Future Public Technologies – WaterBar – Q+A **October 2011**

Q: What does this installation actually do?
A: WaterBar makes mineralized water. WaterBar takes municipal water, filters it and passes it through additional filter media to re-mineralize the water. It then mixes these individual batches to a final mineral water mix-of-the-day.

Q: Why?
A: Water is an essential shared resource and deserves more than to be non-toxic. The privatization of water quality through the beverage industry and the mineral water fashion is a clear indication of the deep desire for a meaningful connection to water. WaterBar adds a 'missing' filter, one that is absent from existing water quality systems. It is based on a different idea of water quality, one that requires more than absence of toxicity. WaterBar geo-engineers water samples for a new relationship to water based on shared concerns outside of personal needs.

Q: What do you mean by 'post-sustainability age'?
A: The standard paradigm of resource management is 'risk minimization'. The world is good for human beings to the degree that it does not impose a risk to health. While that makes complete sense for survival, it does little to foster a deep culture of resource management. WaterBar is one step in that direction, and part of an ongoing inquiry into future public technologies.

Q: What is the inspiration of the future public technologies research?
A: There are several threads to this. One is previous work on information technology in the public realm that lead to the *MicroPublicPlaces* project (together with Hans Frei). The other is ongoing research into the future of sensing systems. The common denominator is an interest in bending technical systems to perform differently in public than in private. Who cares what you do with your mobile phone. But the mobile phone network is of concern to many. It is important to consider design on the level of infrastructure, and it is important to consider how new infrastructures reconfigure the private-public divide.

Q: How does WaterBar perform the mix operation?
A: WaterBar has a custom designed search-bot that reads through internet sources for news and updates on water issues, water crises, water-related inventions and scandals. It collects this textual information and analyzes it. The analysis associates the frequency and intensity of the occurrences of a basket of search terms in several steps. It then maps the result of this process to the properties of the filters, calculates the mix-of-the-day in direct proportion to these results, and moves water through the filter-bank accordingly. Aeration of the filter banks occurs in direct proportion to the intensity of events found in the analysis. For example, noticeable increases in news on corporate greed will make the Francis-from-Assisi filter (the sandstone from La Verna, where the monastery still resides today) active. More water will be in direct contact with this filer (and aerated to increase the reaction rate), resulting in a measurable increase in calcium and a reduction in sodium.

Q: Where does the water come from?
A: The water input to WaterBar can come from almost anywhere. If the source does not meet WHO standards, an additional cleansing step is added (a reverse osmosis step). In this first installation the water comes from a municipal water supply, and in particular from the water supply of the city of downtown Buffalo in the Ellicott Square Building that today houses the Erie County Water Authority.

Q: How does the system control the flow of water?
A: The glass containers are stacked such that the water flows due to gravity when the valves are opened. The containers are connected via flexible tubing. An electronic circuit controls water level sensors and valves that open and close to allow the flow of water. A computer program checks all the water levels and decides when it is best to refill any containers low on water or when to create another batch of the mix-of-the-day water.

Q: Is the water safe to drink?
A: Yes, it adds (and removes) only trace elements to the input water, in this case the municipal water. It is as safe as the input water, but more interesting.

Q: What kind of changes does the system do to the water?
A: The chemical composition of the mix-of-the-day varies with the mix itself. For example, the Inada granite increases the iron content more than all the other filters combined, but lowers the calcium content somewhat. The LaVerna sandstone filter is the only filter with the desirable property of lowering the sodium, copper and magnesium concentrations. All the filters increase the iron content significantly. However, other differences are maximally in the single digit ppm or mg/l (parts per million) range and sometimes only in the ppb (parts per billion) range. These are not significant changes, but they are real and measurable changes.

Q: How was this information generated?
A: The water from WaterBar (with Buffalo City water as input) has been analyzed with a colorimeter (LaMotte Smart 3) often used in on-site field analysis of water samples. This device delivers results from standardized water tests in the parts per million (milligrams per liter) range. Also, an independent chemistry lab checked the same WaterBar water samples with even higher accuracy and found no problems.
Excess water is piped to a container with duckweed that functions as a low-fidelity visual bio-indicator of water quality.

Q: Don’t the plastics, glass and metals affect the water?
A: Glass is an excellent and neutral water container. The only metal in contact with the water is stainless steel. The tubing used to transport the water is designed for the food processing industry, rated 3-A sanitary, resists bacterial growth, does not impart taste and is USDA compliant. The chemistry tests described above used the Ellicott center tap water as a control sample for comparison. There is no measurable and no noticeable effect of the WaterBar system on the water it creates.

Q: Where do the filter media come from?
A: Some of the filter media were collected through expeditions to the various sites. This was the case for the anthracite (from Luzern, Pennsylvania), the sandstone (La Verna, Italy) and the diabase (Gettysburg, Pennsylvania). The other media were collected by colleagues on site and sent to WaterBar over eventful routes. Special thanks to Ben Nachum, Yoshimi Mashiro and Dimitri Charalambous.

Q: What kind of hardware and software does WaterBar use?
A: Part of the hardware is custom designed. The WaterBar electronics and the 30 input/output lines that control the sensors and valves (all 12V) are connected via universal serial (USB) to an old laptop computer running Ubuntu10.4 LTS through an off-the-shelf microcontroller (Arduino Mega). The WaterBar program (12 modules, 72kb of code) is written in python3. Special thanks to Brian Clark and Joe LeGasse.