

Chapter 8

Annex: Executive Summary and Health Deal

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Proof of Principle
Air quality, public health and lifestyle
AiREAS healthy city phases 2 and 3
Executive summary
Global Health Deal
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8.1 Short Summary

With this summarized research report, AiREAS substantiates the wish and need to establish to a broadly supported Health Deal between the population of any region in the world and its executive governance. Since 2011, AiREAS has become functional as a formal cooperative multidisciplinary workgroup initiated by proactive civilians that invited the participation of local government, innovative entrepreneurship, science and our fellow civilians to create together a healthy city together from a perspective of air quality, public health and regional dynamics. Subsequent research to determine individual exposure to air pollution under the influence of our lifestyle and the reigning cultural economic pressure has shown that both governance (local socio-economic context) and the civilian population (culture and lifestyle) need to

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take responsibility together for health and a healthy surroundings as a core value for their own sustainable existence. AiREAS substantiates both the imperative need for context and evolutionary changes in lifestyle through a commitment of combined participation, and a practical solution through innovative co-creation, scientific monitoring insights and proven evolutionary methods.

8.2 Introduction

Human health and a healthy environment should be *the* factors steering socio-economic development by government and business. Right now, this is insufficiently the case, with very serious and *in essence avoidable* consequences for the human being and our natural environment, including the sustainability of our (economic) productivity. In fact, at an executive level, policy choices are being made within the context of a largely obsolete socio-economic agenda that sustains or even produces undesirable situations of degraded health. At the same time, both pollution and illness is being economized through unnecessary and expensive bureaucratic systems. We can determine that there is a vicious circle of financial burdens, resulting in the local and global elimination of our environment and health, which has reached unsustainable proportions with extremely destructive consequences for current and future generations.

The need for a drastic review of our socio-economic agenda, in which we primarily consider our own initiative and responsibility as civilians in our own society for our core values, is therefore extremely urgent. Through the Global Health Deal, with the precedent of the regional Brabants Health Deal in the Netherlands, together with the local build-up of expertise through iconic initiatives such as AiREAS and others resonating with health, the executive level is offered a choice: become part of the creative solution or remain among those who cause the problems?

8.3 AiREAS

AiREAS was founded in 2011 in Eindhoven as a core value-driven cooperation of proactive civilians with the involvement of government, innovative business development and socially committed academics from both the technological and human sciences. In our surroundings, issues like living green, space and air quality play an important role in experiencing and safeguarding human wellness and health. AiREAS addresses these socio-economic challenges with the directly measurable goal of creating smart, healthy cities/regions. AiREAS enables this by inviting all regional stakeholders to interact as equals in a multidisciplinary way, from their own sense of responsibility and innovative initiative, to improve environmental conditions for all of us as civilians. Together with her partners, AiREAS

has established, in a very short time, a multidisciplinary monitoring system, based on a human values oriented philosophy and by science and policymakers for monitoring environment and health, outside of and within the human being.

8.4 ILM and POP

As a first step prior to the global enlargement of the AiREAS approach for healthy cities, the Innovative Air Measurement (ILM) system was installed in Eindhoven. Through a network of 36 multiple sensor Airboxes, the ILM measures the most important air quality parameters in near real time at the exposure level of citizens. The ILM has now been functioning since the end of 2013, and hence is valid as a method for describing the environment of human beings, linking human wellness to lifestyle and environmental conditions. Validated and broadly accepted parameters for the human context are used interactively between specialists and participants. The perception of wellness is evaluated through extensive interview techniques. The effects in the physical location of participants is traced through GPS while, at the same time, a continuous registration of their heart rhythm and stress takes place. Short- and long-term heart and vascular health are evaluated through blood pressure measurements, vascular functionality and aging registration. Considering integrity and current privacy regulations, the human data is made anonymous for further interpretation.

By making visible the invisible, we can adjust our behavior and policy together, thus stepping outside the vicious circle of destruction, through the development of powerful awareness. The societal purpose of AiREAS and the continuous stream of rationalized, objective, validated and accessible 'Open Data' about wellness and the physical parameters of the human being and our environment are, therefore, complementary and synergetic. They create a very powerful and bonding manner in which to provide us with broad insight and make us aware of issues around our own human living environment, behavior, wellness and health that we can influence. The goals of AiREAS through this approach are tremendously ambitious, recognizing right from the beginning the societal need for a solid philosophical and scientific foundation in order to produce the contextual transformation.

The first application of the AiREAS approach and measurement techniques was tested in a Proof-of-Principle (POP) project within the city quarter of Gestel. First, the significance and feasibility of the project logistics and execution were tested. It was a surprise to see that the combination of the information from the ILM with human data from such a small group of 30 young and elderly participants could already identify the effects of healthy and less healthy lifestyles on wellness and health. In addition, 18 amateur marathon runners from Eindhoven were investigated in the same manner. Both the POP and the data from the marathon project are integrated into Fig. 8.3, in which we describe the vascular age of the different

groups. This combined information illustrates that healthy surroundings and lifestyles measurably improve health, and that these are factors that can be influenced. All these AiREAS results are based on experience and knowledge of the existing data, providing AiREAS, in furtherance of the societal need, with a solid scientific foundation.

In a few short paragraphs, we will describe the philosophy that we followed, the set-up and, most importantly, the results in the field of human wellness and physical fitness from the Proof-of-Principle. The summary will be finalized with conclusions and recommendations.

The AiREAS Proof-of-Principle (POP) project, approach and its most important results.

8.4.1 History and Purpose of the POP

After rolling out the first phase of AiREAS in Eindhoven, the fine maze measurement network ILM measuring the citizenry's exposure to outdoor air pollution, two significant research questions arose:

- How does exposure relate to the development of health and the lifestyles of the citizens? (later indicated as 'AiREAS Phase 2')?
- How can we positively influence this by stimulating innovative measures while making visible the invisible (later indicated as 'AiREAS Phase 3')?

For a truly complete AiREAS project, with an impact on the entire city population, we estimated that about 4000 people needed to participate (5 % of the local Eindhoven population, or 1 out of 20 civilians). This was also the size of a population needed for research on overall wellness and health. This size estimate is based on previous research projects in other cities around the world that studied the relationship between air quality and health parameters.

Due to the size and complexity of such an extensive project, involving 4000 participants, the recent and innovative development of the ILM, our new way of working, a new multidisciplinary team, the inclusion of e/Health research around health and lifestyle, and experimentation with persuasive communication for the purpose of stimulating the innovation impulse, we chose to begin with a smaller test project. This pre-investigation involved 30 people and was characterized as the Proof-of-Principle, or POP, for short. This POP in Gestel later became AiREAS phase 2. The research on 'Persuasive Communication' also became a separate project, referred to as AiREAS phase 3.

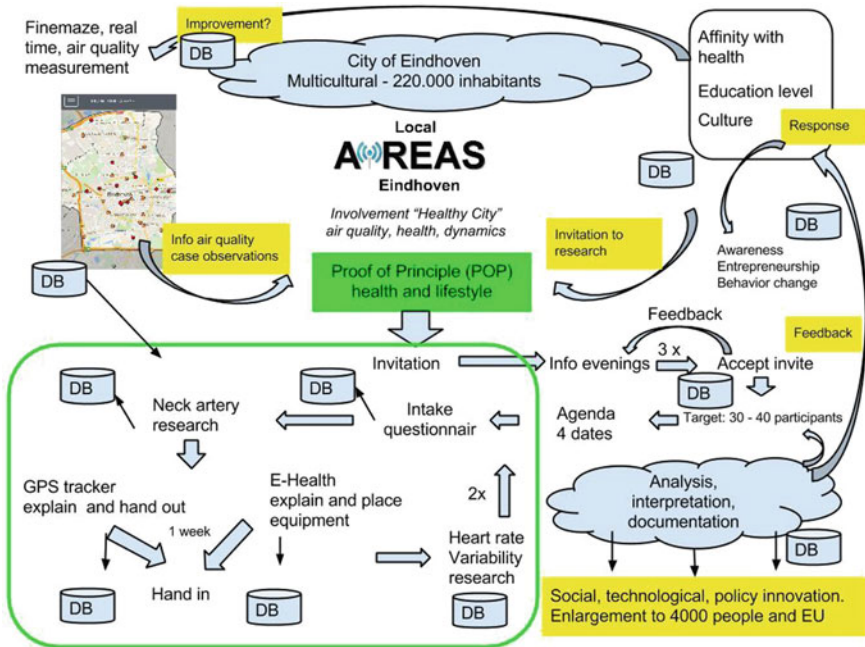


Fig. 8.1 The set-up is based on a broad research project tested by the POP on the complexity of logistics, cooperation and research in civilian participation and science. Process/steps were interactive and quality-controlled (quality control (QC) and quality assurance (QA))

8.4.2 Approach

The civilian participants and the medical research team together formed one community to execute a complex program. Participants were volunteers from the Environmental Defense foundation in Eindhoven, all representing the same affiliation but being of different ages, lives and lifestyle patterns. Figure 8.1 gives an impression of the complexity of the set-up and execution of the POP. Here, it is important to note that each of the actions was realized interactively together with the participants. Technically, all the steps of the process were quality-controlled (QC/QA).

8.4.3 Execution

In January 2015, the research was begun under the overall supervision of Jean-Paul Close. The medical part (heart and vascular research, heart rhythm/stress by means

of heart rate variability measurement, eHealth) and the echographic research of arteries and blood pressure were coordinated by Dr. Eric de Groot (ImageOnline) and Dr. Ir. Pierre Cluitmans (TU/e). The civilian participation and persuasive communication were coordinated by Jean-Paul Close, together with Nicolette Meeder, John Schmeitz and Dr. Jaap Ham (TU/e). John Schmeitz was also responsible for the ICT support and data management. Jean-Paul Close furthermore accounted for the local entrepreneurial incubator trials and international enlargement.

The POP set-up produced 11 databases that needed to be combined in order to get a holistic view of the relationship between lifestyle, exposure to air pollution and health. The individual results were reported to each of the participants within the scope of their privacy. The common anonymized insights have been processed into the conclusion of this summary. The specific insights are being prepared for worldwide publication through the scientific publisher Springer.

8.4.4 Financial Investment

The total monetary investment for the POP was 200,000 euro, 75 % of which was financed by the city of Eindhoven and 25 % by the Province of North Brabant. The investment in human participation, knowledge, time and energy of the partners was significantly greater than that.

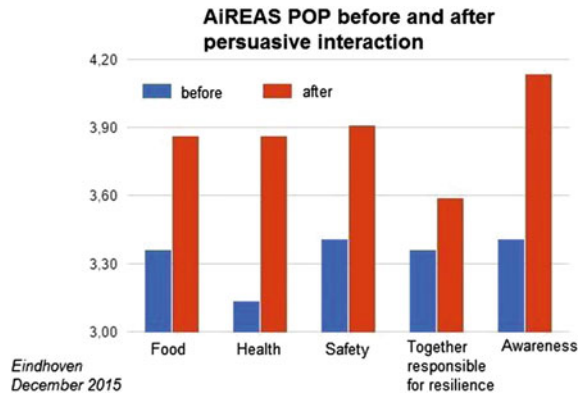
8.4.5 Most Important Results of the POP, Quality of Life/Wellness and Vascular Age

The results are being published extensively. We highlight the results here of wellness (interview) and measurements of vascular wall thickness (vascular age) in brief. Both wellness and vascular quality are important parameters for health.

8.4.5.1 Interview

The participants in the Gestel POP became partners in the process of healthy city development. It was not just the insight into their health conditions and lifestyles that mattered for the POP, but also the way in which the research and interaction affected their awareness and behavior. The participants were asked to judge their awareness on a scale of 0 (not aware) to 5 (very aware, with adjustment of behavior). The evaluation took place according to the 5 core values defined by the

Fig. 8.2 Wellness and awareness about quality of life before and after taking part in the POP



STIR Foundation as the common responsibility between executive governance and the population to assure sustainable continuity. The participants were interviewed twice (by Nicolette Meeder), the first time during the medical research program in March 2015, the second time eight months later upon receipt of their personalized reports in October 2015. In Fig. 8.2, we show the impressive results.

The impressive change in awareness also highlighted a significant problem. Responding participants confirmed that they could address social innovation through their daily decision-making processes. Lifestyle is largely seen as the responsibility of the individual him or herself, often greatly influenced by the surrounding culture. A lot of exposure to pollution is caused by the socio-economic structure of society, in which one needs to participate to sustain an income. Many executive decisions are still made within this old socio-economic context, contributing to and even rewarding polluting and illness-producing behavior. Lifestyle is largely personal, but the socio-economic context is a regional leadership issue. Health hence needs to be a common innovative commitment between leadership and society.

8.4.5.2 Vascular Aging

All participants in the POP took part in the echo research examining the walls of their neck artery (carotids). The thickness of this artery is an accepted measure for the status of health of the vascular system (cardiovascular health): the thinner the wall of the artery, the younger the vascular age and the smaller the risk of heart and vascular diseases (Fig. 8.3).

In addition to the POP, in October 2015, echo-research was also done among (amateur) marathon runners during the Eindhoven Marathon event. These runners

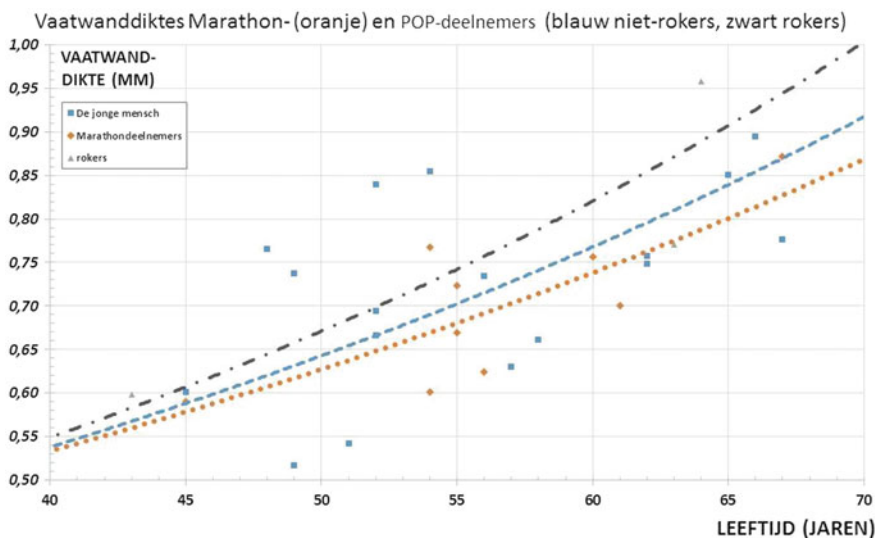


Fig. 8.3 Vascular wall *thickness* versus age. From the POP results, in accordance with previous research, it was determined that people who smoke (=less air quality) show considerably worse arteries compared to non-smokers (the *black dotted line* in the graphic are people who smoke). *Orange* represents the marathon runners, *blue* the other POP participants

had a significantly better vascular age (orange dotted line in the graphic). The blue dotted line shows the vascular situation of the healthy, non-smoking POP participants who had no intensive activity in sports. On a biological level and in terms of risk, the changes caused by smoking and air pollution are tremendous. A healthier lifestyle and a healthier environment therefore lead to healthier organs.

8.5 Schematic Summary, Conclusions and Recommendation

The multi-faceted impact of the AiREAS projects is summarized in the following table.

Impact of the POP project on social participation in 2015/2016

Research context	Direct local participants ~ researchers (ps + res)	Medical research	Primary purpose	Media exposure
Axians App on telephone	150 + 19	No	Persuasive communication	Yes, newspaper, radio, worldwide publication
POP 1	32 + 10	Yes	Medical and lifestyle	

(continued)

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Research context	Direct local participants ~ researchers (ps + res)	Medical research	Primary purpose	Media exposure
				Yes, newspaper, worldwide publication
Backpack	12 + 11	Yes	Lifestyle and exposure	Yes, newspaper, TV
Marathon	32 + 9	Yes	Medical and sport, communication, lifestyle, incubator	Yes, newspaper, TV, radio
Hackathon	15 + 24	No	Incubator and innovation	No
Erasmus+	120 + 12 (+700 studenten Turkije)	No	Incubator multi-culture and lifestyle	Yes, newspaper
Total involvement and exposure	361 + 75 (+700)			Local >500 K citizens Up to 12 times Worldwide: many millions via Springer and New Horizon publications Presentations

8.6 Reasoning from a New Socio-economic Context: Health

Because all partners in AiREAS already reason from the position of the new socio-economic context based on core value-driven innovation around health, proof has been created of the local impact of such an intense psycho-social transition and awareness in all areas and at all levels of society, individually, human, societal, ecological and economic (hence also referred to as 4× profit). The POP impact after just one year was gigantic. But AiREAS is just an island in an ocean of old socio-economic influence. If the latter also begins to consider the transition as a step-by-step evolution, then an acceleration will develop on the human, social, ecological *and economic* scales due to the intense push of transformative innovation. That is why AiREAS supports building up towards a general public/executive Health Deal in Brabant and proposes extending this worldwide through regional partners.

8.7 More Proof and Results

The first phase of the POP was a challenge in the field of multidisciplinary cooperation between a large diversity of expertise. Even though the insights gathered were successful and multitudinous, they still offered a rather narrow insight into the complexity of the entire city. Thanks to the composition of the POP team, we were able to determine different test areas through which a broader view could be obtained on the reality of the functioning of the entire social community of the city in relation to air pollution, human exposure and behavior via lifestyle. Each person is different, and on top of that, Eindhoven is very multicultural. This segregation in society demanded special dynamics and adaptability from the POP team that only became possible after first working out the medical rounds. Different sub-contexts were necessary to confirm our insights or complement them. In this way, we were able to establish the following research relationships within the same overall context of health and air quality:



De natuur is altijd gezond!

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mobiliteit**





**Motor
van
Innovatie
&
Cocreatie**




**AiREAS coöperatieve vereniging
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www.aireas.com
blog: <https://aireas.wordpress.com>

Banner to decorate AiREAS encounters

- Health, outdoor lifestyle and membership Environmental Defense foundation (mindset)/POP1
- Awareness in relation to social innovation/POP2
- Health, direct exposure indoors and outdoors, lifestyle/Backpack
- Turkish community, lifestyle and awareness/Erasmus+
- Health, awareness, technology and entrepreneurship/Hackathon
- Health, sport, air quality and lifestyle/Marathon
- Health, sport and media/Marathon
- Air quality, lifestyle and socio-economic context/All.

All these relationships could be made by looking at the many societal sub-contexts, investigating them and comparing behavioral patterns. Thus, the insight developed that our current socio-economic mainstream culture stand structurally in the way of health by rewarding and valuing the wrong behavior, after which illness and societal costs grow.

By addressing the groups from an alternate socio-economic context, we could make visible the invisible and also show the positive effects if we were able to formalize the health context as the norm. The impact on societal harmony, cohesion and productivity proved to be enormous.

The Health Deal in Brabant and worldwide is hence, according to AiREAS, not a choice but an evolutionary step that is already visible in many awareness-driven, pioneering initiatives throughout society. It only lacks the overall coverage and facilitation of a governing framework. With the Health Deal, this unprecedented evolutionary step will be confirmed and enhanced on the executive level.

8.8 Conclusion

The ILM, POP and Marathon projects illustrate the negative effects on health of our environment and lifestyles, but at the same time, show that they can be resolved. They illustrate above all the enormous potential of working together on innovation in a multidisciplinary setting, and how innovative smart city initiatives such as AiREAS can help with that through the participation of society around core values such as Health.

As indicated in the introduction, this requires modifications in both our lifestyle and the socio-economic agenda of civilians, government and business. These modifications and corresponding changes in insight and the method for making policy is a necessity. We can deal with the modification and adjustment to the new circumstances when considering *health proactively, making leading in our choices* and integral to the societal context (i.e., not reactive to the lack of health via an unaffordable system of monetary dependence).

The proficiency tests done in the POP and Marathon projects had a very positive effect on the response of participants, their contribution to their own improved quality of life and even the appearance of incubators of new entrepreneurship. Lifestyle is in the hands of the citizens involved, but the socio-economic culture is not; that is an executive leadership issue. The latter still rewards and stimulates unhealthy situations, behavior and structures. The reward system is used to sustain a

living standard (housing, food supply, social securities, health care). To break this, a socio-cultural turnaround is needed that can only be done by regional executives and citizens *together*. This has the following effects, already visible in the POP:

- The societal context changes health results into totally new entrepreneurial dynamics with health-driven productivity, serviceability and even new desires for landscape and city design.
- The psychosocial awareness attached to health demands a modified structuring of society and reward systems around value creation.
- By establishing health as the steering mechanism, a totally new governmental charter appears, including in regard to decision-making processes. In Eindhoven, we saw the results of a strengthened social cohesion, reconfirmed leadership and a generalized entrepreneurial spirit.
- Through these choices, icon projects of integral innovation appear. AiREAS is already recognized as an icon of value-driven co-creation. More are being developed.
- The proven multidisciplinary co-creation of our common core values delivers multiple forms of reciprocity without precedent:
 - *Government*: structural cost reduction, reduced bureaucracy and the speeding up of complex processes. Consequences were considered costs, while value-driven co-creation is an investment with a diversity of results. Icon-projects that become visible inspire the world. Every participating region is demographically different, producing unique innovations for itself and the world.
 - *Education*: participative learning models with self-leadership and dynamic clustering around value-driven projects,
 - *Entrepreneurship*: intense innovative stimulus for new product market combinations, design, services, landscapes, city development and cooperative structures. A new socio-economic landscape reveals itself with tremendous local and global growth potential, also referred to as the new Kondratiev wave.
 - *Environment*: social innovation takes care of a new economic impulse, new entrepreneurship develops with alternative value systems. People meet and cluster in health-driven cohesion. Nature regains its important status in our awareness and our relationship with our basic needs (food, energy, water, air).

Health is seen by the money-driven hierarchy as soft, abstract and unrealistic. The POP proves the contrary. It is real, responsible and constructively innovative. The value-driven societal context is a valid successor to the old industrial and consumer economic reality.

8.9 Worldwide Attention

During the period of the POP, AiREAS was approached and visited by China, India, Turkey and different European cities and regions with positive intentions to apply the insights to their own local challenges as well. It was also confirmed by

major economic players that the regions of Brabant and Eindhoven are especially attractive for investment because of our focus on health. AiREAS's method of working has become an icon on its own and was recognized through a European innovation award, as well as formal scientific positioning as a peer 4 regional development by an external research company.

Global enlargement is only possible in regions where health is embraced as a core value for regional development. The Brabant Health Deal is a source of inspiration for all regions of the world and the establishment of a local AiREAS would be a proven manner for addressing the transition between socio-economic contexts in a satisfactory way. The STIR Foundation is set up to help all regions of the world make such a commitment and take these important evolutionary steps.

Signed in Eindhoven, March 15th, 2016

Jean-Paul Close

Founder STIR

Researcher and initiator of AiREAS

Dr. Ir. Pierre Cluitmans

Eindhoven University of Technology

Heart Rate Variability and stress research

Dr. Eric de Groot

Heart and vascular research

ImageOnline

John Schmeitz

Human being and technology

ICT and database

And the rest of the POP team and participants.

Publications:

Springer: AiREAS and Spirituality in Business Ethics <https://books.google.nl/books?id=6M6lBQAAQBAJ&Ipg=PA81&ots=zwT5BDGyKE&dq=Springer%20Jean-Paul%20Close&hl=nl&pg=PA1#v=onepage&q&f=false>

New Horizons: Redefining human complexities <https://marktlederschap.wordpress.com/2015/10/10/my-contribution-to-anthropology-and-sociology/>

Springer/Phase 1 AiREAS: making visible the invisible <http://link.springer.com/book/10.1007/978-3-319-26940-5>

Vinci energy Paris: collective intelligence supporting urban air quality https://www.vinci.com/vinci.nsf/en/newsroom/pages/collective_intelligence_supporting_urban_air_quality.htm

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