of this report (FC) was made aware of this initiative at the conference "Graceful Ageing: exploring the contribution and potential of ICT" held in Carlingford, Ireland, on September 19th, 2013, where she discussed details of its action, outcomes, and impact assessment with Ms. Sinéad Gibney, head of Social Action at Google Ireland.

[4] "Age Action is a charity which promotes positive ageing and better policies and services for older people" (Age Action Ireland, 2014).

promoting the uptake of technology by older people. Silver Surfer Towns pairs older users with mentors, who introduce them to using a computer and the internet, while addressing any questions or specific issues they may have. Older people are introduced to the technology through the lens of something familiar to them, such as a hobby or specific interest, and are encouraged to use the internet to learn more about their topic, or meet with like minded people online. Although the programme is set up in specific towns across Ireland, Google also makes resources available online for anyone wishing to emulate the initiative in their community.

Initiative	Silver Surfer Towns	
Company	Google Inc.	
Company's Website	http://www.silversurfertowns.ie/	
Challenge addressed	Ageing	
End-users	Older people and their communities	
Organization's income	Companies advertising their products on Google search results	

The Silver Surfer Towns initiative is an example of innovation in a service, where a company (Google) identifies a societal need, pairs with a group or organisation with the required expertise (in this instance, Age Action) and develops a programme to address the need. The company approached the issue identified in a deliberate, considered manner, setting measurable and realistic goals through which to assess the effectiveness of the initiative. Although operated as part of their CSR actions, it may also benefit them as a business. Given that their business model is heavily built around selling advertisements which users see when they use the search engine and gathering data to target such advertising, increasing the number of people potentially using the search engine, is likely to have a positive effect on their revenue, particularly in the context of an ageing population.

Case 3 - Global Warming, Tightening Supplies of Energy: The Australian Clean Technology Investment Program

> *We're committed to ensuring our operations are carried out in an environmentally responsible manner. Our 'nothing is wasted' business approach (whereby we reuse and recycle our by-products) displays our dedication to not only creating a profitable future for our stakeholders, but also a sustainable future for generations to come.*
> *We're committed to our vision to be THE innovative, world-class, diversified sugarcane-based business in Australia delivering exceptional value to stakeholders.*
> *(Mackay Sugar, 2012)*

Today, it is beyond doubt that "the warming of the climate system is unequivocal ... many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased" (Intergovernmental Panel on Climate Change, 2013:p.2). The main reason for global warming is the emission of greenhouse gases, in particular carbon dioxide, methane, and nitrous oxide. "Carbon dioxide concentrations have increased by 40% since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions" (ibid.:p.9).

Some projected impacts by 2020 from climate change include (Intergovernmental Panel on Climate Change, 2007)

- "Between 75 and 250 million of people are projected to be exposed to increased water stress [in Africa].
- In some [African] countries, yields from rain-fed agriculture could be reduced by up to 50% […] This would further adversely affect food security and exacerbate malnutrition.
- [In Asia], endemic morbidity and mortality due to diarrhoeal disease primarily associated with floods and droughts are expected to rise in East, South and South-East Asia.
- [In Australia] significant loss of biodiversity is projected to occur in some ecologically rich sites, including the Great Barrier Reef and Queensland Wet Tropics.
- In southern Europe, climate change is projected to worsen conditions (high temperatures and drought) in a region already vulnerable to climate variability, and to reduce water availability, hydropower potential, summer tourism and, in general, crop productivity.
- There is a risk of significant biodiversity loss through species extinction in many areas of tropical Latin America.
- Sea level rise is expected to exacerbate inundation, storm surge, erosion and other coastal hazards, thus threatening vital infrastructure, settlements and facilities that support the livelihood of [small] island communities."

In response, the European Union has issued its "20-20-20" targets for year 2020 with a set of binding legislation with the following aims (European Commission, 2014):

- a 20% reduction in EU greenhouse gas emissions from 1990 levels;
- raising the share of EU energy consumption produced from renewable resources to 20%;
- a 20% improvement in the EU's energy efficiency.

With the "20-20-20" targets, the EU makes sustainability one of its priorities. Combined with efforts to reduce EU-wide unemployment and the negative impact of the global financial crisis, especially in Southern Europe, the EU aims for *sustainable growth.* This means ensuring that future economic success is sustainable in terms of its impact on the environment, and in terms of the EU's ability to compete globally in the near and long term future. This requires that the economy be resource efficient, sustainable and competitive, while developing and exploiting new emerging technologies. Harnessing such technologies effectively is meant to reduce the strain we place on the environment and result in 'greener' industries across Europe.

How to cut the emission of greenhouse gases in order to achieve sustainability targets is a question countries globally are grappling with. We shall provide an example from Australia, even though the newly elected (August 2013) Conservative government has recently abolished both efforts that will be described here, namely: 1) Australia's carbon tax. 2) A range of investment programs, including the Clean Technology Investment Program (CTIP), funded through the revenue generated by the carbon tax (AusIndustry, 2013). Instead, the government installed a national emission trade system, which is planned to be harmonized with the corresponding systems in New Zealand and Europe in 2015 (Hübner 2013).

Australia's second-largest sugar milling company, Mackay Sugar (which produces approximately 800,000 tonnes of sugar per year), emits enough carbon dioxide to place it among the highest level producers of CO_2 in Australia. As a result, it faced an annual carbon liability of $1.7 million, providing a strong economic incentive for it to invest in lowering its emissions outputs (Australian Government, 2012).

With the assistance of a $9.1 million grant from the incentive program the company has implemented a series of measures to increase the efficiency of their operations and reduce their carbon emissions, including upgrading the boiler and constructing a bagasse (the material remaining after sugar cane is crushed) outloading facility. These measures reduced energy waste at the facilities and allowed for larger deliveries, increasing efficiency and reducing emissions.

More importantly, though, in terms of innovation, the grant also part-funded a new venture, namely the development of a cogeneration plant, which produces renewable electricity from previous sugar waste products (Indymedia Australia, 2013). Using a biomass waste product from the sugar refining process, the new plant can generate enough power for the Mackay Sugar operations as well as provide a surplus that covers around 30% of the residential power requirements of the town of Mackay. As a result, the use of power from coal fired power stations can be reduced both for the company as well as the town.

By making increasing efficiency and cutting emissions a priority, and investing the funding thus, Mackay Sugar is expecting to meet the following milestones:

Eliminate the carbon liability ($1.7 million)
Reduce emissions intensity by 71% per tonne of sugar
Reduce energy consumption by 14.9% per tonne of sugar
Produce enough renewable energy to deliver one-third of Mackay City's power needs

Initiative	Australian Clean Technology Investment Program	
Company	Mackay Sugar Limited	
Company's Website	www.mackaysugar.com.au	
Challenge addressed	Global Warming, Tightening supplies of energy	
End-users	Consumers	
Organization's income	End-users	

Both the CTIP and the example of Mackay Sugar highlight the potential for strategic, targeted funding to incentivise businesses to invest in and develop solutions and technologies that can contribute to the goals outlined world-wide sustainability plans such as the EU's 20-20-20 targets.

Case 4 - Public Health: Embrace and GE Health Unit

Embrace's mission is to advance maternal and child health by delivering innovative solutions to the world's most vulnerable populations. We do this by catalyzing the creation of new products with strong potential to improve health outcomes in developing countries, and then working to get those products directly to the people who need them most. Our ultimate goal is to ensure that every woman and child has an equal chance for a healthy life. (Embrace, 2014)

***GE Healthymagination** is a $6 billion strategy to revolutionize the world's health by improving the quality, access and affordability of care. We work to transform how we treat disease, empower communities to get healthier, and build a healthcare system that helps people live better lives. Technology, people and partnerships—this is how change happens. This is healthymagination. Working together, we can help cure the world. (GE Healthymagination, 2012)*

Embrace is a start-up social enterprise that, in line with its mission statement, has addressed with its breakthrough low cost **Embrace Infant Warmer** the need for a solution to the dangers posed by hypothermia to children born prematurely in developing countries.

When a child is born prematurely, it often lacks the required amount of body fat to stave off the cold. In many instances, the solution is to place the newborn in an incubator, where its core body temperature can be kept constant, monitored and controlled. However, such incubators can be prohibitively expensive, particularly for rural communities that have limited or no access to hospitals, or rely on an irregular supply of electricity. As a result, Embrace focused on the design of a warming unit that could be acquired and operated by such communities, potentially saving lives that would be otherwise at risk. Started as a class assignment at Stanford's Institute of Design in 2007, the Embrace Infant Warmer is a low-cost sleeping bag-like product that does not require electricity, can be operated with little difficulty and no specific technical knowledge, and is designed to be durable and re-usable. The Embrace bag works with a removable heating element built with a phase-change material (PCM), a waxy substance that, as it cools from melted liquid to solid, maintains the desired temperature of 37 degrees Celsius (98.6 F) for up to six hours. The heating part takes only 30 minutes to warm up using a portable heater that comes with the product.

Subsequent iterations expanded on the design by adding features that expressed practical needs (such as a viewing window to allow the baby to be monitored without being removed from the incubator) and responded to specific cultural issues, such as a distrust of numeric indicators, leading the thermometer to be replaced with a binary ready/not ready indicator. As *Embrace Global* has been founded as a non-profit venture, the Embrace Infant Warmer was originally

donated to impoverished communities in need, possibly saving the lives of more than 22,000 low birth-weight and premature infants.

Concurrently, GE Healthcare, a unit of the multinational corporation General Electric Company, was also addressing the need to reduce the cost of its incubator unit, the **Lullaby baby-warmer**. In addition to lowering the cost, GE Healthcare also wanted to design the product to suit the social and cultural demands of the expected market, in line with UN's Millennium Development Goals (specifically MDG 5; "reducing by two-thirds the under-five mortality rate by 2015"). This led them to focus on India, which while having the highest global rates of pre-term baby deaths in the world, was also identified as an emerging market of vital importance.

Developed in Bangalore, the Lullaby baby-warmer was launched in 2009, after having been revised to less than 10% of the original market price. It also featured a simple interface, relying on pictorial warnings and colour coding, so that it could be operated by healthcare workers regardless of their mother tongue and level of literacy. However, while it was designed with cultural preferences of the market in mind, its requirement for a constant supply of electricity also meant that it was unsuitable for many communities for whom a reliable electricity supply was not available.

Recognising the need for a solution with an even lower barrier to entry, as well as the need to find products that resonated with a potentially lucrative market, GE Healthcare allied with Embrace in order to bring their Embrace Infant Warmer to market. As a start up, Embrace could be flexible and focus on a very specific design goal led by an identified societal need. However, introducing a new product to a market requires a large amount of capital. While GE Healthcare has access to a lot of resources, particularly with regard to distribution, the research and development undertaken by Embrace was ideal for their needs, meaning that the alliance could significantly lower their costs. "The baby warmer costs $3,000 (£1,900) in India, 70% cheaper than traditional models" (Kannan, 2013).

Product	Embrace Infant Warmer	
Company	Embrace Global	
Company's Website	http://embraceglobal.org/	
Challenge addressed	Public Health	
End-users	Impoverished communities of remote areas worldwide	
Organization's income	Governments, aid agencies, NGOs, donors and the private sector	

In this partnership, we see an example of how cooperation between SMEs (including those that spawn from an academic background) and Multinational Corporations on an initiative inspired by the desire to address societal challenges can produce innovative solutions.

Case 5 - Food Security: sarmap's satellite technology to monitor crop's production

> *sarmap's mission is to build and provide an innovative, sophisticated yet simple remote sensing software product, dedicated to the generation of digital information for a better management and risk assessment of Earth's natural/environmental resources.*
> *While being at the forefront of technology, it builds on traditional values such as reliability and long-term collaboration partnerships based on mutual trust and respect.*
> *(*sarmap, 2012*)*

Reducing by half the number of people suffering from hunger is the first Millennium Development Goal, and the European Commission has identified it as a priority for both the EU and the wider international community. As such, there is scope for innovative solutions to be developed in the area of food security, a global societal challenge.

sarmap, a Swiss company founded in 1998 and spun off from the University of Zuerich, with the mission of developing software that allows for the monitoring of natural resources and the environment, works with partners (including the European Space Agency, the EU Joint Research Centre and Framework Programme, the World Bank and the Japan Aerospace Exploration Agency) to develop tools for monitoring food production and to assess damage done by natural disasters.

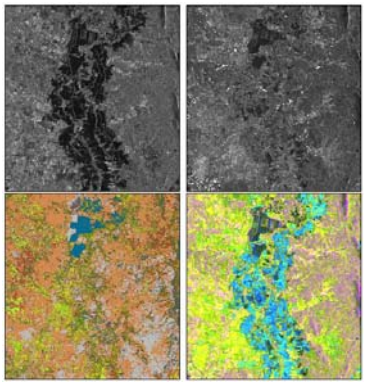
One of sarmap's projects has been listed as one of the remarkable initiatives in global food security by the UN Global Compact report "Scaling Up: Global Food Security and Sustainable Agriculture," a report that reviews the best emerging practices for inspiring industries toward a more food secure and sustainable future (United Nations Global Compact, 2012). The RIICE project (Remote sensing-based Information and Insurance for Crops in Emerging economies) aims to reduce world hunger, specifically to reduce the vulnerability of small-holder rice farmers.

The project has been made possible through a public-private partnership consortium, supported in particular by the Swiss Development Cooperation[5] (SDC) and the Deutsche Gesellschaft für Internationale Zusammenarbeit[6] (GIZ). The involvement of a major insurance partner (AllianzRe Switzerland) and a research institute (International Rice Research Institute) completed the group.

The RIICE project has selected seven countries in Asia where rice growing is of vital importance, both in the context of the economy and for food security in the region. Using satellite technology (from the European Space Agency), the project operates along four milestones; to map and monitor the rice growing areas of the selected countries, to estimate actual rice yields, to forecast

[5] www.sdc.admin.ch
[6] www.giz.de

future yields and, to produce an insurance product suitable for the farmers based on the information gathered through the project. The project is innovative in that, not only does it use satellite technology to monitor crop yields, it also analyses the recorded data to forecast future yields; it gathers data to assess the damage done in the event of a natural disaster, the impact such a disaster would have on the crop, and it works with insurance companies and farmers to streamline the insurance process and ensure that the farmers receive the appropriate assistance when it is most vitally needed. For better support of the user groups, sarmap offers tailored training courses and specific workshops, which inform and educate the participants in the access, interpretation and utilization of processed Earth observation data.

Initiative	Improving global food security and sustainable agriculture through satellite technology.	
Company	sarmap	
Company's Website	http://www.sarmap.ch/	
Challenge addressed	Food Security	
End-users	Small-holder rice farmers and Insurance Companies	
Organization's income	The project is funded by the Swiss Agency for Development and Cooperation (SDC)	

The combination of technology and cross industry collaboration has resulted in a project that has the potential to improve greatly the security of a crop that is a staple in the diets of a large proportion of the global population, while also assisting the small-holding farmers who depend on their crop as their source of income.

Case 6 - Public Health: Fosun Pharma's Artesun-plus®, Artesun ® antimalarial drugs

> *With its commitment to innovation for good health and creating a better future, Fosun Pharma remains on its mission to promote health and well-being. In full recognition of its social role, Fosun Pharma seeks to create a win-win situation for the community, customers, employees and shareholders, so as to promote the sustainable development of the industry.*
>
> *(Fosun Pharma, 2014)*

Malaria is one of the most devastating communicable diseases, although it is both preventable and treatable. A fact sheet issued by the World Health Organization in 2013, gave the following information (WHO, 2013):

- "97 countries had on-going malaria transmission.
- An estimated 3.4 billion people are at risk of malaria, of which 1.2 billion are at high risk.
- In 2012, malaria killed an estimated 483 000 children under five years of age. That is […] one child almost every minute.
- Between 2000 and 2012, an estimated 3.3 million lives were saved as a result of a scale-up of malaria interventions. 90%, or 3 million, of these lives saved are in the under-five age group, in sub-Saharan Africa."

Specializing in modern biopharmaceutical and healthcare, the Shanghai Fosun Pharmaceutical (Group) Co., Ltd. ("Fosun Pharma") is one of the largest healthcare companies in China. Fosun Pharma strongly believes in the principle of sustainable development and has incorporated social responsibility into its long-term business strategy.

Fosun Pharma uses the following principles as its corporate spirit: "Self-improvement, Family Harmony, Career Development, Social Responsibility," which embodies the principles of its social responsibility. Throughout its operation and development, Fosun Pharma makes great efforts to contribute to the society, the government, the employees and the shareholders.

With its commitment to innovation and public health, the company is the leading provider of anti-malaria medicines globally. With its products Artesun-plus®, Artesun® (Artesunate Preparation series), Fosun Pharma contributes to the Millennium Development Goal 6 and its sub-aim (target 6C) to have halted by 2015 and begun to reverse the incidence of malaria and other major diseases, which the above statistic from the WHO refers to.

Artesun (Artesunate for Injection) is suitable for adults and children suffering severe malaria induced by *Plasmodium falciparum*. Artesun-Plus (Artesunate - Amodiaquine Tablets) is an antimalarial drug for treating malaria infection among adults and children, especially effective for the treatment of malaria with drug-resistant *P. falciparum*. The company has six anti-malarial products approved by the WHO.

In efforts at continued innovation to cope with drug resistant strains, Fosun Pharma undertook 11 anti-malaria drug projects in Africa in 2010 and providing anti-malaria drugs for 1,700,000 persons in Mozambique, Equatorial Guinea, Sudan, Central Africa, Chad, Congo, Mali, Liberia, Ghana, Mauritania and Gabon.

Product	Artesun-plus®, Artesun ® (Artesunate Preparation series) antimalarial drugs	
Company	Fosun Pharma (China)	
Company's Website	http://www.fosunpharma.com/	
Challenge addressed	Public Health	
Product end-users	The product has been developed to combat malaria around the world.	
Organization's income	Governments, aid agencies, NGOs and the private sector	

Reflections

The cases presented in this report demonstrate that societal desirability of research and innovation in industry can not only be part of a successful business model but may also be a core component of it. The means by which a company achieves it differ depending on factors such as the product or service that it develops, the targeted end-users and revenue model, the size or the location of where the company conducts its operations and opportunities to access state funding.

Reflection 1: *responsible innovation linked to the Grand Challenges can open new market opportunities and ensure profitability.*

On 18 September 2013, the UN Global Compact launched the "**Global Compact 100**" (GC 100), a stock index of companies committed to the ten principles of the Global Compact. The GC 100 tracked the stock market performance of a representative group of Global Compact companies during the past three years. These companies were selected based on their adherence to the Global Compact's ten principles as well as evidence of executive leadership commitment and consistent base-line profitability. Comparing the GC 100 valuations against a broad market benchmark, the FTSE® All World, the data for total returns is as follows:

GC 100 rose 26.4% during past 1 year; FTSE® All World rose 22.1%
GC 100 rose 19.0% during past 2 years; FTSE® All World rose 17.7%
GC 100 rose 12.0% during past 3 years; FTSE® All World rose 12.0%

While we cannot infer a causal relationship between a commitment to corporate sustainability practices and stock performance, according to Georg Kell, Executive Director the UN Global

Compact, “there appears to be an exciting correlation.” He added that “the results may also reflect the fact that sustainability performance is a factor that is receiving increasing interest from investors” (Sustainalytics, 2013).

Of course, we noted earlier that CSR, of which the UN Global Compact is an excellent example, and RRI are distinguishable in particular due to the Global Compact's lack of reference to societal desirability. Hence, corporate success of UN Global Compact companies has only limited application to RRI (mostly referring to ethical acceptability and sustainability). Yet, the examples in this report have shown that addressing Grand Challenges *can* produce new market opportunities. To show this in figures, such as the new GC 100 tracker does, remains a question of developing and following relevant impact assessment procedures.

Reflection 2: *proving that ethically acceptable, sustainable and societally desirable innovation can be profitable is important to encourage more investment—reliable and transparent impact assessment procedures, standardized across all regions, are crucial.*

Focusing on Europe, the CSR policies and actions of companies in Europe have shown to be affected by the different social, economic, cultural, legal and political context of the countries in which they operate (Gjølberg, 2009). RRI must go beyond this as, as stated in the Europe 2020 strategy, “the best chance for Europe to succeed is if it acts collectively—as a Union” (European Commission, 2010). In this sense, standardised RRI measures might enable equal conditions *for* and fair competition *of* the players in the European market, thus addressing key values of the Lisbon strategy.

Reflection 3: *collective action is necessary for responsible innovation to take place and all actors must take collective responsibility for research and innovation outcomes*.

As shown by the cases reported, both public support and companies’ investment are needed to face Grand Challenges. Therefore, governments’ public policy and targeted investments, civil society organisations, researchers, citizens, policy makers, and business must co-operate and work in partnership during the entire process of research and innovation geared towards the common good.

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