FONDAZIONE BRUNO KESSLER
MAGAZINE

Mobility Story: Giovanni Garberoglio #3 Pittsburgh, Pennsylvania

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After his stay in Colorado, Giovanni goes back to Pittsburgh, Pennsylvania. Let's find out what happened during the third and last stopover of his trip.

I land on September 1, ready for another two months of interesting research (and some more exploration). Pennsylvania is definitely not like Colorado, and Pittsburgh is not in a mountainous area. The city is much bigger than Boulder. From a population of a few hundred thousands to a few million, a factor 10 that one can see for sure.

I had been to Pittsburgh a decade ago for a post-doc, but at that time I worked in an “out of town “Federal laboratory (about an hour’s drive, which for an American is considered a normal commuting distance), and I had rented an apartment in a residential area nearby. I rarely went “downtown”, so I can’t say I had gotten to know the metropolitan area well. This time I will be working directly with the University of Pittsburgh (one of the three or four universities in the area) and the apartment I rented is in the city center.

Karl picks me up at the airport and updates on the latest news as we drive towards the place I will be staying. Almost nine months have passed since we last talked, and this “gestation” has produced news. After thinking it over, he had decided that the method we had discussed, and that more or less I had in mind to organize during the next few months, is not ideal for the kind of calculation they want to do. In the meantime, I think, a collaboration with another American laboratory has come up, and the issue I need to work on is much more accurate than it was before: radioactive decontamination.

The interest in this issue derives from what happened in Fukushima: the water that flooded the reactor became weakly radioactive. Some hydrogen nuclei in H 2 O were transformed into tritium (T), which is a radioactive isotope of hydrogen. Now, the problem is that the amount of radioactive water we are talking about is about one million tons, while the amount of radioactive molecules is (relatively) negligible. If I understand correctly, it comes to a few tens of grams, which means that one molecule of water every about 20 billion is radioactive. They should be separated in some way. [Note: My most attentive readers might be asking themselves at this point: which tons? American tons, British imperial tons or International System tons? Congratulations for your curiosity and precision. At that time, though, I didn’t ask.

If the problem seems to be that of the needle in the haystack, it is actually so. My first question, however, is the following: “wouldn’t it be easier to throw everything into the sea?”

My colleague, Karl, gives me a somewhat weird look, and at that time I don’t quite understand what he’s trying to tell me. Then he shrugs and says: “No, environmentalists do not allow it and it is not a politically acceptable solution.” Before environmentalists come looking for me to hang me from the highest flagpole, let me explain what I meant. There’s an amount of radioactivity that is naturally present in the environment and can’t be removed. In a human body there are about 10,000 disintegrations per second due mainly to the fact that a (small) fraction of potassium present in the ecosystem – that is absolutely necessary for our health – is radioactive. [Note: No, it’s not a consequence of the nuclear tests of the ’50s or ’60s. The radioactive potassium has been here since our solar system was created]

Standards for drinking water alow 1,000 disintegrations per second per liter. How much more radioactive is the Fukushima water? According to a quick calculation, assuming 50 grams of radioactive water in a million tons, it would add up to about 4 million disintegrations per second per liter. It would be enough to have that water diluted 4000 times to make it drinkable; I think it’s technologically feasible.

Then Karl assumes a little more sly expression and he adds: “But the idea isn’t bad. And, at least once, they have already done it! “. At this point, it’s me now that looks a little puzzled. I find out that in a nuclear power plant right in Pennsylvania, there had been an accident where water came into contact with the reactor core, becoming weakly radioactive. Even back then environmentalists were particularly concerned about the destination of this water and they didn’t want it to be taken out of the plant. To solve the problem, it was evaporated.

However, the scientific challenge remained: is it possible to effectively extract that part of 20 billion water that is radioactive? The idea that had been discussed nine months earlier was for a method that could be applied if the water had been gas, and probably not too good even in that case (although it was still necessary to try and make a precise calculation before being sure). In the meantime, Karl had been wondering whether it would be better to work directly with liquid water, using a method similar (but not the same) to the one they had discussed. Six months before, he had put to work a guy who was starting to have some results. The idea was to try and determine which material, between a certain class of polymers, would be the most promising for this purpose. I would still be welcome to cooperate with them. In the following days, I meet the guy who had been entrusted with this project. He explains to me what progress they have made, what they want to do, and so on. There are still several issues where they could definitely use my help. It looks like a good challenge to me, and also an excellent opportunity to learn something new. I decide to devote myself to it, without neglecting what was my original plan, though.

Meanwhile, the great metropolis intrigues me. I remembered from my previous stay there that there was an off limits neighborhood (The exact words they had used to describe it were: “don’t even think of going there!”) but the whole south-eastern part of the city is terra incognita for me, and I explore it freely by taking long walks on weekends. In the end I didn’t see even half of what I had set out to see: Pittsburgh is a huge city. There are plenty of city parks, even very large ones, that I like to go visit again and again. And big residential districts with their typical American “small houses” that stretch for kilometers, each with its own particular style and I do not mind visiting: there’s no traffic, and there’s a lot of green space. I sometimes I plan my itineraties so badly that I end up walking along one of those big American roads, with 4 lanes in each direction, very busy, noisy and definitely smelly.

After a while, I developed a certain sensitivity to Pittsburgh's urban design. At first I do not pay much attention, and only after I've been walking for a while I realize that "something" has changed: I see that maybe the sidewalk is kept worse than "ten minutes ago", I notice a higher concentration of waste here and there, and the houses around me show a little more clearly the signs of aging. After three or four "explorations" my spirit of observation gets finer, and I start to notice these disruptions in the moment they happen. Sometimes you literally just cross the street and find yourself in another world, from the "American dream" style houses to big rundown buildings, the transition often accompanied by a significant change in the "average" ethnicity of its inhabitants. Let's say that my impression is that poverty is much more "colorful" than wealth.

Meanwhile, work goes on… more or less. In early September, signs of life from Italy start coming in. PhD students are back from vacation, and we need to help three students graduate. Luckily for me (and to their honor) I must say that the material they start sending me shows very clearly that they not only went to the beach and had fun this summer. Colleagues are back from vacation as well, and two time zones closer to Italy shield me much less from those "small" (but many) tasks that I was already starting to forget. By mid-September I find myself making a series of videocalls about everything except what in theory I should be doing. One in particular is quite interesting: it seems the various research institutions of Trento are moving towards a common project, anticipating a major financial commitment from the European Union. This project is of course something that has nothing to do with my Mobility project, but the message that arrives (including from the high places) is clear: we want you to be familiar with the subject we you come back, and be sure that, in a year or two, you will be dedicating most of your time to it.

Actually, I don't mind it. In fact the topic proposed is modern and very attractive. It's not exactly what I usually do, but one of my "specialties" is precisely being interdisciplinary. Rather than dealing with a specific subject, I'm mostly engaged in how to use computers to answer Physics questions, and these questions can come from many different fields. So I start gathering material and studying (omniscience is not yet one of my competencies, but I'm working on it…).

My schedule is quite full, and I slowly begin to notice that its getting colder (especially in the morning) and leaves are starting to change. Fall is coming and I remember it particularly colorful in Pennsylvania, thanks to the big number of maples. It's true I have a project to complete and also a new topic to study on, but sometimes a walk is good for your health (and help you think). The perfect excuse comes up when one of my colleagues, I would call her a friend since I had met her 10 years before, invites me for dinner on a Sunday. She and her husband, an American of Italian descent, live in an area of ??the city located a bit far from where I live. She kindly offers to pick me up, but I tell her that I'd rather take advantage of the invitation to take a "walk" (a couple of hours long) and visit a beautiful park which is located near her home; I told her I gladly accepted a ride back home in the evening. Although it's now mid-October, foliage color change is a bit behind compared to what I expected, but little changes can be noticed, and certain trees wore red leaves in the bottom, then yellow, and a variety of shades of green in their tops. I let myself be carried away by this wonder… and I'm a bit late when I get there (luckily they were late too!). For the record, dinner – as the company – was great!

Mid-October comes, and I realize my mind is already home a bit. And in the colorful autumn of Pennsylvania, you can start feeling the first faint hints of the terrible winter. The American weather forecast informs me that snow has started falling in New England, and a cold air low-pressure system is rapidly apporaching from Canada. Time to go home!

But, before I go, I want to see one more thing: the Cathedral of Learning. The building with this pompous name is one of the main features of the University of Pittsburgh central campus.

According to Karl, it is one of the tallest buildings in the world dedicated to education. Legend has it that it was built by one of the chancellors of the University of Pittsburgh who, struggling to find their way around the campus in the early days of his appointment, had envisioned a high and visible building which could be a guide to him and to whoever visited the University. To get the funds to build it, the Chancellor came up with the idea of asking the various ethnic groups in the Pittsburgh area to pitch in. In exchange for their financial contribution, he would devote to each contributor a classroom decorated in accordance with the ethnicity features of their home country.

Karl tells me that he has had the chance to visit the classrooms several times and are very beautiful. It is literally a stone's throw from the Department of Chemical Engineering where I am being hosted. I've always noticed it and photographed it for its beautiful gothic architecture, but for some reason I had never found the opportunity to visit it. During one of my last days in Pittsburgh I drop all hesitation, I get off from work a little earlier and I go visit the inside of the building. In fact it is very nice. Much of the ground floor is occupied by a huge common room in a Gothic style that I find of great effect. The architecture looks like that of a church, with large pointed arches, but instead of being occupied by priests, nuns and Japanese visitors, the room is literally filled with students who study in silence. The Cathedral of Learning in name and in fact.

I decide to go and see the various rooms dedicated to the nationality groups. They are beautiful and peculiar indeed, especially those where they aren't having lessons and I can go in. Curiosity of course drives me to look for the Italian room, but as soon as I step in, I notice that there is an ongoing lesson and I dare not disturb. I had read that it had been decorated to look like a medieval monastery, and I must say that the impression I get quite matches the description I experience another "homey" touch when I step into the Austrian room, which definitely resembles certain parlors that I visited in South Tyrol.

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