Civitas Aquae:
a systemic brand
for a local water service.

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POLITECNICO DI MILANO

Abstract
English

If we look at water from a holistic point of view, it's quite easy to discover how this resource is embedded into the environment: things and human beings. Given the explosive demographic growth and chronic water shortage, now is the right time to reposition water on the main stage of citizen's lives; sensors, screens and tracking devices can give water the possibility to manifest how this element has crucial relevance for the future of our Planet.

Therefore, it's time for citizens and cities to assume their responsibilities, and bridge the dialogue between water supply and human consumption in an innovative manner.
Civitas Aquae (CA), a public-private service brand, aims to play the role of facilitator between water and the city inhabitants and makes up for the value and respect for the public water of the city. The aim of *CA* is to redefine, through its quality service, the appreciation of water from just an affordable element that is immediately available to a higher level of knowledge and wisdom which takes into account the long term impact of its consumption.

Right for the citizens, *CA* offers a system for the management, tailoring and monitoring of domestic water consumption. The single consumer and building block consumption are conveyed on the managing platform of *Publiacqua* (the water provider) to later "spring and flow" in the form of visual feedback for the public in a specific space called *CA Museum*, open to everyone in the city centre. It is crucial to have this meaningful space where people can experience the man-water relationship, its present and future scenarios. This place could be conceived as a treasure box for the global water knowledge.
Within the Museum the special recyclable *CA Bottle* is sold and ready to be filled at the exlusive *CA Fountain* which produces a higher quality water (compared to "standard" one). The same certificated water is then delivered by the *CA Water Supply Service* to private households and the food related businesses.
The goal of *Civitas Aquae* brand is to forcefully state that water is a scarce common good, not endless nor exclusive, but the primary vital resource for the life and management of the city and its community.

Abstract
Italiano

Osservando l'acqua da un'ampia prospettiva, immediatamente ci si accorge di quanto essa sia integrata con l'ambiente e con gli esseri viventi. L'esplosione demografica e la crescente aridità, impone, il riposizionamento dell'acqua su un livello più alto nella vita dei cittadini. Sensori, visori ed elementi per il rilevamento dei flussi latenti sono in grado di manifestare l'importanza vitale dell'acqua per il futuro del nostro Pianeta.

È dunque arrivato il tempo per i cittadini e le città di farsi carico delle proprie responsabilità, di applicare nuovi modelli di dialogo tra il consumo e la disponibilità d'acqua.
Civitas Aquae (CA) è la formula di brand pubblico-privato che si propone a ruolo di mediatore tra la risorsa idrica e i cittadini, valorizzando il rispetto e la considerazione dell'acqua pubblica. *CA* ridefinisce la scala di valore dell'acqua: da marginale elemento di utilizzo a elemento fondante per la diffusione di una conoscenza a lungo termine su quello che è e sarà il futuro di questa risorsa.

Proprio per i cittadini, *CA* offre un sistema di controllo e gestione per la rete idrica domestica (sistema domotico interattivo). I dati di consumo raccolti da ogni abitazione, condominio e quartiere sono gestiti da *Publiacqua* (il gestore d'acqua locale) e pubblicati come output visuale e interattivo all'interno del *CA Museum*. Quest'ultimo diventa il punto chiave e di libero accesso all'interno della città. Ogni individuo può fare esperienza sul significato e il rapporto stretto che intercorre tra se stesso e l'acqua. Il *CAM*, può essere considerato uno scrigno, una library dove il sapere "liquido" è custodito e condiviso.
All'interno del *Museo*, pronta per essere riempita con la speciale acqua di *CA*, viene distribuita la bottiglia in alluminio riciclabile. La stessa acqua è inoltre imbottigliata localmente all'interno delle *CA Water Station* e recapitata agli utenti dal servizio di consegne rivolto sia alla ristorazione che ai privati.
L'obiettivo del brand *Civitas Aquae* è rafforzare la percezione dell'acqua come risorsa di valore comune, deteriorabile e limitata, ma fondamentale e necessaria per la sopravvivenza di una città e della sua comunità.

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INTRODUCTION

Our Future In
A Water Drop

"Water may also be good for the heart"[1]

This thesis aims to analyse how the use of freshwater in urban environments can be enhanced through a better understanding of its value by users and also through the use of new smart technologies. Everyday humans perform routine tasks which affect our lives both in a direct or indirect manner. As people, every day we perform repetitive actions which have become automatic and do not take into account the long term sustainability. Therefore, because of our *"magic box"* presets, it is difficult to perceive the cause-effect relationship of the repetitive human behaviour which usually does not consider long term consequences on the environment. Our brain, in order to maintain a focus on unpredictable things, sorts and ranks certain menial tasks with a low value of awareness. One may notice, by observing our own every day actions, that this kind of "awareness gap" is also found in the relationship between humans and water. Most of us, who have the privilege (over 1 billion people in the world do not have this privilege) of obtaining instant access to clean water, don't realize how complex and articulated the process is behind the simple gesture of turning on the tap water.

In this thesis I wish to assess the appropriate value and awareness to a simple gesture which allows us to benefit from the most important resource we have on Earth: WATER.

A contemporary researcher on the subject of water states the problem as follows:

"If we now compare the rate of consumption with what is available, we conclude that we have been withdrawing from 25 to almost 50% of the available freshwater. How long can that continue? It is tempting to justify such actions as an unavoidable consequence of population growth. But the numbers don't add up. In 1900, the Earth's population was 1.65 (billion people) while in the year 2000 we were 6.1 (billion people), an increase by a factor of 4, while we have seen that the rate of water withdraw jumped by a factor of 8, twice as much. It is therefore not only as many we are but how we act (...). Water is not a human invention, as we have seen in discussing its origins; it is a free gift from nature. It existed way before life existed. Do we have the right to sell for profit something that is not ours? Isn't that the ultimate form of "cosmic theft"? What will happen when water gets depleted? Unlike oil, carbon and natural gas that may one day disappear forcing us to look for alternative sources of energy, if

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1. De Saint-Exupéry, Antoine, "The Little Prince" , [1943]

water disappears, there is no substitute. The disappearance of water means the disappearance of life for the latter was born in it and cannot exist without it"[2].

As Mr. Canuto remarks, (fresh) water is the first plug of life. Thanks to water it is possible to foster human civilization enabling our cities to grow fast, as can be noted by the very high levels of urbanisation in developing countries. The importance of water in urban development is widely recognised, nevertheless this resource remains in peril, due to a general lack of awareness or in some cases due to outright criminal speculation.
Therefore, both citizens and politicians who are in charge of our nations' policies generally use a *"fuzzy lens"* (or nar- row) approach to look at the future with the result that an indiscriminate use of our fresh water sources is made.
The consequence is that future generations risk inheriting a severely depreciated planet.
Given the importance of water, and its 'public good' characteristics, it is hard to believe that there is still no attempt by policy makers for a coordinated enforcement of existing local, national and international policies aimed at safeguarding its use.

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2. Canuto, Vittorio M. [2011] "Water and Civilization: Past and Future"

New Consumer Awareness

TODAY'S "TENSIONS" WARN US TO AVOID PAST MISTAKES THAT DROVE TO A GREEDY AND SHORT-TERM APPROACH TO NATURAL RESOURCE CONSUMPTION WITHOUT CONSIDERATION TO THE ENVIRONMENTAL IMPACT

Water can't generate itself as fast (through the water cycle process of evaporation and condensation and waterfall) as we continue to consume and use it. Water, in spite of appearances, is a limited resource and it needs time to get back to the first step of its generative cycle.
One of the biggest human flaws, and a big issue to tackle, is the refusal of understanding the explicit warnings from environment which clearly indicate our unsustainable use of our planet's natural resources. At this stage, from now until when the situation will be considered sustainable again, our generation has the responsibility to stress the importance of investing heavily in both consumer awareness and service provision. *"Open-decisions"* should not only be affected by individuals driven by their private needs, but the goals and duty for the entire "community"[3-4], hopefully a smart one.

Probably we have one more chance today, many dogmas are crashing down, and now an increased number of people can easily obtain information thorough the "crystal ball" of the millennium: the "internet of things"[5].
"Understand the complexity", this is the opportunity we get from today's networking technologies: the possibility to build up awareness by crossing ideas and experience from people from the opposite side of our planet and also communicate with them too (seeing and speaking). People are no more excused to say: *"I wasn't aware about"* or *"I don't know"*. The second act of "the age of information" or "age of knowledge"[6] is ongoing, for the citizens is possible sketching out rules and drawing ways that make it possible to become Nation 2.0, or 3.0, which aims to solve new big challenges and problems dragged from the past, as I'll describe next. Information access to all is in the process of sweeping away obsolete architectures that for a long time have imprisoned new forms of progress and general awareness. New technologies can therefore be exploited to improve our understanding and management of water.

3. *"intelligent city" (IC) Wikipedia [July 2012]*
http://en.wikipedia.org/wiki/Intelligent_city

4. *Rodotà, Stefano [2006] "10 tesi sulla democrazia continua - il potere e la fase pubblica nell'era delle reti", Apogeo, Milano*

5. *"The Internet of Things" Wikipedia [Aug 2012]*
http://en.wikipedia.org/wiki/Internet_of_things

6. *"Information Age" Wikipedia [Sep. 2012]*
http://en.wikipedia.org/wiki/Information_Age

The New
City Issue

"Cities are the arena in which to do so. All the ways in which the world works come together in our cities. They are the proverbial melting pot -- not only for immigrants, but for systems, blending them together to engender new forms of commerce, of culture, of science, of life and of society. Which is why cities -- more than states, provinces or even nations -- are likely to be the crucible for human progress and evolution in the coming century"[7].

Due to giant steps in technology made in the past decades, we are now able to produce *"eyes"* and "sensors" enabling people to get or share information about things previously impossible to see or touch by hand.
For instance, today it is easier to track objects – on an almost real time basis - like buses, trams, packages and even trash in order to analyse the efficiency of the waste collection services [8].
Consequently, a further step would be to monitor the environment, like the quality of fresh water in urban environments. The attractiveness of these new technological "systems" is that they may enable us to monitor the quality and quantity of water. This could have huge benefits to water management and planning, avoiding for example unforeseen water shortages in urban areas.

7. Palmisano, Samuel J., CEO, IBM Corporation [2009] "Shining Cities on a Smarter Planet"

8. Ratti, Carlo, "Trash tracking", Elaborated by the SENSEable City Lab, MIT

Expand
The City Boundaries

THE PACE OF URBANISATION IS DRAMATIC: MORE THAN 250.000 NEW DWELLERS ARRIVE IN LARGE URBAN CENTRES ON A DAILY BASIS.

Inanimate objects, invisible resources, extraordinary phenomena and an ecosystem of things are now able to generate information that we can easily capture, read and share with others. These are the tools of "*the age of knowledge*", which is happening right now, with the epicentre in urban areas.

According to Matieu Lefevre (EXD at New City Foundation[9]), more than 50% of population currently inhabit cities. The pace of urbanisation is dramatic: more than 250.000 new dwellers arrive in large urban centres (mainly in development countries) on a daily basis. It is expected that by 2050 about 70% of the world's population will live in urban centres - over 6 billion water consumers!

This trend is particularly acute in Asia, Africa and Latin America. Therefore, the city needs to be reframed with a mix of intelligent infrastructure and platforms to enhance the citizen's cooperation and knowledge, and ensure a thoughtful access to scarce resources like water and energy.

9. The New Cities Foundation is a non-profit Swiss institution dedicated to improving the quality of life and work in the 21st-century global city, with a particular focus on new cities in Asia, the Middle East, Latin America and Africa.

"MORE THAN 250.000 NEW DWELLERS ARRIVE IN LARGE URBAN CENTRES, MAINLY IN DEVELOPMENT COUNTRIES, ON A DAILY BASIS"

Critical Times

TODAY'S "TENSIONS" WARN US TO AVOID PAST MISTAKES THAT DROVE TO A GREEDY AND SHORT-TERM APPROACH TO NATURAL RESOURCE CONSUMPTION WITHOUT CONSIDERATION TO THE ENVIRONMENTAL IMPACT

The critical issue of balancing the supply and demand of water, in order to avoid a free-fall into the abyss, has recently been raised by a prestigious economics publication:

"Bringing supply and demand into equilibrium will be painful, and political disputes may increase in number and intensify in their capacity to cause trouble. To carry on with present practices would indeed be to invite disaster"[10].

At present, we are in a time of transition. The current global financial crisis is forcing some radical behavioural changes, and we have the incredible opportunity and know-how for humans to re-locate themselves and establish a new valuable context. This could be considered a sort of pre-Renaissance period, where a deeper understanding and awareness of the critical issues prompts society to find new – more sustainable, ethical and equitable - ways to address problems of water management.

Basically:

1) developing high quality levels of information,
2) keeping communication among individuals clear and
3) making experience as an open shared resource for all, will enable us to look at medium-long term future with optimism and allow us to define a new balance in human development.

Today's *"tensions"* warn us to avoid past mistakes that drove to a greedy and short-term approach to natural resource consumption without consideration to the environmental impact (eg climate change, nuclear disaster etc).

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10. *The Economist, "Special Report: Water", May 20th 2010*

Sources Of
The Solutions

The objective is to enhance the ability of the cities to grow and sustain a 'smart city' ecosystem which can support new opportunities emerging for a dynamic co-production process resulting in more inclusive, higher quality and efficient public services which can then be made replicable and scalable for cross-border deployment.

Cities are natural-labs ideal for generating better solutions thanks to their creative environments, thick networks of individuals where everyone represents a pulse, a brain synapse [11].

Throughout these physical and virtual channels people can compare, test and mix ideas and experiences.
The good thing is that the current crisis is resetting many dogmas, rebalancing the importance of new needs and building a new awareness with particular attention to social and environmental solutions.
The bad thing is: time is very limited for embarking on a more sustainable direction. Urgent action is required.

11. *"Thinking Cities, Networked Society", Ericsson [Feb. 2012] http://www.youtube.com/watch?v=6ctxP6Dp8Bk&feature=player_embedded*

Constant Monitoring, Active Participation

TECHNOLOGY COULD BE EASILY INTEGRATED INTO THE PHYSICAL STAGE OF THINGS TO MAKE THEM TALK (AS FOR CITIES), BUT IT'S HARD TO THINK THAT TECHNOLOGY ALONE WILL SOLVE CITIZENS' SOCIAL ISSUES, THAT'S WHY A PARALLEL PROCESS OF EDUCATION IS NEEDED.

Access to safe and affordable water and sanitation service is crucial for the citizens' public health (e.g avoiding cholera outbreaks), and achieving it will require significant investment in infrastructure and expert advice. Therefore citizens need to be supported in evaluating changes to the city's urban spaces, predicting problems or in some cases even learning how to change their actions in order to maximise efficiency and sustainability of water consumption.

That's why sensors, or smart-meters, in the water system are one part of the solution. Let's try thinking about what it means managing a city today with its numerous inhabitants. Energy and water, both need to be monitored constantly, something that most of the system that is still running cannot manage, or can do so only at a high cost rather than adopting technical sensors and visual-decoders. Sensors are more than a simple *"eye"* for easy detect-

ing, they are able to manage hundreds of standards and procedures, and ensure high quality levels at low costs [12].

For users as well, technology is likely to enable their access to new forms of democratic participation. Indeed it shapes a form of active role and trains sensible citizens. It is the "smart" core and accelerator to improve the quality of the lives of future generations. Communication platforms are the ultimate link between sensors and engagement. Platforms enable the citizens to share their personal ideas, debate them within their community, improve them thanks to other experiences and in the end make the solution available for all. So the answer is finding common solutions and engagements where citizens are proactive, as they will have knowledge from access to the data, understand them and formulate specific answers or requests.

12. *"Smarter Water - energy and utilities" IBM*
http://www-03.ibm.com/innovation/us/thesmartercity/energy/#!/2

2

RESEARCH STRUCTURE

Research Structure

This thesis aims to analyse how the use of freshwater in urban environments can be enhanced through a better understanding by users of its values and through the use of "smart" technologies.

The final design output, is the synthesis of how today, a brand can be deployed to improve the smart use of water in urban environments.

There are two types of research used in this thesis, primary and secondary. First, primary research - conducted through the use of direct interviews and survey forms (daily water log) - points out the critical aspects concerning local water system and how people are relate to it; it illustrates first hand the cultural attitudes towards consumption of public water, and the degree to which it is trusted.

Next, secondary research has focused on obtaining further information on water usage as well as the urban context for developing an improved service. These two sources of research have produced insights for the development of the CA brand.

"SMART CITY"

WATER

PRIMARY RESEARCH

SECONDARY RESEARCH

LEARNINGS

INSIGHTS
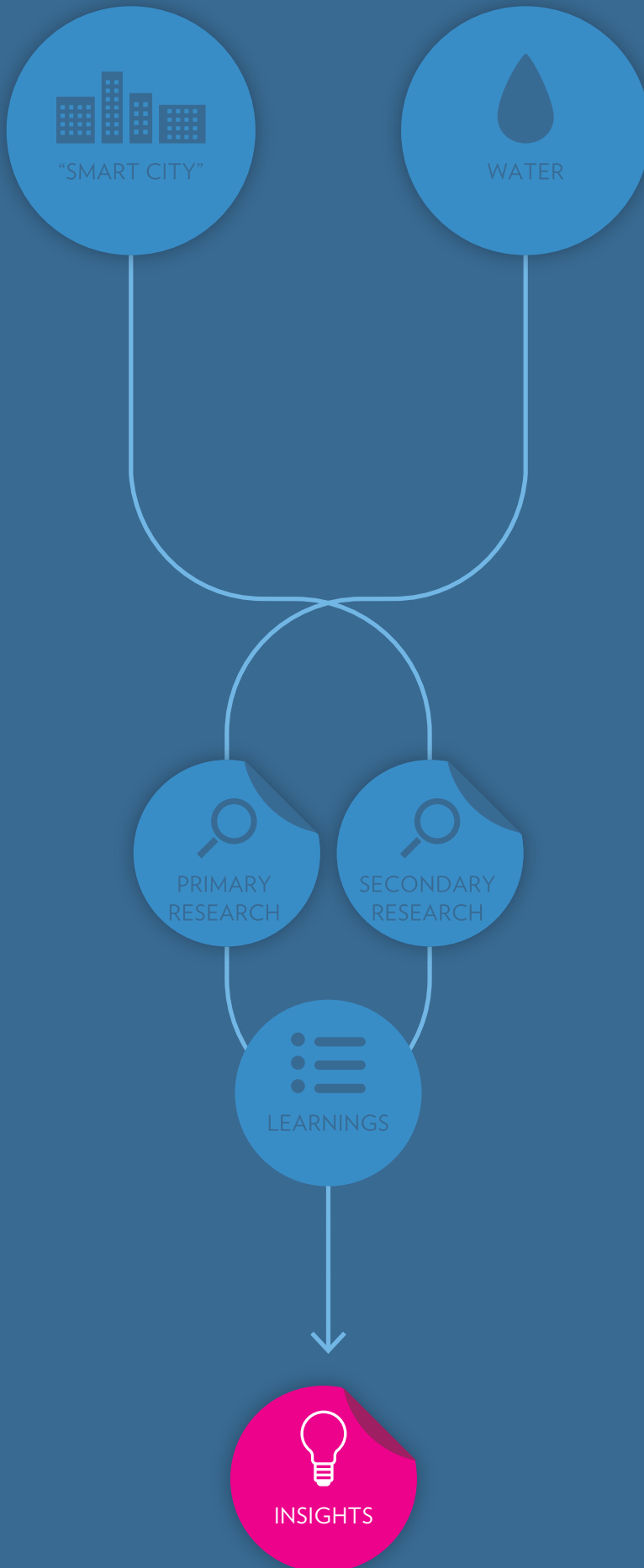
3

RESPONSIVE ENVIRONMENTS

Magnetic Cities

There are several pull and push reasons which today are responsible for the exponential growth of world cities.
It may be better to analyse each driver and narrow these to specific regional global contexts.
However, this topic is too complex to be addressed in this paper, requiring a separate discussion. For this reason, let's presume that the world is flat and imagine to treat problems, solutions and hopes tied together in a unique context, in one phrase: "let's globalize them".

Although it is a predictable result it is interesting to point out some of the main urbanization parameters [13]:

PULL FACTORS:

• Better living standards
• Increased prospects of improving one's living conditions
• New jobs opportunities in service sector
• Better hospitals and health care system
• Cities are social networks and financial trading centres

• Access to better education (schools and universities)
• Stimulating and creative environments

PUSH FACTORS:

• Oversupply of labour in countryside (also arising from mechanization of agriculture)
• Search for higher income
• Lack of services
• Insufficient raw materials (water, wood etc..)
• Deterioration of the quality of farmed lands
• Escape from deprived areas and conflict
• Search for more stimulating lifestyle

These factors are, every day, pressing hundreds of thousands of rural inhabitants to move to urban centres. Inevitably the consequence will be a severe increase in stress of urban infrastructures, such as the fresh water supply system.

13. Herzer, Lauren [2012] "Changing Cities: Climate, Youth, and Land Markets in Urban Areas", The Wilson Center

PUSH AND PULL
FACTORS

We Learn
Better Together

Human beings are a social species that can improve their economic activity under certain conditions.
For example, a designer could work on a very isolated island of the North Sea and not grow much due to lack of interaction with others; while in a city like Berlin, she would figure out what skills and trends are more valuable, what companies are growing, and which venture capitalists are open to new ideas in the field.
In Berlin the designer could develop her product.
The information flow comes from the physical proximity and might also help to build the relationships that would enable her to create a start-up.
Analogous examples of how certain environments have created specific industry clusters include: financial centre of Wall Street in NY, IT centres in Silicon Valley in California as well as in Bangalore in India. These successful economic clusters all require highly educated urban work force within structured legal and regulatory environments.

"Knowledge moves more quickly at close quarters, and as a result, cities are often the gateways between continents and civilizations" [13].

Edward Glaeser in his *"New York Times"* article, addresses well the benefits in having focalized contexts for humans' activity which enable to capture *"flying individuals"* and their experiences, engines for creating a thriving local economic development. An ever green example of urban concentration is provided by technology.
The California's area of Silicon Valley nearby San Francisco bay, has dozens of high-tech companies which are competing hard; but together on the same region this gives them a tremendous power to stay on market-tech edge, the possibility of *"spying"* or exchanging best practice ideas, communicating or trading human resources between each is essential for the sector's competitive edge.

14. Glaeser, Edward L. [May 2009] *"Why Has Globalization Led to Bigger Cities?", The New York Time*

Knowledge
Is The Aim

THE MULTITUDES CAN READ CITIES AS THE PAGES OF AN ENCYCLOPAEDIA, LEARNING ABOUT THE TECHNOLOGICAL KNOWLEDGE

"More than 2,500 years ago, the knowledge of the Mediterranean world made its way to Greece through Athens. Twelve hundred years later, Greek and Indian knowledge entered the Islamic world through the Abbasid Caliphate's House of Wisdom in Baghdad.
Eastern wisdom came west again, through Venice and the cities of Spain.
The circle continues today, as Western technology makes its way east, again through urban portals like Bangalore, Shanghai or Seoul. Since there is so much for developing countries to gain economically by integrating with the developed world, the urban gateways to the West attract millions" [15].

History is the encyclopaedia of mankind, through which most of today's business attitudes are explained. The multitudes can read cities as the pages of an encyclopaedia, learning about the technological knowledge.

15. Glaeser, Edward L. [May 2009] "Why Has Globalization Led to Bigger Cities?", The New York Time

Is The City Getting Big?
No, Mega!

WHAT WE NEED TO KNOW AS CITIZENS, GOVERNMENTS, CORPORATIONS, DEVELOPERS, PLANNERS, DESIGNERS, ENVIRONMENTALISTS, AND CLIMATE AND ENERGY EXPERTS, IS LEARN HOW TO MANAGE RURAL-TO-URBAN MIGRATION RATHER THAN BE SCARED BY THIS UNRELENTING TREND

"If someone had been able to go into orbit around the Earth a century ago, he or she would have seen the light from 16 concentrations of a million or more people. Today, the crew of the space shuttle can see 450 such shining cities on the globe -- the economic, governmental, cultural and techno-logical power plants of an increasingly urban age" - and con-tinue with - "It's not too much of an exaggeration to say that "history" has been, at root, the story of our planet's urbaniza-tion. And it's a story that is now moving a lot faster. In 1900, only 13 percent of the world's population lived in cities. Two years ago, we crossed a threshold -- for the first time ever, more than half of us were urban dwellers. And by 2050, that number will rise to 70 percent. We are adding the equivalent of seven New York to the planet every year"[16].

If Mr. Palmisano is correct about the proportion and speed rates of this growth, in less than one century our world has witnessed the human race multiply itself exponentially, scale up its urban centres which have then grasped and dragged most of the Earth's natural resources.

Whether or not we continue supporting urbanization, it is happening at an increasing rate. What we need to know as citizens, governments, corporations, developers, plan-ners, designers, environmentalists, and climate and energy experts, is learn how to manage rural-to-urban migration rather than be scared by this unrelenting trend. Indeed, nothing about cities and mega-cities should be organic or left to chance; size, and life in them must be planned and managed in a careful and innovative way. And good plan-ning is more likely to occur if people's skills and awareness are strengthened

16. Palmisano, Samuel J., CEO, IBM Corporation [2009] "Shining Cities on a Smarter Planet"

What Is
A Megacity?

UP TILL 1975 THERE WERE JUST 3 MEGA-CITIES ON THE EARTH WITH MORE THAN 10 MILLIONS OF INHABITANTS; CURRENTLY THIS NUMBER HAS INCREASED TO 21 AND MOST OF THESE ARE IN ASIA

"A city and/or metropolitan area with a very high population or average density. A Mega-city is generally considered to be an urban agglomeration with a population of at least 10 million, though the United Nations defines it as a metro area that is home to at least 5 million people living in an area of consistent urban-level density"[17].

Up till 1975 there were just 3 Mega-cities on the Earth with more than 10 millions of inhabitants:

1   New York
2   Tokyo
3   Mexico City

Currently this number has increased to 21 and most of these are in Asia, but in 2025, the number of Mega-cities is expected to reach 29 with an additional 5 in Asia, 2 in Latin America and 1 in Africa as follows:

1   Shenzhen
2   Chongqing
3   Guangzhou
4   Jakarta

5   Lahore
6   Bogota
7   Lima

8   Kinshasa

17. "Megacity" Wikipedia [Aug. 2012]
http://en.wikipedia.org/wiki/Megacity

Mega-Growth,
Mega-Complexity

THE BIGGER THE CITY, THE HIGHER THE CONCENTRATION OF PEOPLE, RESOURCES, INFORMATION, CAPITAL, POLLUTION AND GOODS WHICH NEED TO BE MANAGED IN DETAIL WITH CONSTANT AWARENESS

The answer to the question of how big cities may become is: "as big as we want them to become, as long as we create and manage them correctly". The absence of correct management can put an entire Mega-City in peril, such as what is occurring in Mexico City.

"the 20 millions inhabitants of Mexico City and its surrounding area, for example, draw over 70% of their water from an aquifer that will run dry, at current extraction rates, within 200 years, maybe much sooner. Already the city is sinking as a result" [18].

Mega-cities will speed up the growth of their vibrant urban centres, but with the imperative that we *"read the instructions"* and learn how to manage ourselves in them and how to use resources in an efficient manner.
The "good thing" is that workable approaches to managing Mega-cities infrastructure's complexities already exist.

The *"bad thing"* is the speed by which clean water reserves are depleted *"vaporizes"*. How can we ensure free access to fresh water in "megalopolis" with millions of "thirsty" citizens at the same time? It's mandatory to find a good answer soon, not to pass the point of no return.

The bigger the city, the higher the concentration of people, resources, information, capital, pollution and goods which need to be managed in detail with constant awareness. It's true that 60%-70% of Gross Domestic Product (GDP) is now generated from the largest 600 [19] urban centres, but these alone are consuming 80% of global energy resources.

It's pretty clear that the huge Mega-cities create a new urban dynamic and tensions. Commuters travel long distances from densely populated suburbs.
Economic activity frequently creates "outcasts", dissipating from the centre to the periphery. Often fragmented systems of metropolitan governance have not caught up with this trend, with the result that it is difficult to deliver an efficient, holistic approach to infrastructure challenges at a metro-regional level including the management of water resources.

18. The Economist, "Special Report: Water", [May 2010]

19. According to Matieu Lefevre (EXD at New City Foundation)

The City

2012 - 51%
Persentage of population living in cities

1.3 milion
Pople are currently moving into cities each week

80%
The energy resources consumed in a year

21 Megacities
Cities with over 10 milion people

6 milion
The water consumers in 2050

29 in 2025
The number of Megacities
is expected to reach

The Megacity

City Archetypes

At this stage it is interesting to review some case studies. Siemens, the German company, despite knowing each city has its own unique issues that require specific solutions, applies the same sociology-economical parameters to identify three different identikit archetypes [20]:

Emerging, Transitional and Mature.

Each of these reflect situational conditions which are affecting macro urban agglomerates all around the World, situations where we are living in today and which generations will face tomorrow.
Each of these three types is discussed below.

20. Prof. George Hazel, Doug Miller, "Megacity Challenges", Siemens AG [2012]

Mature Cities

Mature Mega-cities have much slower growth rates than both Emerging and Transitional Mega-cities, at around 1% on average. In some of these cities, the population has stagnated or is shrinking. Mature Mega-cities also have older population profiles. Mature Mega-cities have built out their basic infrastructure to serve their populations one or two generations ago. With high-quality infrastructure in place the challenge has shifted to coping with the need for renewal of ageing systems or to deal with obsolescence. Their existing infrastructure often no longer meets regulatory requirements or changing service expectations. Lastly, an additional trait of Mature Mega-cities is responding to the increased and changing demands for services of all types posed by their ageing populations.

They exist in countries that are typically around 75% urban.

Emerging Cities

Emerging Cites/Mega-cities tend to be characterized by high growth rates driven by migration and natural growth, much of which occurs in informal settlements not served by a pre-base of installed infrastructure and services. Emerging cities are typically in countries with urban populations of less than 50%.
Populations tend to be younger and with high male concentration, with a high proportion of poorly educated rural migrants. Social polarisation, and the gaps in wealth, health, education, and political power between groups are generally highest in Emerging cities.

Annual growth rates are in the order of between 3% and 6%. A 3.5% growth rate implies a doubling of population in 20 years.

Transitional Cities

Transitional Mega-cities have often developed mechanisms to more effectively manage dynamic growth, and may be witnessing a slowing of annual growth rates.
Continued population growth stems largely from migration, with lower natural population increases; several of these cities are seeing the first signs of an ageing population.
Transitional cities have similar infrastructure challenges as compared with Emerging cities but are better able to respond financially and organizationally.
Increasing affluence in these cities places additional new demands on infrastructure as growth in demand for transportation, water, energy, and services often greatly outpaced by population growth.

Growth rates are typically in the order of 2%-3% per annum and Transitional cities are often in countries that are more than 50% urbanized.

The City Like A "Sick Patient"

HOW CAN WE CONTINUE TO PROVIDE WATER, ENERGY, FOOD AND OTHER RESOURCES TO HUGE MASSES?

The rise of the Mega-city often divides observers between wonder and consternation. On one level, these super-sized cities are seen as the engines of the global economy, efficiently connecting the flow of goods, people, culture and ideas. They offer, at least potentially, unprecedented concentrations of skills and technical resources that can bring increased wealth and improved quality of life to vast numbers of people.

But Mega-cities are also *"the mother of all problems"* [21], creating huge demands on the Earth's natural resources and releasing unprecedented levels of waste, and therefore conjure an altogether darker vision. These cities face huge challenges ranging from congestion and pollution to security threats and inadequate services grinding under the weight of excessive demand. Overpopulation may have some benefits just for a restricted group of people or countries but it means poisoning all the others.

Those in the developing world also struggle to cope with the rapid growth of informal settlements. An extreme case is Mumbai, where almost two third of Mumbai's population of 14.0 mln lives in slums were clean water is a scarce commodity [22].

Today almost one in three of the world's urban population lives in slums, by 2030, says the UN [23], more than half of the population of Mega-cities, will be slum dwellers with no access to water or sanitation services whatsoever.

EX: One report cited a current example of an area in Mumbai, where one toilet serves 5,440 people!

The overpopulation issue poses crucial dilemmas: How can we continue to provide water, energy, food and other resources to huge masses? When shall we give the possibility for all to reach a higher level of welfare especially in developing countries? What could each human being do? These and other hundreds unsolved problems no doubt make up the Millennium Challenge.

21. Kotkin, Joel "The Problem With Megacities", Forbes [April 4, 2011]

22. "City of dreams? Over 8m slumdwellers in Mumbai by 2011", The Times of India [November 15 2010]

23. United Nations, "Water for sustainable urban human settlements", United Nations World Water Development Report 3: [2009]

Symptoms

IN A WORLD WHICH IS POPULATED BY OVER 7 BILLION PEOPLE AND WILL REACH 9 BILLION BY 2050, THE
CONURBATION LEVELS WILL BECOME EVER MORE COMPLEX AND INHOMOGENEOUS.

In a World which is populated by over 7 billion people and will reach 9 billion by 2050, the conurbation levels will become ever more complex and inhomogeneous.
The entire life risks to be irreversibly compromised.
It's a survival issue which depends on human intelligence and on how this "smartness" will be applied to coordinate and adapt to the changes.

It's a challenge felt as urgent by mayors, heads of economic development, local administrators, police chiefs and other civic leaders.
The challenges these leaders face is educating their young, keeping citizens safe and healthy, attracting and facilitating commerce and enabling the smooth flow of planes, trains, cars and pedestrians.

Anyway, it is no more the time to shake our heads sadly and sigh: "If only the leaders would lead then the people would surely follow"; because doing nothing or very little is the first of the greatest problems combined with a sense of stubborn refusal to accept responsibilities for our actions.

Global hot issues are causes and effects of the problem [24]:

• Global warming and environmental destruction
• Poverty and starvation
• Racism and discrimination
• Terrorism, torture, weapons... war in general
• Nuclear power

The extremely development of civilization urges us all to new levels of awareness responsibility and action.

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24. Glaeser, Edward L. "Why Has Globalization Led to Bigger Cities?", The New York Time [May 19 2009]

The Diagnosis

This unprecedented urbanization is both an emblem of our economic and social progress, especially for the world's emerging nations and a huge strain on the planet's resources. An immediate solution for solving all the problems reported so far does not exist.
But yes, there is a holistic strategy for *"healing"*.

If we think of the city as a *"System of Systems"*, it may be useful to consider the following three classes of systems: infrastructure, business and people.

INFRASTRUCTURE

Infrastructure systems include transportation, utilities, communications, water management and energy among others. The key objectives for such infrastructure systems are to significantly improve their quality, efficiency and sustainability. These may be provided by either private or public sector, or by public private partnerships.

BUSINESS

A city must also be an attractive place for conducting business, as ultimately this will be its key source of jobs and wealth. A smart city requires a smart government, in particular one with economic development policies to attract and retain companies and start new ventures.
This requires a well thought out approach to planning, product and services regulations, clear legal system, openness to foreign investment, taxation, favourable business environment etc.

PEOPLE

In the end, the top asset of a city is its human capital and its ability to attract and retain talented people.
Doing so it requires attention to a number of basic human services like education, health care and public safety.
But it also includes a rich variety of social, community and cultural services that will appeal to the people and families from all over the world that the city wants to attract, both as residents and visitors.

The Prescription

The way that major companies and key protagonists intend to take is the *"Smart City"* approach. This aims to define clever alternatives, true values to reach directly in urban spaces to transform problems into opportunities.
Focused and very radical changes in everybody's lives, through the assistance of technologies and sector specialists. "Smart City" indeed means that cities use intensive technology to connect people, services, and "things", the cities are therefore intelligent. *"Smart Things"*.
So it would be possible to explore new forms of aggregation between city and citizens or citizens to other citizens too.

Asking for services and participating in pro-active decisions for there own neighbourhood, citizens might suggest rescue (smart) solutions for problems which are affecting them.
5 main macro areas are identified for *"Smart City"* solutions.

• Environment
• Safety
• Transportation
• Utilities
• Buildings

25. fig.. Iclei City Issue Map For Sustainability, World Economic Forum [2009]

The Aim Of The Cities

In conclusion cities are hardly homogeneous. Each city has its own unique style and character, reflecting the key values that its citizens and their elected leaders choose to emphasize. The style and character of a city are particularly important in our increasingly global, mobile world.

In this huge real-digital environment we must have the ability to manipulate and to read core information in order to build up living criteria based on efficiency and opportunities for all.
The "three ICT Sisters"- IBM, Siemens and Cisco - apply their knowledge and their smart-business solutions and directories in the cities where they operate.
But, as remarked in previous chapters, the real revolutionary wave for significant changes comes from bottom up

smart-solutions thinking; people affect their neighbour's behaviour in a positive challenge for self improvement. In a "smart" challenge.

While poorer people will clearly go to those cities and regions where they can best get a job and earn a living, those with more education, marketable skills or financial means will choose to live in those places that offer them and their families the quality of life they are looking for.
These are clearly the kind of talented, entrepreneurial and innovative people that cities are increasingly competing to attract.

"SMART CITY"

4

RESPONSIVE ENVIRONMENTS

"Smart City"
Definition

CITIES STILL REPRESENT THE ECOSYSTEM WHERE INDIVIDUALS INTERACT. THE *"SMART"* ONES HAVE THE CAPABILITY TO EMPOWER OPPORTUNITIES IN BUILDING UP COMMON RESOURCES AND SHARE SOLUTIONS FOR ALL

In digging in the *"Smart City"* issues one finds dozens of different definitions, considering all these I would summarise the meaning as follows:

"I consider a Smart City as a Natural environment where things and living being are interconnected; you can see them, you can talk them, even if those are stones or chair"[27].

Cities still represent the ecosystem where individuals interact. The *"Smart"* ones have the capability to empower opportunities in building up common resources and share solutions for all. For this reason technological networks/wireframes are needed: fast, adaptable and capable to challenge with smart knowledge the needs of their days. This technology can be provided by the Internet.

Therefore a *"Smart City"* could be seen as an integrated network, a platform that allows individuals to easily connect with one another with extraordinary flexibility. The exchange of this information is possible also thanks to the technical implementation of the physical environment *"mouths, eyes and brain"* [28]. This process of implementation could reduce trading costs dramatically, stimulating individual initiatives and personal entrepreneurship. This might be defined *"Intelligent Process"* or *"Smart Process"*.

26. *"Le città sono un insieme di tante cose: di memoria, di desideri, di segni d'un linguaggio; le città sono luoghi di scambio, come spiegano tutti i libri di storia dell'economia, ma questi scambi non sono soltanto scambi di merci, sono scambi di parole, di desideri, di ricordi". Calvino, Italo, "Lezioni Americane", Mondadori [1993], pag. 80*

27. *Gracci Krogel, Beniamin "Persoanal consideration about the Smart City definition", [Aug 2012]*

28. *"Smarter Cities: Introducing - The Smarter City", [March 24 2010] http://www.youtube.com/watch?v=_6b_ztbpRaw*
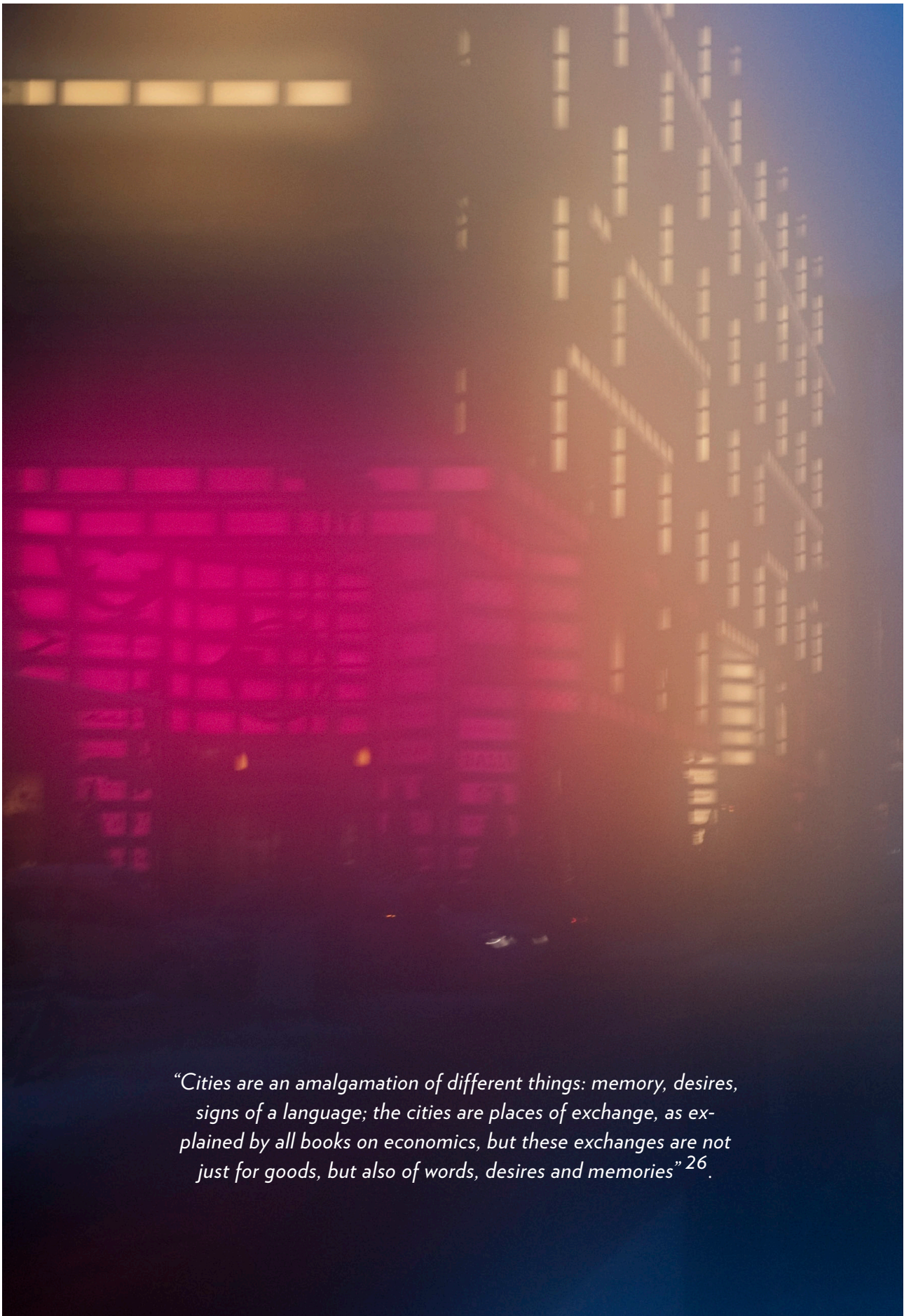
"Cities are an amalgamation of different things: memory, desires, signs of a language; the cities are places of exchange, as explained by all books on economics, but these exchanges are not just for goods, but also of words, desires and memories" [26].

The "Smart" Awareness

Talking about the Smart City is now a trend; something "interesting" for discussion, a new insight that could favour a new approach and so on rather than something that has *"relevance"*.

But as Luca de Biase warns, the question now is [29]: *who takes the decisions? How can we avoid the "smart spark" from become just a small transition time? On one hand, those who offer solutions for a Smart City could be visionary as well as than entrepreneurs who just want to generate profit for themselves; on the other hand, one who asks for those solutions could be an innovator with a social awareness of the cultural dynamics rather than a politician who sponsors his electoral policy. The risk is high –* de Biase continues *– because, whatever the choice, this is bound to have repercussions in the long run.*

The only way to cut risks is to recuperate, develop and promote a sensible awareness so that common people are oriented to take smart decisions and smart actions in the *"Smart"* direction.

"SMART CITY"

29. De Biase, Luca, "I'ntelligenza delle Smart Cities", [April 4 2012]
http://blog.debiase.com/2012/04/lintelligenza-delle-smart-city/

The Essential Conditions
To Be "Smart"

In order to qualify as a Smart City, the following parameters must be considered:
It should be:[30]

1 Connected
2 Neutral
3 Open
4 Efficient
5 Easy
6 Friendly

Essential conditions for de Biase are these pre-conditions:

. Each data generator element must be interconnected efficiently and naturally

. Each data generator element provides its data to all citizens in an open way

. Freedom of individuals must be defended from the intrusion by the collective control

. Every person is able to contribute to the service

. Missing data are generated by advanced sensors which give them access to the system

There is a need for integrating and connecting the systems in a rational way by building a platform where it is possible to link applications inherited from the past with the new ones that we must build now for the present and the future, like systems of sensors for security, privacy, etc.
There could be a great opportunity for citizens and associations in taking part and giving their contribution in building *"smart platforms"* .

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30. De Biase, Luca, "l'ntelligenza delle Smart Cities", [April 4 2012] http://blog.debiase.com/2012/04/lintelligenza-delle-smart-city/

"Smart City"
And The Invisible Technology

"THE TECHNOLOGY IS READY. CONSUMERS ARE READY. MANUFACTURERS ARE READY. THE WORLD IS READY. NOW IT IS UP TO DESIGNERS TO DEFINE WHAT THAT PRACTICE WILL MEAN"

New technologies deeply interact with the City, in an extraordinary new manner. Instead of distracting us, technology and its applications show us the City's anatomy and its secrets. Citizens can be active observers of a new phenomenon: "Networks bits combine with the atoms of the material World" as explained by Carlo Ratti on WIRED[31] interview some time ago.

Clouds[32] of sensors and electronic networks are changing the City in a *"Smart City"* where the Internet expands its influence, covering physical space in a phenomenon that could be similar to having an open-air computer wherever you need it.

Integrating technology with the surrounding environment not only helps us to surf, work and keep connected with other individuals, but also allows us to re-discover our interests for details: environmental conditions, services, connections, opportunities. And it is obvious that it is the Quality of Living that really matters.

"Right now is the time to create a practice of ubiquitous computing user experience design. The technology is ready. Consumers are ready. Manufacturers are ready.
The World is ready. Now it is up to designers to define what that practice will mean"[33].

We can talk about invisible interaction? And how is it possible? Computers are so much embedded in our daily life that they are getting *"transparent",* vanishing from human perception. Everyday life is exactly the same as today, but it is simultaneously altered by invisible computing everywhere.

So, how should we interact with these intelligent sensors? Exactly like in a car. Though contemporary automobiles contain dozens of microprocessors, most drivers will never recognize many of these tiny computers as such; indeed, they just feel the brakes react to road conditions, ideal climate adjustments, distance optic readers, GPS communications tracking and automatic gear adjustments.

31. Ratti, Carlo, "Le città diventano smart", WIRED Italy, [May 2012], pag. 76-77

32. def. "Cloud computing" Wikipedia [Sept. 2012] http://en.wikipedia.org/wiki/Cloud_computing

33. Kuniavsky, Mike, "Smart Things - ubiquitous computing user experience design", Morgan Kaufmann [2010]

Characteristics
Of A "Smart City"

SMART ECONOMY. SMART LIVING. SMART GOVERNANCE. SMART MOBILITY. SMART ENVIRONMENT. SMART SOCIALITY [34]

A Smart City should have the following six characteristics, built on the *"smart"* combination of skills and activities of self-decisive, independent and aware citizens.

SMART ECONOMY

SMART LIVING

SMART GOVERNANCE

SMART MOBILITY

SMART ENVIRONMENT

SMART SOCIALITY

34. "Amsterdam Smart City"
http://www.amsterdamsmartcity.nl/#/en

Smart Economy

FROM B2C AND B2B PERSPECTIVE SMART ECONOMY IMPLIES BUYING, PLAYING, BRAND INTERACTION, ADVERTISING, CASHLESS AND ALTERNATIVE COMMERCE, SMART CARDS, MOBILITY, MONEY AND PRODUCTION IMPACTS.

Smart Economy, which underpins the Cities service sector economies, includes factors related to economic competitiveness such as innovation, entrepreneurship, marketing, trademarks, productivity and flexibility of the labour market as well as the integration in the international market[35].

From B2C and B2B perspective smart economy implies buying, playing, brand interaction, advertising, cashless and alternative commerce, smart cards, mobility, money and production impacts.
Basic features for a *"smart economy"* could be:

• Innovative spirit
• Entrepreneurship
• Economic image & trademarks
• Productivity
• Flexibility of labour market
• International embedding (1)
• Ability to transform

CASE STUDY: AROUNDME[36]
AroundMe is a multi award winner app leading the way in local search, allowing its users to find what they want, when they need it. With over 6 million users and 25 million searches completed every month in over 200 countries, AroundMe is the most widely used app of its kind. AroundMe has recently integrated cutting edge technologies like Augmented Reality and GPS navigation such as Navigon [36], Mobile-navigator, Tom-Tom and Motion X-GPS Drive, and it works with the likes of Booking.com, Opentable, FourSquare [37], and other top notch localized data providers.
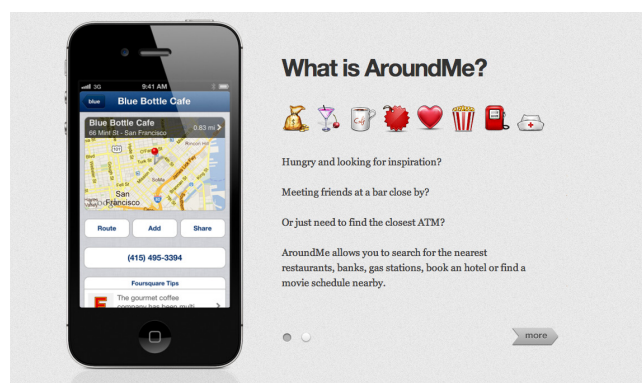
35. *"Songdo" as a designated Free Economic Zone and the first new sustainable city in the world designed to be an international business district. [2009]*
http://www.songdo.com/

36. *"AroundMe" was the first mobile application for the iPhone OS to use the Google's location-aware and also was the first mobile application to make use of Google dynamic mobile advertisement.*
http://www.aroundmeapp.com/

37. *"Navigon"*
http://www.navigon.com/portal/int/inde

Smart Living

FROM REMOTE MONITORING, POLLUTION MONITORING, PATIENT PARTICIPATION AND COLLABORATIVE TRAINING IN HEALTH TO THE REACTIVE ARCHITECTURE, MEDIA FACADES AND OPEN INFORMATION ABOUT BUILDING AND VENUES

Next, Smart Living comprises various aspects of quality of life such as culture, health, safety, housing, tourism etc. From remote monitoring, pollution monitoring, patient participation and collaborative training in health to the reactive architecture, media facades and open information about building and venues.

• Cultural facilities
• Health conditions
• Individual safety
• Housing quality
• Education facilities
• Touristic "Attraction"
• Social cohesion

CASE STUDY: Wifi Thermostat NEST[38-39]
The Nest thermostat is a good example of Smart Living. It is enabled with Wi-Fi chip, so that it can connect with your home network and also other devices like meters or appliances that will inevitably come with other smart-grid improvements in the future. Along with web connectivity Nest has also created mobile Apps and a website that enables one to remotely turn up or down the thermostat, and provide you more detailed data about home energy use.

38. "NEST"
http://www.nest.com/

39. Pogue, David, "A Thermostat That's Clever, Not Clunky", The New York Times [Nov. 30 2011]

Smart Governance

[...] ADDITIONAL CAPABILITIES THAN GOVERNMENTS SHOULD POSSESS TO MAKE THEIR JURISDICTIONS MORE SUSTAINABLE IN ECONOMIC, SOCIETAL AND ENVIRONMENTAL TERMS [40]

Smart Governance comprises aspects of political participation, services for citizens as well as the functioning of the administration.

• Participation in decision-making
• Public and social services
• Transparent governance
• Policy strategies & perspectives

CASE STUDY: New Urban Mechanics [41]
New Urban Mechanics is an approach to civic innovation focused on delivering *transformative* City services to Boston's residents. To speed the rate of municipal innovation and to increase its scope, the Mayor, in 2010, created the Mayor's Office of New Urban Mechanics. Part of Boston's Municipal Government, this office serves as the City's innovation incubator, building partnerships between City agencies and outside institutions and entrepreneurs to pilot projects in Boston that address resident and business needs.
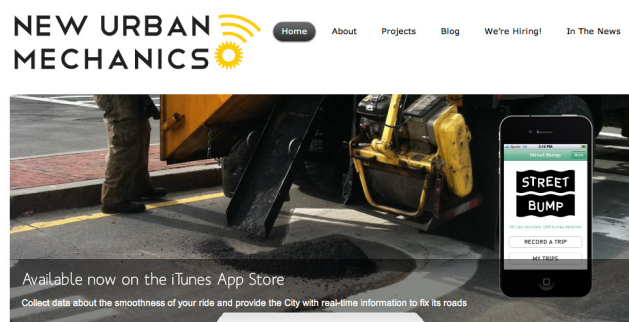
40. Di Maio, Andrea "Defining Smarter Government", Gartner Group [Nov. 14 2010]

41. "New Urban Mechanics" http://www.newurbanmechanics.org/

Smart Mobility

Smart mobility includes: transport and ICTs for local and international accessibility as well as the availability of information and communication technologies and modern and sustainable transport systems [42].

• Local accessibility
• Inter-national accessibility
• Availability of ICT-infrastructure
• Sustainable, innovative and safe transport systems

CASE STUDY: The Copenhagen Wheel[43]
Smart, responsive and elegant, the Copenhagen Wheel is a new emblem for urban mobility [44]. It transforms ordinary bicycles quickly into hybrid e-bikes that also function as mobile sensing units.
The Copenhagen Wheel allows you to capture the energy dissipated while cycling and braking and save it for when you need a bit of a boost.
It also maps pollution levels, traffic congestion and road conditions in real-time.

42. "Urbanow" An interactive information service for urban screens. he project has been developed in Helsinky. [2009-11] http://helsinki.urbanflow.io/

43. "The Copenhagen Wheel" http://senseable.mit.edu/copenhagenwheel/index.html

44. "The Copenhagen Wheel - Teaser" Dic 8 2009] http://www.youtube.com/watch?v=S7y3qlQu3Gc&feature=player_embedded

Smart Environment

SUSTAINABILITY AND PROTECTION OF THE ENVIRONMENT SHOULD BE THE FRONT AND CENTRE IN ANY ASSESSMENT OF THE CITIES OF THE FUTURE.

Smart Environment is described by attractive natural conditions: climate, green space, low pollution, resource management and also by efforts towards environmental protection. Sustainability and protection of the environment should be the front and centre in any assessment of the cities of the future.

• "Attractive" natural conditions
• Low Pollution
• Environmental protection
• Sustainable resource management

Case Study: City Dashboard[45]
City Dashboard is a project created by researchers at the CASA[46] research lab that gives you a quick and easy way to check the real-time "pulse" of your city via a single page that aggregates and displays information from public API's and a range of other data sources including:
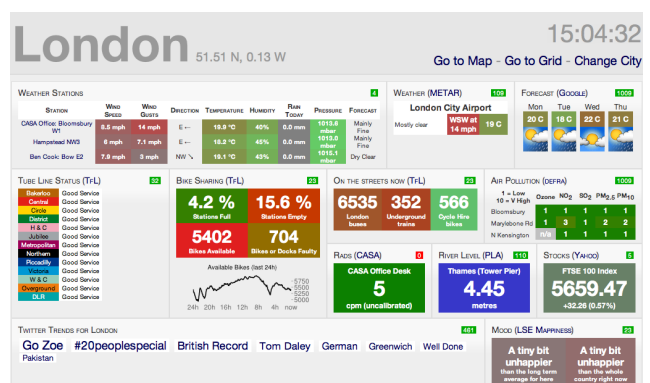
45. Dean, Will "CityDashboard - everything you wanted to know about your city", The Indipendent, [MAY 10 2012]

46. "The London CityDashboard"
http://citydashboard.org/london/

Smart Sociality

THE "SMART CITY" BECOMES THE NEW "SPACEBOOK" WHERE MEDIA BECOME MORE OF AN ENVIRONMENTAL EXPERIENCE.

Not only is the social and human capital described by the level of qualification or education of the citizens but also by the quality of social interactions regarding integration and public life and the openness towards the "outer" world[47]. The *"Smart City"* becomes the new *"Spacebook"* where Media become more of an environmental experience. Users have a personal identity, the possibility to write their own stories and share these with others and enhance public awareness.

• Level of qualification
• Affinity to life long learning
• Social and ethnic plurality
• Flexibility
• Creativity
• Participation in public life

CASE STUDY: Hyper Cities[48]
The Hyper Cities empowers citizens and researchers to use the tools of interactive *"time mapping"*.
With Hyper Cities, you can explore social, cultural, and political history in several Globe cities over time.
The site can be accessed from a web-browser in any school, community centre, government office, home, and academic setting, allowing citizens to dive into and create their own collections of *"mappable"* knowledge and cultural heritage. Community-generated content exists side-by-side with scholar-produced research data, thereby creating new interactions between traditionally separated domains of knowledge.

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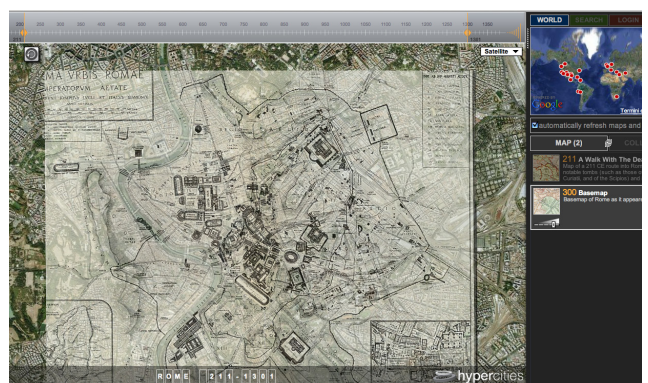
47. Smith, Rachel, "Can Karaoke Transform Public Space?", This Big City, [January 2 2012]

48. "HyperCities" is a collaborative research and educational platform for traveling back in time to explore the historical layers of city spaces in an interactive, hypermedia environment. http://hypercities.com/

Example Of
"Best Practice"

HEALTH-LAB AMSTERDAM - THIS PROGRAM FOCUSES ON INCREASING THE EFFICIENCY IN CARE.
APPLICATIONS ON OPEN DATA - THE OPEN DATA IS OFFERED WITHOUT CONTROL OVER HOW IT IS UTILIZED
AND REPACKAGED, GIVING THE DEVELOPERS FULL CONTROL OVER HOW THEY BUILD APPLICATIONS ON IT

BEST PRACTICE 1: Health-Lab Amsterdam[49]
This program, found in the metropolitan region of Amster-dam, has the ambition to create and stimulate solutions for the care of tomorrow. This program focuses on increasing the efficiency in care as well as on allowing elderly people or people with disabilities to be independent longer.
This should be done with the help of technology but not limited to technology. In Health-lab people from care institutions, research and private companies work together with the end-users to co-create solutions.
Health-Lab is a partnership between the care institutions in the Amsterdam metropolitan region, the local universities, government and private sector companies.

The program is set up around three pillars:

• A platform where all people meet, discuss and share development and implementation of new solutions in care;
• Several living lab locations were new solutions can be tested and improved, together with users;
• The creation of new curricula focused on the implemen-tation of these new solutions in educational settings.

BEST PRACTICE 2: Competitions for Applications on Open Data, Helsinki[50]
Helsinki has been opening its databases to the public.
To encourage the reuse of the data stored in them and to enable the businesses in Helsinki to create value out of the data, both for themselves and for the citizens.
The Open Data is offered without control over how it is utilized and repackaged, giving the developers full control over how they build applications on it.
The data that are provided in a raw format as well as via Application Program Interfaces, (APIs). The first sets of data opened to the public were the public transportation data, the timetables, routes and real time location of the busses, trams, metros etc.
Later other sets of data where introduced, including demographic, geographic, environmental and other sets.
There have been several competitions organized to bring attention and interest into the possibilities that the Open Data offers.

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49. "Health-Lab Amsterdam", with the partnership of AIM Amsterdamse Innovation Motor, [2012-13]
http://www.aimsterdam.nl/about-aim/english
http://www.health-lab.nl/

50. " Competitions for Applications on Open Data", Helsinky [2011], (original text reported)
http://apps4finland.fi/en/

5

THE ITALIAN "SMART" AGENDA

Italian "Smart" Realities

As seen in the previous chapters, many of the challenges that mankind must overcome in order to guarantee their future are taking place in urban areas.
Mobility, knowledge, work, quality of life, health, everything is played out in urban areas, combining solutions generated by individuals. To make this possible a minimum technological infrastructure needs to be present in the cities. First, data must be opened (OS); second, sensors must be widespread; third, both digital and physical network are required.
The more a platform is designed and managed in an open way, the more the conditions are favourable for the development of an intelligent community.

Italy could take up this challenge. Indeed, thinking about recent changes in this country, we might immediately detect good opportunities to increase the value the existing cultural heritage which the entire world could envy.
An example is the real-time monitoring of the "healthiness" of archaeological sites (eg. Pompeii) for improving sustainable tourism.

Luckily, several local realities have already embraced this approach by highlighting their unique characteristics. Protecting the cultural local identity is one way of enriching and promoting could be smart realities.

The following section reviews specific examples of how some Italian cities have in recent years distinguished themselves in managing local resources in order to improve delivery of a specific service to its citizens.

Bari:
Bari has prioritized sustainability efficiency in public and private buildings, in addition to reframing the optimization of water and waste management.

Florence:
Florence is investing on management and enhancement of its cultural heritage and better mobility.

Milan:
Milan is focussing on energy efficiency, transportation and urban planning in sight of the Expo 2015.

Turin:
After ten years of restyling, switching from industrial to tourist destination, Turin aims at creating hyper-fast broadband.

Perugia:
Perugia's new mobility system is providing a car-free way to visit the city.

51. GRAPH |Italy and its smart growing realities

The "Big Cake" Of Opportunities

ITALY IS IN THE PROCESS OF RENEWING MANY OF ITS INFRASTRUCTURE, WELFARE SERVICES AND PRODUCTION REALITIES THEN... MAKE IT SMART!

Italy is in the process of renewing many of its infrastructure, welfare services and production realities[52].
This provides an excellent opportunity for a systemic strategy of intervention and for technology diffusion throughout the territory. The "digItalia"[53] decree recently approved legislation for upgrading the countries technological infrastructure, marks an important stage of this objective.
The decree establishes rules on financing the process of "upgrading" the country's digital infrastructure; this investment aims at enhancing the provision of new services for the communities, cutting off the bureaucratic chain, and hopefully, reaching a better level of clarity and equity never known before. Even if the government is still making good progress the *"digItalia"* approval needs time. In the meantime many local realities are working in the same direction.

This chapter presents some inspiring *"smart"* challenges and good practices which are already running and giving back positive results [54].

52. Granelli, Andrea "La città che produce intelligenza - la mia agenda digitale", WIRED Italy, [April 2012], pag. 65-66

53. Di Corinto, Arturo "Agenda digitale italiana, primo sì ma per l'agenzia rinvio a settembre", La Repubblica (Tecnologia), [July 26 2012]

54. Palma, Gabriele "La città ideale di Wired", WIRED Italy, [June 2012], pag. 78-80

55. 2011 "quality of living worldwide city rankings" Mercer Survey [Nov 29 2011]
http://www.mercer.com/press-releases/quality-of-living-report-2011

56. Purvis, Andrew, "Is this the greenest city in the world?", The Guardian - Observer Magazine climate change special edition [March 23 2008]

57. "Drive Now" Premium Car Sharing by BMWi, MINI and Sixt
https://www.drive-now.com/international/?L=1&language=en_GB

58. ISPRA, "Rapporto Rifiuti 2009"
http://www.isprambiente.it/it/pubblicazioni/rapporti/rapporto-rifiuti-2009

59. "E-Governament solutions"
WIRED Italy, [June 2012], pag. 85

60 "Orti urbani"
http://ortiurbani.blogspot.it/2011/03/orto-diffuso-mappatura-degli-orti.html

Open Government

The proactive involvement of citizens in public life, social services and decision-making is the main fact to enable an open government.
Open government is the key-indicator for advanced and democratic communities.

Ex: Finland and other Baltic countries are on the forefront for voting systems and democracy applications.

Quality of life

Cultural opportunities, public health, individual safety, housing quality, education, tourism and social cohesion are the essential values on which Austrians and Belgians have been investing heavily.

Ex: Vienna is considered the top in World ranking [55].

Diffused energy efficiency

The city is powered by a *"smart grid"*. An intelligent network capable not only to distribute the power produced by traditional power plants, but also to gather the energy created by thousands of micro-sources, like solar panels and wind mini-generators installed and deployed in private homes.

Es: Freiburg in Germany has decreased more than 30% its CO_2 emissions [56].

Sustainable mobility

Real-time traffic tracking and optimization of public transportation in addition to empowerment of bike sharing system and adoption of electric-powered vehicles provided by municipality or private ventures

Ex: "Drive-Now"[57] it's a service in Berlin, Munich and Dusseldorf which is offering citizens an efficient rental service with more than 1000 eco-vehicles.

Municipal waste efficiency

Every Italian produces 0.5 tonnes of waste every year. Of these only 33% is recycled, 53% ends up in landfill site (9% in Lombardy, 99% in Sicily).
By 2020, recycling must reach 50% [58].

Ex: Switzerland since years has adopted an efficiency dumping system.

Supports the creative enterprises networks

Creative people and scientists are not just looking for better rewards, they are searching for quality of life and cultural communities into the city.
Being supported by local governments in providing spaces at low price is a strong incentive for Crowd-sourcing skills.

E-Payment for services

In Italy Today the mobile payments amounts only to 700 million Euros, with roughly 30% for the purchase of physical goods (supermarket shopping) and services (public transport, parking, paid parking). But in 2015 smart-phones equipped with the NFC technology in Italy will be 20 million.

Ex: Tokyo, where consumerism and technology "dependence" get together, similar systems are still running since two years.

Public safety

Data analysis and tracking techs can greatly improve the fight against crime. Today citizens can help actively the city institutions in terms of safety; they can map their neighbourhood, easily communicate with the community and highlight potential dangers.

Ex: criNew York advanced analysis of crime and internal migration to cities has helped to reduce the crimes of 30%.

Tourism revitalization

The beauty and quality of life of a city attracts tourists, but also young talents, Innovative companies and investors, so it is precondition to keep enhancing the cultural heritage, not only creating but also recuperating locations.

Ex: "Le Murate" in Florence's centre, it was a female prison that has recently been converted in a public space for artists, tourists and citizens.

E-Governament solutions

Promoting citizen participation and transparency in government is a democratic priority but just 8% of Italians have access to forms of e-gov, meanwhile in Europe the average is 21% [59]. The datum emphasizes once again the serious and absolute need to develop new forms of participation to politics and decisions making.

Urban requalification

In italy there are over 12 million residential buildings and a consistent part of these are derelict, mainly located in villages and small towns that currently fall in ruins and are left by its inhabitants. Most of us live in historic houses. What to do? Fewer new and creative solutions.

Ex: borgo di sempronio (gr) is an example of diffuse hospitality (the so called "albergo diffuso"), where guests are welcomed in different spaces located in the historical village's centre.

Km zero

Cut the supply chain and bring food production closer to the consumer. Urban vegetable gardens, hydroponic system illuminated by leads. Producing and consuming seasonal food locally saves energy and cut in half the greenhouse emissions [60].

Ex: in milan "orti urbani", "farmer's market" and others social initiatives point to a strengthening of these forms of sustainable trade.

Urban/rural welfare

Thanks to the internet of things, sensors and geo location the social welfare system can monitor directly from remote the health of its patients. Injuries, blood pressure changes and other common symptoms can be easily treated by doctors from distance; this solution is a significant step toward in saving costs for hospitalization and patient well-being.

Ex: the "safe control" is a project which is already running in Puglia; a smart-box, positioned in the patient's house can constantly monitor its health log.

Brownfield development

Investments in culture and creativity, together with the reconversion of disused industrial estates in and around urban areas are a powerful engine of urban redevelopment.

Ex. The Florence major has introduced a development criteria in the new master plan, that before approving new construction all unused buildings should be exploited first.

Commercial networks 2.0

The small-talks (consumer blogs?) On the web orient and optimise e-commerce and shopping in physical stores; the malls "natural" concept is revisited into a new dimension of commerce with trade benefit for both sellers and buyers.

Ex: Barcelona, where the monitoring of pedestrian dynamics has enhanced the growth of targeted retail stores.

Smart Water

If we look at water from a holistic point of view, it's quite easy to discover that this resource is embedded with the environment: things and human beings.
Given the explosive demographic growth and chronic water shortages, now is the right time to reposition water on the main stage of citizen's lives; sensors, screens and tracking devices can give water the possibility to manifest how this element has crucial relevance for the future of this Planet. Therefore, engineers, designers and artists have the possibility, if not the responsibility, to bridge this dialogue between the water supply and human consumption in a brand new manner.
The aim is redefine the appreciation of water from just an affordable element which is immediately available for us to a higher level, of knowledge of wisdom which takes into account the long term impact of its consumption.
Creation of new local services, the upgrading of the older ones and offering open platform for citizen's participation can be the right step for the strategy of resource preservation.

Men and machines, if allied together, may improve the speed rate of Cities' awareness, in a process of deep revitalization through the ideas of alternatives in doing business and living together peacefully.
This is not a hope but the result of constant application of some people to achieve the condition to make another step forward; some practices of already existing realities are reported in the previous chapter.

The *"internet of things"*, instead, which is now fully integrated in most of our lives is, one the hand, the voice that allow to share experiences and creativity; on the other hand, it's the "shield" for the ordinary citizens to defend their common values from the interest of those seeking to commodify and exploit water for profit.

6

THE WATER WORLD

Water:
A Liquid Asset

WATER IS THE EXTRAORDINARY OPPORTUNITY THAT WAS GIVEN TO HUMAN KIND TO RAISE ITS
CIVILIZATION ON THIS PLANET, AND PERFORM ALL ECONOMIC ACTIVITIES, INCLUDING PRODUCING FOOD,
ENERGY AND INDUSTRIAL OUTPUTS

Clean water is a vitally important natural resource, demanding careful management. It is essential for life and integral to virtually all living organisms.

Water is the extraordinary opportunity that was given to human kind to raise its civilization on this planet, and perform all economic activities, including producing food, energy and industrial outputs. The availability of clean water in sufficient quantities is not only a prerequisite for human health and well-being but also essential for freshwater ecosystems and the many services that they provide. That's why this topic is so attractive and challenging, even if waters general conditions degenerate day by day.

Anytime we open the tap or we hydrate our gardens, a complex and invisible distribution process starts; an extraordinary ramification of many interlaced activities, managed by humans and not, which make this extraordinary engine supply *"liquid life from pipes"* onto our faucet. Of course water is a subject that deserves a deep understanding and long time to dive in, much more than any thesis or book can do.

This section provides a local perspective inside the Italian context. The attention is focused on the existing local water services set into the province of Florence boundaries'. I chose this city, because it has several factors like size, background history, characteristic of its running services and also the behavioural peculiarity of dwellers, those could be consider important aspects to run a platform with a beta service for water.
As seen in previous chapters, the city is getting *"smart"* faster than other places, because it has an inner potential to affect a new wave of opportunities for its citizens in: business, quality of life, environmental and social interactions; basically the tools to reset society into a sustainable direction.

Before narrowing into project's details, it is useful to review some important aspects of the water life cycle, in order to have a general understanding of the context and its actors that are working across.

Water Challenges

WATER IS THE REASON WHY, PERSONAL INTERESTS, NATIONAL STRATEGIES AND COMMONS RIGHTS RAPIDLY RECALL THE AWARENESS OF THE MASSES TO TAKE PART TO THE WATER REVOLUTION.

"As the world charts a more sustainable future, the crucial interplay among water, food and energy is one of the most formidable challenges we face. Without water there is no dignity and no escape from poverty" [61].

The issue is wide and far reaching, it is a world challenge indeed. The global water has become a most powerful symbol of the growing inequality in our world. Indeed, water is the core topic around which many social and political conflicts occur.

"The proportion of people living in countries chronically short of water, which stood at 8% (500 m) at the turn of the 21st century, is set to rise to 45% (4 billion) by 2050. And already 1 billion people go to bed hungry each night, partly for lack of water to grow food"[62].

Water is the reason why, personal interests, national strategies and commons rights rapidly recall the awareness of the masses to take part to the water revolution.

61. Ban Ki-moon - United Nations Secretary-General; "World Water Day 2011: Water and Urbanization", UN-HABITAT [2011]

62. The Economist; "Special Report: Water", [May 20 2010]

63. Barlow, Maude; "Blue Covenant: the global water crisis and the coming battle for the right to water", The New Press [2007], introd.

64. "Velonia"
http://www.veoliawater.com

65. "Siemens"
http://www.siemens.com/

66. "Nestlé"
http://www.nestle.com/

67. "Coca-Cola"
 http://www.thecoca-colacompany.com/

68. "Pepsi"
http://www.pepsi.com/

Water - Environment

The environmental issue is on front line: where it sees the industrialized nations push the limits their extraction of water from any centimetre and deepness of the ground; companies continue spilling out water with the idea that is an unlimited resource.

There was a time (when population levels where manageable) when it was a renewable source, but not anymore. Nature can't force its processes. Water enters clean in industries and urban areas, but once it gets out of there it is a liquid that is either useless or may require heavy filtering. In this perilous scenario, none of the global governments seem to be able or brave enough to set up a straight strategy in respect of Kyoto protocol, or even more important in respect of their citizens.

Water - Business

Ethic is another big one: "into the arid Kingdom who has got the water is the King". Is there still space for democracy? Yes, keeping away the many private interests from a resource that belongs to everybody. Is it easy?
No.
Corporate are so powerful and they are a direct apparatus of banks institutions like: World Bank, the International Monetary Fund, the World Trade Organization, the World Water Council and parts of United Nations[63]. So, what do I have to do? Watch out for water issue; if you are used to delegate decision to others, one day, bad ones could be dried you. What we can do? As a *"smart"* citizen you are already part of the solution, because you are informed, connected and willing to increase the efficacy of raise awareness campaigns. To struggle for common rights in first person is the water justice movement (one of the many existing), which is probably formed by environmentalists, human rights activists, indigenous and women's groups, small farmers, peasants and thousands of grassroots communities fighting for the control of their local water sources, plus you.

Water - Ethic

The water business has increased its growth numbers yearly at exponential speed rate in the last twenty years. Dozens of companies rise up in developed countries with the noble intent of offering high-tech for water purifications like desalination, nuclear desalination and nanotechnologies. This last entrepreneurial wave goes directly to increase the already existing *"block"* of Corporations. The Corporate block represents the supremacy in the water market, without any competition at the same level, but it is still having huge opportunities for profit.

The control of water services, infrastructure management and food&beverage are held by a few corporations Gdf Suez and Veolia[64]; GE and Siemens[65]; Nestlè[66], Coca-Cola[67] and Pepsi[68]. Those and other water companies set the stage for the complete commodification of the world's fresh water supply and the creation of a global corporate-owned water cartel.

Water - Government

The challenge for the government is to redefine an efficient frame of rules to protect their citizen's rights against private interests. Place clear boundaries in between the water and the private interests of a few.
This is an uphill process that needs the aid of each person; no profit organizations are required for vigilantes.
The deregulation and the power of water lobbies boosted by the support of banks (W.B. And MF), have a top down deep-rooted influence on governments, which are dealing with profitless conditions, sometime forced sometime not.
The major scandal is the bargain price of land concessions, and the relative duration of this agreement, which often are not taking in consideration the environmental costs and risks.

The
Private Sector

THE REVENUES OF THE PRIVATE SECTOR OPERATING IN THE WATER INDUSTRY IT IS AROUND 400 BILLION OF US$ [...] IF WE ADD ALSO THE GALAXY OF OTHER WATER COMPANIES THE ANNUAL REVENUES INCREASES UP TO 700 BILLIONS OF US DOLLARS

Water has always been seen by everybody as a public and common resource, but something at certain point has changed dramatically.
Since the private sector has realized that our world was running out of clean water, has tried to exploit the governments' lack of specific strict laws on the issue, so that its control will be more powerful and profitable.

Indeed, private for profit *(PFP)* companies now provide municipal water services in many parts of the world; put huge quantities of water in bottles for sale; control vast quantities of water used in industrial farming, energy production, cars, computers and other water intensive industries. The private sector owns most of the dams, pipelines and technologies for water treatments such as: nanotechnologies, water purification systems, desalination plants. Governments are looking at the private sector for infrastructure technologies to replace the old municipal; control the virtual water trade; buy up groundwater rights and whole watersheds in order to own the largest quantity of water stock and industry market trade in share to increase dramatically its profits [69].
All of this development in private water industry has arisen in just two decades, since the first governments deregulation in public sector in early nineties.

How big is the water industry? Summarizing the revenues of the private sector operating in the water industry it is around 400 billion of US$.
When we add also the galaxy of other water companies the previous numbers increase by other 300 billion of US$.
We can say that the proportion of water service business has reached total annual revenues of 700 billions of US dollars [70].

What if I consider not only the water waste treatment service I did? It's clear that if bottled water is included, as well as the billions that will go into the urban water infrastructure, plus the emerging technologies of purification, desalination and nanotechnologies, the global water market can approximately arrive to the amount of a trillion dollar plus per year industry with no limit in sight.

The water business is the fastest in growing compared with others and especially with the *"Olympus"* of what is considered the *"three sisters"* assets industries: Oil, Gas and Electricity. In 2006, according with John Dickerson of the San Diego Summit Water Equity Fund, the size of the *"Universe"* of water enterprises has reach the number of 360 and is continuing its expansions.

69. Barlow, Maude; "Blue Covenant: the global water crisis and the coming battle for the right to water" The New Press [2007]; pag. 35

70. Dickerson, John; San Diego Summit Water Equity Fund [2006]
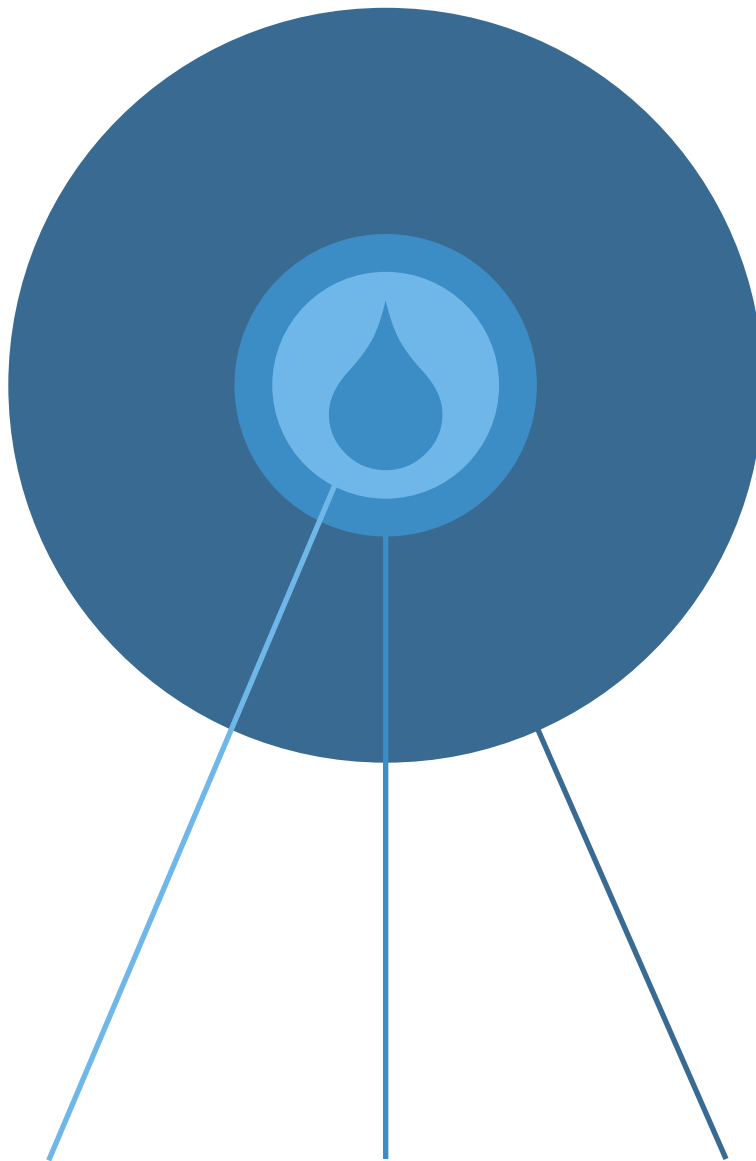
300 BILLION

Pump & Filter Companies
Engineering
Construction
...

400 BILLION

Service Companies
(Traditional management)

1 TRILLION

Bottled Water Ind.
Emerging Technology
(Desalinisation, Nano-
techs, etc.)

Tech Drops

DESALINATION

Desalination [71] is widely discussed and increasingly used to meet freshwater demand in water scarce regions. The greatest desalination capacity both installed and projected, is found in the Middle East and North Africa, which account for more than 70 % of global capacity. Europe holds some 10% of global capacity, with Spain the biggest user of desalination with a capacity of 1.6 million m3/day [72]. Spain is currently discussing increasing its capacity dramatically, with 20 new installations planned. The market is expected an expansion in investments from current 70 billions of euro up to 150 billion Euros in 2015 [73].

NUCLEAR DESALINATION

This kind of sea water conversion it's quite similar to the desalination one, with the variant in exchange that goes together with a nuclear power reactor. The reactor is used as source of energy, because the desalination process has the one of the highest consumption in electric energy among the industrials processes ever made by humans. Nuclear desalination implants are already operating in Japan, Kazakhstan and India; their construction is ongoing also in Morocco, Egypt, Tunisia, Algeria, Iran, and China, Pakistan, Russia; and recently also Argentina and Indonesia still thinking about according with what is reported by the Global Water Intelligence [74].

71. "Desalination" [2010]
http://www.edwardsaquifer.net/desalination.html

72. Dr.-Ing. Tobias Bleninger & Prof. G.H. Jirka, Ph.D.; "Environmental planning, prediction and management of brine discharges from desalination plants"; Karlsruhe Institute of Technology [2010]

73. "Desalination markets 2010 - global forecast and analysis"; Global Water Intelligent report [2010]

74. "Nuclear Desalinisation" [2009]
http://www.world-nuclear.org/info/inf71.html
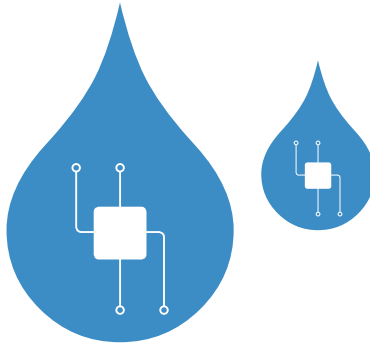
NANOTECHNOLOGIES

The membrane separation technologies of *reverse osmosis*[75] (hyper-filtration) and *nano-filtration* [76] are important in water treatment applications.

Reverse osmosis is based on the basic principle of osmotic pressure, while nano-filtration makes use of molecule size for separation.

Recent advances in the field of nanotechnology are opening a range of possibilities in membrane technologies.

These include: new membrane preparation and cleaning methods, new surface and interior modification possibilities, the use of new nano-structured materials, and new characterization techniques [77].

Unfortunately, recently studies reveal that treated water can contain residues from a whole host of toxic substances, including pharmaceuticals, hormones, antibiotics and endocrine-disruptors which are chemicals that mimic the effect of oestrogen and have been linked to sexual abnormalities and disorders in both humans and animals [79.]

HYPER TECHNOLOGY

Emerging technologies for water production, alternative to the natural one, are creating investment interest; one of these are the manufactures of *Atmospheric Water Generation* (AWGs)[80]. AWGs are machines that literally suck water from the condensation found in the air, some are aiming to take larger amounts of water from the atmosphere to supply dry regions and population with water.

Aqua Sciences [81] is a Florida based AWG company that has developed the technology to product 450 litres of water a day from fully self-contained mobile freshwater generating systems, immediately adopted by US Army in deserts campaigns as Iraq and Afghanistan.

Another Hype-Tech which in China is still investing more than 50 million euros a year and employing 40.000 people is, what in slang is called *"cloud theft"* or *"cloud seeding"* [82].

75. "Reverse Osmosis"; Wikipedia [Sept. 2012]
http://en.wikipedia.org/wiki/Reverse_osmosis

76. "Nano-filtration"; Wikipedia [July 2012]
http://en.wikipedia.org/wiki/Nanofiltration

77. Barlow, Maude; "Blue Covenant: the global water crisis and the coming battle for the right to water" The New Press [2007]; pag. 76-77

79. Mel Suffet, Joe Pedersen and Mary Soliman; "Water Technology Research Center & Nano Systems Institute"; UCLA University of Wisconsins [2009]

80. "AWG"
http://www.advanceddryer.com/

81. "Aqua Sciences"
http://www.watair.com/company.php

82. "Cloud Theft" or "Cloud Seeding" [April 2007]
http://www.edwardsaquifer.net/cloudseeding.html

The World
In A Bottle

IN THE 1970'S ONE BILLION LITRES WATER WERE SOLD ANNUALLY AROUND THE WORLD […] FROM 2006 MINERAL WATER CONSUMPTION HAS RISEN UP CLOSE TO THE 200 BILLION LITRES SOLD EVERY YEAR

Since its creation in 1855 in France under the brand of Vittel, mineral water sold in bottles has never had a moment of crisis. After 100 years the same water brand, Vittel, unveiled the first plastic water bottle aimed at mainstream consumer market and the race was on. From that moment, what started as an upscale consumer product became one of the fastest-growing industries in the world.

In the 1970's one billion litres water were sold annually around the world. From 2006 mineral water consumption has risen up close to the 200 billion litres sold every year. On average in the past decade annual growth has been of 10%. It's a business seems to have no boundaries [83].

It's seems interesting now, narrowing the focus on who is responsible for the outstanding growth of the mineral water industries. First we must look at the US market, which alone takes hold both records in water consumer ranking.

The average yearly water consumption pro-capita in US is around 170 m^3, than the global bottled water in States is up than 32 billion litres.
Following countries are Mexico with 20 billion litres per annum, China and Brazil 14 billion litres per annum. Then there are Italy and Germany with 12 billion litres a year each. Of course, not in every mentioned country the consumption growth rate is the same; therefore, in developing countries, for example India has seen its consumption grow by 500% in the last five years; China, Mexico and South Africa are growing at 25% annually.
So the country with low economic level and high levels of poverty can have very high water consumption rates. Pricing and affordability are also key factors.

"For the price of one bottle of Evian, the average North American could buy 4000 litres of tap water" [84].

83-84. Barlow, Maude; "Blue Covenant: the global water crisis and the coming battle for the right to water" The New Press [2007]; pag. 82

200 billion

10%
Annual growth of bottled water industry

1 billion
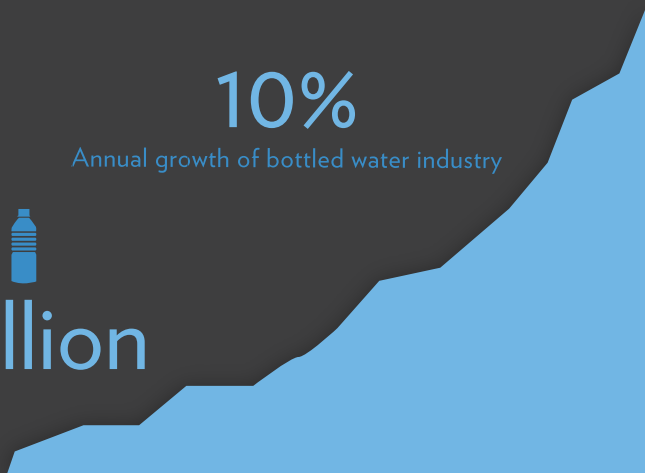
1970
Litres of water sold around the world

2006
Litres of water sold around the world
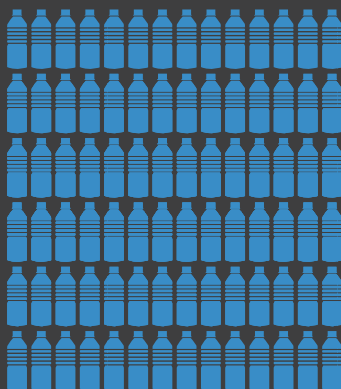
1.000.000
Water Bottles

Water Bottles Exported
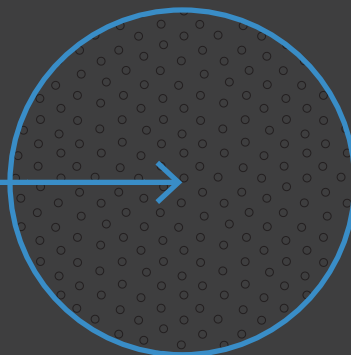
18.2
Tons of Carbon Dioxide

The Water Kingdoms

The bottled water industry is dominated by the food Swiss giant Nestlé, which in its history has adopted the strategy of *"finding & incorporating"* producers of complimentary brands. Over years Nestlé has been buying up successful established brands, such as Vittel, Perrier, San Pellegrino and Poland Springs and since 1998 has launched its own water division: Nestlé Waters.
Nestlé's water business has grown in the past decade by almost 15% a year, and represent 10% of company's revenues. Nestlé's tactics have to buy up established brands once they become stable and successful.
The Swiss food conglomerate is the king of water industry, by owning more than 70 different well-known brands sold in 130 countries [85].

In Europe Nestlé has just on competitor: Danone which has Evian and Volvic waters with annual sales of nearby 20 billion litres and the quote of 70% in emerging countries with a rose of 10% a year.

Leaving the European region, where are Pepsi and Coca-Cola which, unlike their European competitors, Pepsi and Coke use tap water, which they add minerals during the osmosis process.
Coke, has been reported by *Fortune* magazine, still sell way more than its rivals.

85. Barlow, Maude; *"Blue Covenant: the global water crisis and the coming battle for the right to water"* The New Press [2007]; pag. 86

Who Is The Target Consumer?

TODAY, WATER ADVERTISEMENT "WEAPONS" ARE SHARPER THAN BEFORE AND CONTINUING TO HAVE A TREMENDOUS IMPACT IN AFFECTING PEOPLE'S BEHAVIOUR, PLAYING ON THE MYTH OF DECLINING PUBLIC WATER SYSTEM

Who is the main target in *"producer's water war"* now? In most industrialized countries tap water is safe and often more so than bottled water, as reported by global and local surveys by UN, EU Commission, Legambiente and other organisms for Health Protection.
Anyway, bottled water industry market increases its revenues with an average increase of 12-15% a year, why? Today, water advertisement *"weapons"* are sharper than before and continuing to have a tremendous impact in affecting people's behaviour.

Producers successfully play on the myth of declining public water system and on few incidents of contamination that have happened, to sell their product as the only safe resource of water.
The new target for the bottled water industry is children [86]. Nestlé has spent in water samples advertisement campaigns (for kids), such as 17 million of euros in 2004-2005 marketing Aquapod water, shaped like a rocket and aimed at six to twelve years old market.

86. Barlow, Maude; "Blue Covenant: the global water crisis and the coming battle for the right to water" The New Press [2007]; pag. 85

The Plastic Mirage

FEWER THAN 5% OF PLASTIC BOTTLES AROUND THE WORLD ARE RECYCLED, MOST ARE EITHER INCINERATED, WHICH PRODUCES TOXIC SUBSTANCES THAT NEED THOUSANDS YEARS TO BE BIODEGRADED

Mr. McGuire: *"I just want to say one word to you. Just one word".*
Benjamin: *"Yes, sir".*
Mr. McGuire: *"Are you listening?"*
Benjamin: *"Yes, I am".*
Mr. McGuire: **"Plastics".**

The Graduate – 1967

"Plastic" is the magic word that Mr. McGuire's warmly recommended to Benjamin's ear in the famous movie *"The graduate".*
Mr. McGuire was right indeed, plastic materials since their chemical synthesis never stop to grow up in markets as well in the environment.
The bottled water industry is one of the most polluting industries on Earth, and one of the least regulated.
The PET (polyethylene terephthalate) is a synthesis from crude oil and chemicals which, after some steps get filled by water, but it is just the beginning of a long way.
Nearly one-quarter of all bottled water crosses national borders to reach foreign consumers, using enormous amounts of energy to fuel the boats, trains and trucks carrying it.

Worldwide, 2.7 million tons, about 2.5 billion kilograms of plastic [87], are used to bottle water every year, creating mountains of garbage and fouling waterways.
Fewer than 5% of plastic bottles around the world are recycled, most are either incinerated, which produces toxic substances that need thousands years to be biodegraded. Plastic is the main issue. Fifty years ago, most flotsam was biodegradable. Now it is 90% plastic. In 2006, the United Nations Environment Program estimated that there were 46,000 pieces of floating plastic in every square mile of ocean. It's curious, indeed, what you can find while you are sailing across the Pacific Ocean, a plastic monster called The Pacific Garbage Patch [88] whose definition is reported below .

Garbage Patch or the Pacific Trash Vortex is a floating monument to our culture of waste, the final resting place of every forgotten carrier bag, every discarded bottle and every piece of packaging blown away in the wind.
Opinions about the exact size of this great, soupy mix vary, but some claim it has doubled over the past decade, making it now six times the size of the UK [89].

87-89. Cumming, Ed; "The Biggest Dump in the World"; The Telegraph [March 16 2010]

88. The Pacific Garbage Patch it has been formally discovered in 1997 by Charles Moore, an American yacht-racing captain sailing home across the North Pacific from a competition in Hawaii.

Bottled
Water's War

WATER BOTTLERS PAY ALMOST NOTHING FOR THE WATER THEY EXTRACT AND IN MOST COUNTRIES PAY LITTLE OR NO ROYALTIES OR TAXES ON THIS COMMON HERITAGE FROM WHICH THEY EARN SUCH HUGE PROFITS

Some of the arguments between those who sponsor bottled mineral water, and those who are pro tap-water, on the quality, safety and chemical properties.
Each accuses the other one, again *Public vs Private*, but numbers give the public sector one of the right to confirm that water from your tap is good and safe.
Publiacqua, the public water provider in Florence, makes 235.000 tests a year [89]; 9000 directly in its lab in addition to the ones made by the Local Health Authority (ASL) and University of Chemistry in Florence. Instead, studies have found that because it is largely unregulated, some bottled waters (private) are less safe than more highly monitored (public) tap water. A 2004 study of 68 brands of European mineral waters by the University Medical Centre in the Netherlands[90], has found "high levels of bacteria contamination" including traces of legionella bacteria. Coca-Cola was forced to recall all its Dasani bottled water from the UK market in 2004, because the high level of bromate.

However the market is so large and profitable that bottled brand producers such as Coca-Cola are continuing their aggressive marketing campaigns promoting their bottled water as healthier and better than tap water; they effectively consider bottled water as a commodity by all standards.

Water bottlers pay almost nothing for the water they extract and in most countries pay little or no royalties or taxes on this common heritage from which they earn such huge profits.[91]

This as also create reason has also created a powerful backlash against the commoditisation of water that forms the core impulse for the global water justice movement. Organised and active citizens are the best shield to challenging the growth of private interests and political influences of international corporations.
The aim is to protect this precious public good against privatization, the heritage of humanity for the benefit of the many and not the profitable control of the few.

89. "Publiacqua S.p.a", The Florence water provider
http://www.publiacqua.it/qualita/Controllo%20Acqua

90. 44th Annual Interscience Conference on Antimicrobial Agents and Chemotherapy, Washington, D.C., Oct. [Nov. 2, 2004]

91. Barlow, Maude; "Blue Covenant: the global water crisis and the coming battle for the right to water" The New Press [2007]
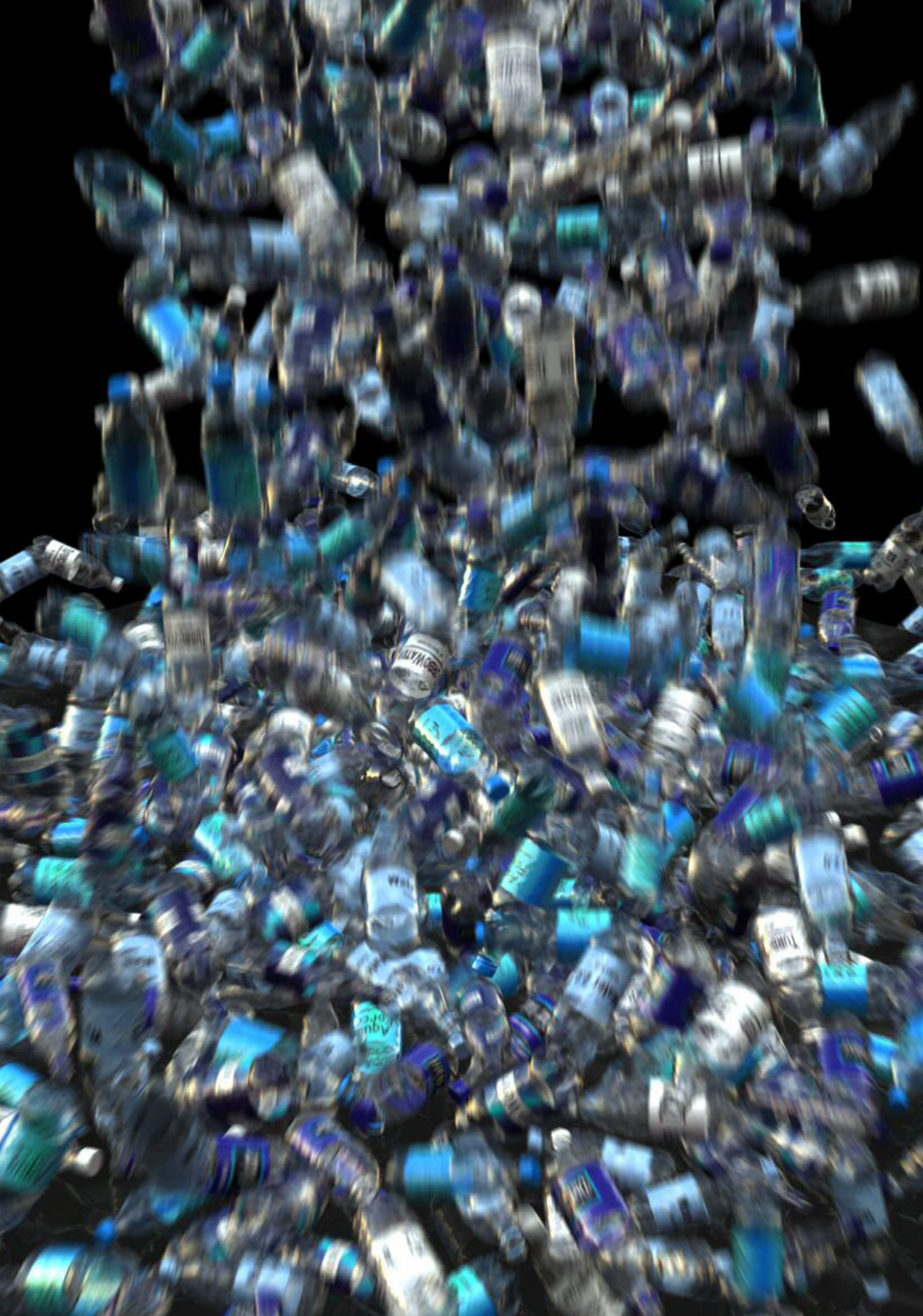
The European Union (Public)

PRIVATIZATION AND ITS DECLINATIONS ARE USUALLY SHORTCUTS WHICH GOVERNMENTS, COMMISSIONS AND MUNICIPALITIES TOO OFTEN LOOKING FOR

Due to the rising dominance of neoliberal policies of the 80s, instigated by the Regan and Thatcher policies respectively in the US and UK, and the current cuts in the public expenditure (spending review), the privatization and commercialization of essential public services (like energy utilities, transportation and water) have turned into a dominant political trend in Europe. The outsourcing and the introduction of "new public management" mechanisms, have led to the commercialization of water services and resource management in many municipalities and public operators where water companies have formally remained public.

The questions that need to be asked are: what kind of water provision do we want? How should a public water company function to deliver its services in good, social and ecologically sustainable ways? What are good alternatives to the failed experiments with privatized and commercialized water? And, last but not least, how can we construct a social project based on these that can reverse the dominant political trend in Europe?

A reconfiguration of public management systems and its inner efficiency is strictly needed, to ensure benefits for the next generations. However, efficiency and efficacy not necessarily mean *"privatizing"* a public service. Privatization and its declinations are usually shortcuts which governments, commissions and municipalities too often looking for. What could be considered "smart" for our cities and their communities, indeed, is analysing what is already there and encourage and enrich the debate on good alternatives to privatize and commercialize water.

The Public-Private Contracts

Without including privatization in below index, because according to with the World Bank, privatization is considered the complete divestiture of public assets, preferring the less politically loaded terms of *"Private sector Participation"* or *"Public-Private Partnerships"* to describe its more current projects, most of which being leases or management contracts. The following are the three basic types of agreements:

CONCESSION

Concession contracts give a private company a license to run the water system and charge customers to make a profit. The private company is responsible for all the investments, including building new pipelines and sewers to connect households.
Ex: India practices a form of extreme concession whereby whole river systems are leased to the company who runs them for profit without any government interference.

LEASE

Lease are contracts under which the company is responsible for distribution system and for making the investment necessary to repair and renew the existing assets, but the local government remains responsible for the new investments.

MANAGEMENT

Management contracts make the private company responsible only for managing the water service but not for investment.

50% of waste management services in the EU are concessions. 6,169 concessions advertised in the Spanish national Official Journal between 2006 and 2010, 817 in Italy in only in 2008, while in France there is a stock of approximately 10,000 concessions contracts running [92].

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92. source The European Parliament and of the Council on the award of Concession Contracts; Brussels, [Dec. 20 2011]

Privatization&Public Participatory

THE PROCESS OF MOVING FROM A GOVERNMENT CONTROLLED SYSTEM TO A PRIVATELY RUN, FOR-PROFIT SYSTEM [93]

PRIVATIZATION

Privatization occurs when the business sector – usually through a publically regulated tender process - takes over public services, such as roads, health care, prisons and energy. The idea behind privatization holds that the private sector, through competition and economies of scale, can provide better services at a lower price. Many opponents argue that privatization leads to less accountability and deterioration in services. The following sections argues the pros and cons of privatisation.

PRO: REVENUE

Selling, concession, leasing and contracting out public assets and services provide quick ways to raise money, that allow redirecting investments to promote new projects, other infrastructures or debt payment. Government, in this way, can also avoid raising taxes or taking on more debt through privatization.

PRO: COMPETITION

Generally, when services once provided by the public sector become privatized, users should gain a greater choice, with a wider portfolios of services for its needs.
If performed properly, indeed, privatization based on competition, in alternative to an exclusive contract, often comes at a lower price and with an increase in service quality.

CON: LESS TRANSPARENCY

When private companies agree to contracts from the government, especially long-term ones such as concession or lease, the companies can begin to prune parts of the service which does not consider productive and profitable. Unless the contracts include specific reporting criteria, like management one or *PPP* [94], these businesses' modes of operation may prove difficult to monitor.
When the business becomes involved in public safety as it is in water services for treatments and drinkable waters, the repercussions can become serious. Indeed, a wide range of examples of failing of privatization exists (eg. rail services in the UK, which separated rolling stock from network and led to numerous incidents), because the profitable over-taken the public safety.

CON: METHODS OF AWARDING CONTRACTS

Privatization doesn't guarantee that the contracts will go to the best companies, those that can do a better and cheaper job. Big companies with good lobbyists and political influence often land the contracts. Recently a clear example of contracting malfunction is the Bechtel one: a big construction firm as of 2011, won a $45 million contract with the city of San Francisco to upgrade the city's water system, then had it cancelled due to waste and over billing [95].

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93. def. "Privatization"; *Oxford dictionary*

94. *"Public-PrivatePartnerships" (PPPs), refer to any form of agreement (partnership) between public and private parties.*

95. *"The San Francisco Bay Guardian" showed that Bechtel completely wasted about $5 of the $8 million it received.*

PPP's Or PuP's Model
For Your Smart City?

As a result of the increasing deregulation of national water markets since 90's, more and more private companies are attracted to enter the water market.
This development has been met by controversial discussion on the advantages and disadvantages of private sector involvement and *Public-Private Partnerships* in the water market. Concerning the current transformation of international water markets, the issue is how technological modernization will be realized, how transparency will be enhanced, how the interests of consumers can be considered and how health and environmental standards will be guaranteed [96].

PUBLIC-PRIVATE PARTNERSHIPS (PPP's)

As mentioned, more than 50% of water waste management services in the EU are concessions based on *Public Private Partnerships* contracts, but what is exactly is meant by *PPP*[97]? What kind of advantage are there for citizens and the private sector? The performance of *PPPs* has been widely debated, but *PPP's* clearest benefit seems to be efficiency gains and some technical improvements in performance [98].
Involvement of the private sector at particular times for specific purposes can be useful to boost utility performance, but this depends on adequate capacity to design and manage context-specific relationships.

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96. European Water Markets between Regulation and Competition

97. Kappeler, Andreas and Nemoz, Mathieu; "PPP's applications"; Economic and Financial Report [July 2010]

98. Increasing production, service hours, revenue collection and technical performance.

PUBLIC-PUBLIC PARTNERSHIPS (PuP's)

PuPs [99] is simply a collaboration between two or more public entities to improve public services generally based on a not for profit basis (which could also be compatible with "not for loss" and reach economic 'break even'). *PuPs* generally have lower costs and greater focus on capacity building and equity, and have the potential to support more holistic approaches to urban services and the water cycle. Partnerships with local actors can also improve services by allowing more flexible approaches to service provision to meet the needs of different households [100].

Since two decades those private investors, in particular Suez, sponsorship *PPPs* between public utilities and private water companies, and we have seen how this business is profitable for private ventures.
Recent research, however, reveals that compared to *PPPs*, *PuPs* are a more effective, efficient and equitable approach:

EFFICACY:

PUPs are better performing goal and improving public services by capitalizing the synergies between two public entities. *PuPs* can take a more integrated approach to water resource management and have a more lasting effect on the operation of utilities [101].

EFFICIENCY:

PuPs are associated with significantly increased efficiency in service delivery and tend to be less costly.
In general, *PPPs* fail to enhance efficiency [102], involve high transaction costs and increase water prices.

EQUITY:

By involving the entire community, the municipality, rate-payers, community groups and the utility; *PuPs* maximize the accountability and equity of water services.
PuPs deliver services to everyone, including people and communities that are often excluded, underrepresented or disadvantaged.

99. "Public-Public Partnerships in Water"
http://ourwatercommons.org/water-solutions/case-11-public-public-partnerships-water

100. "PuPs in water" A Case Study from The Yokohama Water-works Bureau first started training partnerships in the 1980s to help staff in other Asian countries. Far more countries have hosted PuPs than PPPs (44 countries with private participation).
Water PUPs have been around for over 20 years and are in all regions of the world. They have been growing in number more rapidly the last few years. They are used as an alternative tool for improvements in public water management.

101. Tucker, Josephine - General for External Policies of the Union, European Parliament; "A comparative evaluation of public-private and public-public partnerships for urban water services in ACP countries."; Directorate B Policy Departmen [May 2010]; pag. 13, 17 and 33.

102. "PuPs efficiency"
http://www.scribd.com/doc/84147734/Public-Public-Partnerships-An-Alternative-Model-to-Leverage-the-Capacity-of-Municipal-Water-Utilities

The Water Situation In EU

ACCORDING TO THE EUROPEAN COMMISSION, 20% OF ALL SURFACE WATER IN EUROPE IS "SERIOUSLY THREATENED", AND UN ADDS THAT ONLY FIVE ON FIFTY-FIVE MAJOR RIVERS IN EUROPE CAN BE CONSIDER "PRISTINE" ANYMORE.

Keeping out from the door all the financial troubles which are affecting western countries, which may currently be distracting us from the debate of the importance of water, the general interest and the healthiness of our lands it cannot be forgotten for a moment.
According to the European Commission, 20% of all surface water in Europe is "seriously threatened", and UN adds that only five on fifty-five major rivers in Europe can be consider "pristine" anymore.
The Rhine, the Sarno and Danube rivers are all in peril. Recent and regular droughts have European leaders very worried about water availability. Southern Spain, south-eastern England and western and southern France are all viewed as vulnerable areas, while fears has already embraced nations like Italy, Portugal and Greece. From 2007 and recently also in 2010, a state of emergency was declared in the northern and central regions of Italy as the country's largest river, the Po, dried up, devastating the Po valley, which

is grows a third of country's food. In Tuscany, in particular the areas surrounding Florence province, has been characterised by new negative records: waterfall on soil decreased by about 70% in one year according with Publiacqua Spa reports (2011). In several of these countries, reservoirs are at their lowers levels in recorded history [103].

To its credit Europe has taken some serious actions. In 2000 European Commission launched the Water Framework Initiative, a European Union wide plan for water conservation, clean up and administrational based on the joint management of river basins.
All European waters must achieve "Good Status" by 2015. All European region must have access to clean drinking water (120 million are currently without), and the environment must be protect as well [104]. This initiative requires cross-border cooperation on all areas of watershed protection.

103. Publiacqua; "Bilancio 2011"; [2011]

104. Charlemagne Conference Centre Brussels; "3rd European Water Conference Brussels"; [May 24-25 2012]

The EU Reactions

EU'S AIM IS TO PROMOTE COLLECTIVE ACTIONS THAT CAN SPEED-UP SERVICE QUALITY AND EFFICIENCY IN THE WATER SECTOR AND REMOVE BARRIERS TO INTRODUCE ALTERNATIVE SERVICES

EU policy makers know that managing water sustainably in a 'green' economy means using water more efficiently in all sectors and ensuring that ecosystems have the quantity and quality of water needed to function effectively.
In agriculture, for example, waste and pollution of waters reach high rates. Shifts to water-efficient irrigation techniques such as drip irrigation, crop patterns and wastewater reuse are particularly promising.
Sustainable public and industrial water management depends more on innovative production treatments and processes, ecological design in buildings and better urban planning.

In order to get those common goals, EU's aim is to promote collective actions that can speed-up service quality and efficiency in the water sector and remove barriers to introduce alternative services.
The actions are intended to achieve the EU water policy objectives while reducing the EU water footprint, improving water accessibility and promoting the worldwide leadership of the European efficiency in water management.

To achieve there are three main objectives established by the Europe 2020 strategy [105]:

1 First, we need to take coordinated action in a wide range of policy areas and this action needs political visibility and support.

2 Second, we have to act urgently due to long investment lead-times. While some actions will have a positive impact on growth and jobs in the short-term, others require an up-front investment and have long pay-back times, but will bring real economic benefits for the EU economy for decades to come.

3 Third, we have to empower consumers to move to resource-efficient consumption, to drive continuous innovation and ensure that efficiency gains are not lost.

105. "Europe 2020 Flagship Initiative Innovation"; European Union sec. [2010] 1161

7

THE ITALIAN WATERSHED

Italy
And Water

ITALY IS AMONG THE COUNTRIES IN THE WORLD THAT WASTE MORE WATER IN INDUSTRIAL PRODUCTION AND AGRICULTURAL USE.

Italy is the first country in Europe for the collection and consumption of water, and third in the world with 152 cubic meters consumed per capita per year. Italian consumption pro capita is just a bit less than United States and Canada. In our country annual availability of water is about 52 billion cubic meters [106], but with a significant local differences. Indeed, there are available 1,975,000 cubic meters for each inhabitant of the north-east, and only 220,000 cubic meters for individual citizens in the South. Recent studies have proved that each inhabitant in Italy actually consumes 152 cubic meters per capita per year, compared with Spain (127 m3), United Kingdom (113 m3) and Germany (62 m3) [107]. Italy is among the countries in the world that waste more water in industrial production and agricultural use. The Italian agriculture sector alone uses at least 20 billion cubic meters a year, in some circumstances obsolete irrigation systems and inefficient techniques further exacerbate the leakage from the water supply system [108].

Key figures of Italy and water are as follows:

• 52 billion cubic meters of water a year, is the gross amount of water collected and consumed in Italy
• 9.11 billion cubic meters of fresh water for domestic usage
• 1.975.000 water litres for each person in Italy's North-East
• 220.000 water litres for the one who lives in the South

Usage is as follows:
• 15% domestic
• 25% industry
• 60% agriculture

A cause of concern in Italy is the poor quality of the water infrastructure network, which has high water leakage: approximately 40%, with peaks of 70% in Calabria and Puglia[109]. This condition is very risky in a country that shows serious signs of droughts and progressive desertification.

106. "Istat: in Italia consumi pro capite di acqua superiori alla media Ue"; [March 21 2011]

107. "Legambiente rapporto sulla gestione dell'acqua in Italia" [2012] http://www.legambiente.it/contenuti/comunicati/acqua-l-italia-rischia-siccita-e-multe-mala-gestione-esce-ambiente-italia-2012

108. Italia 2012 di Legambiente e Istituto di Ricerche Ambiente stima che un miglioramento delle tecniche irrigue permetterebbe un risparmio del 30%.

109. "Comitato Italiano Contratto Mondiale sull'Acqua"; 2012] http://contrattoacqua.it/salvaguardiamo-le-risorse-idriche-del-pianeta/
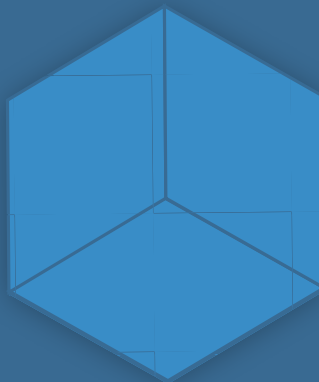
52 billion

Meters of water a year, is the gross amount of water collected and consumed in Italy

9.2 billion

cubic meters of fresh water for domestic usage

15%

Domestic Consumption

25%

Industry
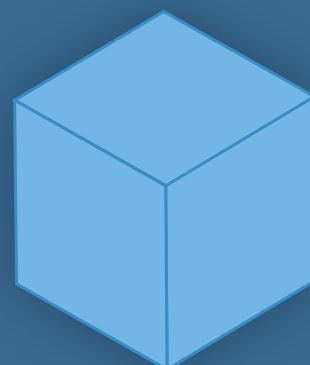
60%

Agriculture

Regional Water Management

THE ATO MUST ENSURE AN OPTIMAL SUPPLY OF DRINKABLE WATER FOR THE CITIZENS WITHIN ITS JURISDICTION, FOCUSING ON QUALITY AND SAFETY AS WELL PRESERVING WATER RESOURCES AND THE ENVIRONMENT BY MAINTAIN AN EFFICIENT SUPPLY SYSTEM.

It is a hard task to trace a clear anatomy and explain how Italy's water laws and management system work. However, the entire country is segmented in 92 districts: ATO [110].
An ATO – ambito territoriale ottimizzato - is a public sector authority responsible for coordinating local public services, such as water and waste management.
Each ATO has to administer a wide area with integrated public services, such as waste or the water.
The ATO must ensure an optimal supply of drinkable water for the citizens within its jurisdiction, focusing on quality and safety as well preserving water resources and the environment by maintain an efficient supply system.

Of these 92 territorial authorities:

• 19 ATOs have not yet assigned the service

Of the remaining 72 ATO's (68 in 2010)[111] have allocated water service provision as follows:

• 34 (31 in 2010) belong to the model in-house (over 20 million users)
• 13 are entered into with listed companies (around 10 million) (reliance on public equity market)
• 12 are the loans to joint ventures (PPP)
• 7 are shared schemes, with several operators within the same ATOs
• 6 are assigned to corporations licensed to third party private managers (5% of the population)

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110. *"Ambito Territoriale Ottimale;" (ATO); Legge Galli (L. 36/94)*

111.*"Rapporto sullo stato dei servizi idrici"; Commissione nazionale per la vigilanza sulle risorse idriche [Dic. 2011] http://www.conviri.it/contenuti/Relazioni_annuali/Rapporto2011. pdf*

The Water
Quantity & Quality In Italy

ITALY STILL HAS A LOW TERRITORIAL COVERAGE OF SEWERAGE AND SANITATION: 30% OF THE COUNTRY LACKS SANITATION, AND 15% IS NOT YET CONNECTED TO ANY KIND OF SEWAGE SYSTEM

Italy has an amazing natural heritage, but to preserve the property intact from the human threats and interests requires extraordinary efforts. Indeed, the deterioration in quality of both surface water and groundwater is widely recognised. Italy risks the loss of major rivers, lakes and wetlands due to pollution.
The evidence can be found in the dramatic global trend of other contaminated water resources.

Despite our level of industrialization and development, Italy still has a low territorial coverage of sewerage and sanitation: 30% of the country lacks sanitation, and 15% is not yet connected to any kind of sewage system (except main municipalities).[112-113]
Indeed, in the provincial capitals, the sewage system covers (in 2011), 89. 9% of the population (+0.7 percentage point compared to 2010)[114].

112. Legambiente; "Ambiente Italia 2012; Legambente [2012]

113. Legambiente; "Goletta Verde" Legambente [2012]

114. Chief town share for the population served by sewage treatment plant; source ISTAT [2011-12]

The Water Treatment Process

SCREENING

Raw unfiltered water arrives from rivers to the purification stations through metal screens, which trap large living organisms such as: fish, floating plants, sticks, leaves and general litter and debris; object free water proceeds to enter.

COAGULATION

The raw water enters the middle of a spiral flocculation where slaked lime is added. This is thoroughly mixed in the rapidly moving water. The slaked lime attracts sand, silt and clay particles, some small living organisms, germs and all pesticides, lead, mercury, arsenic and other substances eventually form *"clumps"*.

FLOCCULATION

As the water begins to slow down in the outer section of the flocculation, the *"clumps"* join together to form a *"floc"*.

SEDIMENTATION

The water flows slowly into the sedimentation tanks, and *"floc'"* then settles to the bottom of the large tank to form *"sludge"*. This is called sedimentation.
The sedimentation mud is removed by filters and sent to a sludge deposit site

CARBONATION

In the tanks water have a pH of about 10.5, from the slaked lime that was added. In order to make the water less alkaline (a lower pH), carbon dioxide is bubbled through the water and the pH reaches between 8 and 8.5.
This makes the water taste much better. At this pH level calcium carbonate is deposited in the distribution, this protects the tanks from rusting.

FILTRATION

Water flows into closed filter containers where it passes through sand filters, made up of different sized particles of sand and stone. This is the final process to capture last organisms before the final treatment.

CHLORINATION

Even after the water has been filtered it still contains some germs. To kill these germs, chlorine gas is mixed with the water.

Freshwater:
Domestic Consumption

THE PER CAPITA CONSUMPTION IS AROUND 175.4 LITRES PER CAPITA A DAY (-3.7% COMPARED WITH 2010), THAT IS A POSITIVE TREND, PROBABLY RELATED WITH SUCH AN INCREMENT IN CITIZENS AWARENESS, THEREFORE, OF HIGH VALUE.

The data on the use of drinkable water in Italy reveals that 2011 saw a reduction of aggregate consumption, compared to 2011, of 3.4% (1.16 billion cubic meters).
The per capita consumption is around 175.4 litres per capita a day (-3.7% compared with 2010), that is a positive trend, probably related with such an increment in citizens awareness, therefore, of high value.

15.5% of the provincial capitals consume from 200 to 250 litres of drinking water per inhabitant per day: whereas 6% between 100 and 200 litres.
There are only three cities which rank above this threshold: Pescara, Massa and Salerno, but no more than 300 l / inhab. / day.

Among the main municipalities, the per capita daily consumption of potable water exceeding 200 litres are found in:

North: Milan and Turin
Centre: Rome
South: Catania and Messina

Over the past year, Catania has, instead, increased its consumption by +3%. In other municipalities there is a decreasing trend, with more substantial contractions in Florence (-10.7%) and Genoa (-6.5%).
The average consumption therefore amounts to 175.4 litres per day per capita: 33% of municipalities are located above this threshold. Concerning water shortage, this is particularly acute during the summer for southern cities, such as Cosenza (90 days) and Vibo Valentia (60 days).

Domestic water consumption in Italian capital cities: [115-116]
• 0,9%: 250 <x> 300 lt/ inhab./day
• 15.5%: 200 <x> 250 lt/ inhab./day
• 83.6&: 100 <x> 200 lt/ inhab./day

115. ISTAT, Osservatorio ambientale delle città 2011

116. "Consumption of drinking water for domestic use in the province of chief town with population above 200k"; source ISTAT; [2011-12]

AVARAGE REGIONAL WATER CONSUMPTION

- >90 liters pro capita
- From 90 to 100
- Over 100 litres pro capita

CITIES PRO CAPITA WATER CONSUMPTION

- 2011
- 2010

-3%

175
Liters

ITALY

200 liters

150 liters

-6%

-10%

+3%

Milan   Venice   Genoa   Florence   Rome   Catania
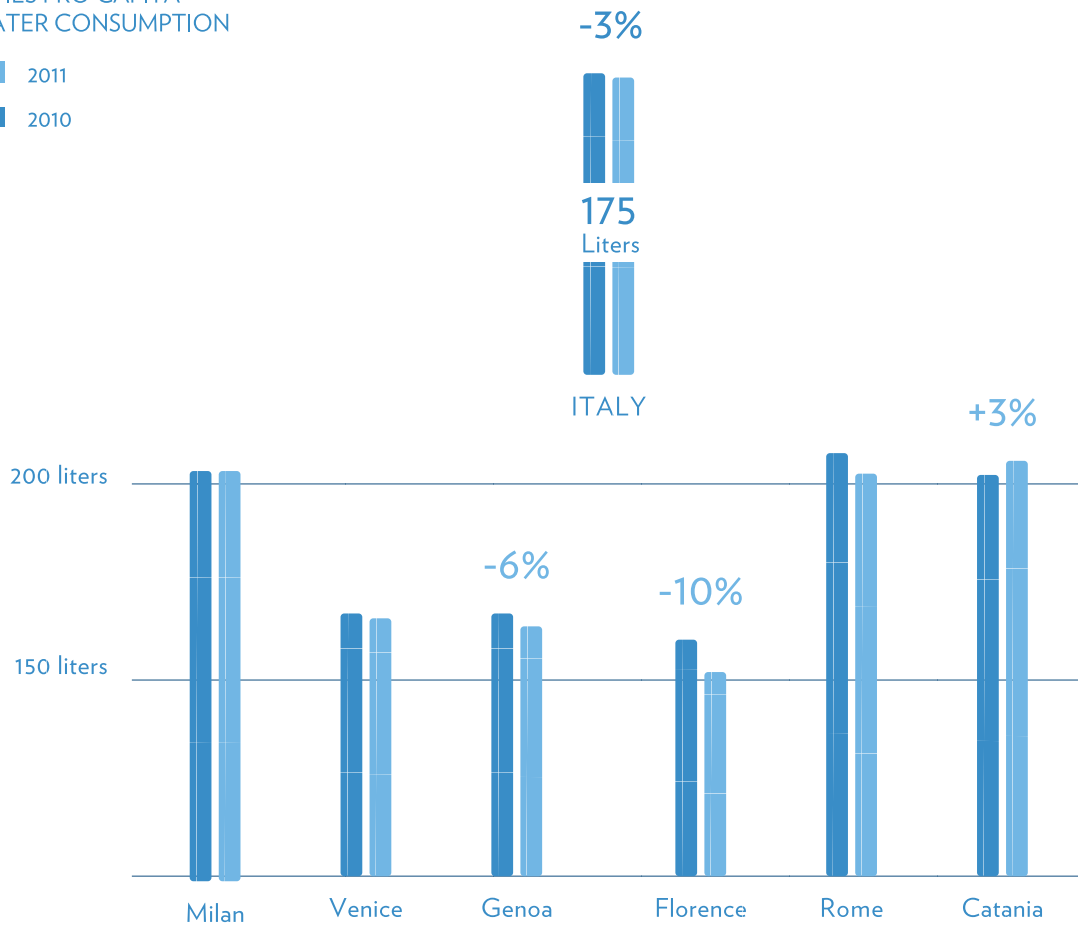
The World
Of Water Leakage

THE ITALIAN WATER SUPPLY NETWORKS LOSES MORE THAN 30% OF THE TOTAL AMOUNT OF WATER; OF THIS 43% OF LEAKAGE OCCURS IN 94 CITIES.

The problem of water system leakage deeply affect most of the Italian cities. The national statistical institute, ISTAT[117], has been able to estimate the volume of water fed into the network, and how much of this is effectively charged to (or used by) customers. The results, for 2008 [119], show that the Italian water supply networks loses more than 30% of the total amount of water; of this 43% of leakage occurs in 94 cities. This dramatic phenomenon continues to be particularly relevant in South. Among the cities that lose more than 50% of their water: 10 are in the South and islands and 4 are in the Centre.

• More than two-fifths of Italian cities have around 30% of water leaks all along its network.
• The water leakage along the pipeline represent over 70% of the total amount of water losses in water treatment.
• In Italy the loss from the distribution pipes amounts to 104 litres of water per capita per day.

In summary, for each 100 litres of water per head distributed in Italy the pipeline network needs to pump about 168 (litres per head) – this implies a wastage of 68 litres of water per head. To put it another way, for every 1 litres of water only about 60 centilitres are used by consumers. The most efficient region is the Lombardy (127 litres). The worst performers are Puglia (187 litres) and Sardinia (185 litres).

115. ISTAT, Istituto nazionale di statistica;
http://www.istat.it/it/

116. ISTAT, "censimento Ecosistema Urbano"; [2008]

WATER NETWORK LEAKAGE

LOW

Calabria

Sicily

Abruzzo

Molise

Campania   Puglia

Sardinia

0% ← ——————————————————— → 100%

Tuscany ITALY Umbria

Lombardy

Marche

Piedemont   Basilicata

Liguria   Aosta

Trentino

Emilia-Romagna   Veneto   Friuli

HIGH

Water Service
Efficiency

47

ITALY

100% ———————————————————————————————

                                                                    87

                                                       63

                                          55

                        43
            27   38

50% ———————————————————————————————

0% ———————————————————————————————

Lombardy   Veneto   Tuscany   Lazio   Campania   Puglia
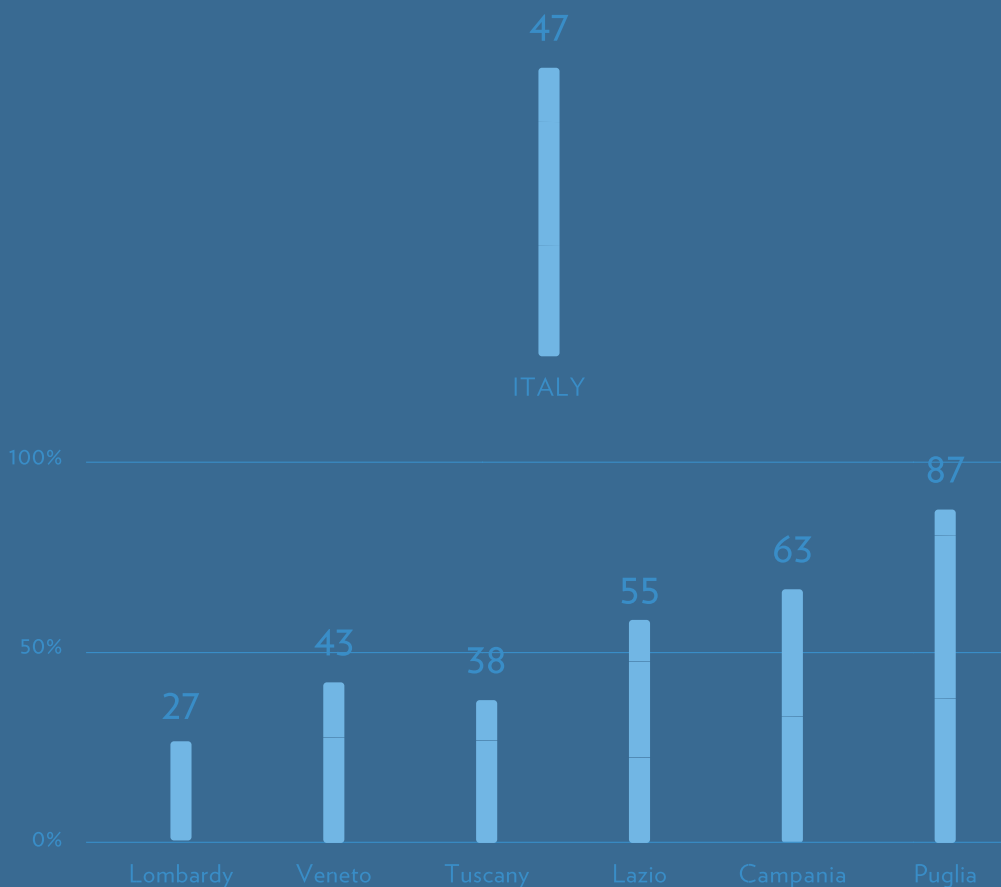
Italy:
Made In Bottle

ITALY MAINTAINS ITS EUROPEAN LEADERSHIP; ITS WATER CONSUMPTION IS 192 LITRES PER INHABITANT, MORE THAN DOUBLE THE EUROPEAN AVERAGE

Worldwide, about 120 billion litres of bottled water a year are consumed. In Europe, 1/3 of the total is consumed[117]. The bottled water and its market have not faced a crisis of demand, thanks to the essential nature of water. Indeed, in 2009, Italy maintains its European leadership; its water consumption is 192 litres per inhabitant, more than double the European average.
Following are Germany with 160 litres per capita, Spain (123), Belgium (122) and Switzerland (120). The last positions are reserved for both Russia and United Kingdom where respectively 22 and 25 litres per-head are consumed, eight times less than the average Italian consumer[118].

Weather may in part explain for these national differences. In order to satisfy the *"great thirst"* of 2009, 12.4 billion litres were bottled in Italy; of this about 8% for foreign markets. Higher consumption was recorded in North-West of the country with 30% of the total, followed by the regions of Central Italy and Sardinia with 26%, from the South of Italy and Sicily with 25% and the North-Eastern region with 19% [119].

Country	2007	2009	Variation %
Italy	196	192	-2%
Germany	140	160	14%
Spain	140	123	-12%

Consumption per capita of bottled water in European countries, comparison between 2007 and 2009.

117. Europe represent the 6% of the World population.

118-119. Beverfood, "Bevitalia", report [2010-2011]

"Hey Italian,
Still Or Sparkling?"

ITALIANS LEAD EUROPEANS IN PER CAPITA BOTTLED WATER CONSUMPTION AT 155 LITERS PER YEAR.

The mineral bottled industry had a business volume of 2.3 billion Euros in 2009, unchanged from the previous year but still growing in the last thirty years, has reported in Bverfood 2010-12 report.

Italian Bottled Market	2008	2009
Company	189	168
Production total	12.5 million/litres 200k treated water/added 12.3 mil/l spring water	12.3 million/litres 200k treated water/added 12.2 mil/l spring water
Export	980k/litres	1.000k/litres
Internal Consumption Turnover	11.52 million/litres 2.3 million/€	11.2 million/litres 2.3 million/€
Consumption per capita	194 litres	192 litres
Water products	Smooth waters 64% Sparkling water 19% Natural sparkling water 17%	Smooth waters 63% Sparkling water 21% Natural sparkling water 16%
Packaging	Plastic 79% Glass 18% - Other 3%	Plastic 78% Glass 20% - Other 2%
Retail Channels	Hyper, Super 66% Catering 22% Detail 12%	Hyper, Super 68% H & R, Catering 21% Detail 11%

The mineral water market in Italy:[120]

120. Elaboration Legambiente; "Altreconomia dati Beverfood"; Report [2010-2011]

Is Bottled
Water Also Safe?

THE ITALIAN PASSION FOR BOTTLED MINERAL WATER RUNS DEEP; THE PASSION WAS REAFFIRMED IN 2011
WITH 2.5 BILLION EUROS OF REVENUES

The Italian passion for bottled mineral water runs deep; the passion was reaffirmed in 2011 with 2.5 billion Euros of revenues. Astonishing revenues, which give more than one reason for private producers and foreign companies to take full advantage of this field which, if left unchecked, may cause serious environmental damage.

Bottled water is the Italian's first choice, at least for many. But compared to tap water, bottled water is not necessarily always healthier.

The reason for is simple: the Italian and European norms on public drinkable water are much stricter than those applied to mineral (bottled) water.

This is because, mistakenly, they consider bottled water as a good for occasional consumption, whereas tap water is considered for constant consumption.

The *"Salvagente"* [121], an Italian magazine for consumer awareness, has recently published an article concerning the quality of mineral bottled water in Italy.

The magazine's research, showed how people are misinformed and unclear about the true quality of the mineral water which they use for drinking. Indeed, 12 of 27 water samples analysed [122], show a presence of unhealthy substances for our organism.

And 4 of them had higher values of toxic substances, especially dangerous for childrens health.

121. Liverzani, Barbara; "Quello che la minerale non dice"; Il Salvagente [May 28 2012]; pag. 19-23

122. Dott. Prof. Ritieni, Alberto; Laboratory of quality control and safety food&nutraceutical products of the Faculty of Pharmacy, Università Federico II di Napoli [2012]

Who Pays The "Natural" Bill?

TO PRODUCE OVER 350.000 TONS OF RAW PET AROUND 700.000 TONS OF CRUDE OIL ARE NEEDED, WHICH PRODUCE 1 MILLION TONS OF CO2 RELEASED INTO THE ATMOSPHERE.

The Italian regions must trigger a deep-rooted review of their concession fees for bottling and distributing bottled water. The regional and local administrations need to reconsider the critical importance of water resource, focusing on better ways to manage this scarce resource.

The real cost of water needs to be reflected in the concession fees, which are currently too low to the benefit of the private water bottling company.

Reframing fees so that these reflect the true cost means taking into account environmental impacts caused by the entire production process of water, such as ground extraction, plastic moulding, bottling and transportation.

When all these direct and indirect costs of a product are taken into account we have what is called the "Water Footprint"[123] of a bottled water product.

Due to the royalties and the adjustment of fees, regions could increase their funds to assign for example, to improve the garbage disposal of water bottles and plastics. In Italy the plastic bottled water cycle can be summarize in this way [124]:

• To produce over 350.000 tons of raw PET around 700.000 tons of crude oil are needed, which produce 1 million tons of CO_2 released into the atmosphere.
• 78% of the bottles are plastic, where only one third is recycled while the remaining two thirds end up in landfills or incinerators.
• Only 15% of bottles travel by rail, the rest is transported on the country road by heavily polluting trucks.

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123. def. "The water footprint is an indicator of freshwater use that looks not only at direct water use of a consumer or producer, but also at the indirect water use" - Arjen Y. Hoekstra, Ashok K. Chapagain, Maite M. Aldaya and Mesfin M. Mekonnen

124. 2. Legambiente; "Acque minerali: la privatizzazione in Italia"; [March 2011]

Summary:
Italian & Water

THE MISTRUST OF TAP WATER IS STILL DEEP ROOTED IN ITALY. 30% OF FAMILIES HAVE AT LEAST ONE MEMBER
DECLARING THAT THEY DO NOT 'TRUST' TAP WATER

Italy is characterised by irregular water supply.
In 2011, 9,3% of Italian families have had problems relating to water supply services. This is particularly a problem in Southern regions, which suffer from chronic disinvestment in public infrastructure, with an average rate of 17,4%. The highest peaks are recorded in Calabria (31,7%) and Sicily (27,3%)[125].

Where does the water come from? In 2008 Italy had storage of about 9,11 billion cubic meters of fresh water; with 85,6% from groundwater, 14.3% from surface waters and the remaining 0,1% to sea water or brackish water.
Regions have a total of 9.04 billion cubic meters of potable water to be allocated to local distribution networks. Evermore in 2008, the volume of water per capita was 72.9 m3/year approximately 200 litres per capita per day, with a decrease of 9.2% compared to 1999.[126]

BOTTLED WATER
The average yearly purchase of bottled water in Italy is estimated at 19,50 euro per family without any substantial difference among regions; the spending is only slightly

lower than the one for domestic water services. Italian families, again in 2010, bought 61.8% bottled water, slightly down compared to previous years [127].

TAP WATER
An increasing number of Italians are now returning back to drinking water from the tap. On a sample of 2030 people, a growing number of people who drink tap water (75.5% of total). Of these, in 2009 they 46.9% claimed that they almost regularly drink tap water; up from 2008 when only 40% claimed they were regular tap water consumers [128].

The mistrust of tap water is still deep rooted in Italy. 30% of families have at least one member declaring that they do not 'trust' tap water; with the highest levels of lack of confidence recorded in Sicily (60.1%), Sardinia (53.4%) and Calabria (47.7%). In these regions the quality of tap water may indeed be inferior to the national average.

125. ISTAT for UN initiative "World Water Day - how Italians drinks water"; ISTAT-UN [March 22 2012]

126. ISTAT; "Ambiente ed energia"; [2010]

127. ISTAT; "Servizio Stato dell'ambiente"; [2010]

128. Sole24ore; "study conducted by CRA - Customized Research & Analysis";

32.8

30%

Of Italian households that have at least one family member who mistrust tap-water

ITALY
Tap-water Mistrust

61.8%

Italian families who purchase bottled water (year 2010)

TAP-WATER
MISTRUST IN ITALY

Istat - "Vita quotidiana"
2010

46.1

31.5

21.6

North
Italy

Centre
Italy

South
Italy
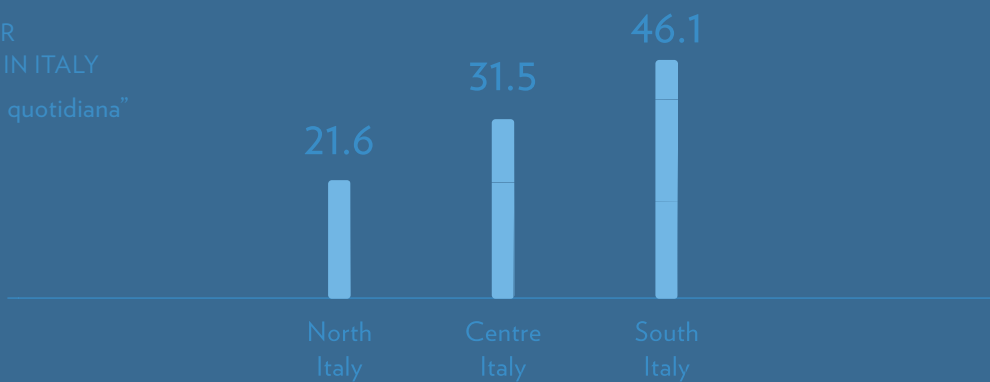
THE BOTTLED WATER IMPACT

1Kg
PET

25
Bottles

2Kg
Crude Oil

17.5
Liters of water

1300Kg
CO_2 produced X 1000 Km

8

THE FLORENCE WATER FRONT

The Context

FLORENCE HAS A LONG STANDING DEMOCRATIC TRADITION; LOOKING BACK IN TIME IN 1115 A.C. THE CITY HAD TRIED TO INTRODUCE A FIRST MODEL OF FREEDOM AND ELECTED MUNICIPALITIES, AND IT WAS RUN WELL FOR SOME YEARS...

The Florence urban area offers three main related reasons for implementing the proposed project. Except for the fact that is actually the city where I'm born, Florence, even if it considered small/mid-size city has its own inner dynamics which are its power.

These attributes are:

• Rich cultural heritage (history, food and environment)
• Tourism
• Long history of political-social activism by citizens (also from dynamic local public administration)

"WORLD CULTURAL BRAND(1)
The city by itself is an internationally recognized cradle of the re-birth of man, which occurred during the Renaissance [129] period. The 13/14th century provided us with a rich artistic heritage to manage today.
Thanks to the constant flow of tourism, the city's economic life is sustained: shops, hotels and related services (restaurants, museum) thrive in large part thanks to tourism.
Luckily for Florence, and its inhabitants, the city does not revolve only around its artistic and architectural magnificence. It has also developed value added sectors in design and fashion with brands such as Antinori, Gucci, Ferragamo ecc. But what is fundamental to recognize as a valuable aspect is the local culture for food and its production of Chianti [130] wine, Oil, *Chianina* [131] meat, and so on.
For the people of the area, branding as local food & beverage, has a real attraction.

Tuscany is one of the main destinations of national and international tourists: it absorbs 45% of all tourist flows towards central and northern Italy, and its cities of art represent the international capitals of tourism.
Therefore, tourism is the main resource for the city and the surrounding lands, but "tourists" are a crowd of complex individuals, which are dragging their own cultural heritage, that is not always well balanced with the local city ecosystem. Moreover, in some cases the city is ill equipped to absorb the vast multitude of tourist (think of the lack of public toilets).
Florence, as most other ancient cities in general, have been created step by step along history, perfectly sized on its dwellers number and needs. At this time it's easy to imagine the environmental overload and shock to the city:

129. Comune di Firenze; "Piano strutturale 2012 - 2014"; [2011]
http://pianostrutturale.comune.fi.it/

130. "Chianti Classico" (not just a Chianti)
http://www.chianticlassico.com/en/

131. "Chianina" meat is renowned products from the Valdichiana area in Tuscany, the famous "bistecca alla fiorentina" is produced from its meat;
http://www.beintuscany.com/blog/?p=215

132. The city of Florence in 2010 exceeded 8 million nights, an

in any one day in spring or summer there are 650.000 individual visitors added to the existing 350.000 inhabitants. Providing adequate service for all, including water supply and sanitation becomes a challenge.

For example, in 2011 more than 8 million of foreigners were visiting Florence and stayed at least one night; 20% of them were Americans [132]; and now consider the water consumption or the waste produced just by this 20%. Moreover consider that the average water consumption for an American citizen is around 237 [133] litres a day.

Publiacqua's biggest challenge is how to guarantee freshwater resources for all, and particularly during water stress periods like the summer. The city, the citizens and the local administration have positive responses to flag awareness campaigns and social initiatives about quality life and environmental resource conservation. In 2002, at the Congress 10+10 [135] in *Fortezza da Basso* (a reconverted defence structure), strategies and proposals to adopt in the environment and improve the quality life of our cities were discussed. From that forum, the Florence municipality points out a priority list and a commitment to implement these in the comings years.

In November 2012, the same event will be upgraded to account for the progress that has been made during these 10 years, and also open the forum of debate for new ideas.

Florence has a long standing democratic tradition; looking back in time in 1115 A.C. the city had tried to introduce a first model of freedom and elected municipalities, and it was run well for some years. This gave birth to the city-state, a unique institution to central Italy, were citizen participation was growing. Occasionally these were violently repressed by local despots or external powers. But periodically, between kingdoms, the city retook control of its municipal independence.

Since 2009, when the Major Renzi's administration established itself at city hall, in *Palazzo Vecchio* [136], once a year, open to citizens a district meeting, to foster common initiative and project cooperation to enhance the area of competence. This is the first modern Italian experience of participatory democracy [137].

increase in arrivals of 5.4%, especially concentrates in the months from April to September; source Provincia di Firenze [2011]

134. UN; "WWD 2011"; UN-HABITAT [2011]

135. "Congress 10+10" [2012]

http://www.firenze1010.eu/index.php/en/

136. "Palazzo Vecchio" The Florence municipality building

137. 100 Luoghi per Firenze – [Sept. 2011]
http://www.comune.fi.it/opencms/opencms/citta firenze/100luoghi.html

The Water Stakeholders Map In Florence

40%
Private Partners

60%
Public Partners

PUBLIACQUA
The Water Provider

Acque Blu Fiorentine
The Private Partner

68,99%
Acea S.p.a

22,86%
Ondeo Italia S.p.a

8%
MPS Investments

0,18%
Other Partners

Water

Florence 21,67%
Municipality

24,94%
Gruppo Consiag

12,96%
Other Municipalities

0,43%
Publiservizi
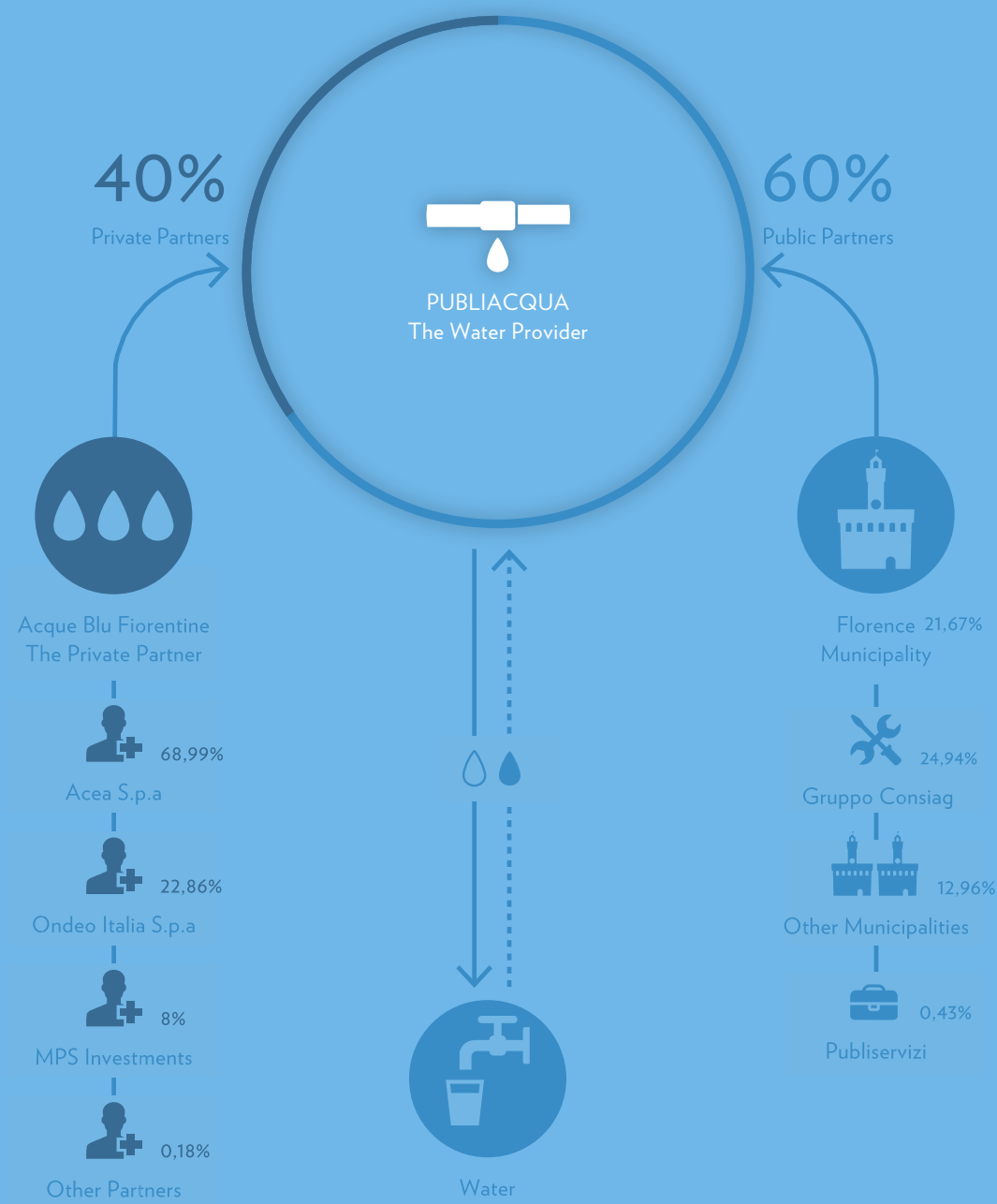
The Florence Municipality

THERE ARE SEVERAL SPACES AVAILABLE FOR CITIZENS TO EXPRESS THEIR THOUGHTS AND IDEAS IN AN EFFORT TO IMPROVE THE COMMON ENVIRONMENT.

The City of Florence in recent years has distinguished it-self by encouraging the processes of citizen participation. There are several spaces available for citizens to express their thoughts and ideas in an effort to improve the com-mon environment.

Promoting respect and protection of the environment is a priority for the municipality of Florence, facing not only their citizens but also foreigners.
The city has about 350,000 permanent inhabitants, but this number increases with the more than 8 million visitors who stay in the city over the year, with maximum peaks are between the months of April and June.

For this reason, in 2001, the municipality has introduced a small fee to the hotels, 1 € per day for each tourist ac-commodation in the city. The revenue needed to cover the *"environmental costs"* of visitors, especially the consump-tion of water, street cleaning and sanitation.

Thanks to the *"Fontanelli"* initiative, in 2011, the admin-istration of Florence has saved an estimated 5 million Euros from bottles and plastic disposal materials it did not require [138]. This has had the positive environmental impact of eliminating an estimated 7.5 million bottles and there-fore helped reduce the smog levels otherwise produced by transporting water bottles and PET bottles production [139].

138. *Osservatorio Prezzi e Tariffe di Cittadinanzattiva; "Importi Iva compresa, anno 2011"; dossier acqua [2012]*

139. *ISTAT; "Indicatori Ambientali Urbani"; [July 2012]*

Municipality Project Master Plan

THE FLORENCE ADMINISTRATION IS HEADING IN THE RIGHT DIRECTION, AND HAS RECENTLY APPROVED THE CITY PLAN OF INVESTMENTS OF EURO 2 BLN IN 3 YEARS

The national context of public spending review requires local governments to adopt a positive approach that allows to rationalize the use of resources and services.
Local authorities must establish budgets within their means (ie. tax revenue).
The Florence administration is heading in the right direction, and has recently approved the City plan of investments of Euro 2 bln in 3 years [140].

This will include investments for infrastructure, schools and cultural services. Therefore it will include some very interesting aspects to empower the city's *"smart"* wave, such as those described below.

140. Consiglio del Comune di Firenze; "Relazione progtrammatica 2012-2014"; [May 2012]

141-142. Comune di Firenze; "Piano strutturale 2012 - 2014"; [2011]
http://pianostrutturale.comune.fi.it/

Develop and promote a "Unique Territory"

• Promoting the "Brand Florence".
• A system of organic interventions designed to configure the clear identity of Florence and its municipality.
• Re-educating local businesses objectives in the context of the City's long term interests, and promote genuine value of tradition.
• Emphasize business products and encourage the highest quality
• Banner design, the product up to the price.
• Improve more intensely Florence as capital of food (for example as the International Ice cream fair is already doing): food, wine, the typical production terms and conditions for a development linked to the style and quality.

Rationalize the consumption of basic utilities

• Reduction in consumption of utilities.
• Arrangement and distribution of reports on consumption trends.
• Identification of measures to be implemented for rationalization and reduction in consumption of electricity, gas, heating, water and utilities. Identification of the savings targets to be implemented and associated monitoring and developments control.

Promote digital Florence

• Simplify the management processes and tools of authentication, by a unique platform of "citizenship", where different services are integrated and managed within the municipality [141].
• Set the Wi-fi in all the city squares (piazza's) and public spaces
• Enhancing usability of the user experience of the Open Data website of the City of Florence, through the increase of visual forms more understandable to not computerized users.
• Promotion of new forms of sharing of ideas and comments with citizens on the Open Data display on internet site, mobile devices and street-boards.
• Promote forms of shared public data display with other stakeholders in the Florence area, ensuring the ownership of the source, but stimulating forms of cooperation and sharing information is publicly, for the benefit of citizens and administrative transparency.

Promote participation and social cohesion

• Enhancing interaction with the use of web tools (1) and creation of conditions for encouraging participation through online forum discussions, blogs etc
• Continuation of the process of active participation of citizens planning of the City for major decisions [142].

Ato3: Publiacqua&Co.

PUBLIACQUA MANAGES WATER SERVICES FOR OVER 49 MUNICIPALITIES SPREADS ON A SURFACE OF 3,380 KM2 AND DIVIDED INTO 4 MAIN DISTRICTS

Publiacqua S.p.a. is a public private partnership (PPP) based in Tuscany. The shareholders are 60% public and include key stakeholders such as the City of Florence (21.7%) as well as other local authorities and public entities. The remaining 40% is held by *Acque Blu Fiorentine*, itself a private partnership including national and local financial institutions and water management operators.

Publiacqua manages water services for over 49 municipalities spreads on a surface of 3,380 km2 and divided into 4 main districts [143]: Florence, Prato, Pistoia and Arezzo, with a total population of 1.3 million people on average density of 373 km2.

Publiacqua Spa is responsible for the following areas covering all aspects of water supply, from source to tap to sewage:

• Production and sale of drinkable water
• Sell high quality water
• Treatment
• Sewage
• Laboratory tests chemical and organic analysis

$3386.10 \ Km^3$

Area covered by Publiaqua's service

1.277.000

Number of Inhabitants

7.000 Km

Water Pipe Network

4.200 Km

Sewage Piepes

143. from 2013 the number of the districts will be probably reduced to 2.

Publiacqua In Numbers

THE PIPELINE LENGTH IS ABOUT 7.000 KILOMETRES AND A DRAINAGE SYSTEM OF OVER 4.000, AND ITS CONDITION ARE IN GENERAL NOT IN GOOD; INDEED, APPROXIMATELY ONE THIRD OF IT DATE BACK TO THE DAYS WHEN FLORENCE WAS ITALY'S CAPITAL IN 1875

Only in 2011 Publiacqua has undertook more than 87.000 maintenance operations of repair and replacement of water supply. The pipeline length is about 7.000 kilometres and a drainage system of over 4.000, and its condition are in general not in good; indeed, approximately one third of it date back to the days when Florence was Italy's capital (1875). Indeed, the average leaking of water along the Publiacqua networks it's up to 30%: for every 1 Litre of water extracted at sourc, about 0.7 Litres reach final tap destination. The private sector shareholder has the responsibility of maintenance.

Key figures of the Publiacqua PPP are summarised below.

• Local Authorities serviced: 49
• Km of area covered: 3386,18
• Number of Inhabitants: 1.277.000
• KM of water pipe network: circa 7.000
• Water meters: circa 370.000
• Km of sewage pipes: circa 4.200
• Number of depurators: 129
• Number of Potable Water plants: 112
• Number of chemical and biological plants: 2
• Number of chemical and microbiological tests: circa 300.000 per year
• Staff: 647
• Annual Turnover: circa 160 million Euro
• Realised capital investments to date: circa 660 million Euro

129

Potable Water Plants

300.000

Microbiological Tests

647

Publiaqua Staff

160 mill./€

Annual Turnover

Climate
Is A Big Issue

AS A RESULT OF THE EXTRAORDINARY DROUGHT OF 2011 AND 2012 (THE HARDEST IN 60 YEARS)
PUBLIACQUA HAS MADE INVESTMENTS OF AROUND 40 MILLION EUROS FOR EXTRAORDINARY
INTERVENTIONS

As a result of the extraordinary drought of 2011 and 2012 (the hardest in 60 years) Publiacqua has made investments of around 40 million Euros, anticipating, in some circumstances, the realization of interventions planned for future years [144]. The local water resources (groundwater, streams, wells) after a short period of rainfall between the months of April and May, have returned below the minimum level. Numerous fires over the summer months have added further stress to the fresh water supply of the region.

For this reason Publiacqua for about two years has promoted several channels of information about the status of the water resources in the Tuscan region.
Many portals allow the audience to obtain information and query the health of rivers and recollection water ponds.
Overall, at least until now, the company's communication campaign does not appear to have penetrated people's attention [145].

144. *"Acqua usiamola bene", the Publiacqua communicaton channel*
http://www.acquausiamolabene.it/link-utili/

145. *"Autorità di Bacino del Fiume Arno" [2011]*
http://www.adbarno.it/cont/testo.php?id=1

Marketing
Or Rise Awareness?

PUBLIACQUA UNDERSTOOD THAT INVESTING HEAVILY IN ADVERTISING, PROMOTION AND AWARENESS CAMPAIGNS FOR RESPONSIBLE USE OF WATER, REPRESENTS A SIGNIFICANT RETURN NOT JUST FOR THE FIRM'S PUBLIC IMAGE, BUT ALSO IN PROFITS

Publiacqua understood that investing heavily in advertising, promotion and awareness campaigns for responsible use of water, represents a significant return not just for the firm's public image, but also in profits. The company has a strong presence in many of the initiatives promoted by the local authorities in the territory of jurisdiction and conducts numerous educational initiatives.

Publiacqua, from 2010, has promoted a massive publicity campaign in the region, for increasing awareness of the quality of its waters by creating of *"Fontanelli"*[146].
A competitive initiative that has no rivals anywhere else in the country, recently (August 28 2012) it has- inaugurated on the 51st (excluding distributors in public buildings).
Of these 51 "Fontanelli" currently operating in the territory of Publiacqua, 15 are located in Florence, since 31 December 2011, the 28 Fontanelli so far have provided more than 22 million litres of water [147].
In the first six months of 2012 the amount of water supplied is 13 million litres. An impressive figure, and very positive if one considers the saving in bottled mineral water, plastic and money. Also the water quality of Publiacqua has significantly improved over the years.

Levels of customer satisfaction of the water:

• 81% in 2004
• 92% in 2010

Claims to drink regularly from tap water:

• 21% regularly and 33% occasionally in 2004
• 39% regularly and 20% occasionally in 2010

In spite of appearances, Tuscan consumers rank among the top in bottled mineral water consumption, not only in Italy, but also across the Europe [148-149].

146-147. Publiacqua [2012]
http://www.publiacqua.it/fontanelli

148. Tourism plays a key role in on consumption of bottled water, which has an exponential growth in the the summer season.

149. In 2005 Tuscany as been consumed 200 liters pro head of bottled mineral water; source "Comminssione consiliare Territorio e Ambiente" Regione Toscana [March 2006]

Citizens&Co.

THE WATER CONSUMPTION IN FLORENCE HAS SIGNIFICANTLY DECREASED OVER THE 2010 AND 2011, WITH A CONTRACTION RATE OF -10.7%, WHICH MEANS A DAILY CONSUMPTION OF 150 LITRES PER HEAD. A REMARKABLE RESULT.

The water consumption in Florence has significantly decreased over the 2010 and 2011, with a contraction rate of -10.7%[150], which means a daily consumption of 150 litres per head. A remarkable result and the most significant in Italy(1). But how was it possible to achieve this level? There are two main reasons.

The first one , is that since the 2003, Publiacqua, invested aggressively on an increased awareness campaign and it has improved its network especially in the last two years because the serious drought; the second one, is an economic reason. Indeed, the integrated water service managed by Publiacqua has a cost per family of 474 Euros a year [151].
Tuscany region has 8 cities in the first 11 positions for expensive water services [152-153].

After the publication of these data, many committees' citizens have started to protest against so elevated fees and asked for an explanation.
The main problem is the fixed costs: between 70 Euros and 80 Euros (counter reading by external company); secondly the fact that there is no clear reading of meters, based on the consumption of each single dwelling.
In any case, most of the citizens don't know how long and complex the water process, from source to tap, actually is.

150. Genoa follow after with -6,5%; source: "Indicatori ambientali urbani"; ISTAT [July 2012]

151. Servizio idrico integrato ATO3; [2012]

152. Municipalities expenditure 2011: 1 Florence € 474.00; 2 Pistoia € 474.00; 3 Prato € 474.00; 4 Arezzo € 465.00; 5 Grosseto € 457.00; Siena 6 € 457.00; 9 Livorno € 447.00; Pisa 11 € 442.00.

153. 1. Osservatorio Prezzi e Tariffe di Cittadinanzattiva; Dossier acqua [April 2012]

150

Liters of Water
Daily Florence
Per-Capita Consumption

-10.7%

Decreasment of Water
consumed

+ Awareness

The City
Needs

TO BE CONSIDERED "SMART CITY", FLORENCE AND OTHER NEIGHBOURING PUBLIC AUTHORITIES, ARE WORKING HARD TO APPROVE A SEVERAL GUIDELINES FOR ENERGY AND WATER SUPPLY SYSTEM EFFICIENCY AND NEW FORMS OF PARTICIPATORY MANAGEMENT FOR THEIR CITIZENS

The city of Florence, like many others in the country, seeks to find investments in order to modernize its infrastructures and deliver a competitive service with no/limited waste of water to its citizens (who pay for the service). The water issue is complex, a real pitfall for each municipality, which tends to outsource administrative responsibilities to third parties (eg. like meter reading), even if this means paying more for poor service.

To be considered *"Smart City"*, Florence and other neighbouring public authorities, are working hard to approve a several guidelines for energy and water supply system efficiency and new forms of participatory management for their citizens. Unfortunately, the recent economic-financial crisis, together with the sluggishness of the local administrative processes, are slowing down the implementation of some proposals reported below [154]. It is clear that each user wants to know exactly its own consumption, but this is not possible at present. Currently, everything is delegated to the estate administrator, who divides the water consumption of the building, in the same measure but with extra fee for this service. Effectively, the administrator is a 'middle man' representing a cost; with todays technology such cost can be eliminated.

Priority and actors involved:

154.*Progetto Attuazione dell'Agenda 21 Locale dell'Area Fiorentina [2008]*

High priority

Setup of counters for unique living unit and financial reporting access to citizens. (Publiacqua, Municipalities)
Adoption of devices for adjusting the water flow of flushing cisterns for toilets.
Rainwater harvesting for each condominium or single dwelling. (Municipalities, regional authorities)
Water and sanitary facility with recovery of drain water. (Municipalities, Regional Authorities)
Modernization water supply system to reduce the water leaking along the network[155-156].
(Publiacqua, Municipalities)

Medium priority

Back to the Public management of water supply system. (Publiacqua, Municipalities)
Phytodepuration for domestic wastewater, such as kitchen, bathroom.
Discouraging the purchase of plastic bottled water. (Publiacqua, Municipalities)

Low priority

Finance rainwater harvesting in public spaces. (Municipalities)
Discouraging the unfair water consumption by introducing extra fees, especially for the 'wasteful' agricultural sector. (Publiacqua, Municipalities)
Improving information and training on water resources. (Municipalities, Regional Authorities, Management Authority)

155. The Motion for longereported by citizens; Piano d'Azione Energia e Acqua [2009]

156. Best preactice: the multiutility company Gruppo Hera, which by means diversified businesses activities is able to cover the costs of the less profitable areas such as the modernization of water pipelines.

The Company Needs

A GOOD THING FOR EVERYONE (EVEN ENVIRONMENT) IS THAT, HAVING USERS WHO MAKE A CAREFUL USE OF WATER COULD ENABLE THE OPERATOR TO ACHIEVE SAVINGS THROUGHOUT THE ENTIRE SUPPLY CHAIN OF WATER.

As mentioned, Publiacqua's – though its private partner - put some efforts in promoting laudable initiatives and awareness campaigns. Still a profit motive has driven the company's decisions. Acque Blu Fiorentine Spa [155], aim is based on the preservation of water network and the managing the human resources.

Therefore, the private partner does not want to reinvest the bills proceeds in a long and slow strategy of upgrading the plumbing/water pipe system.

This would be a losing strategy with high cost with a long pay-back period, even though this would be great for the good of the city and those who live in.

A good thing for everyone (even environment) is that, having users who make a careful use of water could enable the operator to achieve savings throughout the entire supply chain of water.

Less water consumption could be translate in less costs of maintenance, and so far in water utility bills, translate into a larger operating profit.

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155. *"Acque Blu Fiorentine Spa" is the private partner in share of Publiacqua*

The Citizens
Key Role

OFFERING TO INDIVIDUAL, DWELLER, CITIZEN, THE IDEAL BASIC KNOWLEDGE IN SUPPORT FOR READING THE CONTEXT IN WHICH HE LIVES, EITHER ON A LOCAL SCALE, EITHER ON GLOBAL ONE TO HAVE AN OUTLOOK ALL OVER THE PROCESS OF RESOURCES FINALIZATION

It becomes necessary to reconsider the relationship between man and water. Crucial is finding models and solutions on a local scale, and then replicate successful ones throughout the country. The solutions should not be exclusively a technological one.
But rather try to copy as much as possible from the already existing ecosystem of human dynamics and at the same time, linking people with a little help from specific "pocket" technologies.

Offering to individual, dweller, citizen, the ideal basic knowledge in support for reading the context in which he lives, either on a local scale, either on global one.

The goal is enabling individuals to take a widest perspective all over the process of resources utilized by him along his life journey. The second step is records its own behaviour best practices and apply this understandings to enhance his way of living the space and things which are interacts in it, likely water.
The goal is to enable individuals to have an outlook all over the process of resources finalization, from the beginning until the end.

The second step for the same person is understand its behaviour best practices and apply them to his way of interact with things and other people.

Unfortunately this country still misses a global point of view on environmental assets; indeed, it seems not yet traced a common interest's guide line among the fragmented political and territorial realities.
Meanwhile, the urbanization and the water shortage can't wait; so it's really urgent finding for citizens a joint pivot with their local municipalities now.

However, in a *PPP* located in Florence, there is a positive socio cultural context to create communal services of interest across citizens and private companies; one of them is how to get to an efficient use of the water resources available. This is the concept of transformation to be implemented immediately.
It becomes crucial to seek in already existing services, provided by the city government; already existing service templates waiting for being upgraded with opportunities that change and time provide to us nowadays.
Citizens in this context get a chance to share their talents, know-how to set creative synergies to promote smart services aimed at protecting and monitoring the environment, the community and the interest of future generations.
This could create a sustainable virtuous cycle.
The mind-set can start without waiting for huge investments from above, but for instance, throughout changing contract's assets among key players, like *PuPs* contracts instead *PPP*.

Municipality
Best Practice: ECODES

ECODES, WAS FOUNDED SPECIFICALLY TO HELP REDUCE WATER USAGE IN ZARAGOZA, AND WORKED CLOSELY WITH THE MUNICIPALITY TO INSPIRE AND SUPPORT WATER-SAVING INITIATIVES

Zaragoza, a city in North-East Spain, provides an example of successful management of urban water demand. The city reduced overall water use by 1.600 million litres on average each year between 1995 and 2008 despite significant population growth.

A local non-governmental organization, Ecodes (Foundation for the Environment and Development), was founded specifically to help reduce water usage in Zaragoza, and worked closely with the municipality to inspire and support water-saving initiatives. Water quality also improved.

Importantly Ecodes enjoyed the full support of the municipality and managed to secure the engagement and support of the public through a clear and well structured publicity campaign. Water saving became a matter of civic pride disassociated from party politics, and consequently survived several changes of government.

Successful measures included the adoption of a range of water-saving techniques by industry such as re-circulating cooling systems and improvements in cleaning methods and maintenance regimes, combined with the introduction of water meters. In addition, following public awareness campaigns, the behaviour of the general public changed.

The government also drew up a municipal order to save water, to be incorporated in the Municipal Building Code. Finally, a workable water tariff system that aims to be fair to all consumers was introduced following a stakeholder consultation.
The campaign was so successful that initial targets were achieved two years ahead of time, allowing even more ambitious targets to be set [156].

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156. "Sustainability of water management in Zaragoza city", the text is edited by Shirley-Smith [2008].

9

SECONDARY RESEARCH

Quality & Safety
Parameters

THE TERM "WATER QUALITY" ADVOCATES THE WATER CHARACTERISTICS IN RELATION WITH GUIDELINE
VALUES THAT ARE SUITABLE FOR HUMAN NEEDS AND ITS CONSUMPTION PURPOSES

Quality: *Water quality parameters provide important information about the health of a water body. These parameters are used to find out if the quality of water is good enough for drinking water, irrigation, and aquatic life* [157].

Safety: *it is the condition of exposure under which it is practically certain that no harm will result to the exposed personnel and property* [158].

The term *"water quality"* advocates the water characteristics in relation with guideline values that are suitable for human needs and its consumption purposes such as personal hygiene and domestic uses as well as irrigation and aquatic life.
The guidelines values refer to the four components of water: physical, chemical, biological and microbial, and compare them to human limit thresholds of assumption.

157. *"Water Quality"; Wikipedia def [Aug. 2012]*
http://en.wikipedia.org/wiki/Water_quality

158. *"Safety"; Oxford Dic. def.*
http://oxforddictionaries.com

159. *E.Coli, Entamoeba and Giardia, are the most common parasite in water.*

Physical aspect

The physical aspect concerns the turbidity, colour, taste, and smell of water.
Turbidity should always be low, especially when being disinfected; indeed, high turbidity can inhibit the effects of disinfection against microorganisms and stimulate bacterial growth. Most of the times taste problems the evidence of changes in water sources or treatment process.
Inorganic compounds such as magnesium, calcium, sodium, copper, iron, and zinc generally affect the taste of some waters, as well as chemicals, fertilizers and other artificial products which may percolate into the soil.

Chemical aspect

The chemical contamination of water sources may be due to industrial and agricultural processing, or in some cases to natural causes.
Not always is it easy to eliminate toxic chemicals present in drinking waters, and this is one of the main causes of harmful effects, especially for the population exposed to industrial areas and leakage in the sewage system.

Biological aspect

Parasites, like protozoa and helminths are also indicators of water quality.
Throughout the world, the most common contamination of raw water sources is from human sewage and in particular from human faecal pathogens and parasites [159].

Microbial aspect

Drinking water should not include microorganisms that are known to be pathogenic. Besides it should not contain bacteria that would indicate excremental pollution, the primary indicator of which are coliform bacteria that are present in the faeces of warm-blooded organisms. Chlorine is the usual disinfectant, as it is readily available and inexpensive.

Potable Water

POTABLE WATER:

Potable water is water that has been either treated, cleaned or filtered and meets established drinking water standards or is assumed to be reasonably free of harmful bacteria and contaminants, and considered safe to drink or use [...] Examples of potable water would be that from treated municipal water systems, water that has been UV filtered, water distilled, or purified by reverse osmosis [160].

There are dozens of water parameters which are checked both by the water authorities and the local water providers[161]. Most of these parameters do not affect the quality and the safety aspects of our freshwater; their incidence is not relevant. Some other ones, instead, determine the *"boundaries"* within which water parameters must keep in order to consider that water as potable that is "safely drinkable".

The most commonly used metric to assess the safety of our potable waters are the following: [162]
pH:
This parameter shows how much water is acidic or basic: the value specified in order to be acceptable by law must be in between 6.5 (acidic water) and 9.5 (basic water).

TDS (Total Dissolved Solid):
It is the amount of mineral salts, expressed in mg, obtained by evaporating at 180 °C a litre of water. The waters are classified according to the value of the remaining residue:

Slightly mineralized:
<50 mg / l, it is water-poor minerals;
Oligominerals: <500 mg /l;
Minerals: the TDS is comprised between 500 and 1000 mg/l.
Rich in minerals: the TDS> 1500 mg / l.

160. *"Potable Water"; def. Wikipedia [Sept. 2012]* http://en.wikipedia.org/wiki/Drinking_water

161. *In a year, Publiacqua, takes from its distribution networks something like 14,000 samples, on which are determined more than 400,000 parameters.*

162. *Parameters are compared with Publiacqua, the local water supplier in Florence.*

Types Of Water

There are mainly 4 types of drinkable water on the market: tap water; purified water (micro filtered and treated); spring water (bottled just on spring); mineral water .

TAP WATER

Tap water is supplied by the local municipal water provider through the municipal water network: its fundamental requirement is its drinkables. The amount of "macro" and "micro-elements" (TDS at 180 ° C) must be less than 1.5 grams per litre.

PURIFIED WATER

It should be water taken from rivers, lakes and wells; purified from pollutants, de-mineralized and balanced.
This water is *micro-filtered* to be made suitable for human consumption. Compared to tap water this type of water has the advantage of being bottled locally and immediately after the purification process.

SPRING WATER

It is bottled as it springs out and cannot be treated and cannot boast healthy properties as allowed to mineral waters [163].

MINERAL WATER

It is natural, untreated spring water containing small amounts of minerals, salts and *oligo* elements which characterize its taste and its health benefits.
To be marketed and sold it requires the approval of the *Ministero della Salute* [164] .

The mineral water standard requirements are:

• Mineral water must spring from a pure source, maintain its original natural characteristics and be bottled at source.
• Mineral water has special characteristics and specific health benefits.
• Mineral water is distinguished from ordinary drinking water or spring water for its original purity, and the quality and quantity of minerals.

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163. Direttiva 2009/54/EC del 18 giugno 2009 su spring and mineral water

164. Ministry of Health, regulated by a special law, the D. Lgs 105/92.

Healthy & Harmful Substances

Calcium

Calcium is an important factor of water hardness, and it also functions as a pH stabilizer, because of its buffering qualities. This chemical element is also present in the human body in large amounts, about 1.2 kg; no other element is so abundant. Contrary to popular belief, indeed, calcium in water (within safe limits) is healthy and particularly for the bones and for teeth too.
Calcium also gives water a better taste.

Pros: in the right quantity it is healthy; it is a taste enhancer
Cons: it has the cleaning power of a detergent; it may cause high blood calcium levels
Florence water contains 57 mg/l !!

Magnesium

As an alkaline metal, magnesium is also responsible for water hardness. It is a central atom of the chlorophyll molecule, and is therefore a basic element for plant photosynthesis. So far for negative effects are not expected for human and animal health, eventually just taken in large amount may cause laxative effects.
Magnesium compounds are usually removed from water, because of the role magnesium plays in water hardness. This is achieved by means water softening. Magnesium hydroxide is applied as a flocculation in water purification. Magnesium sulphate adds a bitter flavour to water.

Pro: right for physical activity
Con: laxative properties; unpleasant flavour
Florence waters: 12 mg/l

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165. Methemoglobin is an oxidized form of hemoglobin that has a decreased affinity for oxygen, resulting in an increased affinity of oxygen to other heme sites and overall reduced ability to release oxygen to tissues.; def. Wikipedia [Jen. 2012]
http://en.wikipedia.org/wiki/Methemoglobin

166. This syndrome occurs mostly in babies six months or younger, Blue baby syndrome is most common in rural areas where nitrates are used in high levels for agricultural purposes.

167. "Chloride"; Wikipedia [Aug 2012]
http://en.wikipedia.org/wiki/Chloride

Sodium

It is a chemical element which can be found naturally only in compounds, such as salt. It is important in the human diet as partially responsible for nerve functions.
Blood serum contains 3.3 g/l sodium. It regulates extra cellular fluids, acid-base balance and membrane potential, partially together with potassium. An overdose intake of Sodium could cause risky factor such as arterial hypertension, dehydration, muscle paralysis and decreased growth.

Pro: right for physical activity
Cons: laxative properties; flavour
Florence water contains 24 mg/l < limit 200 mg/l

Nitrates & Nitrites

Nitrates (NO2) are compounds present in the water both for the effect of natural phenomena and as a result of man's activities, such as the treatments of fertilization of the land or sewage infiltrations into the soil. The concentration limit is 50mg / l.
High nitrate levels in water can cause *methemoglobinemia*[165]; when nitrite is absorbed in the blood, and haemoglobin (the oxygen-carrying component of blood) is converted to methemoglobin which does not carry oxygen efficiently and cause serious brain damages. Therefore, is strictly recommended not to let infants drink water that exceeds 10 mg/l, that could cause the *blue baby syndrome* [166], a bluish colour of the skin, particularly around the eyes and mouth. As food additives nitrates may cause asthma and allergies. Nitrites (NO3) as well as nitrates are compounds with the same origin and cause the same diseases, but they have a lower accepted limit of   0.10 mg / l.

Pro: none
Cons: methemoglobinemia, blue baby syndrome; allergies
Main causes: fertilizers and manure; animal feedlots; municipal wastewater and sludge; septic systems
Florence water: nitrates 4 mg/l < limit 50 mg/l; nitrites none < limit 0,10 mg/l

Chloride

Key compound for the human body, chloride helps the cell metabolism (the process of turning food into energy). It also helps keep the body's acid-base balance; the amount of chloride in the blood is carefully controlled by the kidneys. Chloride is also a useful and reliable chemical indicator of river and groundwater faecal contamination, as chloride is a non-reactive solute and ubiquitous to sewage & potable water [167]. Many water regulating companies around the world utilize chloride to check the contamination levels of the rivers and potable water sources. If the level is high water sapidity rises up and the corrosive characteristics too. The limit is 250 mg/l.

Pros: body's acid balance; tuning cell metabolism
Con: in large quantities provokes kidneys illnesses
Florence waters: 43 mg/l < limit 250 mg/l

Fluoride

For several decades, fluoride has been added to water in an effort to prevent tooth decay. This in many areas is accepted as a fact, and not to fluoridate water would be an obstruction to public health. However, as usual, high concentrations of fluoride taken for a long time, can cause problems such as dental *fluorosis* and water actually it is something that people assume everyday. For this reason, the limit of fluoride is regulated.

Pros: good bone density; tooth enamel stronger and more resistant
Con: dental fluorosis, bones density reduction
Florence water: <0,1 mg/l < limit 1,50 mg/l

People's Mistrust In Tap Water

FOR MOST PEOPLE, INDEED, DELEGATING THEIR OWN SAFETY AND HEALTH RESPONSIBILITY TO THIRD PARTIES, REQUIRES AN EXTREME ACT OF TRUST, AND IN SOME CASES THAT BECAME A STRESSOR

We could say that generally speaking public trust in public tap water is *"leaking"*. Despite strict regulation on water parameters, public water is still not trusted as good drinkable water by most consumers, even causing anxiety in many. People are usually unconfident when dealing with something that they cannot *"test"* directly.

For most people, indeed, delegating their own safety and health responsibility to third parties, requires an extreme act of trust, and in some cases that became a stressor. In some way, the feeling could be compared with a serious clinic situation, when before taking an important decision a patient expects different medical responses before making his choice. The *"water mistrust"* attitude is more or less the same. Unsafe water is mechanically processed and treated, once potable injected into the pipeline system, till when the users decide to open the tap and... even if the water is certified by the provider, most people mistrust the quality of the process. [168]

There is still to determine if bottled water is healthier or more harmful than tap water; but so far market data remark the healthiness of water industry. In this panorama, indeed, it is easy for bottled water industry to push the right buttons of consumers feelings. At least until people won't be able to verify water contents directly proving the quality of what they are drinking.

For instance let's try to discuss and convince a pregnant mother to drinking tap water. She will probably reject your opinion. During the research phase, I have come across an interesting *"pregnant mothers"* website, called Baby Centre. On this portal, mothers and mothers to be can share solutions, and asks to *"the wise expert"* tips about their pregnancy. One of the question was: *"what kind of water is the best for a baby?"* Regardless of the expert answers, below, for over 10 pages, a battle among mother was started. All of them were arguing with others and there were no tips anymore.

Mistrust in Institutions
The qualitative standards that they ensure as *"good"* are too elevated or they are not taking into consideration events and risks of pollution. Rules are not so restricted as they should be, therefore it's too easy to say: *"potable water"*. Obsolete methods for water treatments cannot guarantee the elimination of harmful substances.

Mistrust in water network
Old and ageing pipelines not only lose high percentages of water, but are also vulnerable to toxic percolation or might release lead. Taste is basic aspect of perceived water quality

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168. ex: To prove the quality of its water and gain the citizens' confidence, Emilia´s water public manager Hera, has compared their water with the mineral bottled ones. The results of this benchmark has shown a total overlapping of the parameters between public water and bottled one.
http://www.gruppohera.it/gruppo/attivita_servizi/business_acqua/qualita/pagina4.html

168. "Baby Centre"
http://www.babycenter.com

Surface: the visualization, how the finished product looks like.

Skeleton

Skeleton: make the structure concrete; decide what kind of components will enable people to use the platform.

Skeleton

Structure: how the pieces of the platform get together and behave.

Structure

Scope: the features that the platform needs to include.

Scope

Strategy aim that the platform want to achieve and what the user wants.

Strategy

Simplified planners of user experience.
based on J.J.Garrett
"Element of new user experience"

Connecting
The Invisible

SMART METERING

Smart Metering is the technology, the *"eyes"*, the knot that has been devised for linking the intangible world with the tangible one. Meters are expanding their application in house, where they are mostly used to check the consumption of gas, water and energy with a 100% of accuracy and in some cases allow the user an active control. Metering can implement environment as well as provide factual information and feedback to users, utilities and governments[169]. As reported below there are different smart meters: active smart meters and passive smart meters.

Active smart meters:
When data are collected and automatically recorded and displayed on managing platforms.

e.g. Active metering: meters drag situational information from the environment and redirect them to a platform, that in general is a website. *"SenseAware"*[170], is a small device fromw FedEx that measures in-transit condition, mainly used for shipments that are vital or critical. From its web platforms *"SenseAware"* allows costumers to track their goods in real time and have feedback statistics.

Passive smart meters:
Prevent users from managing data, except for reading and collecting information.

e.g. Passive metering: passive meters monitor environment information and display them on a visual surface which users can read.
An example of passive smart meter is the Smart Metering System of Enel[171].

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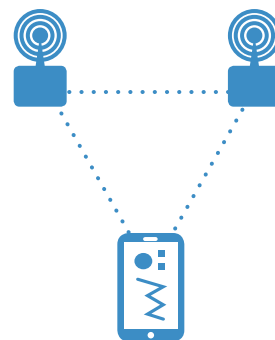
169. Zetland and Weikard, "Payment by the drop: The move to water metering in England and Wales"; OFWAT, [Dec. 2011]

170. FedEx Senseaware tracks everything about your package; [2012]
www.senseaware.com

171."Enel smart meter"
http://www.enel.com/en-GB/innovation/project_technology/zero_emission_life/smart_networks/smart_meters.aspx
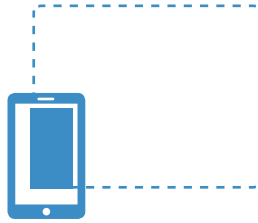
HCI (Human Computer Interaction)
Human interaction has always been a fundamental plug-
ging aspect of design, and in the last twenty years it has
grown exponentially. The reason could be seen in the tech-
nical and computer mass development, and the require-
ment for *"expert"* or *"facilitator"*.
The Interaction designer, indeed, has the skills to bridge
the gap between users and the machine.
Our living environment is more and more technological,
therefore designing communication platform becomes
crucial. A long term goal of HCI is to design systems
that minimize the barrier between the human's cognitive
model of what they want to accomplish and the computer's
understanding of the user's task [172].
The HCI approach links the passages between the bottom
layer of strategy to the top one of visual, as Jessie James
Garret [173] shows in his user experience model applied to
a website structure, but the same wireframe can also be ap-
plied to other design fields like service and meta product
[174].

DATA VISUALIZATION
What kind of data do we want to communicate? What kind
of audience are we talking to? What kind of visual tools do
we need to use?
Data representation needs an answer to all of these ques-
tions in order to accomplish its only aim: *"explaining"*.
The way in which the contents are displayed it is crucial to
catch people's attention, for explaining them the complexi-
ty of the water route. Particular attention needs to be given
to the meters,which must be easy and user's friendly also
for inexpert people. That means supporting the users in
priorities their research and collect the insights needed.
The complexity of the visual architecture is the main cause
of the lack of information. Sometimes the missing point
depends on the device/medium where information is dis-
played, sometimes on the wrong or confusing layout

172. Human Computer Interaction (HCI), Wikipedia [Sept.
2012]
http://en.wikipedia.org/wiki/Human%E2%80%93computer_interac-
tion

173. . Jesse James Garrett is a user experience designer;
http://www.jjg.net/ia/visvocab/

174. Garett, J.J.; "Elements of User Experience"; New Riders Press
[2002]

Eco-Visualization (EV)

[...] ECO-FEEDBACK IS INFORMATION PRESENTED DURING THE PRODUCT-USER INTERACTION WHICH PROMPTS THE USER TO ADOPT ENERGY SAVING STRATEGIES, HOWEVER, LITTLE IS KNOWN ABOUT HOW SUCH FEEDBACK WORKS AND THUS HOW IT CAN BEST BE APPLIED FOR OPTIMAL EFFECT [...]

By consumption visualizations, otherwise known as eco-visualizations (EV), we mean devices that are targeted at revealing water or energy use in order to promote sustainable behaviours or foster positive attitudes towards sustainable practices.

"By focusing on the interaction between the product and the user it is possible to generate responsible conservation behaviour using eco-feedback. Eco-feedback is information presented during the product-user interaction which prompts the user to adopt energy saving strategies, however, little is known about how such feedback works and thus how it can best be applied for optimal effect". [175]

EVs visually reveal to the users their domestic consumptions at any given moment in relation to the type of aim and context where the device must operate.
EVs are made by at least by a sensor which is constantly monitoring its environment, and by a device with connected integrated software whose task is to rank and represent information. In this way residents can have an open access to relevant information and the tools to interact with them in a meaningful way.

But how can eco-visualization be represented? Traditionally rooted in science, the field of information visualization has increasingly emphasized the importance of art and aesthetics, and it could be distinguished mainly between two general types of data-visualization: pragmatic visualization and artistic visualization. [176-177]

• Pragmatic: it borrows formal elements from scientific visualization (eg. line graphs, grids, clear labels) to clearly communicate the numbers, the consumption in a direct way.

• Artistic: the aesthetic form is something the owner would be proud to display, as a symbol of sustainable values and lifestyle to others (eg. a 2.0 sculpture or installation). [178]

The feedback is crucial in EV systems, in order to prove that the system works. In fact feedback is produced by the constant collection and visualization of data relating to the several levels of resource consumption.
In the Water-Log Diary, for example, a problem which has been remarked by the people interviewed was actually the lack in meaningful feedback while they are using water or energy in their houses.
Feedback is the dynamic means through which information is conveyed to a person who uses a particular visualization device or interface.

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175. def. James Pierce, William Odom and Eli Blevis [2011]

176. McCalley, L.T.; Midden, G.J.H.,"Computer-based systems in household appliances: the study of ecofeedback as a tool for increasing conservation behavior", [1998]

177. Kosara, Robert.; "Visualization Criticism – The Missing Link Between Information Visualization and Art"; The University of North Carolina at Charlotte [July 2007]

178. image 1. "Green Cloud" (Nuage Vert), Helsinki, byHeHe. Image based on original photo by Antti Ahonen.im.2 "Power Cord"
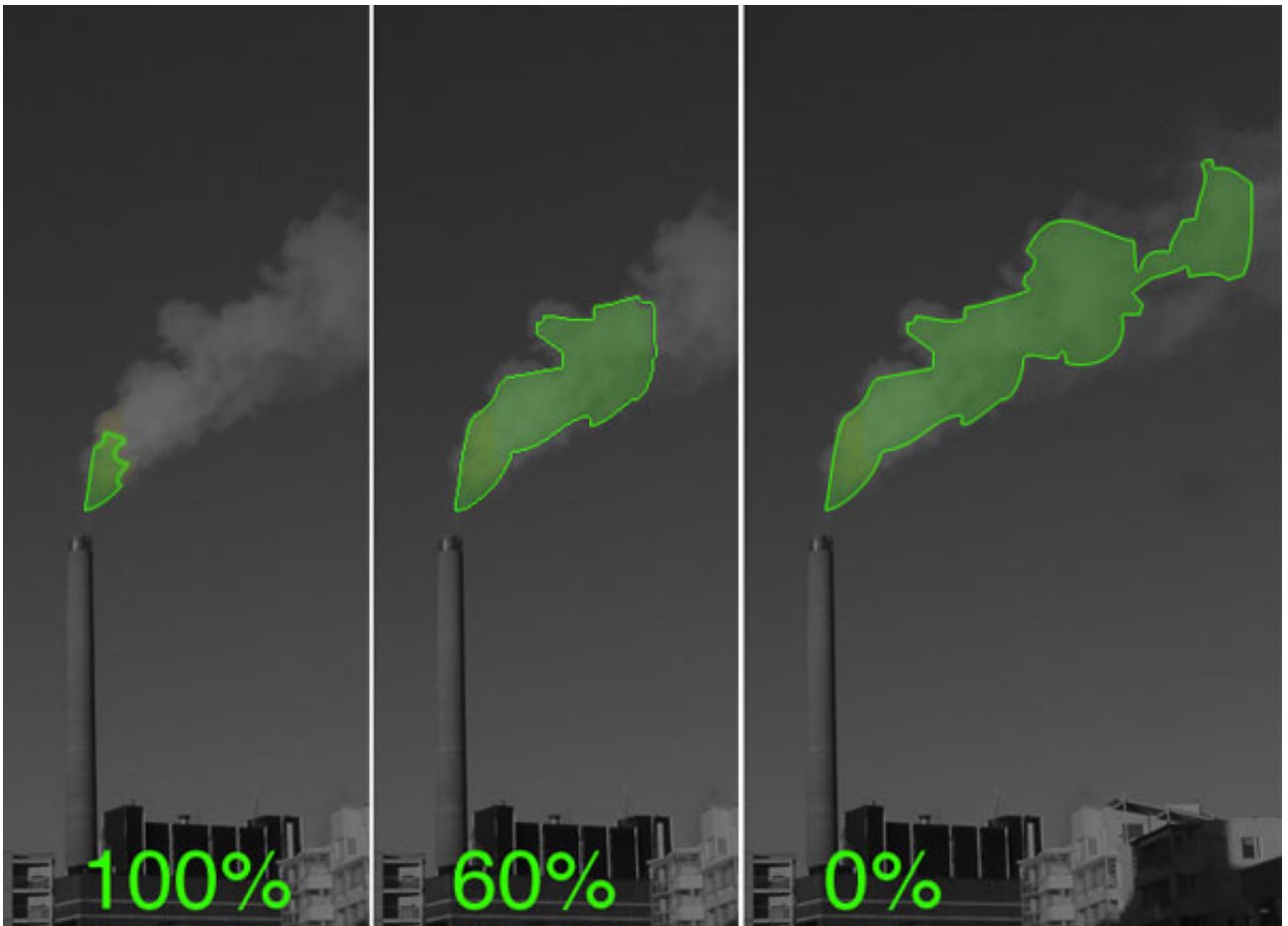
Rising Public Awareness With EV

VISUALIZATION FOR BEHAVIOURAL CHANGES

Eco-visualization has outlined 5 different strategies to promote social and individual changes.
The first two relate to supporting conservation goals by providing clear and useful information or feedback [179].
The third and fourth strategies focus on creating incentives to conserve, especially in contexts where financial incentives are not present.

The last strategy focuses on more experimental aspects of making consumption visible, ideally helping to create or support conservation goals in the process.

179. These visualizations tend to assume that the user already has some motivation to conserve energy (e.g. to save money, or reduce environmental footprint)

180. Energy and water monitoring services from Lucid's Building Dashboard product have helped building owners in an area of down-

town Seattle to track cuts in their consumption; http://www.luciddesigngroup.com/

182. http://www.luciddesigngroup.com/

181. http://tiffanyholmes.com/

Behavioural cues and indicators

A common approach to motivating resource conservation is to provide contextual, real-time feedback in the form of simple signals or markers close to the point of consumption with the goal of capturing attention and guiding behaviour. In alternative to numerical feedback, changes in water status (volume, pressure and chemical) can be communicated through brightness or colour differences in lighting.

Analysis tools

This systems offer more in depth feedback, allowing users to explore their consumption pattern more in depth, and to consult the history of records. [180]
However, there is still the issue of incentives, for many financial or environmental incentives may not be enough to motivate one to conserve or adopt such a tool in the first place.

Effects visualization

It is often difficult to connect individual actions (eg.. Turn off the water while brushing teeth) with the negative consequences of our collective actions (eg. Water shortage). Many EVs communicate water consumed in terms of environmental figures such as desertificated lands or numbers relating to the decrease of the water flow of a river.
The visualization attempts to communicate numerical statistics in a more meaningful way, creating an emotional connection between the individual and the environmental consequences of water consumption. [181]

Playful-S-Engagemant (playful social engagement)

It consists in combining EVs with social incentives to conserve, such as in the context of formal competitions to reduce consumption. Displays, but not just them alone, have the power of connecting to other meters and other platforms, and this pushes users to build a holistic benchmark about their consumption. The problem that designers should solve is how to keep people interested in the challenge, and how to accustom the users to the process by introducing awards for virtuous consumers.

Projecting sustainable lifestyle

Many of the visualizations already discussed serve both symbolic and practical functions. For example the Lucid's Building Dashboard [182],may provide information that motivates or informs conservation behaviour, but it also communicates that the building owners, managers, or residents care about energy conservation. Indeed, the building dashboard is an important way in which buildings that intend to be *"green"* can show visitors and building residents how efficient they are, perhaps even highlighting energy efficient technology that may be less visible, such as solar panels or efficient water depuration.

Communicate
Local Values

TOGETHER WITH PUBLIACQUA, THE TARGET IS TO ENCOURAGE THE REUSE OF THE WATER PLASTIC BOTTLES FOR THE TOURIST AND THE CITIZENS TOO.

During the last year Florence Municipality has started a process of communication restyling.
"One of the goals of this administration – the deputy mayor Dario Nardella said - *is create a new logo and marketing strategy for the city of Florence, to promote events and the territory attributes as done by other cities like Amsterdam and Berlin"* [182].
In the next three years several international events will take place in Florence, one of them being the World Cycling Tour. Florence, as Nardella remarked, wants to show its evolution and the renovated capacity of development to both the national and international public.
Therefore, the city needs to promote new services and improve the existing ones.

One of the most recent and popular on going services has been the setting up and improvement of the network of *"Fontanelli"* throughout the urban area.
Water is a pivot project for both the Municipality and water distributor. Together with Publiacqua, the target is to encourage the reuse of the water plastic bottles for the tourist and the citizens too.
In one year only, the Florence has saved something like 5 million euros for bottles and plastic disposal materials, with the global elimination of 7.5 million bottles and the reduction of smog produced by water transport and PET bottles production [183].

182. Giovani Imprenditori di Confidustria Firenze; "UN MARCHIO PER FIRENZE"; [2012]

183. ISTAT; "Indicatori ambientali urbani"; [Aug. 2012]

Communicate
The Water

LOTS OF ASSOCIATIONS, IN ITALY, ARE ENGAGED IN THE BATTLE FOR WATER RIGHTS AND TO RISE AWARENESS AT ANY LEVEL

"Libere - liberi di bere!" [184] is one of the mottos of existing associations that are watching on the safety of water as a common good for the Italian territory.
Lots of associations, in Italy, are engaged in the battle for water rights and to rise awareness at any level; even COOP has renovated its own green strategy for freights transportation, while groups of citizens have created Apps for mapping the water fountains in the cities.

Since 2011 COOP [185] has started a water rising awareness campaign in all its retails. COOP remarks on how high the rate of bottled water consumption is in this country and on the heavy impact for the environment: in Italy, more than 80% of bottled water is carried by trucks.
The average distance covered by trucks with water is 150 km [186] Therefore, in order to cut the CO_2 emissions, COOP has started to selling the mineral waters which are produced closer to its outlets.

COOP's campaign to minimize plastic consumption and the distance reduction from the water source has triggered a counter-action by the big water brands.

Since 2009 the citizens' project called *"Libere - liberi di bere!"*[187] has promoted a systematic mapping of the public fountains in Rome. The project includes pushing active citizens and tourists to reveal public fountains locations and share them on website.
That is a sort of open database of water spots where people can look for the closest fountain nearby.
The aim of the project is reducing the plastic bottles consumption by giving the opportunities for citizens to get water for free next to their houses.

184-187. *"Lìbere - liberi di bere!"; [2010]*
www.fontanelle.org

185. *Coop; "Acqua di casa mia"; [2010]*
http://www.e-coop.it/portalWeb/stat/docPortaleCanali/
doc00000085979/true/true/acqua-di-casa-mia.dhtml

186. *100lt of water carried on trucks for 100km, they are producing 10kg of CO2; [2011]*

10

PRIMARY RESEARCH

Project
Research&Goals

Primary research is a thesis milestone to seam the best design answer to citizens needs. I started with recruiting different types of participants and informing them about my understanding and targets.
I found out some differences between users' habits, attitudes and behaviours that could be useful in defining the personas and possible scenarios and I resolved that 10 extreme users were enough.
In this way we can reach a better understanding of the reasons that trigger a person in his choice in front of hundreds of different water labels, or if he/she has developed a personal point of view on possible approaches and solutions about increasing public administration efficiency, or private consumption of water.
Thanks to interviews, observation, and scenarios settings it was possible to draw a hierarchy of possible and interesting windows of context opportunities for the water topic.

In order to reach these results I selected 6 different types of candidates, for each interviewee I set specific open questions which I recorded.
With 12 candidates I have also introduced the tool diary kit, to observe and define which kind of relationship occurs between subject and water ecosystem. Useful insights were pointed out by crossing the data recorded.

From the first survey (questionnaire 1on1) it was possible for me to understand in detail the contexts or the main reasons that affect users in decision making.

The second stage of Primary Research, by adopting diary kit, made it possible for candidate ranking his personal values in his/her relationship with water along single day.

The whole process it has been divided into 5 layers:

1. Contextualization
. Framing the research contextPrivate/Public

2. Screening & Recruitment:
. Users selection (screening and recruitment)

3. Observation:
. Environment observation (through videos and pictures)

4. Water Daily Log:
. The Water Daily Log: questionnaire about the user perception and relationship with water
. Synthesis of values

5. 1on1 interview:
. Questionnaire settings (from surface to depth)
. Interviews
. Learnings

PRIMARY
RESEARCH

Private Space

Contextextualization

Public Space

Screening & Recruitment

Observation

W.D.L.
Questionnaire

Water Daily Log

Synthesis of values

Interviews

1-ON-1 interviews

Learnings

INSIGHTS
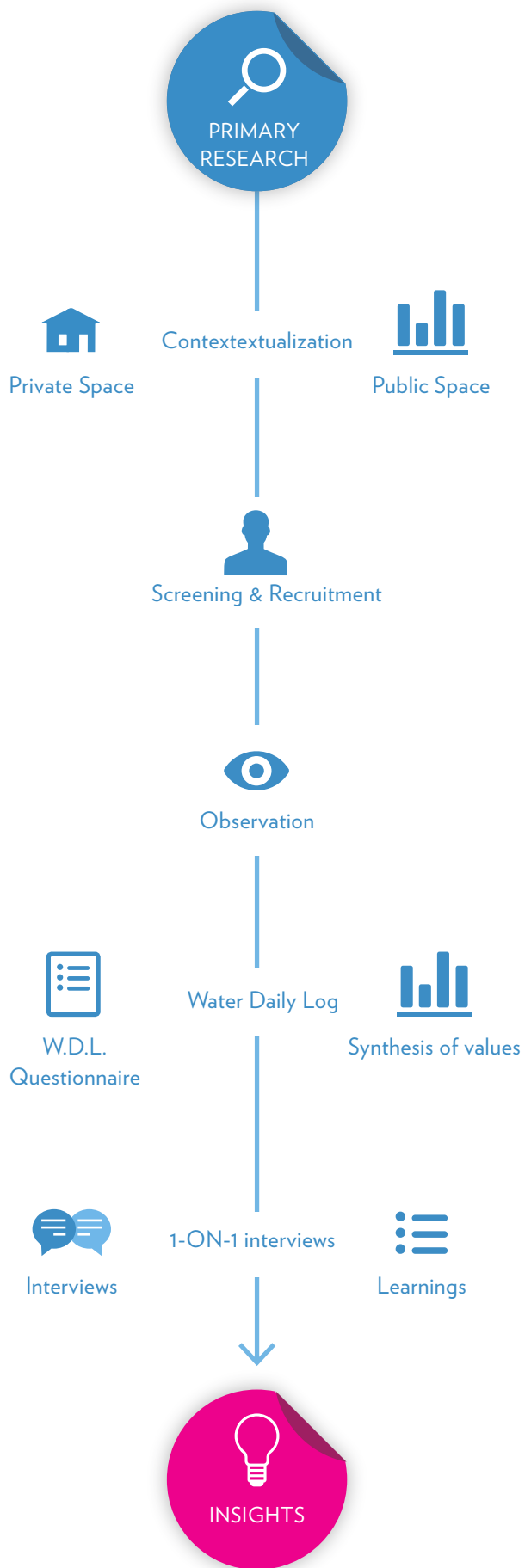
Contextualization
- Public Spaces -

Based on Florence reality I selected some public hot-spots into the city in order to have a range of different context attributes. Florence is well known worldwide like tourist destination thanks to its tremendous historical and artistic heritage; just in 2011 more than 8 million visitors were accommodated by city structures and this number will be annually increased with an average 5%.

This volume of people adding to 374.168 permanent inhabitants and 54.558 foreigners living on a surface of 102 Km2, has a tremendous impact on the local environment. Indeed, people fluxes re-shape public city contexts and the preexisting ecosystem of relationship and economical activities between permanent residents.

The intent was to observe how differently some individuals behave and interact with the city ecosystem from a water perspective.

. Users in public spaces
. Users in private spaces
. Public water consumption Vs mineral one
. Environment factors

Contextualization
- Private Spaces -

I used two different approaches during observation; after establishing a base of trustful conditions I asked the subjects to introduce and show me how they usually relate with the private water system, what they usually do and what they want. Moreover, I introduced questions to understand what affected them in choosing one brand of mineral bottled water instead of another one (if they actually do it), or if they blindly trust the utility bills issued by (water) utility companies and so on.

The main strategy for hiring candidates was looking into my "friends of friends" circles, and exception for the Pub-liacqua manager, I selected users fitting at best with my screening parameters (chart shown in next chapter). Interviews/observation terminated by introducing and explaining to the interviewee the second part of my primary research, the "home work" chart and the diary kit.

. Mineral water Vs Public water
. Level of trust in Public Vs Private Brand
. Personal level of consumption awareness
. Type of services

Candidate Selection

1. Publiacqua employee
2. Estate manager
3. Restaurant owner 1
4. Restaurant owner 2
5. Family mother 1
6. Family mother 2
7. Grandmother
8. Student 1
9. Student 1
10. Tourist (couple)
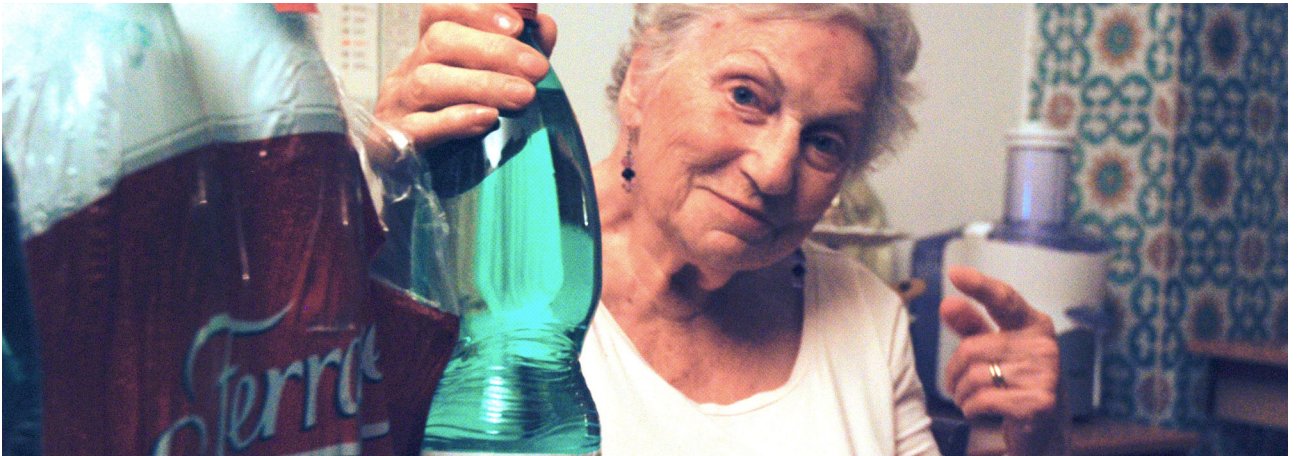
Observation

Research method:
Observational research and shadowing technique - in numerous households I have observed how people consume water in different ways (eg. using home water filter, drinking directly from tap, buying bottled water, a mixture of the above etc)

Aim:
To have a better understanding of individual attitutìdes and approaches, whether sub conscious or not, towards water consumption.

The first step of the primary research has consisted in the pure observation of different subjects, each of them in their own private domestic context.

This research method provided useful as it enabled me to capture the scene around the user, and directly assess their routine consumption of water.

Indoor: kitchen, bathroom, or office.
Outdoor: garden, street/piazzas
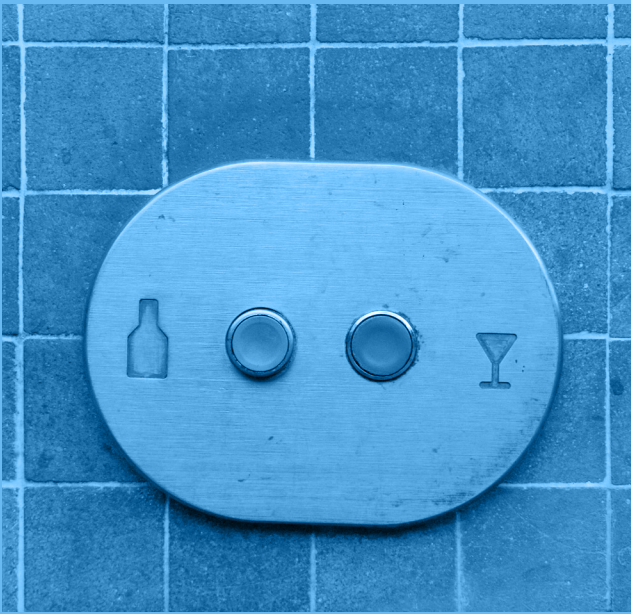
The Water
Daily Log

Aim: brake into the topic and have a high-level profile of the interlocutors.

On the Water Daily Log 12 candidates have answered with a mark the relationship that they thought that are occurring between them and the water during the 24 hours.
The aim was not really get a crisp result from the questionnaire, but use this tool has entry level for the fathers questions (1on1 interview).
The "Water Daily Log" format is structure in tree sections:

The 24hours' water relationship: personal interactions records with water during an ordinary day of the week, in order to understand how and where is focused the water consumption of the individual during the 24 hours. (eg. from the shower to the bottle of water at bar)

The user water perception in public-private spaces: in this section user rank a personal hierarchy of values in different contexts and different actions where water actively take part.

Close questions about general awareness - basically to understand the knowledge and awareness level in of water and its usage.

THE WATER DAILY LOG

24h

name: Giorgio   position: N.D.   place: MILAN   date: 38.7.12

1. The 24hours' water relationship

Graph 1: any time you're using water remember to mark the time line, be sure to mention the time, the type of water application and the grade of satisfaction.
L=Low; M=Medium; H=High. Ogni volta che utilizzi dell'acqua durante il giorno fai un segno sulla 'linea del tempo', ricorda di menzionare: ora, luogo, tipo di utilizzo e grado di soddisfazione. L=Basso; M=Medio; H=Alto.

6:00
6:20
what — cosa
drink from tap — bere dal rubinetto
kitchen — cucina
L

8:00–8:30
doccia dati
bagno
H

8:00

bagno
L

½ acqua

12:00

15:—

Synthesis
Of Values

6
Workers

2
Students

1
Housewifes

1
Grandmother

24h
23h-17h   Of Water Consumption   18h-22h

7
Hybrid
Tap/Bottled

12
USERS

3

2
Bottled
Water

Water/outdoor

outdoor water assumption

quality

accessibility

value

negative factor   taste (chlorine)

Satisfaction
Index
■ high
■ medium
■ low

Restaurant

water bottle price

branded water bottle

reading water proprieties

restaurant water bottle value

drinking tap water   only if it is certified

Satisfaction
Index
■ high
■ medium
■ low

Home

water bottle price

are you saving water

time in kitchen

time perception (shower/bath)

saving water (bathroom)

tap water quality

readeble bill

know personal consumption

Satisfaction
Index
■ high
■ medium
■ low

1-on-1
Interviews

Research method
In person conversational interview.

Goal
Cross informations, collecting learnings, point out insights and get inspired.

Each interview has been conducted with a deliberate conversational and open structure, to better understand if the core insights previously hypothesized were really relevant to the respondents and, at the same time, to guarantee enough freedom for eventual new inputs.

However, to facilitate the conversation and the questions framing a bone structure of inspiring sentences was helpful (side page) in tandem with the Water Log tools that was introduced to 6 interviewee.

SAFETY&QUALITY
How can I immediately recognize if the water is good for me and my family?
How can I understand the water quality without being a chemist? (able in reading the water components)
Is it possible to check the water quality into the bottle in a visual way?
Is it possible to be informed/warned when the water quality in my house changes?
What kind of remedy do I need to use to enhance tap water taste quality?
Can the system store and filter drinkable water by itself?
What kind of features does water need for different users? (ex: kid, elderly, sporty, anemic, etc.)
How can I receive up to date information about the water I'm drinking now?
Could it be possible to manage different typologies of water according to the use I need? (distilled water>washing machine, drinkable water>kitchen, grey water>Wc)

PROSSEMIC RELEVANCE
How can I find other water "sources" nearby?
Is it possible to map the urban area highlighting free water spots?
How can we make the system more dynamic and affordable for users?
How can I reduce the costs of the water service delivering with low budget resources? (improving service at the same time)
If the service enhances its efficiency, that will be also affecting its cost for users?
How could it be possible to reduce the volumes of yhe water to carry?
Could it be profitable to empower the water distribution network with other spots? (balance between the expenses in plastic dumping and extra water delivery)
Is it possible to replicate and scale up the "fontanello" experience?

POTENTIAL BUSINESS
How could different actors be put together on the same level?
Embedding different water players in just one reference for users will be an advantage?
Is it an advantage for a service to speak the same language in different city districts?
Who needs to be actively involved in a consortium water brand?
How could the ordinary water distribution be qualified?
Can it be possible to create a business for the municipality?
Can a business connecting condominiums be taken into consideration?

COMMUNICATION GAP
Are those campaigns penetrating the mass awareness?
How can we keep citizens' awareness high on the topic in the long run?
Can residents share good practices among them in an easier way?
Can a condominium run a social platform in Italy?
What kind of information is hitting the attention and the sensibility of residents?
How can we visualize the best and worst residents' performances in a challenge for a smart consumption?
Can this challenge be made wide open to the entire city?
How could people be rewarded by the community in case of success? (discount for energy upgrading of the building, because it is the community and the entire condominium who win)
How can we show the condominium consumptions?
What if citizens could become first advisors about water supply system malfunctions?
Could anyone pay for its real consumption?

Learnings

"I want to check water characteristics before drinking it, nitrates, for example, can't be healthy"

"Dwellers are always in competition between each other"

"Too many companies and too many energy meters, in a labyrinth of marginal costs"

"I've seen just one "fontannello" here around"

"New forms of cooperation and organization partnership are always welcomed"

"I have a water provider not so far from here, it's useful but a bit expensive"

"Just a few specific mineral waters are good in sports activities"

"Investments in awareness-rising campaigns means saving 10% in water consumption in one year

"Users can't imagine how complex the water system back-off is"

"Plastic it's definitely easier to carry when you must stand up all day long".

"Water purification saves almost 40% of water costs for me, and for my clients too"

"Cooperating with other residents could be a possibility for self regulation"

"I don't know if I'm using more water than other dwellers, anyway I can't measure it"

"The water origins does not influence choices so much, but instead, what is really important for me it's the content"

"A high waste of plastic is produced everyday and who knows where they get dumped after that"

"I trust my doctor tips, and 2 other friends of mine do the same"

"I can't monitoring water consumption in our family, I have never taken into consideration this detail, but we pay a lot at the end of year"

"Since the "fontanello" has been opened near by, I have eliminated bottled water from the buying list"

"Unforeseen errors could compromise the system efficiency, accuracy is needed to control the water supply system"

"Most of the students in my class bring bottled water from the indoor school bar"

"Local food&beverages brands enhance the spirit of the city"

"Having own branded water bottles gives a valuable picture of my business activity"

"I don't know how much water we waste per day in here, but I presume it's a lot"

"I don't know if tap water is good or not, the experts are always in disagreement"

11

SYNTHESIS

Insights
Summary

THROUGH THE BRAND, WATER RE-GAINS THE POWER TO TELL ABOUT ITSELF, RECALLING ITS ANCIENT PAST, WHEN WATER WAS THE VERY CORE AND THE INDISPENSABLE ELEMENT TO THE CITY.

As emerged both from the research and from the insights, the need of making important structural investments in the water supply chain is widely required in the whole nation. This point is meaningful but not crucial for this project development.

What is relevant is to enhance the useful changes and local solutions that are taking place on the territory, producing benefits for the environment, the people and the city (eg. "fontanelli").

Indeed, "little" solutions adopted by local municipalities or communities, sometimes have a great positive effects, triggering new behavioural challenges and big changes in the short term.

Medium size contexts like Florence, and their heterogeneous population with 50% citizens and 50% tourists, represent the perfect platform where to implement systematic solutions for systemic issues.

Distance and obsolete infrastructures
provoke people tap water mistrust

1

The long flow of water and the unknown processes of its treatment, in addition to the obsolescence of the pipeline network, make people afraid of the water quality at home.

The water label
is important

2

For people it is crucial being able to read a label that certifies the quality of the water they are drinking, often more important than the water origins.

Just one mouth

3

Scientists, doctors and health experts are often contradict each other in determining if tap water is healthy or not. Too many experts disorientate people and increase some forms of anxiety, in particular regarding children.

Water Footprint
the invisible consumption

4

While everybody is focussing on their direct water consumption, nobody knows how much indirect water is being used all along the production cycle of goods. The indirect use of water is called the Water Footprint of a product.

Proxemic sourcing

5

For the city and its citizens having public quality water supply spots (fontanelli) is considered a factor of life quality implementation especially because they are free and accessible to all.

Segmented business

6

Private bottled water distribution services are too segmented in the city.

Private bottled water distribution services are too segmented in the city.

7

Most people, when out at work or at school, etc, often turn to buying bottled water, this is not because they don't trust tap water, but because they are not considering the possibility of bringing a bottle from home and re-use it.

Plastic is light

8

People use plastic bottles because of their light weight. The plastic bottle is so easy to carry but has a heavy impact for municipality waste collection costs.

Pro-Eco initiative - "fontanello"

9

After the introduction of a new type of city free fountains, much better controlled and regulated by the water authorities, the volume of plastic bottles collection has significantly decreased.

Eco-Eye on personal consumption

10

All interviewees complain considerably about the price of their water bill. Even if clearer and more detailed bills have been introduced in the last few years, some features are still not easy to understand for all and there is often an inexplicable discrepancy between the individual consumption and the general consumption recorded by meters in building blocks.

Too many actors

11

The public water provider relies on different private contractors for meters reading and consumption billing, this sometimes that creates the same problems above specified.

Branding local public water

12

Public water is good and in some contexts it is also of good quality, but because of its taste and misbeliefs ias still not gaining people's trust.

Zero Km water

13

Our water still has a long natural cycle, therefore there is no relevant need to pollute with tons of CO_2 to make and recycle plastic bottles, plus dragging tons of them from far distances when you can get it locally and at lower cost.

Self-management

14

The condominium residents usually cultivate mistrust feelings concerning administrative costs, therefore they prefer developing forms of self-administration and responsibility on personal consumptions.

Local Spirit

15

Making a distinction between "good" business and "bad" business, Florence municipality tends to promote the local quality and the local traditions by branding them.

Water Purification

16

All the interviewees declare to completely trust the healthy values of purified waters.

Awareness campaign success

After the introduction of a new type of city free fountains, much better controlled and regulated by the water authorities, the volume of plastic bottles collection has significantly decreased.

17

Prevention system

Unforeseen errors could compromise the system efficiency; great accuracy is needed to control the water supply system.

18

Condominium competition

A consistent number of condominium residents are often in conflict between each other; the use of water and energy are among the main causes.

19

Comparative consumptions

Comparing water consumption between residents may produce forms of "green competitions".

20

Design
Opportunities

THROUGH THE BRAND, WATER RE-GAINS THE POWER TO TELL ABOUT ITSELF, RECALLING ITS ANCIENT PAST, WHEN WATER WAS THE VERY CORE AND THE INDISPENSABLE ELEMENT TO THE CITY.

As emerged both from the research and from the insights, the need of making important structural investments in the water supply chain is widely required in the whole nation. This point is meaningful but not crucial for this project development.

What is relevant is to enhance the useful changes and local solutions that are taking place on the territory, producing benefits for the environment, the people and the city (e.g "fontanelli"). Indeed, "little" solutions adopted by local municipalities or communities, sometimes have a great positive effects, triggering new behavioural challenges and big changes in the short term.
Medium size contexts like Florence, and their heterogeneous population with 50% citizens and 50% tourists, represent the perfect platform where to implement systematic solutions for systemic issues.

A systemic solution can be developed. It should not only be capable to communicate the quality of the public water and gain the consumer trust, but also to build real awareness, interest and commitment in using the precious water resource at best.

For these reasons I consider it a valuable opportunity to develop a brand (insights 12), which is both capable to frame and increase the importance of water in the city context and capable to solve most of the other issues pointed out.
Branding local water means repositioning a fair balance between people and water. Branding will promote water not as a private good but as a public common good that requires the citizens' trust. The brand can be empowered by a PSS, that "supplies" costumers the local water and its benefits.

Through the brand, and the way it is communicated, water re-gains the power to tell about itself, recalling its ancient past, when water was the very core and the indispensable element to found a city.

12

THE BRAND

FIRENZE

VBI
SAPIENTIA
EST

Civitas Aqvae

Brand Statement

CIVITAS AQUAE aims to become a holistic service operator in Florence's public water sector with the aim of improving consumer awareness and consumption habits of this fundamental liquid asset. Thanks to its use of communication strategy, technology, educational campaigns – which are driven by the principles of efficiency and sustainability - CIVITAS AQUAE will enable Florence to make a quantum leap towards a more intelligent use of public water.

Naming

In the history of Rome, the Latin term civitas (plural civitates), according to Cicero in the time of the late Roman Republic, was the social body of the cives, or citizens, united by law (concilium coetusque hominum jure sociati). The civitas is not just the collective body of all the citizens, it is the contract binding them all together, because of which each is a civis.

Aqua – water, the Indo-European root -ak has the meaning of bending, hence derives probably the Latin word "aqua"

Civitas – city, comes from the same etymology of civilization, Latin civilitas, adjective civilis from civis (citizen") related to the qualities of a member in the community, who takes part in the city life and enjoys the rights.

Recently CIVITAS has also become an initiative of the European Union to implement sustainable, clean and (energy) efficient urban transport measures.
The initiative is co-ordinated by cities and is active since 2001. Hence the use of Civitas in the public good sector is appropriate as it implies a common social interest.
AQUAE, water, are the core resource for the city and its development. Without water, there is no base for any kind of civilization. CIVITAS AQUAE therefore captures the spirit of a collective interest in water usage.

AQUAE indeed, is the core resource for the city and its development. Without water there is no ground for any kind of life and civilization, consequently.

The CA brandmark echoes the local cultural heritage, the building silhouette, which characterise, not only the Tuscany main city, but also the other cities of the central and northern Italy.
The symbol has a further meaning for the city of Florence. As can be seen from the symbol, the buildings are traversed by water, as a reminder of the flooding which occurred over the centuries.
The Arno's disastrous 1966 flooding, in particular, triggered widespread urban and national participation with the aim of safeguarding the city's artistic and historical heritage.

In short, the CIVITAS AQUAE term is meant to encompass the following concepts.

. Community responsibility
. Respect and responsibility for the water resource
. Everyday self improvement in the management of water
. Respect and responsibility for the common resources
. Everyday self improvement

If armilla is like that because it is unfinished or because demolished, if there is some enchantment or only A whim, i do not know. The fact is that it has no walls, no ceilings, no floors: it has nothing that makes it seem a city, except the water pipes that rise vertically where the houses should be and spread out horizontally where the floors should be: a forest of pipes that end in taps, showers, spouts, overflows. Against the sky a lavabo's white or bath or some other porcelain, like late fruit still hanging from the branches. It seems that the plumbers had finished their work and if they are went before the bricklayers, or that their facilities, indestructible, had survived a catastrophe, an earthquake, or the corrosion of termites.

Abandoned before or after it was inhabited, armilla cannot be called deserted. In any hour, raising your eyes among the pipes, it is not uncommon to see one or many young women.

Italo Calvino
From "The invisible cities" (Le città invisibili)

Logo
Variations

CIVITAS AQUAE is a brand that blends the historical heritage of a place with the waters' regional environmental context. These two components are juxtaposed in order to strengthen the value and importance of the message through the CA brand its services. Unity and integration are the common themes of the CA brand.

Therefore, the CA logo must be recognisable also when ther logo is applied in different realities from Florence. The CA brand must find its application both through the use of materials such as paper and aluminium (e.g. for a

bottle), but also on screen, where - for necessity of contrast – the logo must be bright.

It is imperative to maintain the integrity of the CA graphic symbol in the various declinations and applications: margins and distances from other elements must be kept in proportion. For its strongly geometric and rational nature, and the importance of the underlying CA service, the logo should be positioned centrally and without other nearby geometrical obtrusions.

■ 1x

5x   10x   5x

1x

1x

FIRENZE

VBI
SAPIENTIA
EST

11x

2x

2x

CIVITAS AQVAE

Civitas Aquae
Brand Migration

Pantone 7547 EC

FIRENZE

CIVITAS AQVAE

TRIESTE

CIVITAS AQVAE

PALERMO

CIVITAS AQVAE

GENOVA

CIVITAS AQVAE

MILANO

CIVITAS AQVAE

Business Card &
Print Applications

FIRENZE

CIVITAS AQVAE

B/W Version

FIRENZE

CIVITAS AQVAE

Primary Version

CIVITAS AQVAE

Secondary Version and Screen

CIVITAS AQVAE

Civitas Aquae Water Museum

Typeface

A a B b C c 01234

Velrag Book

ABCDEFGHIJKLMENOPQRSTUVWXYZ
abcdefghijklmenopqrstuvwxyz
0123456789

Velrag Book Italic

ABCDEFGHIJKLMENOPQRSTUVWXYZ
abcdefghijklmenopqrstuvwxyz
0123456789

Velrag Bold

ABCDEFGHIJKLMENOPQRSTUVWXYZ
abcdefghijklmenopqrstuvwxyz
0123456789

Colour Scheme and Applications

The CIVITAS AQUAE chromatic palette is naturally related with the element it represents, namely drinking water. However, in contrast with the sign of the logo, the blue colour is bright, almost active. The RED and the BLUE will be applied on the water bottles, in order to distinguish the two different kind of water:

Sparkling Water - RED
Still Water - BLUE

The staff associated with the CA brand, for example those involved in the distribution of water (or at information points throughout the city), will wear the CA uniform with the following traits:

. Baseball hat
. Polo (white or blue)
. Denim (blue)
. Shoes (active colour recommended)

The interiors of CA spaces and the CA tools are declined with the standard, water inspired, blue palette.

FIRENZE

VBI
SAPIENTIA
EST

CIVITAS AQVAE

Background C 83 M 55 Y 24 B 4

FIRENZE

VBI
SAPIENTIA
EST

CIVITAS AQVAE

Background C 74 M 34 Y 3 B 0

FIRENZE

VBI
SAPIENTIA
EST

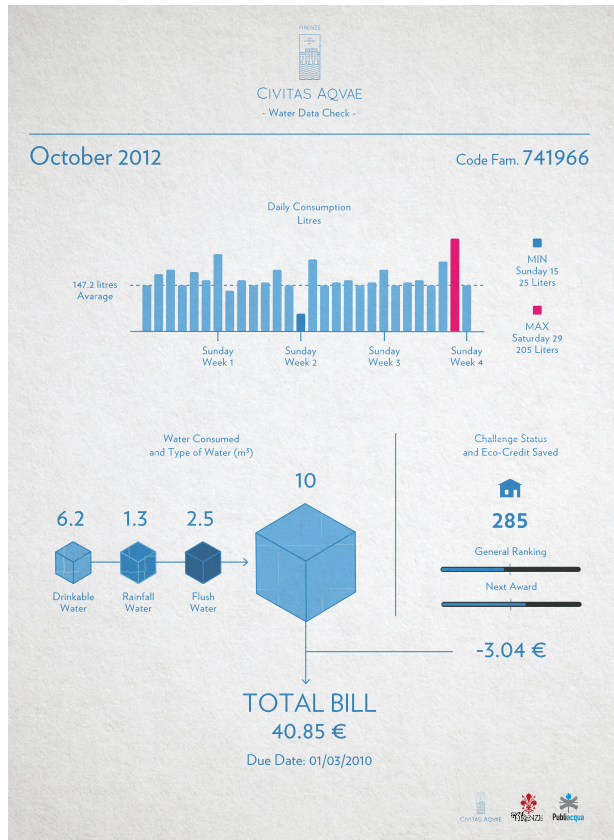CIVITAS AQVAE

Background C 52 M 14 Y 0 B 0

FIRENZE

VBI
SAPIENTIA
EST

CIVITAS AQVAE

Background C 0 M 0 Y 0 B 90

13

BRAND STRATEGY & PSS

BRAND STRATEGY

INCREASING PUBLIC AWARENESS THOROUGH BOTH TANGIBLE AND INTANGIBLE METHODS OF COMMUNICATION RELATED TO WATER CONSUMPTION IN THE URBAN CONTEXT.

PREMISE:
To build a brand around public water, does not mean to build a private sector product/service, but rather to communicate its value to citizens so as to enhance their awareness of the importance of this liquid asset.

GOAL:
Increasing public awareness thorough both tangible and intangible methods of communication related to water consumption in the urban context.

STRATEGY:
Improve the message that public water found at neighbourhood level is of high quality and its consumptions entails a low environmental impact.

insights 13 -PSS-Km 0

Creation of a CA point which provides information on local water consumption (statistics) to the citizens.

Introduce alternatives to plastic water bottles.

Provide domestic readers to allow families to monitor and manage water consumption.

10 Eco-i

Complementary solutions created for the citizens.

Develop a targeted education campaign to increase public awareness and involvement.

Artistic Eco-visualisation

STRATEGY MAP

VBI
SAPIENTIA
EST

CIVITAS AQUAE
Brand

Enhance Local Qualities

Common Values

Personal Awareness

Self Water Management

Brand
Positioning

THE CIVITAS AQUAE BRAND, AND ITS SPECTRUM OF SERVICES, IS POSITIONED IN THE LOCAL PUBLIC SPHERE; THIS IS DUE TO ITS NATURE AS A PUBLIC GOOD PROVIDED BY LOCAL AUTHORITIES.

CIVITAS AQUAE (CA) is therefore a brand with a strong public character, and whose service takes place in a market segment which lacks both direct public and private competitors. Once again, it is important to recall, that CA is a service whose primary objective is twofold: to defend citizens right to have access to clean water and to promote awareness and sustainable consumption of water at local level through a well crafted service strategy.

As illustrated in Exhibit A, the majority of water supply is concentrated in segment 4, private-non local, which is crowded by large and well known brands of bottled water distributors. This means that bottled water is transported hundreds or thousands of kilometres, from source, to its end users (think Fiji). The COOP brand in an intermediate position and aims to adopt a distribution strategy focused on water distribution in proximity to sources of water extraction. The COOP service still entails some transport of water, though at a more regional/national level (e.g the closest Coop spring to Florence is at 130Km).

Next, the purified market segment is in great expansion; this private-local (segment 3) service offers local food and beverage businesses (restaurants, hotels etc) the flexibility to both: a) have their own brand of bottle which comprised of locally sourced and purified water, and b) a service of distribution and /or installation of filtering systems in the local urban area. This market segment is highly sustainable, and requires no unnecessary transport, because demand of local water is entirely supplied by local water sources. The nature of this service is however limited and not widespread for residential, and may not be implemented easily, as shown in Exhibit B.

In fact, CA is not included in the public-local sphere (segment 2), because it a 'systemic organism' which has some elements that have a private sector nature. The CA brand provides the platform for domestic consumption monitoring; the utility bill comes separataly.

Public

"Fontanelli"

CIVITAS AQUAE

Long
Distance
+500 km

Local
0 km

Nestlé
Coca-Cola
Pepsi

Coop

Esselunga

"Purified"
waters

Fiji
Water

Private

LOCAL BRAND OFFER

Systemic
Brand

CIVITAS AQUAE

"Purified"
waters

"Fontanello"

Mono
Brand

Potential Revenues And Cost Savings

The CA partnership, which could be set up as a limited liability company (in Italian: società a responsabilità limitata), would have revenue and cost structure with the following key components.

Revenues:

1. Sale Proceeds of CA Sensors to households and businesses
2. Sale proceeds from deliveries
3. Sale of CA bottles
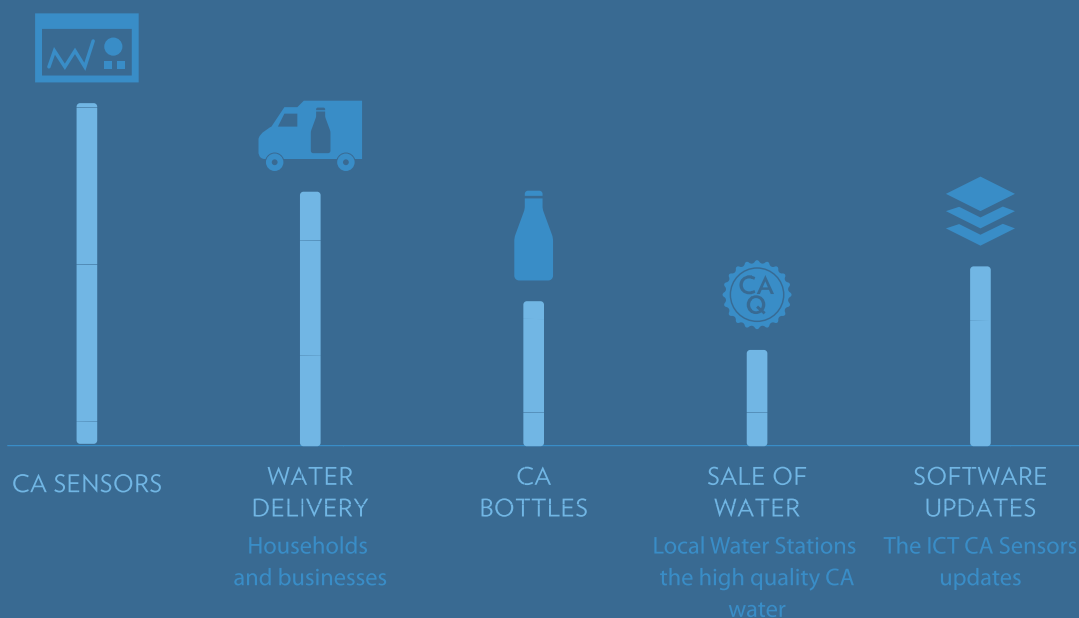4. Sale of water at CA points (WS and museum)
5. CA Software Sensor updates

Costs:

1. CA Staff
2. Bottle production
3. Utilities
4. Rental of Premises
5. Electrical Vehicles
6. Set up/refurbishment costs (info point, museum, uniforms etc)
7. Maintenance

Wider cost savings and environmental benefits include the following:

1. Reduction in plastic bottle consumption will allow the comune di Firenze to allocate less resources in the collection and dismantling of large number of water bottles. For example, it is estimated than in year 2011 the comune saved Euro 6 mln through the introduction of the Fontanelle system. Thanks to these local fountains, citizens have reduced the use of plastic bottles significantly and therefore the costs associated with the collection and disposal of such bottles reduced. This trend could continue further with the introduction of the CA brand.

2. Reduction of wasteful water consumption to the benefit of Publiacqua. Thanks to increased awareness and improved technology in monitoring usage, marginal water consumption is expected to be optimise.
This should translate on more efficient water consumption to the benefit of the Publiacqua system.

3. Environmental sustainability by low impact transport technologies and 0 km delivery. The CA system would produce the effect that less reliance is made on non local water supply, which is currently transported through polluting transport modes. For example, 80% of national water is carried on trucks; with the increased consumption of local water there will be less need to carry water across the nation or from other countries.
Also local deliveries will be made with zero emission vehicles. These changes will reduce CO_2 emissions to the benefit of the environment and the citizens.
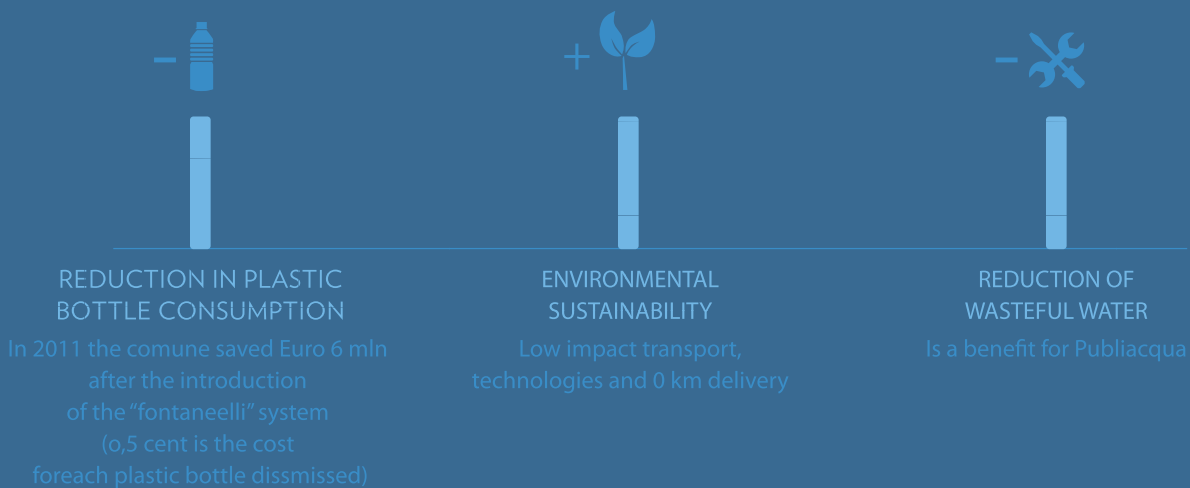
CA SENSORS

WATER
DELIVERY

Households
and businesses

CA
BOTTLES

SALE OF
WATER

Local Water Stations
the high quality CA
water

SOFTWARE
UPDATES

The ICT CA Sensors
updates

COSTS

CA STAFF

BOTTLE PRODUCTION

UTILITIES

RENTAL OF PREMISES

ELECTRICAL VEHICLES

SET UP/REFURBISHMENT COSTS
(Info Point, Museum, Uniforms Etc)

MAINTENANCE

Publiacqua

Local Oil & Wine container producers

Municipality/Publiacqua

Private P.

Municipality/Private P.

Municipality/Publiacqua/Private P.

COST SAVINGS AND
ENVIRONMENTAL BENEFITS

REDUCTION IN PLASTIC
BOTTLE CONSUMPTION

In 2011 the comune saved Euro 6 mln
after the introduction
of the "fontaneelli" system
(o,5 cent is the cost
foreach plastic bottle dissmissed)

ENVIRONMENTAL
SUSTAINABILITY

Low impact transport,
technologies and 0 km delivery

REDUCTION OF
WASTEFUL WATER

Is a benefit for Publiacqua

System Overview

CIVITAS AQUAE IS A PPPS BRAND THAT FOLLOWS THE SAME CONTRACT RULES THAT EXIST BETWEEN PUBLIACQUA AND ITS PRIVATE PARTNERS. SO, CIVITAS AQUAE HAS, AS SHAREHOLDERS BOTH PUBLIC (MORE THAN 50%) AND PRIVATE SECTOR(LESS THAN 50%).

Public Partnership:
Publiacqua supports and manages communication initiatives and the promotion of CA brand throughout its already existing channels and partially also in the CA Water Museum (touch point 2).
The new responsibility for Publiacqua is the control and the direct responsibility of the Domestic Water System (touch point 1). In this way Publiacqua, solves the issue of mistakes in controversial water reading undertaken by external private contractors, as emerged in the interviews (chapter 10).

The CA majority shareholder is the Florence municipality which has direct responsibility of the CA brand and the management of the CA Water Museum (touch point 2) and its spaces. CA Water Museum is the knot of the communication of the entire system; in this space that data flow, about the city water consumption and other water aspects, are collected, analysed and made available for visualisation for the public.

Private Partnership:
Private sector has the minority of CA shares, but is fully responsible for Bottle Management, Logistics and Distribution which includes: production and selling of the CA branded bottle and supply both the CA Water Museum (touch point 3) and the city's distribution spots (touch point 4).
The CA brand also provides the Water Delivery service, all the tools for bottling and purifying (public) water direct at delivery point (eg. restaurant) and provide them incentives for improving the service with sustainable technology (eg. Electric van).

Water Controller:
Placed in city's housing units and public buildings, the system allows the users to manage and observe their private water consumption and also to set personal goals in saving. Water consumption feedbacks are stored into the CA Cloud where citizens and the utility provider can monitor the city's water consumption. (Publiacqua)
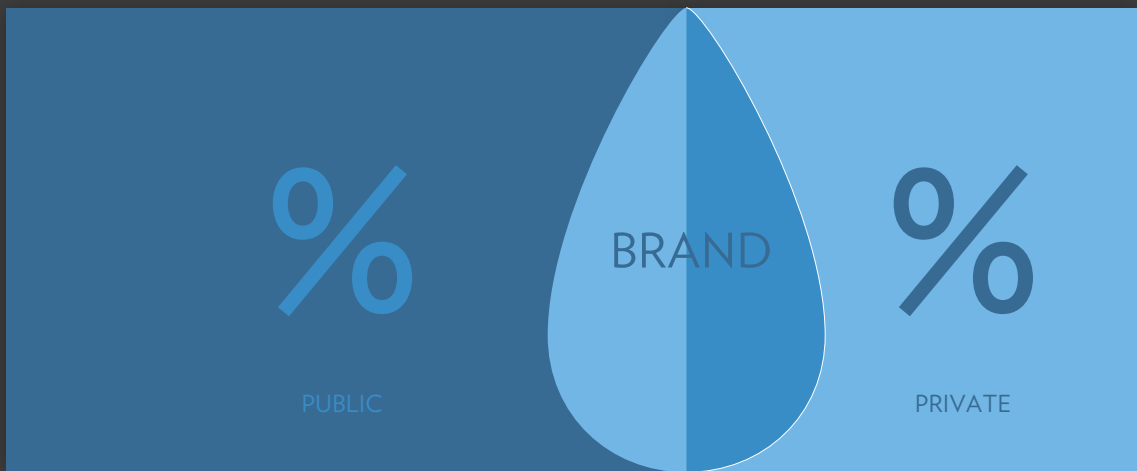
CA Water Museum:
CA-WM is the physical place where the city water data, contained into the Cloud, become tangible and visible to the citizens. In the same place, people can experience directly all the critical issues surrounding the city's water sources, and the effects of supply and demand. (City Government)
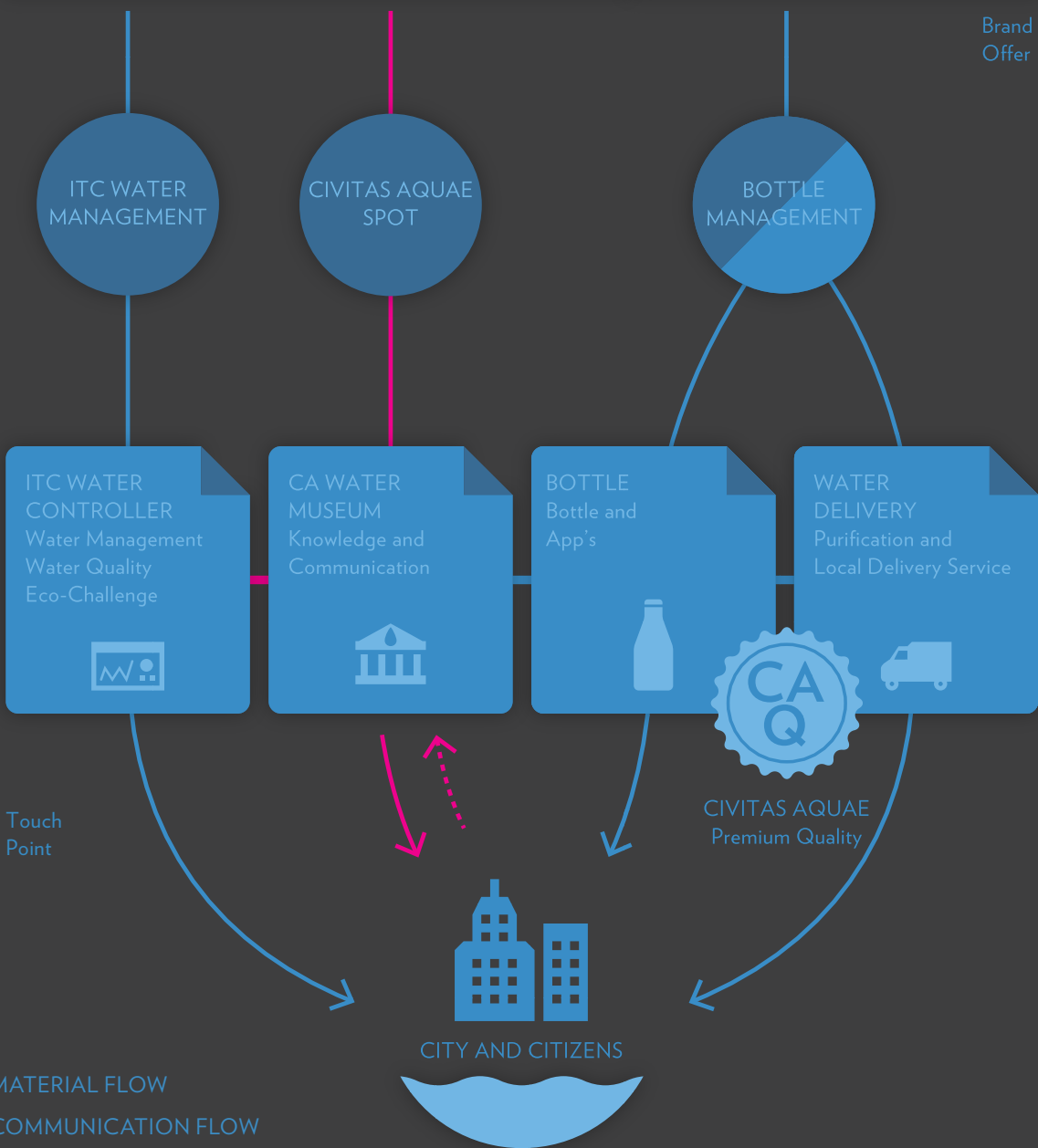
Bottle Supply:
The bottles are produced, distributed and locally sold (e.g to CA Water Museum and Water Delivery). Florence, thanks to local oil production and packaging, has many producers of aluminium for food containers. (Private)

Water Delivery:
Public water is purified and bottled locally, and as well locally distributed to the restaurant industry, hotels and private houses by the same service. (Private)

% PUBLIC

BRAND

% PRIVATE

Brand
Offer

ITC WATER
MANAGEMENT

CIVITAS AQUAE
SPOT

BOTTLE
MANAGEMENT

ITC WATER
CONTROLLER
Water Management
Water Quality
Eco-Challenge

CA WATER
MUSEUM
Knowledge and
Communication

BOTTLE
Bottle and
App's

WATER
DELIVERY
Purification and
Local Delivery Service

CA Q

Touch
Point

CIVITAS AQUAE
Premium Quality

CITY AND CITIZENS

MATERIAL FLOW

COMMUNICATION FLOW

DATA FLOW

Brand Offer

The brand Civitas Aquae offers four different local services:

The Civitas Aquae bottles are delivered by the water delivery service and filled with quality purified water in the Civitas Aquae water station closer to the costumer.
In this case the empty bottles are returning to the service.
The bottle is also available in two neutral versions (1,5 litres and 0,5 litres) , which are sold exclusively inside the Civitas Aquae Water Museum where is also installed the Civitas Aquae fountain, with its certificate quality.

The Water Service is the private water supplier for citizens and restaurant industry; the service is branded and guaranteed by the Civitas Aquae that offer the delivery and purchase platform.
Clients can order and purchase water through the official Civitas Aquae website, an easy and intuitive interface with short cuts where the clients, besides the possibility to buy water they have the opportunity to take advantages from other services offered by Civitas Aquae.
Those involved in the distribution, Civitas A. provides them the navigation software that integrate the scheduling system for the distribution of water, in addition to the Civitas Aquae uniforms and the electric mini van for the locals deliveries.

The Civitas Aquae Water Museum is the pivot of the communication of the brand. This real space, located in the city centre, users can deep diving into the water world through interactions and insights that are offered in this space. Observe, playing and learning are actually crucial for the experience an rise awakens of individuals.
The Civitas Museum is the only place where people can buy the bottles from the automatic vending machine and fill the Civitas Aquae bottle by them self in the only one fountain with guaranteed water.

The fourth Civitas Aquae touch point is the ICT Water Controller. This device (software and hardware) from the Civitas Aquae brand integrate and visualise the domestic utilities ecosystem. In addition to the water control, the Civitas Aquae software platform is ready to host other utilities such as energy, gas, connectivity. In this way, users can have the maximum control across the their houses.
The water section have three layers of depth:
Layer 1: users can monitoring in real-time their water consumption and its history in a year, the cost of the next bill, and manage the daily personal goal of water consumption.
Layer 2: the quality of the water that you drink is important for your family. Therefore, on layer costumers can consulting and monitoring their domestic tap water with a simple gesture, water informations are immediately displayed also in case of changes in water parameters the system will advise the users.
Layer 3: is the water challenge stage that is devided two horizontal sub-sections, one dedicated to the residents of the same condominium and the other one scale up the challenge to the local city are or across the whole city bounders. Each step completed on time, means a prize to incentives the dwellers to make a "green upgrade" in their houses, condominium or local environment.

Solution: CIVITAS AQUA BOTTLE
Lasting and Recyclable, the Civitas Aquae aluminium bottle locally produced is the answer to the glass and plastic.

. sold in single pieces at CA Museum
. 0.5 litres bottle
. 1.5 litres bottle

Solution: DELIVERY SERVICE
The local door to door water delivery service, aim to implement already existing water services

. on-line water purchase platform
. CA bottles
. service delivery application
. electric van
. CA official uniform
. CA water station

Solution: CIVITAS AQUAE MUSEUM
The CA M is the physical water knowledge container, it works as a OS library for informations related to the water topic.

. permanent visual water experience exhibition
. open source water database
. bottle automatized dispenser
. CA water quality fountain

Solution: ITC WATER CONTROLLER
CA ICT is the device that integrate the software for the household utilities management, always connected and accessible to users.

. flexible platform (ready to host other utilities too)
. real-time cost and consumption visualisation
. domestic water quality parameters
. personal consumption goals
. condominium and householders challenges
. connected with other personal communication devices

The Bottle

CIVITAS AQUAE IS A PPPS BRAND THAT ARE FOLLOWING THE SAME CONTRACT RULES THAT ARE EXISTING IN BETWEEN PUBLIACQUA AND ITS PRIVATE PARTNERS. SO, CIVITAS AQUAE HAS A PUBLIC COMPONENT (60%) AND A PRIVATE ONE (40%).

The CA bottle is an elegant aluminum structure, which is naturally suitable for drinking as its protected from PTB. The bottle is produced in one of the numerous light industrial plants at the periphery of Florence, which together with many other Italian cities active in the agricultural/food sector, and have the structures capable of producing such bottle products.

THE BOTTLE SYSTEM MAP

CA to Producer:
The CA brand entrusts the company with the production of bottles of either 0.5 L or 1.0 L with its logo on the bottles surface.
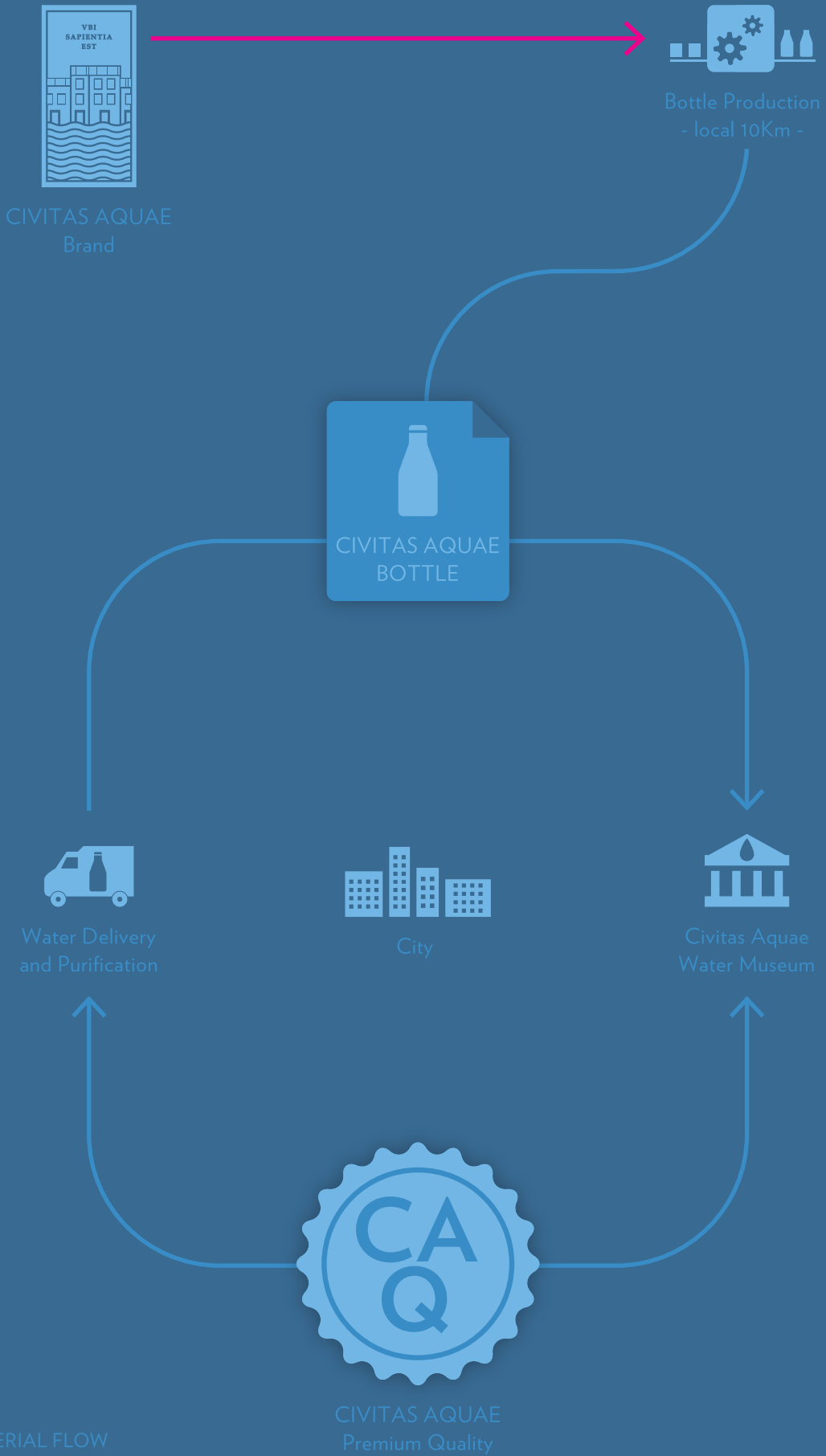
From producer to the City:
The bottles are distributed according to demand in the various CA Water Stations, so that that me filled with filtered water. At the CAWS points the filling of bottles will indicatively occur as follows:

-        15% of 0.5 L of which 50% still and 50% sparkling water.
-        85% of 1.0 L of which 60% still and 40% sparkling water.

Next, the CA Water Museum will complement the CA Water Spots to provide communication , meeting points and transit area in the centre of the city (Piazza della Signoria). For these factors the type of bottle which will be in larger demand here will be 0.5 L bottle and the 'neutral' package without the trademark ring of the still/sparkling bottles. So the CA WM will be supplied as follows:
. 95% 0.5 L
. 5% 1 L

VBI
SAPIENTIA
EST

CIVITAS AQUAE
Brand

Bottle Production
- local 10Km -

CIVITAS AQUAE
BOTTLE

Water Delivery
and Purification

City

Civitas Aquae
Water Museum

CA
Q

CIVITAS AQUAE
Premium Quality

MATERIAL FLOW
COMMUNICATION FLOW

The 1,5 litre Civitas Aquae bottle

The 0.5 litre Civitas Aquae bottle

FIRENZE

**VBI
SAPIENTIA
EST**

CIVITAS AQVAE

Basic Empty Bottle
Pantone 7547 EC

FIRENZE

**VBI
SAPIENTIA
EST**

CIVITAS AQVAE

Purified Still Water
C 83 M 55 Y 24 B 4

FIRENZE

**VBI
SAPIENTIA
EST**

CIVITAS AQVAE

Purified Sparkling Water
Pantone RED 032 M

FIRENZE

**VBI
SAPIENTIA
EST**

CIVITAS AQVAE

Lemon Flavored Water
C 20 M 0 Y 100 B 0

FIRENZE

**VBI
SAPIENTIA
EST**

CIVITAS AQVAE

Mint Flavoured Water
Pantone 7479 C

The Civitas Aquae bottle is made of aluminum, coated inside with the micro film for alimentary use.
There are two seriesof the CA bottle: the one for the direct sale to the costumers (e.g. in the museum of CA), and the one dedicated to the CA water distribution service.
The different is the brand and the top colour of the bottle; water service need to distingush between the different kind of water that are going to delivery (sparkling, still, aromatic, etc.), rather than the CA museum that are selling an emprty product and for this reason must be neutrum.

The bottles are produced and treated (recycled and cleaned) close to the city bouders. Florence offer many production solution for aluminum containers, thanks to its agricultural and food industry, specially for oil and wine.
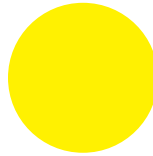
Last page: Two images of the Civitas Aquae Bottle, from the left to the right, the 0.5 litres bottle and 1 litre bottle.

Above in this page: a detail of the Civitas Aquae bottle for the CA distribution service.
Red for sparkling water
Blue for the still water.

Next page: The Civitas Aquae family overview.

FIRENZE

VBI
SAPIENTIA
EST

Civitas Aqvae

"L'acqua comune che non ti aspetti"

*Civitas Aquae è il servizio locale di purificazione e
distribuzione dell'acqua pubblica in città,
una certezza di qualità nel rispetto dell'ambiente.*

The Water Service

The filtering, bottling of public water and its subsequent distribution in the various neighbourhoods of the city will be entirely the responsibility of the private partners of CA. This process will occur in the CA Water Spots of the cities various districts. The CA WAS will be the various small local distributors coordinated under the CA brand.

CIVITAS AQUAE water spot system map:

Empty bottle:
The empty bottles will arrive at the local CA WS directly from the production plant which will be 20km max from the city centre.

Bottling local water:
The local water aqueducts water will be filtered. Still or sparkling, it will be bottled directly in the CA-WS and ready for distribution.

Booking water:
The client - whether restaurant, hotel or private home – will make the order directly from the web portal of the closest CA-WS point. The system will automatically place the order and calculate the most efficient delivery path on the map.

The CAQ - branding the quality:
Certificate the quality and provide to the costumers a valuable product is the core of the Civitas aquae business activity in water distribution. Is this one, the watersheed from others water brand and local suppliers.
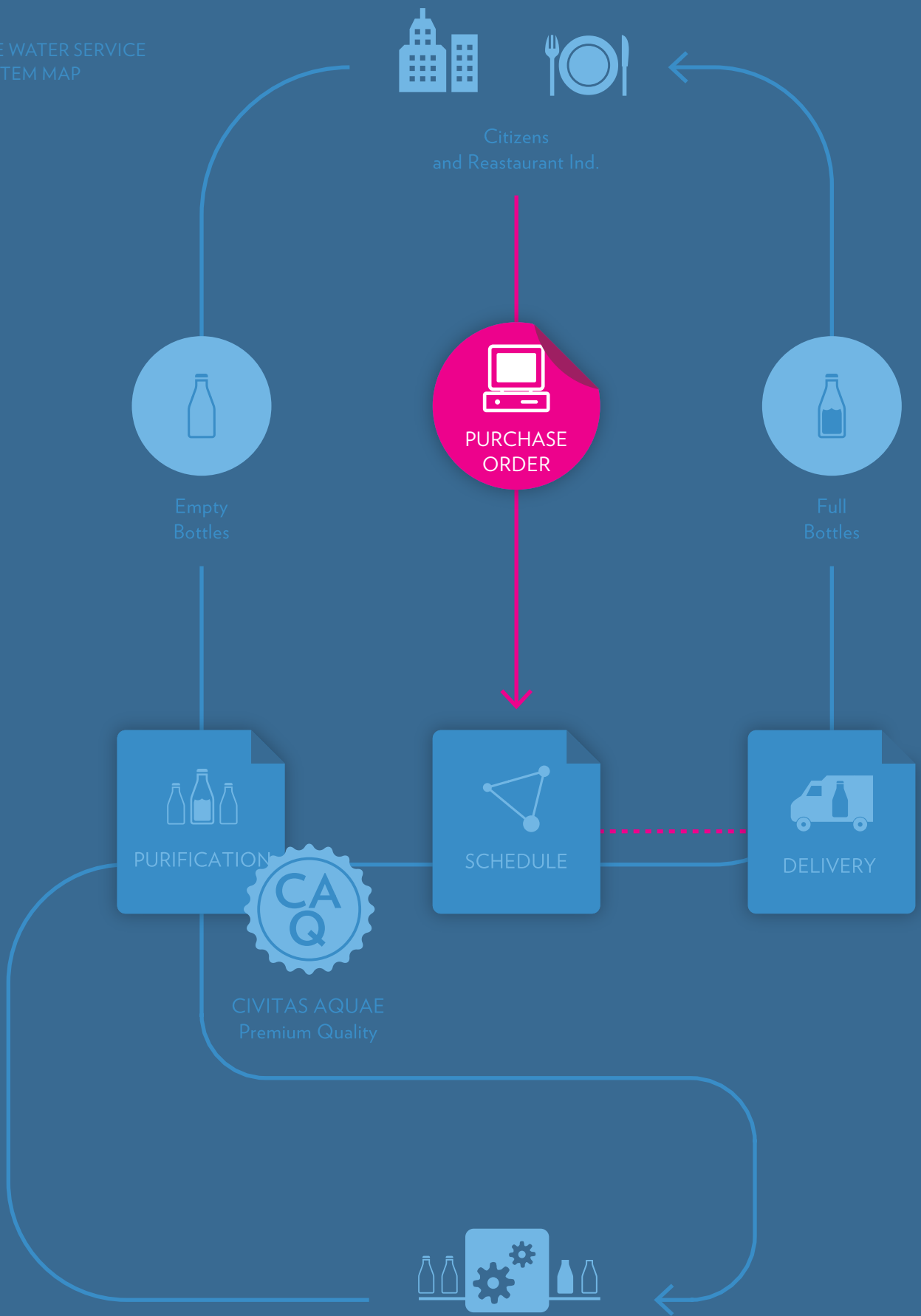
On my way:
Each CA-WS has a specific catchment area. Within this area the CA-WS is the hub for all deliveries which are undertaken by means of the electric van.

Full for Empty:
At every CA-WS, the van may return empty bottles which are collected along the route from various clients. The bottles will be temporarily stored, until the producer will pick them up for cleaning or recycling in case of damages.

THE WATER SERVICE
SYSTEM MAP

Citizens
and Reastaurant Ind.

Empty
Bottles

PURCHASE
ORDER

Full
Bottles

PURIFICATION

CA
Q

CIVITAS AQUAE
Premium Quality

SCHEDULE

DELIVERY

Bottle Production
Cleaning and Recycle

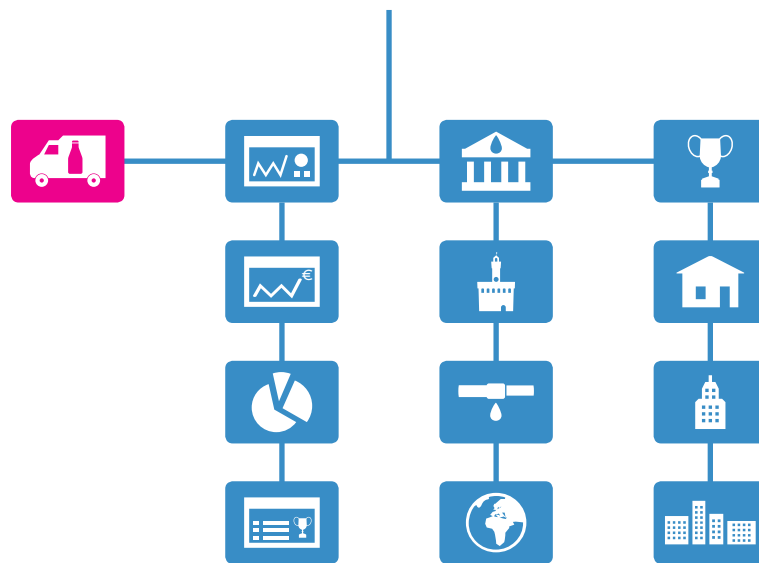MATERIAL FLOW
COMMUNICATION FLOW
DATA FLOW

Customers require new stocks of water from the Civitas Aquae service. Empty containers are retrieved by Civitas Aquae supply service.

Water
Purchase

WWW.CIVITASAQUAE.COM

The customers access to the Civitas Aquae services and water purchase through the official Civitas Aquae Web platform.
The Civitas Aquae website structure is divided in four main horizontal sections and three vertical sub layers:
1) Water Delivery Service and Purchase

2) ICT Water management and monitoring (access through internet)
3) Civitas Aquae Water Museum link page and sub pages for direct info share with and for institutions.
4) The award section and water consumption overview across the city.

Users access to their personal profile from the Civitas
Aquae home page. www.civitasaquae.com

Buy water on the Civitas Aquae web page its very easy and
intuitive. Customers can watch in real-time the delivery
status and the time left to the target.

**Touch Screen
Sensible**

The order and payment has been processed correctly. Civitas Aquae has scheduled the delivery to the Civitas Aquae Water Station closer to the customer.

The Civitas Aquae delivery staff will be receive the notification on portable device with the targets coordinates.

**Slide Windows
Previous/Next**

Civitas Aquae
Official Uniform

Touch Screen
Sensible

Civitas Aquae makes a lot of attention to the brand communication, therefore, to the staff has also provided the official Civitas Aquae uniforms.

Electric van are used by Civitas Aquae crews to supply bottled water from the Civitas Aquae Water Station to the neighbourhood.

The Civitas Aquae Water Museum

The CIVITAS AQUAE WATER MUSEUM is not just a physical space in the city where citizens can learn, but also a virtual Open Source space where a holistic approach is adopted to understand the theme of water. Government, and non government (with rigorous ethical standards), institutions may enrich the Information Library with water-related themes such as: news, case studies, publicity and information campaigns aimed at an ethical and sustainable use of water.
It is fundamental for the CA brand to create a physical space. This will serve to show and communicate to all citizens the importance of water and how it is used within the urban area.

The City in a Cloud:
The waters' consumption data of each client and its aggregate units - household, condominium, neighbourhood etc and city – will be transmitted to the DOMESTIC WATER CONTROLLER and organized through the Cloud in CIVITAS AQUAE.

While guaranteeing complete privacy for its users, it will be possible to freely and instantaneously access CA CLOUD and consult the data relating to water consumption. This means that anyone can monitor the city's water consumption in real time, and appreciate the second-by-second changes to the local water resource.
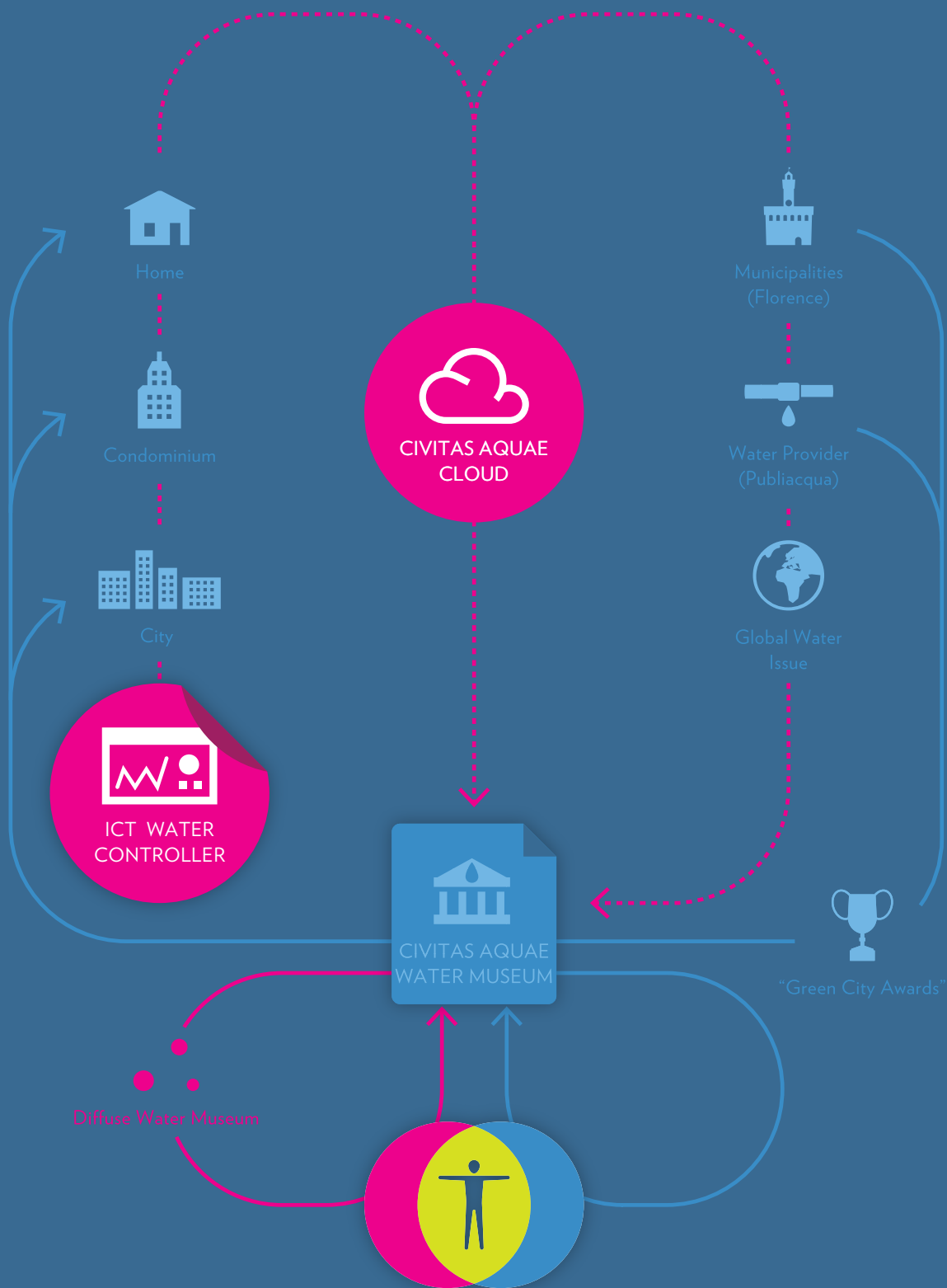
The Institutional Role:
The local authority, just like the local citizens, will be able to read consumption real time. It will also be able to publish reports on a periodic basis and enrich the information provided in CA-WM.

The local Water Provider, through Cloud, will have a complete vision on the consumption trends of urban water. Through this system, it can increase efficiency of the distribution service. The Water Provider therefore enriches the CA database, by inputting detailed information that take into account both the urban population as well as the immediate local surroundings. Water provision and consumption is constantly monitored. The local institutions can therefore play a critical role in augmenting the importance of water.
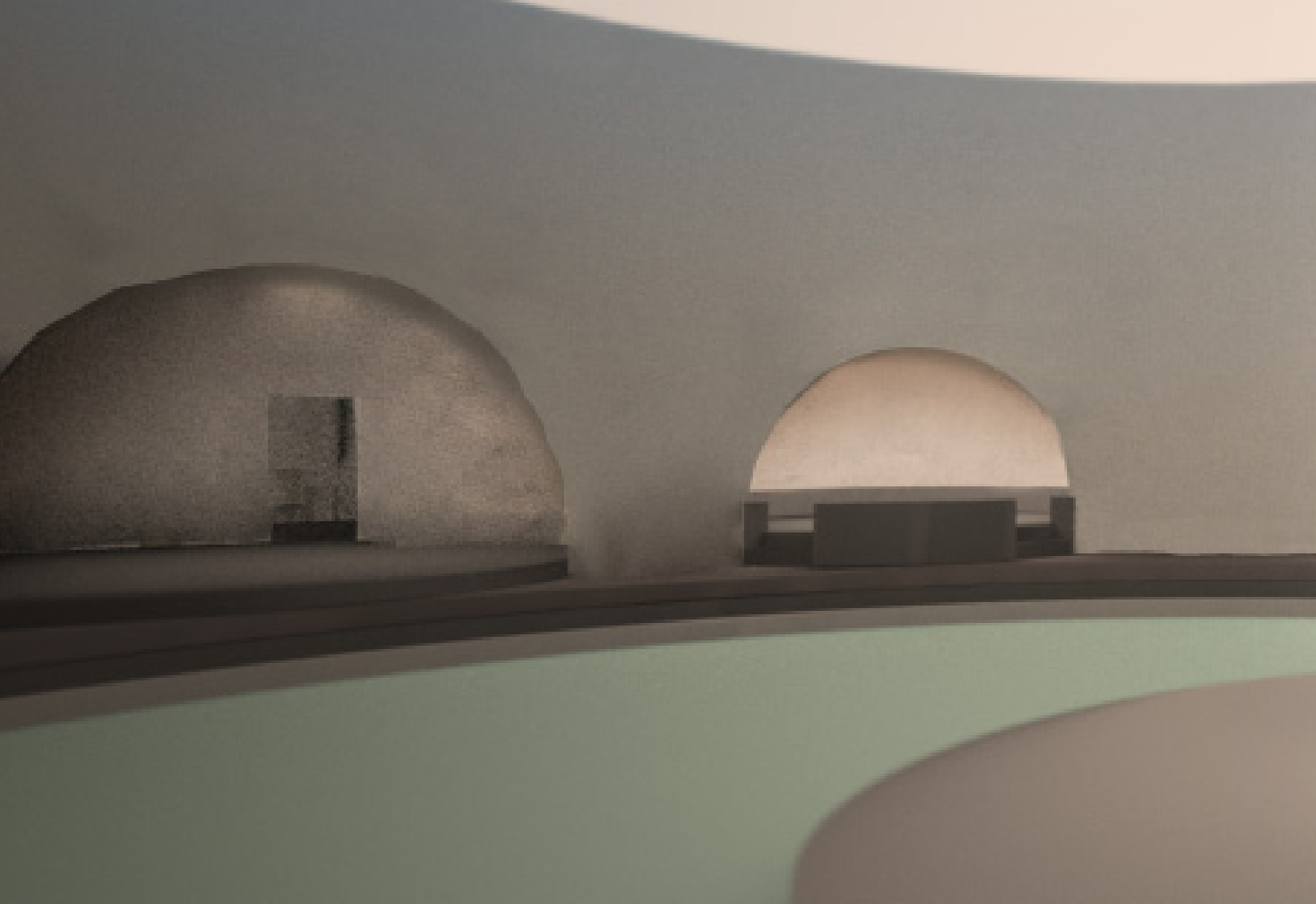
The Award:
Both the Water Provider, and the local authorities, can award users that make the most virtuous use of water. Such awards can be in the form of incentives for installation of plants and sustainable ecological services. The performance of the "city green competition" will be viewable both from the CA web site as well as on Cloud and in the CA-WM.

Home

Condominium

City

CIVITAS AQUAE
CLOUD

ICT WATER
CONTROLLER

Municipalities
(Florence)

Water Provider
(Publiacqua)

Global Water
Issue

CIVITAS AQUAE
WATER MUSEUM

"Green City Awards"

Diffuse Water Museum

INTERACTIVE
WATER EXPERIENCE

MATERIAL FLOW
COMMUNICATION FLOW
DATA FLOW

The CAWM Space

THE C.A. WATER MUSEUM IS A METHA SPACE WHERE INDIVIDUALS HAVE ACCESS TO EXPERIENCE THEIR SELF
ABOUT THE MEANINGS OF WATER THROUGH DIFFERENT SPHERES OF KNOWLEDGE

The Civitas Aquae Water Museum is the spatial synthesis between the physical component and the information flow. The physical space is designed as a cave where the person who goes inside puts his/her own feelings in balance with the surrounding environment and its components. The soft lighting, together with the sounds, will help visitors to
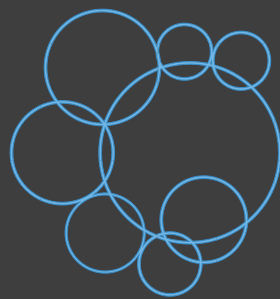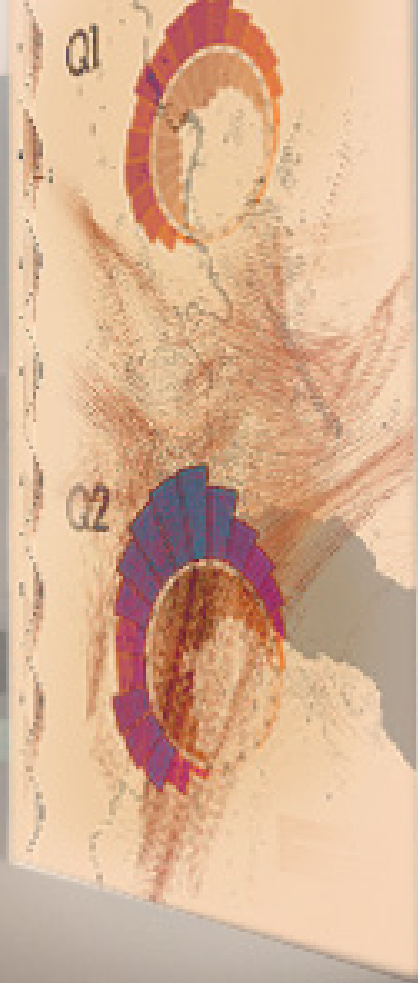
detach themselves from the outer world and focus on the contents inside. The space is empty and round, ready to host the water contents which are flowing into the space from the outside.

The intangible component is made up by the water data that are captured, sorted and projected on the surface of spheres. The CA Water Museum, indeed, is the Open Source archive for world-wide information about water. Its mission is to promote and spread the best practice initiatives across the city, with artistic or didactical performances.
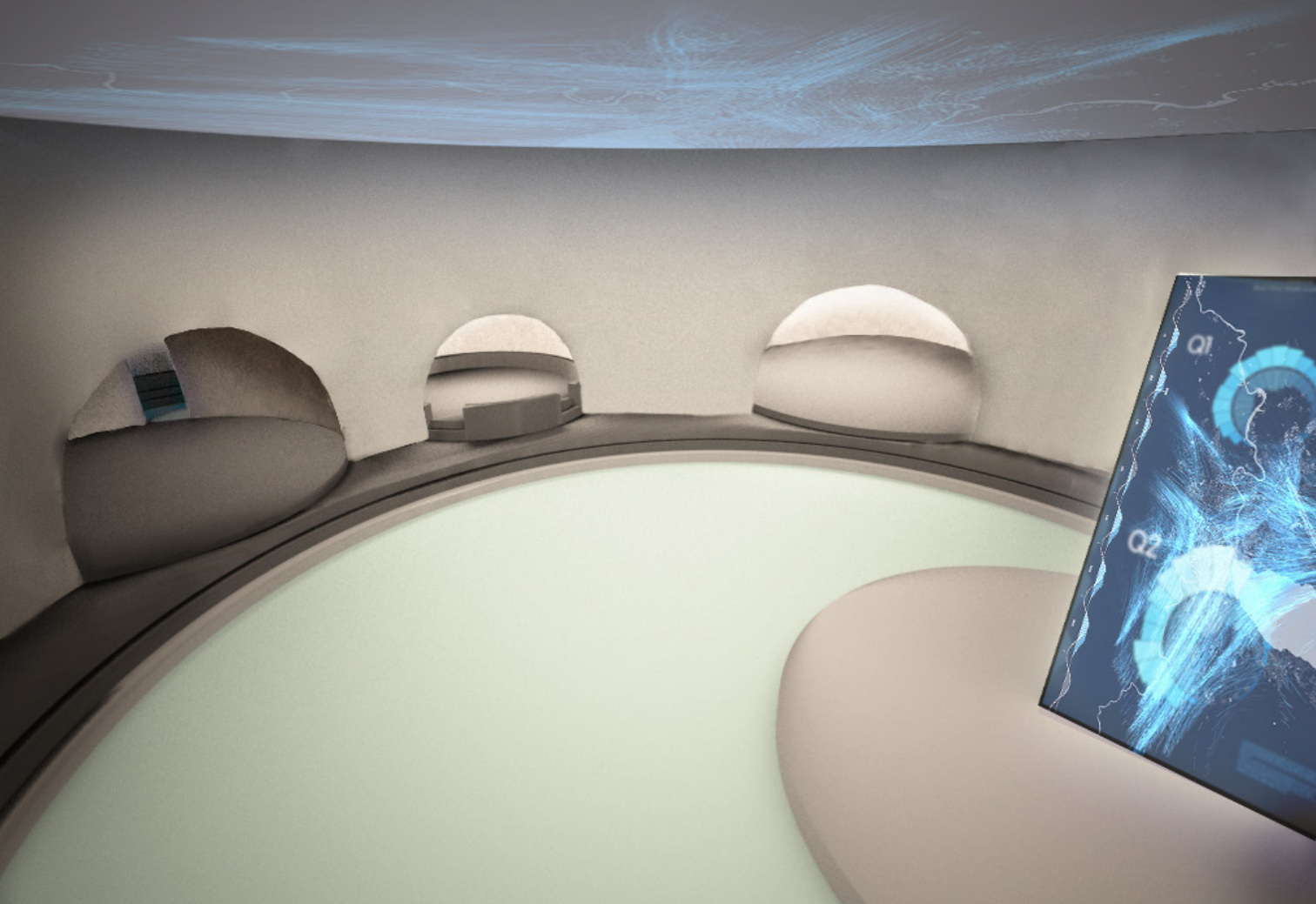
Top: This is the main space of the Civitas Aquae Water Museum, this room the visitor has access to all other areas (spheres) of the museum.
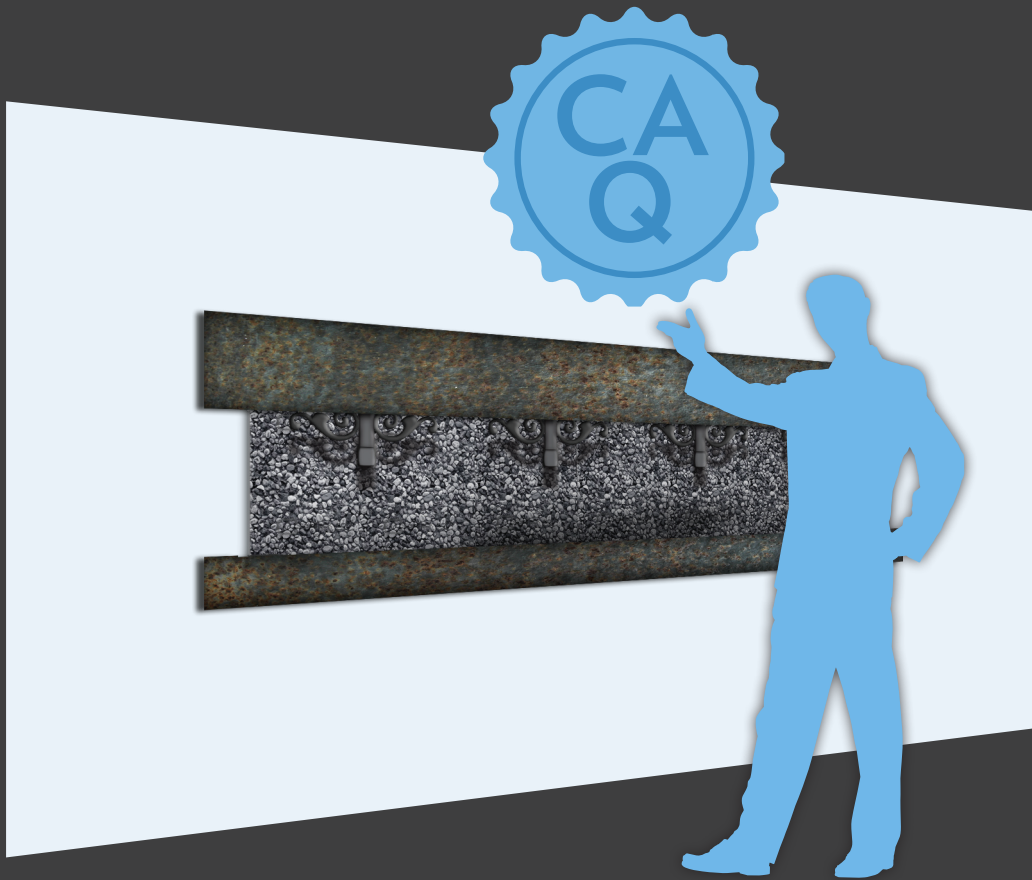
Left : The "querying mirror" is a touch screen positioned in the main hall of the museum (see upon) that shows the water flow of the city: the eco runnings challenges, highlight the different areas of the city and their consumption.

Side page: A close perspective from a side room of the museum, with the "querying mirror" in the background.
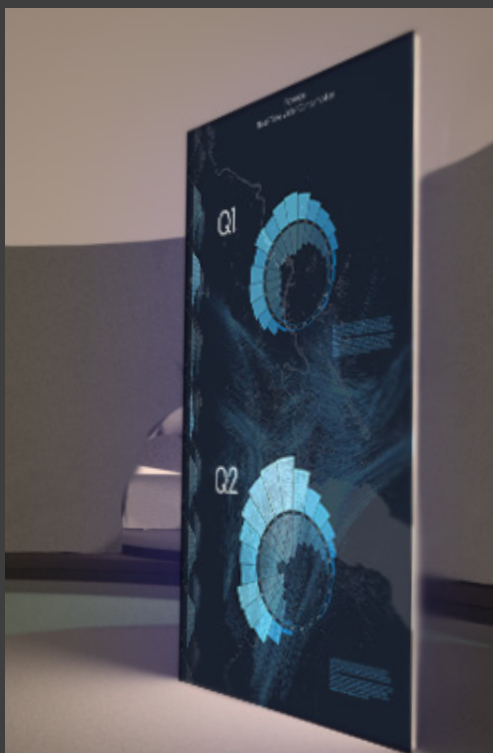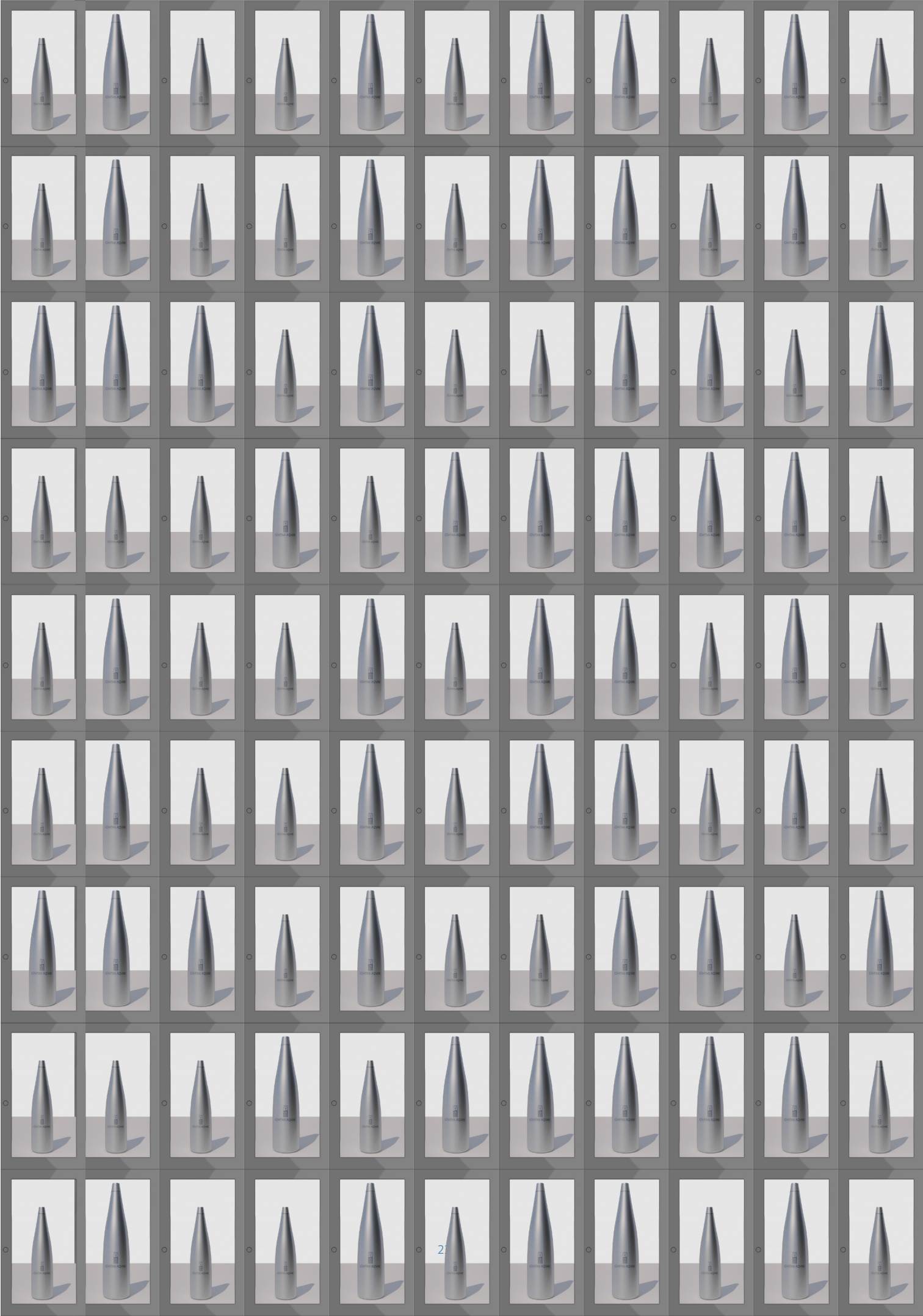
The bottle dispenser is the automatized vending machine located inside the Civitas Aquae Museum. Costumers are free to buy the exclusive Civitas Aquae bottle in size of 1.5 litres and 0.5 litres.

The bottle could be immediately filled at the Civitas Aquae fountain, which ether is located inside the Museum space.
The water that spill out from the fountain, has the CAQ (Civitas Aquae Quality) marks, a certificate that guarantee the high quality and taste of the water that is recognized, not only by the local authorities, but also from experts "water sommelier".

The ICT
Water Controller

The fourth touch pint of the CIVITAS AQUAE system is the ITC Water Controller. This is a device used for reading water consumption in households and buildings throughout the city. The platform software foresees an integrated system with other utilities, such as electricity, gas and telephone. This will enable a complete reading and monitoring of all the essential sources provided by local utilities. With a readable, and user friendly application, it will be possible to have a complete overview on personal and collective consumptions. Such integrated platform will be flexible and will allow the user to automate some procedures, such as payment of utility bills.

Another novel advantage for the user will be the ability to manage, within a single system, their consumption occurring in other properties connected with the same user (for example vacation homes, offices, storage units etc). From a single platform, and with the data in the CA Cloud, it will be possible to monitor consumption across several places.

The CA ITC WATER CONTROLLER platform:
The CA ITC Water Controller platform, in order to control and manage water consumption, will be organized on 3 vertical and 2 horizontal level.

Level 1
Real-time cost and consumption visualisation throughout pragmatic eco-visualisation techniques.

Level 2
Water quality parameters and real-time benchmark with the authority water provider.
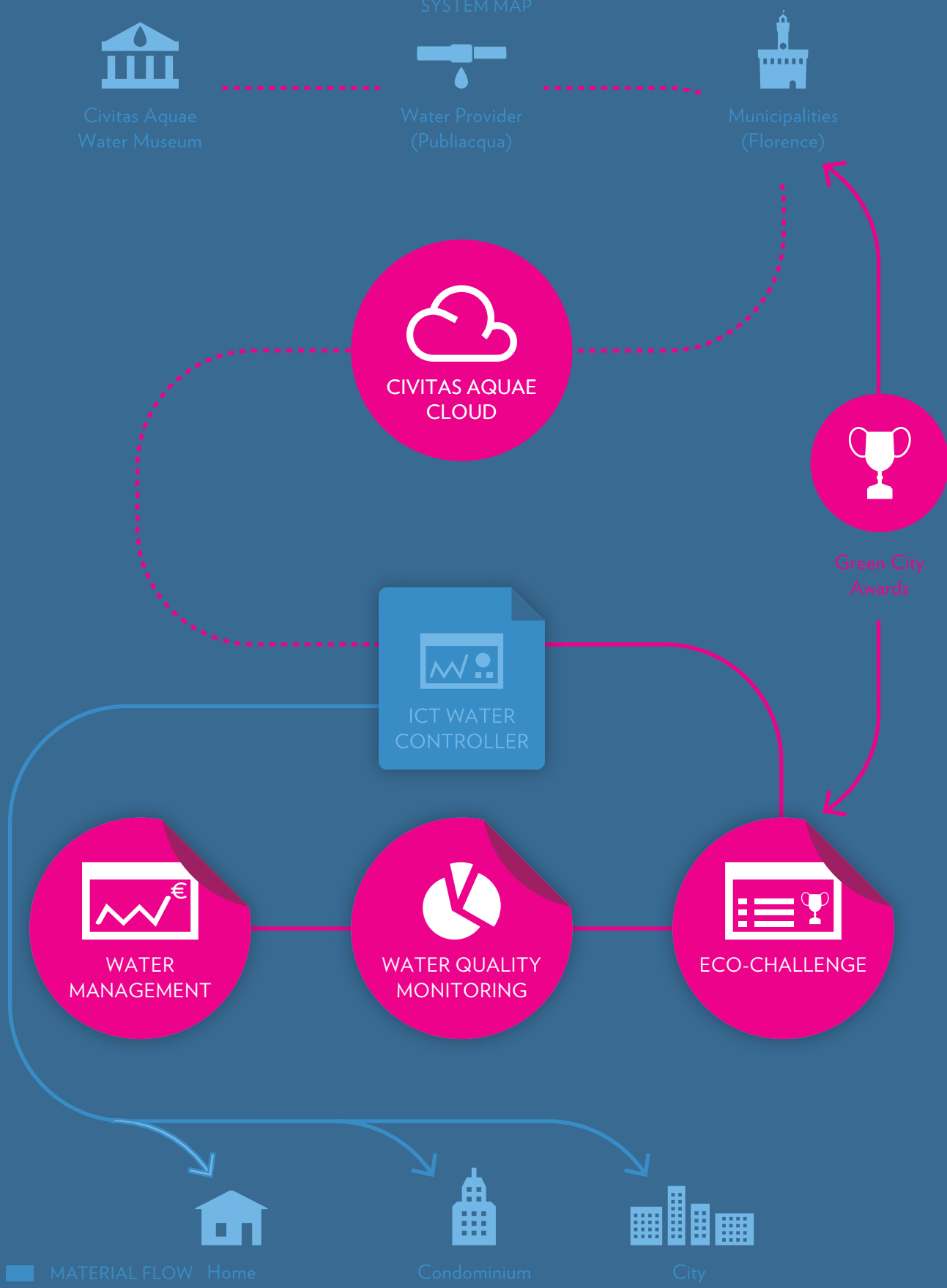
Level 3.1
Personal consumption goals and self achievements history.

Level 3.2
The condominium and local city area saving water challenge (city green competition)

Level 3.3
The water city map, the goals and the challenges which are taking place across the city. The challenge is scale up, together with increasing personal awareness.

The water challenges in which residents are competing, are displayed inside the CIVITAS AQUAE WATER MUSEUM at anytime, where at the end of the contest, is declared a winner. The prizes are different, depending on the scale of the competition (condominium, local area and the entire city); The winner receive economic incentives to realize little urban green projects rather than discounts for upgrade the housing eco-efficiency.

THE WATER CONTROLLER
SYSTEM MAP

Civitas Aquae
Water Museum

Water Provider
(Publiacqua)

Municipalities
(Florence)

CIVITAS AQUAE
CLOUD

Green City
Awards

ICT WATER
CONTROLLER

WATER
MANAGEMENT

WATER QUALITY
MONITORING

ECO-CHALLENGE

Home

Condominium

City

MATERIAL FLOW

COMMUNICATION FLOW

DATA FLOW

The Civitas Aquae ICT controller once installed expand the users control and awareness across the private living space, with accuracy in utility measuring and information displaying.

The ICT is always connected with the Civitas Aquae brand word of items and services. The water public provider, can read the house eater consumption directly from remote.

Civitas Aquae
"Welcome Home"

VITAS AQVAE

— Welcome Home —

Touch Screen
Sensible

Civitas Aquae offer the software platform for private living spaces that will be integrated into a device applied on domestic walls and connected with other electronics house

devices. Civitas's device is works as a normal touch screen display.

House
Empowerment

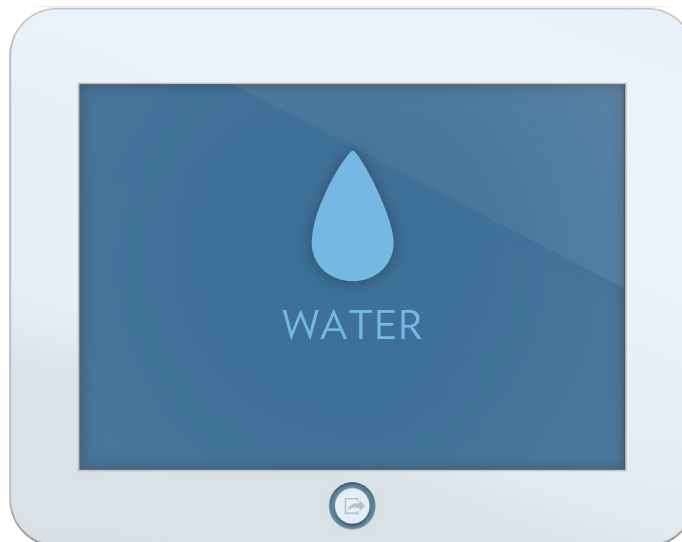WATER

CONNECTIVITY

ENERGY

GAS

Slide Windows
Previous/Next

The Civitas Aquae software is extremely flexible, ready to host on its platform other utilities features such as: electric energy, household connectivity, gas, and obviously water. Integrate into a unique interface the different utilities features, empower the user control.
Users can shift from a utility to another by The Users can switch from one dialogue window to another via horizontal touch scroll.

Water
Section

WATER

System Layers
Up/Down

The users scroll the system's windows horizontally and vertically to achieve the depth of the information system.

WATER MANAGEMENT

€
25,78

110lt

85.000
litres

You
and Your
Money

Water
Saving Goal
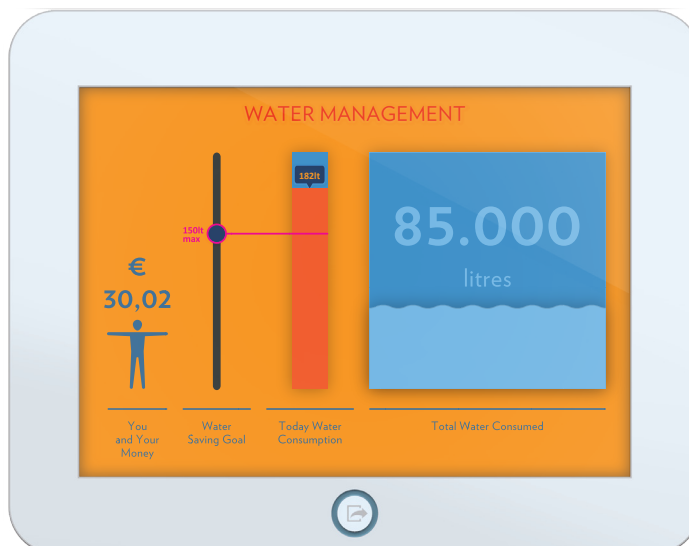
Today Water
Consumption

Total Water Consumed

System Layers
Up/Down

From this panel window the users can control, in real-time their domestic water consumption.
The screen shows: the cost of the next water bill, the domestic daily consumption and the total amount of water consumed during the year.

Users can also set on the ICT System, personal target about their daily water consumption with the simple gesture of sliding up and down the bar of *the saving goal*.

WATER MANAGEMENT

182lt

150lt
max

€
30,02

85.000
litres

You
and Your
Money

Water
Saving Goal

Today Water
Consumption

Total Water Consumed

Civitas Aquae ICT Water controller is always "on", for this reason users can be trust in that system shows on its screen. The ICT system notifies to the users that their limit

of daily water consumption has been exceeded and their target is miserable failed.

WATER QUALITY

CALCIUM

Calcium is an important
factor of water hardness,
and it also functions as a pH
stabilizer, because of its
buffering qualities.

Safety

57 mg/l	12 mg/l	24 mg/l	43 mg/l	0,1 <mg/l	4 mg/l
Calcium	Magnesium	Sodium	Chloride	Fluoride	Nitrates & Nitrites

Civitas Aquae
"Welcome Home"

The Civitas Aquae ICT could be considered such as "play maker" role in domestic environment; indeed the entire house ecosystem can be controlled through this device, included the quality of the tap water.

Thanks to small smart meters systems installed in household water or condominium the ICT device is able to analyse the changes in the composition of the water. Users can have in real-time feedbacks about the water parameters: if water it's safety to drink for them and for their children.

WATER QUALITY

CHLORIDE

Con: in large quantities
provokes kidneys illnesses

NITRATES & NITRITES

Cons: methemoglobinemia,
blue baby syndrome;
allergies.
Main causes: fertilizers and
manure; animal feedlots;
municipal wastewater and
sludge; septic systems

Not Safe

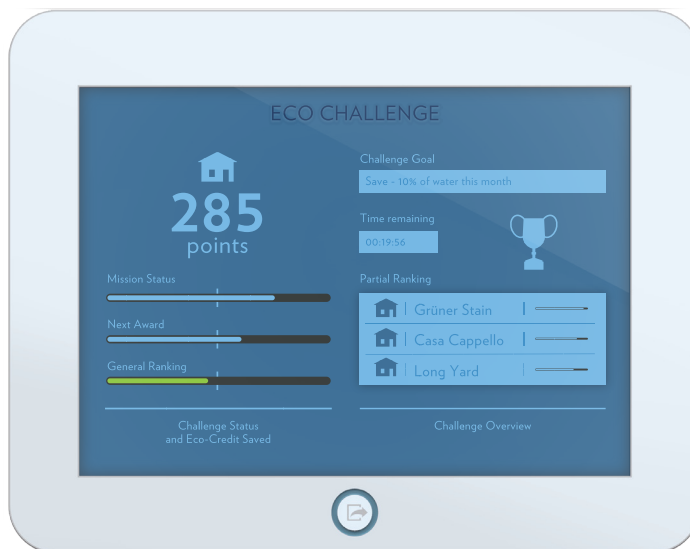| 56 mg/l	8 mg/l	42 mg/l	120 mg/l	0,8 <mg/l	35 mg/l
Calcium	Magnesium	Sodium	Chloride	Fluoride	Nitrates

The system reacts immediately to the change of some important parameters which ensure the quality and purity of water.

The screen change its tone and the water parameters under accuse are highlighted and described.
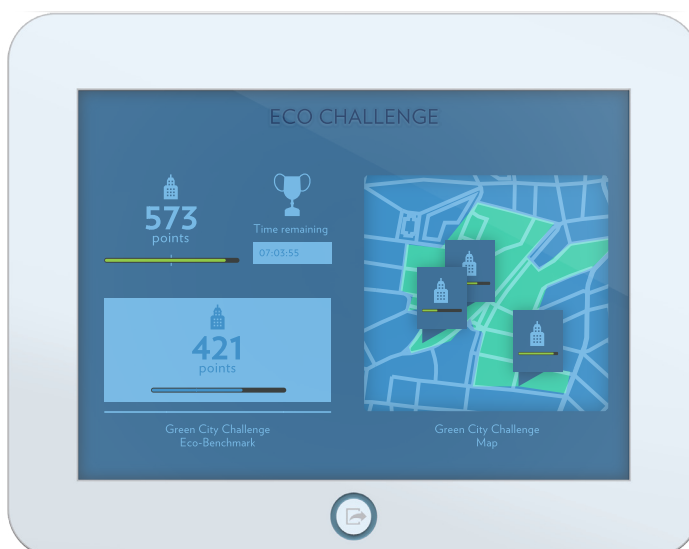
ECO CHALLENGE

285 points

Challenge Goal
Save - 10% of water this month

Time remaining
00:19:56

Mission Status

Next Award

General Ranking

Partial Ranking

Grüner Stain
Casa Cappello
Long Yard

Challenge Status
and Eco-Credit Saved

Challenge Overview

The third layer of the Civitas Aquae ICT water section is dedicate to challenging users in change their approach with the water use.
The challenges that are proposed to the users by Civitas Aquae in direct participation with the City Hall and the local water provider, are published on this ICT water section. The competitions take place on three different levels: 1) domestic which involve the entire condominium; 2) local city area; 3) across the entire city.
Users have always open access to the challenge session, monitoring the their own mission statement and the general ranking. More points users are collecting before the end of the mission more real "green advantage" they received from the local government.

ECO CHALLENGE

573 points

Time remaining
07:03:55

421 points

Green City Challenge
Eco-Benchmark

Green City Challenge
Map

Slide the screen to the right and the challenge assume a new dimention. Now coalitions of residents from the same "compund" are in challenge with the entire neighbourhood. Consume less and smart all together increase the possibility to win the competition as well as improve the quality of the environment where we live.

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