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SUSTAINABLE DEVELOPMENT

Jean-Paul Close *Editor*

AiREAS: Sustainocracy for a Healthy City

Phase 3: Civilian Participation— Including the Global Health Deal Proposition

OPEN

Local
AiREAS
Eindhoven



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Foreword

In the interest of solving many of our societal problems (e.g., air pollution, sustainability, health issues), technological innovations alone are not enough: Human behavior also needs to change. Research into persuasive technology (Fogg 2003; IJsselsteijn et al. 2006) investigates how we can use the technology that people interact with while making the relevant decisions (e.g., in regard to their car) needed to influence human behavior or thinking. This relatively young research area promises to provide solutions and deliver the insights needed to change the human behavior related to our societal problems. At the same time, this area still needs study to uncover many of the basic mechanisms of how technology can help people change and adapt (see also, Midden and Ham 2012: Persuasive technology to promote pro-environmental behavior). One of the open questions is in regard to the crossroads of usability and persuasion: What are the interactions between the usability of technology and the persuasiveness of technology? A highly motivated team of students (Joyce Brouns, Tim van den Boom, Marjan Hagelaars, Relinde van Loo and Daniëlle Ramp) set themselves up to analyze this interaction in a very societally relevant application domain: The newly developed AiREAS App, which is intended to provide users with information about the air quality in their direct surroundings as measured by the AiREAS measurement network in the city of Eindhoven, The Netherlands. This app may contain a variety of persuasive strategies (e.g., providing information about air pollution levels). Still, usability problems with the app might diminish its persuasive power, and even more complex interactions between usability and persuasiveness might be identified. The report on this research can be read in the following pages and is one of the first steps into this important new domain. These are important issues, as much from a societal perspective as a scientific perspective. The full power of persuasive technology (in helping to solve current societal issues) can only be unleashed when we better understand this kind of technology, and are able to build systems that are both usable and persuasive.

Dr. Jaap Ham

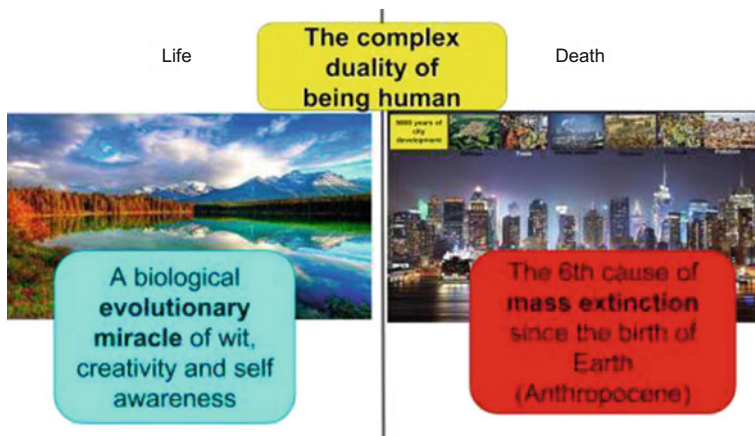
Preface

One of the biggest complexities we encounter when desiring the transformation or evolution of a reality is the way people relate to a reigning culture or paradigm through a particular mindset. For them, this perception of a current reality gives comfort and security. It is intensely difficult when this mindset needs to be revised voluntarily for the sake of sustainable human progress. What is sustainable human progress? Why would anyone want to participate in a transformation? With what authority can we ask people to look at their reality in a different way? Why would anyone let go of a lifestyle to adopt a new one?

My own breakthroughs in awareness have been described in depth in Chap. 2 of the book on Phase 1 as manifesting in the origin of STIR and subsequently AiREAS. This new state of mind enabled me to look at our reality in a totally new way. I saw the complex duality of our current human existence on planet Earth:

- Recognize the human being as a member of a very smart and creative species, a kind of miracle of evolution of life, capable of developing tremendous tools to help in its own wellness; a unique species that has come so far that it hardly has to fear shortages or problems if it organizes itself well
- Recognize this same human being as the sixth cause of massive elimination of life-forms, including our own, since the birth of our planet!

When this duality manifests itself in one's own awareness, a choice appears. Do I address my own wit and creative potential to deal with life and the sustainable evolution of the species? Or do I blindly continue being part of this destructive reality into which we have evolved, peaking during the last few decades up to unsustainable heights?



We all have this choice. When we make it, a whole new reality appears. AiREAS invites us to make this choice for health and healthy air

The choice seems simple, but the consequences are huge. Our global community is using its wit mostly for destructive self-interests, being part of the problem rather than the solution. During my opening speech at the global announcement of AiREAS in October 2012, I asked my fellow citizens to take responsibility for our core values by joining me and others in AiREAS, creating a movement from destruction to sustainable human progress (Sustainocracy). The next speech was delivered by Eindhoven’s alderman, Mary-Ann Schreurs, who related to my words “taking responsibility.” She said that one also has to “*be able* to take responsibility,” referring not just to awareness, but also to the many impediments people encounter when they want to make the choice. It is not just the people who encounter difficulties; the institutions and their executives also encounter huge challenges and discouraging situations that inhibit them from moving forward when awareness strikes. Our POP research was therefore much more challenging, because we needed to determine ways in which individuals and executive people of the institutions could find comfort in taking responsibility and discover ways around the impediments.

Our investigation went to great length to interact openly with people when inviting them to look at their own lifestyles, daily choices, and voluntary changes when confronted with information about health, air quality, and exposure. We are still confronted with a society that, in essence, rewards polluting activities out of old political, social, and economic interests. For instance, people commute between home and salaried work in fossil fuel-consuming cars. We organize logistics involving diesel trucks around our consumption patterns. We destroy our landscapes for massive manipulated food production. The pharmaceutical industry pollutes the water, air, and soil with medicines, pesticides, and fertilizers. We have developed a throwaway lifestyle around (plastic) packaging. In essence, our money-driven political and economic reality is blindly perverse when dealing with

real core values. Our financial systems were designed to reward fragmented, industrialized, and commercial processes, taxing the population and enterprises to organize remedial activities through bureaucracy and social services. We are not financially structured to reward “proactively doing good” from a social or environmental point of view. While things such as a house, food, recreation, and health care are financed through income obtained by “contributing to the problem,” “doing good” is seen as a common idealistic activity.

People often comment on their understanding of pending and worrying issues, but also the impossibility of their taking responsibility due to an overruling societal format revolving around money: “Yes I know, but I need the money to pay my mortgage.” This duality was significant for our research. What comes first? A new societal format with which to resonate, one which delivers the necessary securities to its participants in a new way? Or a change in mentality for people that have the guts, or simply have no choice but to distance themselves from the old format in order to start developing the new?

The answer is both! We need a choice and we need a need to choose. And even then the choices are often still subject to a hierarchy of priorities. It is not the choice itself that matters so much, it is what one lets go of in the process of making the choice. There is therefore a considerable mental effort involved in the process of making choices. Such effort translates into all kinds of reaction, from stress to satisfaction, from fear to passion, and from reluctance to excitement. In essence, we distinguish between the blind pursuit to “have what we need” and trusting our wit to “(co)create what we need.” Those who create tend to evolve, while those who just consume tend to die mentally in reluctance, apathy, and greed, even before dying physically.

This is easily said, but the mainstream of a community is captured through the organized structure of perceived and desired possession, even if everything we have or obtain is accessed through establishing a financial or natural debt. This debt, if expressed in money, is against the economy; if expressed in natural values, it is against nature, life, and our evolution. Research had shown that up to 36 % of the local population in Eindhoven was worried about air pollution and the possible effects on their own health. Recent scientific reports provide worrying insights of children being born with behavioral or physical disorders and reduced life expectancy, enhancing such senses of discomfort due to air pollution. Most people, however, still hold government responsible for producing corrective measures, failing to see themselves as a significant part of the problem and hence also of the solution. Often, public responsibility for pollution is blamed on traffic, combustion of fossil fuels, and industrial activities. The lack of available alternatives and the perceived need for a car and other material consumables makes people reluctant to challenge their own lifestyles. The lack of awareness is high, even though worries are significant. Air pollution, in general, is invisible, and hence does not immediately belong to the daily reality that we perceive and take into account. Thanks to this project, we were able to look at and describe the real situation in regard to pollution, health, and lifestyle and come to new insights. We also had a chance to glance at cultural and demographic differentiation, giving rise to strong desires to further elaborate on this in future programs, in Eindhoven and across the world.

Using phase 1, the ILM

The ILM project of AiREAS, phase 1, published through Springer at the beginning of 2016, was designed to make visible the invisible at the level of human exposure to air pollution as it affected citizens and visitors in their outdoor activities in town. This fixed network of airboxes is designed to measure local conditions in the vicinity of elder homes, schools, and city quarters where people reside, and shopping places where people tend to gather or commute in different ways. Scientists and government officials helped decide the position of each airbox in order to get the best theoretical insight into the pollution that surrounds each measurement station. Thirty five airboxes deliver a full set of measured information to a database every 10 min. This database has open access, allowing us to pick up and use the near real-time data for communication purposes.

The ILM measures:

Particulate Matter:	PM 1, 2.5 and 10
Ultrafine Dust:	UFP (6 out of the 35 units)
Gases:	Ozone, NO ₂
Environmental data:	temperature and humidity
Technical data:	GPS coordinates, time of the day

The historic database is kept for interpretation and analysis by both scientists and government officials. This infrastructure was the basis for defining the healthy city project that was to follow and involve 4000 citizens through health and lifestyle research, using the health data for interpretation and communication, together with the database of air pollution. Due to the enormous complexity (medical, technological, social, team effort, interpretation, etc.) of this project, a smaller Proof of Principle, or POP for short, was set up first, with just 40 citizens. In Chap. 2, we will go into the details of this process and the interaction we engaged in with the citizens involved.

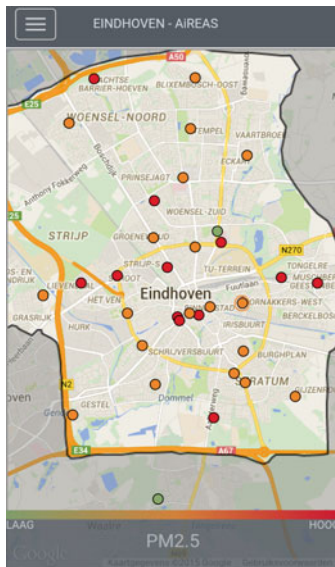
Persuasive interaction with citizens became a challenge on its own. Included in phase 1 (air quality data gathering) was a small budget for communication. We had considered the 3D approach presented by the University of Madrid to show layers of air pollution through a 3D animation over the town. We also looked at integrating light codes into the city's streetlight system. But at this stage, it was too far-fetched to consider integrating systems. Instead, we decided to set up a website (<http://www.aireas.com>) with the intention of getting interaction going with the citizens through this means. This worked to a limited degree at best.

A website provides highly informative data for those who look for it. Accessing a website indicates a pre-existing level of interest in the topic covered by the site. In the case of air pollution and health, the people who visit the site still need to make up their own minds about what they see and how they interpret the mix of data without the benefit of specialized knowhow. Little interaction was achieved, even though the site served its informative purpose perfectly, especially for a minority of committed citizens.

Mobile App for instant information

Our network partner Intech (later Axians) had suggested making an App for mobile phones. Instead of making it a co-creation effort within the multidisciplinary context of AiREAS, they decided to develop it as an internal experiment with a commercial motivation behind it. The ILM network was released as a measurement system in December 2013. The mobile App was ready in May 2014. It was shared with a very small amount of people for testing.

The availability of the App was decisive in getting instant access to the network and near real time data anywhere simply through a mobile phone. It instantly revealed high peaks through color coding of the sensors, displayed as dots on a map of the town.



The App for mobile phones; each dot is an Airbox, coded like a traffic light (red = bad, orange = risky, green = good) (This type of coding information was changed over the course of 2015 through interaction with the Ministry of Health (RIVM). Discussion addressed the thresholds when changing color and the unjust psychological effect of 'green' as safe.)

This allowed us, the initiators of the AiREAS healthy city movement, to document cases of pollution when alerted by the app. The mobile access to real time information, in the case of an alarming event, would trigger instant field research through human observation and dialogue, allowing for a combination of local civilian observation with the measurements of the system, weather information and specialist interaction that would together determine the details of the case. Within 24 h, such dynamic interaction would provide us with insights about curiosities detected in our own city. The invisible had become visible and highly alive.

For first line research, the App was a good tool, especially for those active in and committed to the field of observation and analysis. But the question arose as to

whether the App would serve the interests of the larger public. Would people want to pay for the App? What use would they get out of it? And how would the App help influence social behavior? These questions needed specific research.

The University of Technology in Eindhoven has a department led by Dr. Jaap Ham. It teaches *persuasive technology*. This specialized field looks at the ways in which technology influences the behavior of people. An interesting next step triggered by AiREAS was to see how the objective of behavioral change could be proactively achieved through applied technology, knowledge, and communication skills. The field of “persuasive communication” was accessed and drew the enthusiastic attention of Dr. Ham. During a minor, a short course of a few months for students who wish to enhance or broaden their education with other fields of interest, about the subject of persuasive communication, students from many different fields of study would get acquainted with the concept of value-driven persuasion. They were asked to analyze the AiREAS App from that perspective and come up with suggestions for optimum persuasion.

The progression of our experience had accelerated, transforming from basic useless marketing attempts, or the regulation of pollution, to a persuasive invitation for general involvement in proactive health and air quality development through innovation. The peer 4 “participation society” or “awareness-driven eco-system” had started, even if we ourselves did not yet know it when we started.

Seven Chapters and the Global Health Deal:

In Chap. 1, we will go into great detail about the AiREAS App analysis through persuasive communication skills, using a case study on Jaap Ham’s activities by one of his groups of students.

By January 2015, the POP had started, as the result of which we attempted to involve 40 local civilians in a medical and lifestyle research trajectory. This proved much more challenging than anticipated. The choices we made and the experiences we gathered are described in Chap. 2.

In June 2015, our technological partner TNO expressed a desire to find 12 volunteers to participate in a backpack experiment for the measurement of direct exposure to air pollution. The backpack was filled with measurement and GPS equipment and would be carried for 5 days, 24 h a day, both indoors and outdoors, by each participant. AiREAS was an ideal partner to set this up professionally, and the information could enhance our own POP research on lifestyle. All that we learned can be read in Chap. 3.

Persuasion has many fields of attention, and one of the POP objectives was to see if we could stimulate or activate the innovative drive among the population. When people relate to a new reality, then new productivity can appear that may translate into new forms of entrepreneurship, the development of services and products and even a new element in the economic reality, referred to as the Transformation Economy. In Chap. 4, we explore this incubational drive and the early results that we obtained.

Similarly, we wanted to address the multicultural reality of our city. We wanted to obtain the involvement of many subcultures, of which the biggest are Turkish

and Moroccan. We had entered into an exchange program for students with AiREAS's sister enterprise STIR Academy, a peer 4 initiative for the development of participative learning. The European Erasmus+ subsidy program was brought in by our partner Stichting BdT, bridging the Turkish and Dutch cultures. Seven thousand students from all over Turkey are to visit us in Eindhoven over the coming years. By the end of 2015, we had already received 700 students and some 50 teachers. We involved them all in the AiREAS Healthy City challenge with admirable results. These will be described in Chap. 5.

Finally, we decided to experiment in combining our ILM and POP research with particular events in Eindhoven. It was announced that the Marathon of Eindhoven would become one with innovative components proper to the characteristics of the city. Sport in the town's streets, training, health, and air quality match nicely with an experiment in communication and human interaction. Over 200,000 individuals would support the 23,000 participants during that Sunday in October 2015. Such an audience is a good platform for experiments. Chapter 6 will describe to you what we did and what we learned.

Summing up in Chap. 7, we will relate all of the above to the definition of a peer 4 regional development and the important consequences of the multidisciplinary, core-driven innovative partnership between the local government and its population. This evolutionary step at a regional level is new. To consolidate the method, we need to define very well how it functions and show the results to the world. It is a strong response to all of the key issues of destruction of our habitat and health that we face everywhere in the world, worth the while of local leadership to adopt such evolutionary steps to strengthen local harmony, economy, and resilience. We will also see that we learned much more than expected, about our behavior, our lifestyles, our adaptiveness, and our interpretation of such health and health hazards as pollution.

The 7 chapters will hopefully serve as a source of inspiration for other communities, enhancing our experiments, learning processes, and incubative innovations with those of their own in their own regional context. Every region is culturally and demographically unique and different, producing a diversity of challenges and innovations that can surprise the world. Adopting peer 4 sustainocratic processes has its obvious advantages, not just in generating a new economic evolution, but also in empowering regional leadership. We are ready to help anyone get started and consolidate such decisions.

To finalize the book, we publish the executive summary in **the annex**, in which we use the evidence obtained to make a call for a **Global Health Deal**. This establishes the context of all dialogues and socioeconomic development around the core values that can make our global community and human evolution robust and sustainably progressive.