An Interview with

DEJAN S. MILOJICIC

Conducted by Jeffrey R. Yost

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Abstract

Former president of the IEEE Computer Society Dejan S. Milojicic discusses his education, early career, longtime service at HP Labs and his various volunteer leadership roles for the IEEE Computer Society. Fundamental to the discussion are his roles as the founding EIC of Computing Now, a pioneering publication bringing together digital content for the Computer Society, and his years as president-elect, president, and past president of the Computer Society.

Yost: My name is Jeffrey Yost from the University of Minnesota and I'm here this morning at HP Labs in Palo Alto, California, with Dejan Milojicic. This interview is for the IEEE Computer Society Leaders Oral History Project to interview past presidents. Dejan, can you begin by giving me some basic biographical information on when and where you were born?

Milojicic: I was born in Belgrade, which used to at that time be Yugoslavia — nowadays, it's Serbia.

Yost: Did you grow up there as well?

Milojicic: Yes. I finished there my elementary school, high school, and university. And peculiar for nowadays, I walked to all three. Elementary school, which lasted eight years, was about five minutes walking distance away from my home; high school was about eight minutes away; and university was about 11, 12 minutes by foot.

Yost: Can you talk about your interests as an elementary and high school student?

Milojicic: I was always driven. I don't know why; maybe because I lost my mom when I was six months old, so I felt a need to secure myself. So I was always driven to accomplish things. I was always one of the best students in elementary school. I remember I enjoyed studying. Over vacation I would find books from my cousins and I would study the materials for the next year because I enjoyed it.

Yost: Were there particular subjects you were especially interested in?

Milojicic: I was more driven towards math. In high school I won some competitions at the town level, at the republic level, then went to the national competition. Also physics, chemistry, biology; all these kinds of subjects. And then there was an award for

chemistry that the town awarded, that I received when I was in seventh grade of elementary school.

Yost: You attended Belgrade University?

Milojicic: That's right; faculty of electrical engineering.

Yost: And what year did you start?

Milojicic: I started in 1978 and finished in 1983. I think I was the first to graduate in my class, but not overall. I remember I still had nine unfinished exams when I entered the fourth year and I heard about some junior students who finished in two years. So I said it's possible. So I asked to start the term project, because we had nine semesters and then we're doing a project. So entering the fifth year, I asked to immediately switch to doing the project, just stopped going to classes. That's how I graduated first in my class. I finished all these exams, passed them all, including the ninth semester, and then just went on to get the degree.

Yost: Did you know that you wanted to study electrical engineering from the start?

Milojicic: No. I was really good in math and everyone expected me to study mathematics but I felt that there's no clear path to being successful, to make an impact, really. There wasn't enough opportunity to get employment and electrical engineering also seemed to be harder, and I was always challenging myself. If something is hard then I'm drawn to it like bulls to red color.

Yost: You did an undergraduate thesis on parallel logic for hybrid computers. Can you tell me about that project?

Milojicic: Yes. It was a really interesting project. It was assigned to me by my advisor. Students select their advisor and I selected an advisor who I respected. Actually, I passed

three times the same exam with him. He was the professor because of whom many students stopped studying, because he really had high standards. I remember the first time I was getting his exam, he just told me, 'Okay, I'm giving you the lowest grade.' And I said, 'I don't want it.' So next time I got the lowest grade again and I felt stupid, so I went the third time and got much better grade, although still not an A. Anyway, so I went to him, and he liked me and sent me to Institute Mihailo Pupin, where they were building analog and digital computers in parallel. There were some large boards and it was my task to test them; and I tested them with digital logic. These were digital logic parts for an analog computer. And then at some point in time he asked me to continue testing new boards and I said, 'I don't want to do that.' He said, 'What do you mean you don't want to do it?' 'I don't think this is a diploma project.' And he said okay, 'Then go and write your thesis.' So I took these boards and I basically defined my diploma thesis. I took these boards and replaced them with parallel array logic (PAL), and I managed to accomplish between seven to 16 reductions in complexity, and thereby probably more reliability. And then went on to write the thesis. But as I said, I wasn't satisfied with what I wanted. Once I've done testing, doing more testing won't bring me much; I didn't think it would bring much to anyone. So they liked the thesis, eventually, because I spent time doing a proper thesis instead of incremental contribution in testing additional boards.

Yost: When you graduated in 1983, did you go straight on to graduate school or did you work?

Milojicic: That same team where I did this project offered me an opportunity to start working for them, and I declined. I wanted to go to the United States to study for a PhD. But I didn't manage to identify any way how to go there. I think I was a little bit naïve at that time. So it was between June and September, I was trying — it seemed much longer but it was only a few months— actually it was May. May and September I couldn't find a way to study in United States, so I accepted an offer from another team in the same institute. In parallel, I started my Master of Science studies, because it was possible to both work and study. The first year at work it was really, really boring. They didn't have anything for me. They were just building a team and asked me to study day in day out.

But the second year was really interesting. There was an entrepreneurial general manager who struck a deal with local post offices to build a completely new computer. So we were on a very aggressive schedule to build it and it was extremely engaging. We built it on an 8086-based board with 16 users, and most other systems at that time would only have one or at most two users. Plus, it spurred use of all kinds of peripherals, and that became eventually the theme of my Master of Science thesis, "Support for Transactional Operating Systems." So I did a little bit of file system — primitive file system — all kinds of device drivers, programming model, because we had to package everything in very limited amount of memory. I remember first it was 64k, then 128k, then expanded to 512, and eventually to 1 megabyte.

Yost: And who were the ultimate users of that?

Milojicic: It had a huge impact, eventually in the whole of Yugoslavia at that time, plus they sold it in Eastern Europe countries. I was really pleased and impressed with it. So it started with the post offices, where it was the front end monitor and on the back end system with printers and all of that, so they were doing transactions. Then it made it into the banks, then eventually we upgraded the system to 386 so it went into the IRS-like services, inside of the country and abroad. So it really had a broad impact and I was really pleased with it. Although getting to 386 required porting of UNIX, and that was a whole different story. We actually came to the United States and to London, where we built OS from AT&T UNIX source code. But we ended up porting another UNIX operating system and didn't benefit much from the source code. That was another highly impactful project. I think that Serbia, or Yugoslavia at that time, was very close to the world in terms of technology, because we had like 386 based on Multibus II, almost at the same time as companies were rolling it out in United States. It was an extremely engaging project.

Yost: So you completed your master's degree in 1986.

Milojicic: That's right.

Yost: And in the late 1980s, were you continuing with similar work?

Milojicic: Well first I had to spend a mandatory year of military service, which I managed also to fill with the projects, but after that I was flirting with Artificial Intelligence (AI). I wanted to do a Ph.D. thesis, I wanted to continue — and I also spent some time abroad at that time. But I wanted to do AI so I found a professor in Sarajevo who I felt was the best choice but he dispersed my illusions, he said it wasn't a good idea to do thesis remotely, we should be more engaged for successful mentoring of PhD. So then I switched the thesis to load balancing. I found it intriguing topic and as I said, I had a couple of travels to United States in that period and brought a lot of books. So I basically prepared my thesis proposal, and it's sort of different than the United States where you have qualifying exam after a few years; you don't have any exams in Serbia, you just do your thesis proposal and then you pursue that research. Well that research can last really long. It's results have to be influential, and most importantly, you have to publish, just like here, a few important journal papers. But anyways, I prepared the thesis proposal, they accepted it as a proposal and I was ready to roll. But it wasn't done, nothing was done, it was just a proposal of the work. I wrote a survey paper — I remember I submitted it to European UNIX Users Group (EUUG) event. And at the same time, I somehow stumbled on the opportunity for a scholarship abroad. Prior to that I just spent six months in United States on a government grant, and then when I came back there was an Institute announcement about grants and scholarships in Germany, sponsored by German government (DAAD, Deutsche Akademische Austaushdienst). I wasn't much interested in going to Germany because I just came back, so it wasn't going to make sense. But I enquired with the lady and she said you don't have any chance of making it because the deadlines are like within a couple of weeks and you have to collect tons of documents. So again, it triggered my stubbornness, you know, and "you can't do it" challenge; so I collected it all. And she was right; they asked for transcriptions and formally stamped everything, including high school degrees, so it really took a lot of effort. But I got it, and at that time, there wasn't still much of an Internet in Serbia, so I remember having that grant for a year in Germany, it was a good opportunity but then I

needed to find a place where to go. So I remember I wrote about 40, 50 letters; printed them, stamped them, wrote addresses on envelopes, sent [them out]. And about 10 professors came back. One of them, Prof. Jürgen Nehmer from Kaiserslautern, invited me to come and visit his group and his university. He already had students funded by DAAD; I think that he saw us as free students because we were funded externally, while all other of his PhD students were funded by his department, basically employees. That is how it still works in Germany, Switzerland, and some other EU countries. So I went there and went to another place to visit another professor, who I still collaborate with. It's interesting. So the professor I chose, Jürgen Nehmer, he eventually became my advisor, and that was University of Kaiserslautern; and the other one was Hermann Haertig, who at that time was working at GMD in Berlinghoffen. That was Gesellschaft für Mathematik und Datenverarbeitung, which eventually became Frauenhofer institute. He was working on an interesting operating system, BirliX, while Nehmer was working on distributed systems. I didn't know where to go, and I was almost flipping the coin. But instincts told me it's better to go to Professor Jürgen Nehmer, which turned out to be the right thing. So I went there and his department also benefited from me, I think, as I was raising the level of English speaking in his group. So he felt as I spoke English well; the first year the whole group spoke English at the meetings. I was planning to stay only a year but the war started in Yugoslavia, and he was extremely pleased with me because previously there was a guy who spent six years and didn't do much. I took it very seriously, I was working 5:00 a.m. to 5:00 p.m. workdays. I was literally there in the office every morning at 5:00 a.m. And everyday, so he saw that every time he comes in the morning, I was there, working hard, and I knew what I was going to do, because I already prepared thesis proposal in Belgrade. Not only the proposal, but it was practical things because it was implementation of the load distribution on top of the Mach microkernel, which was a novel operating system at the time. So he engaged me with a couple of undergrads who were working with me. And also, having spent six, eight years in industry, I was a skilled organizer. I was working partly with students; I would do some stuff and they were working other pieces, and we managed to implement within about two years, whatever we planned. And that was mechanisms for task migration (a few implementations, in user space and in kernel space), then a load information

management, and finally a distributed scheduling, and we had a bunch of applications. I managed to submit papers and got a few papers accepted. After a year, my professor offered me to stay, which I accepted; and we planned it for two years and everything I promised I delivered on time. Then we asked for another extension of five months so that I could complete the thesis writing, defending and find the next job. I wrote the thesis in three months, which was basically assembly of the three papers that got accepted plus added stuff. It's intriguing — and that's probably a message for others — anything that I've done that I wasn't expected to do; almost everything that I've done extra, it meant something. I remember when I just came to Germany, I was supposed to go to a workshop in Grenoble and it was really tight with an exam that I was supposed to take, German language exam. That was the only exam that I basically took to prove that I could speak German. It wasn't mandatory, I didn't have to, but it turned out that without that exam I couldn't officially enroll in the Ph.D. program there, because the professor also offered for me to get my Ph.D. there, despite me getting proposal earlier accepted in Belgrade. So that was one thing where I stayed extra day instead of traveling to the workshop. I took the exam, passed it; but that enabled a lot for me long term. The next example happened once I finished and wrote the thesis, my advisor mentioned an opportunity to turn it into a book, and that was extra work, but it wouldn't bring me anything, you know, little bit of money which was negligible. But it turns out that that book was critical for me to get a green card, eventually. So these small efforts, perceivable small efforts at the time really matter long term, what I'm trying to say is doing extra work always pays off in unplanned and unimaginable ways. So whenever I have opportunities, my wife criticizes me saying why are you doing this, why are you doing that? Well you don't know. Going an extra mile is always good.

Yost: So you completed your doctorate in 1993, is that correct?

Milojicic: That's right, in the fall.

Yost: What were you thinking career-wise at that time?

Milojicic: Like all previous cases, I was interested in one path, but it ended up differently. I was hoping to start working in Grenoble at the Open Software Foundation Research Institute, I really liked it. Actually, I spent more time traveling there than anywhere else. I visited them six times because they were working on the same Mach operating system, and I was making contributions to Mach source code so it was a natural choice that I should go there. There were workshops, my private visits where I would spend a week; I even spent my vacation there because I liked them. So I was hoping to go there but they didn't have an opening. But they said they have opening in their headquarters, in Cambridge, Massachusetts. So they forwarded my resume there and they liked me in Cambridge. Similarly to my undergraduate thesis, they thought they're just bringing one more body for programming, just like they wanted me to do testing in Belgrade institute. But I was much more ambitious than that. I started projects on my own, and they liked it, so it was approved and funded. I remember I was working on a 64 nodes system, but the machine could go up to a thousand nodes; Paragon computers. And I did concurrent remote task creation, because I noticed that for high performance computing, in order to start applications quickly you need to create these tasks on many nodes, usually by forking. And it took a lot of time, so I found how to parallelize in time and space. This remote task creation got IBM interested in, and others. And then I've done other research projects while there. I started this testing and then evolved into something much different. Again, extra mile always helped, I think.

Yost: And you were there until 1998 when you joined HP, is that right?

Milojicic: That's right. It was about five years. I started on the 4th of January, 1994, immediately after completing my Ph.D. thesis; and ended up in September, 1998. They were downsizing. It was consortia founded by many important companies of those times, but those companies lost interest. So they downsized. And with all this downsizing, I didn't really like to be in something that appeared to be less and less relevant. They offered me a raise on a piece of paper and offered me to stay and lead the project, but I declined. I interviewed at about four places. I created a process at that time, where to go. One of them was a start-up on the East coast; another one was a well-known, still well-

known mobile phone company; third was a big storage company in the area that was just acquired; and then HP. I liked them all, there were advantages of each and I was confused what to do, so I wrote a process where I had a couple of dozen criteria, and then I ranked them; and got some numbers on ranking. Out of these couple of dozen I picked up like five, six key criteria and then ranked them again. Then I asked my wife what she thinks, and then ranked them again. Then I threw it all away and by that time, I already knew where I wanted to go. So that's how I chose to come to HP Labs; that was 17 and something years ago.

Yost: You joined as a senior researcher and as a manger?

Milojicic: Researcher and manager, yes.

Yost: I see from your CV that you have a number of different topical areas that you've done research in, so I'd just like to go through the list and [see] if you have comments on them.

Milojicic: Okay, yes.

Yost: On global memory management and failure recovery.

Milojicic: See that's real interesting because after maybe 15 years we're doing almost the same thing now. At that time, it was led by a visionary distinguished technologist Tung Nguyen, who wanted to build a NUMA architecture with each node running Windows NT. Because it's something in between cluster and scale-up, there was a possibility of one OS failing and Windows wasn't as reliable so we had to deal with memory failures on remote nodes. And today, with The Machine project, we're dealing almost with the same problems, so that was intriguing. At that time, I think, we'd done an extensive report on memory failures; it was a couple hundred pages, largely looking at Itanium, which had sophisticated failure support. We also started research on the memory failures, the physical chips failures, impact on them. And we then started basically from

bottom up; from technology through hardware and architecture, operating systems, middleware and applications, how these failures impact each layer. Over time, a couple of decades ago, similar principles remained. And sometimes even these simpler and not as comprehensive support, like Itanium had; the current chip venders have a little bit simpler choices. But that was an interesting project, both were.

Yost: And mobile and client computing?

Milojicic: It's interesting, my team didn't want to work on this anymore so they pushed us to go mobile and pervasive computing became popular so they all insisted we move and being a team player, I agreed, then we moved into that area. In retrospect, it was a mistake because after the split of HP, I remained with enterprise part as opposed to small scale devices, laptops and things like that. There are low margins there, I think, and less potential for innovation. It is cool, sexy area, but the opportunities for impact are smaller there. People may disagree but you know things come and go very quickly so there's less of an opportunity for lasting impact. It is interesting but somehow I didn't quite find myself there. We had a bunch of interesting experiments at that time, but eventually my team was disbanded, which happens frequently, so I became technical contributor. I remember I started the project on using mobile phones to interact with big screens, which is becoming more and more common today but it was way too early then. At that time I remember I had to stick the big wireless cards on the iPaQ handheld devices. So lesson learned: you don't want to be too visionary, too much ahead of your time. You want to stick closer to reality what can make impact sooner rather than far out because by the time it becomes feasible, newer technologies probably will make your contributions less relevant.

Yost: Can you speak a bit about your management philosophy, or management techniques for leading people?

Milojicic: Management techniques? I don't think I really have one. I have tons of books, but it's really about understanding people. Probably the most important one is "Love

them or lose them." If you don't show them love day in and day out, then you will lose them. I always try to do the best for all my team members. Sometimes it works, other times it doesn't. I worked with very junior people, with students I enjoy working; I have worked with very senior people. At one point of time I had three distinguished technologists reporting to me and it just worked well. What I didn't know before [was] the importance of working for the right level of manager. It's not just like most people believe that management is managing downwards. Managing upwards is maybe even more important. Your immediate manager is probably the most important person in your career, because you want to make him successful. It's not about you, it's about the whole effort, the whole team, company, and ultimately starts going upwards. You make your manager successful by working with your team members, and it goes up and up. But I've also done a lot of introspection; it starts really with understanding yourself. So you gotta understand Myers-Briggs. I also did social styles, Enneagram, and there are a few others. Then you want to understand others in order to understand how to work with others. Because I had so many blind spots, you know, you don't understand why you're annoying someone. You've got to understand his social style. Some people are introverts, others are extroverts. I remember one person who freaked out when I came to him. He was amiable and I'm driver driver. And when you come to him you know he wants first to be shown love and taken care of, then he starts to open up. I was all about the tasks, goals, what we're going to do, so he completely freaked out.

Yost: And you did work in adaptive monitoring?

Milojicic: Yes, that was interesting project. It was more on the enterprise side, it was dealing with how can you, with the constantly changing infrastructure, continue to manage that infrastructure? And IT management starts with monitoring. You first need to monitor what's going on, then you manage it. So things like virtual machines coming up and down, knowing how much information you want to monitor; getting inaccurate data because sometimes you are monitoring the load but there is backup happening. So you had these spikes in CPU usage, and dealing with these anomalies, and all kinds of other things. We've also done in-network monitoring. I remember that was work by one

student, which was really intriguing. Most of my students, when they come they stay about three months, spend about two weeks defining their job, and then they go on for two months doing the work, and two months wrapping it up. But this guy didn't do anything until almost the very end. In the last two weeks, he only came up with a proposal that sounded very good but he didn't do anything. So he went back to the university to continue work on it. It was basically a way of in-network monitoring, passing down the queries in the hierarchy of nodes, and as you go you calculate whatever you monitor, and then you roll up things. It became an excellent patent and a very respectable publication, as well as an internal to HP publication, which is much, much harder to get published or accepted. I think acceptance ratio was about three percent, which I am not aware of any conference which has three percent acceptance rate. They get about 1500 submissions and accept about 40 papers or so.

Yost: And another area, service deployment?

Milojicic: That's another interesting area. Actually it all started with an existing project which was called Smart Frog. That was exactly the time when I moved back from this ubiquitous computing back to the enterprise computing, and they asked me to help standardize that Smart Frog, which was really a service deployment tool. So service description, and then how you describe what you deploy, and then the protocols for deployment, and engine for deployment. That was just upcoming technical area, and the standardization body called GGF, Global Grid Forum; you might have heard of that. HP Labs management wanted us to standardize Smart Frog there. So I went into that, convinced the group that it is important, found three other partners, I think NEC was there, startup Centricity, one university, and HP. So there were four very active participants, and a bunch of others. I chaired it together with another gentleman from NEC. We named it Configuration, Description, Deployment, and Lifecycle Management (CDDLM). Around that we also did the prototype implementations, and had a bunch of accepted documents as a part of GGF. So it was in my mind, one of the most successful groups in GGF in terms of getting credible results at the end.

Yost: And you were central to the tech transfer from HP Labs to Software and Enterprise Server Groups.

Milojicic: Yes. So that was another interesting effort. They asked me to coordinate engagement with these business units. For example, when they would acquire a new company — and they acquired a number of companies at that time, I remember Talking Blocks, Radia, and a few others — I organized a workshop with all of them so we would have this interesting mix of people coming in from other companies and HP Labs, engaging with them before they get absorbed. It was an interesting exchange of ideas and thoughts so that going forward they would know if there was potential for tech transfer, one or the other way. And I've done the same thing with Enterprise Servers and Storage Business Unit. I also had a great experience with CTOs who were running it on the other side of the company, so it was a great growth opportunity for me.

Yost: You worked on directing a virtual desktop system (VDS).

Milojicic: Yes. That eventually, I think, got productized. We worked closely with teams in Singapore, India, and Brazil who all contributed to development of VDS. But it started with targeting Singapore and the funding agencies there who we worked with. It was the time when virtualization became quite promising technology, and we wanted to use virtual machines to replace the desktops. So you would have the thin client and a vacant server running VMs so when you turn off your computer, when you're logged off, the VM can be cached or sent to sleep. When you log in again, the VM is brought [up] and started for you. So there was a lot of research there. It was really interesting applied research because it allowed huge technical, huge business opportunity for the company. It also required technical contributions; it was architecturally challenging; which protocol to use. I remember we were using RGS, Remote Graphics System protocol that HP supported for graphics workstations, because really the bottleneck was in the network. So we've done comprehensive analysis of different applications as a function of different protocols, what are the latencies, etcetera; that was eventually presented to CTO of HP Software.

Yost: And you worked on shared services, the platform server?

Milojicic: Yes, that one was a follow-on to virtual desktops. That project dealt with how you can build services on demand and what is the management software for that. I think that project had a little bit less impact; you know not all projects are wildly successful. But let me just tell you what was the key contribution at that time. The key contribution was to take some types of services, develop the core support services for them, and then when you take on the next types of services, the hypothesis was that you would need less development and research and as you add more and more types of services you will need less and less because you have developed this platform of services for them.

Yost: And open service cloud computing?

Milojicic: It was Open Cirrus Cloud Computing Testbed, that project was really enjoyable. I think university relationships started in cooperation with Yahoo and Intel on creating a cloud test bed for collaboration, and it was pretty successful, similar to what open stack is today. At that time, I think Intel had some Cloud services, addressing virtualization layer, the name was Tashi. Yahoo had Hadoop at that time. HP had also some tools, dealing with the physical provisioning, and we thought that would be a good starting point. And then we started adding partners. I remember we added IDA from Singapore, ETRI from Korea, and eventually I picked it up; I drove it to conclusion because we wanted every site to have 1,000 cores deployed in data center, and then we would connect them. And we added UIUC, Georgia Tech, and Carnegie Mellon Universities in United States. In Europe we added Russian Academy of Sciences, CESGA from Spain, and there was Karlsruhe Institute of Technology. In Asia we also added later, Chinese Academy of Sciences, and China Mobile, and China Telecom. So really it was about 16 sites around the world, and I took the opportunity to organize events three times a year where we would present and drive institutions towards closer, tighter cooperation. I turned these events into formally sponsored IEEE events so you can find nowadays proceedings from these events, fifth through seventh events had

proceedings published and best paper awards. I thought it was successful, but it turned out it was too early for adoption and there was less industrial support. It was primarily driven by Intel and HP, we didn't include the other industrial partners in time, so eventually we stopped the testbed.

Yost: In developing partnerships with other players in the industry, was there a great openness and willingness to do that? Or were there concerns about helping competitors and creating future competition for HP?

Milojicic: I think it's all going back to styles, leadership and management styles. There are people who are glass half full, there are people who are glass half empty, and we need both of them. When you start a project, you need people who are glass half full. By the way, they tell me I am sipping over the glass, in terms of being full, because I'm really focusing on the possibilities. So it's important to build trust. It's all about trust; without trust nothing happens. And trust is best built by openness in the beginning, but then later it is more about following through. If you don't follow through, you know it's pretty soon over. As you know the old saying is it's really hard to build trust, it's very easy to lose it. So you need to consistently build on your promises and deliver on them. I know examples where, for example, IBM and HP were competitors but I worked best with IBM on standardizing technology, and once standard is done, then you go off and compete in the market. But you know IBM and HP have similar cultures so people understand each other much better than among people working in small companies and big companies. Same is true for others: Microsoft, EMC, Oracle. On the other hand, there are still different cultures inside of the companies, but I don't want to go there, it's more the discussion over beer.

Yost: And for the Department of Energy, Exascale.

Milojicic: That was very, again, engaging. I had had the opportunity through all of my career to work on very engaging projects. With DOE we worked with all the biggest labs and we were hoping to leverage our memory technology, and our photonics to build

Exascale computers. And this is a process; I think it's still not there; it's still unclear how it will get funded; but it was really engaging to work with the top minds there. We had a number of proposals for the Department of Energy, DARPA, in that direction. Some were awarded, others weren't, some got awarded and then cancelled, etcetera, but the whole process was a huge learning opportunity. And also looking ahead, it's always tough understanding the problems of the future. Why is it 20 megawatts that DOE wanted as a requirement for maximum power usage? Why most bidding companies believed it's 30 megawatts instead that is the power limitation? For example, you can build Exascale computer today, but it will have 60 times more power consumption beyond what is targeted by the DOE.

Yost: You've been at HP Labs for nearly two decades. Have there been major strategic shifts with the lab?

Milojicic: Are you asking me on daily basis?
[Laughter.]
Yes. The only constant thing in labs is change. Everything else is changing, too. I had opportunity to work with some great leaders. I remember Joel Birnbaum, who retired and I was at that time proposing a new project. I always liked getting advice from great people, so I remember asking him to meet me briefly on the Fourth of July to talk about what I have on my mind. And after four hours having spent with him on the Fourth of July, when he chose to spend time with me as opposed to spending time with his family, he was still passionately talking to me, motivating me to go forward. These kinds of commitments you can rarely find elsewhere. It reminds me of the days back in Belgrade where we spent a few nights continuously working, people slept under the tables for a couple hours in order to deliver the product. Similar culture I find here, when you're close to that line, that something's happening now with The Machine program. On one occasion, I remember working 36 hours non-stop on the government proposal. And in the midst of these 36 hours was my 50th birthday. This kind of commitment and passion is what drives the inventions and technology forward.

Yost: Do you recall what year you joined the Computer Society?

Milojicic: I joined once I returned from a sabbatical in United States; I believe it was 1988. I should know that because it was reported as I was elected to division director, they've got all these dates.

Yost: What were your earliest volunteer roles with the Computer Society?

Milojicic: First let me tell you why I joined. I came to United States; saw all these books and papers. I remember I had copies and Xerox of stacked stuff that was higher than me standing, literally. So I carried that all back to Belgrade; I don't know how much money I spent for overweight airline luggage, but it came back with me. And I became an expert in Xeroxing proceedings. I was really excited. I remember I liked ASPLOS Proceedings most. And then I loved IEEE *Computer* papers talking about anything; I was literally swallowing them all. For a while I didn't have almost any volunteering experiences. I believe my first IEEE publication was IPPS, International Parallel Processing Symposium, where I submitted a paper. That's only once that I came to United States because there wasn't much incentive in Belgrade to publish, and what I've done during my Ph.D. thesis in Germany was more slanted towards USENIX conferences. So once I got to United States I think IPPS was the first conference paper I got accepted in IEEE. So I had a couple of conference papers, and then I submitted the magazine paper, and it was accepted at IEEE *Parallel and Distributed Technology* magazine. Eventually, that magazine got converted to IEEE *Concurrency* and editor-in-chief at that time invited me on editorial board — it was Gul Agha, who I have huge respect for. So my first engagement in IEEE Computer Society was through the magazine editorial board. They had too many magazines and costs were too high, so they wanted to reduce them. They were also interested in new technologies rather than traditional delivery models of papers. And so they made a proposal for digital delivery, which was called *Distributed Systems Online*, so that was the first non-printed magazine, and I was part, again, of that editorial board. Jean Bacon was very capably running that editorial board as an editor-in-chief; I really enjoyed it. She would organize editorial meetings in Cambridge, with very low

cost. Basically the cost was flying to Cambridge, to Heathrow and then taking a bus or train to Cambridge, but very low cost university lodging there. And it was really engaging how we worked together. It's similar with Internet Computing, so I'm on that editorial board as well, and I have been for a while. So I started with these editorial boards. Then after a while, the IEEE Computer Society leadership and staff felt that *Distributed Systems Online* hasn't delivered what they really wanted. So they wanted to change it, and wanted to stop it as a formal magazine. They didn't want magazine basically, because they felt that the costs were higher than return on investment, and they still didn't get the novelty in delivering content. So they opened up opportunity for proposing a new type of delivery model, and I proposed something that eventually became *Computing Now*, so I was the founding editor-in-chief and made the original proposal. There was another proposal by another gentleman, and mine was selected. And it wasn't magazine anymore, but it was delivering content. I like to call it mash-up of content. There's IEEE *Computer* paper we wrote about the mash-up of content and what became out of it, and it's still driving the content and I think most other IEEE organizations picked it up as well. I even think IEEE as a whole is using that model, so that you can do the pick-up of the content, you choose carefully what other interesting content from other magazines there is, and then you deliver snippets of it. It suits more the busy life of researchers today, and gives insight. Less organized. There were many interesting ideas, for example, having guest issues; monthly issues by selecting an area and then picking up relevant papers, past papers; giving out some for free, others for charge; and then there were many other ideas. But I think I'm recognized in Computer Society as coming up with *Computing Now*.

Yost: Was there anything that served as a model in your thinking and conceptualizing *Computing Now*?

Milojicic: Certainly everything that came before that and understanding the problems, talking with staff with what worked, what didn't. Computer Society and IEEE, all internal organizations are good mixture of staff and volunteers. When they work closely together, good things happen; if they're fighting, nothing happens, it's a disaster. So I

carefully spoke to them, and tweaked, and improved it. And [I] also used the *Distributed Systems Online* as a good past model. I also pushed for internationalization. So we had people from China, an associate editor who would translate to and from Chinese, same thing for another gentleman from Argentina for Spanish language, [and] another from Europe. So cross-geographical participation was really important. We didn't have any face-to-face meetings, but we had periodical — first monthly, then I reduced it to quarterly — meetings, and then again focusing on what works.

Yost: How large was the board?

Milojicic: It was about, at my time, about dozen people; little bit over. Not everyone participated every time. But you focus really on contributions not the lack thereof.

Yost: Who stands out as being particularly helpful in the early years of *Computing Now*, both on the volunteer and the staff side?

Milojicic: There was one lady who left, Crystal Schiff, she helped formulate it. Dick Price was very helpful in formulating it, he also retired in the meanwhile. And then the executive director, Angela Burgess, she was very helpful throughout the process. Some of it was delegated to the director for publications, Evan Butterfield, who oversees all of it. And then there were a number of other staff who were helping in the process; most recently Steve was helping with delivering multimedia content. We also heavily started deploying multimedia content and sought cooperation with IEEE *Computer* in that regard. I'm still not sure we're there where we wanted to be, but it's the right direction that it's going. And as I mention, on the volunteer side, these were the gentlemen from China, Tiejun Huang, one from Europe, Donald Sousa, and another one from Argentina, Osvaldo Perez.

Yost: And *Computing Now* sent out a digital newsletter on a periodic basis.

Milojicic: On a monthly basis.

Yost: On a monthly basis, and was that something that you needed to opt in for, or did it go to all membership?

Milojicic: I think it's both and it's also for free, so we have broader participation than the membership, which was really important. It also ties to something else that I'll talk about a little bit later, special communities, but this reach is important. I think most other newsletters came out of *Computing Now* as far as I can see they have a similar model. They are repeating that model to others, that's where the impact is coming from. And obviously it's all this careful listening at various magazine operation committees, of which you are a part, learning what works, what didn't work. So it's continuous tweaking; there is no magic wand that made it happen. It's just continuously improving things; seeing what works, what doesn't, and taking it forward.

Yost: In the early years with *Computing Now* what were the greatest challenges that had to be overcome?

Milojicic: It's engaging people, so many times I personally would have to fill out the monthly editorial slot if there wasn't anyone or someone drops. These things happen. It wasn't as rewarding as being editor-in-chief or getting a publication in regular journals. So it's really convincing people that visibility, and reach out to everyone is important. Nowadays, it's different with blogs, posts, it is much more similar to *Computing Now*. At [that] time, people said: 'Well, it's not published paper so it doesn't have any relevance.' There isn't any published magazine nowadays, so nothing is delivered as a print publication, but it was challenging to convince people at that time. It was really hard convincing people that IEEE *Computing Now* was impactful. It took time.

Yost: It was launched at a time when there was a lot of discussion about the potential of a digital first model that has now been implemented. Can you talk a bit about how those two things coincided and changes with delivery of content from print to digital?

Milojicic: Well I would like to say that it was extremely impactful. I think that really the major reason for not delivering print is cost. That's very clear. We served as a model but we just coincided, because it was yet another experiment towards it to see whether people are interested, how many are opening up Web pages. I drove careful measuring of impact so we were continuously tracking what kind of impact we are achieving, how many downloads do we have for different versions, was IEEE *Computing Now* important and relevant for our Society and the profession as a whole? For example, there were months when there's lower access during vacation; other months when we have been mentioned in some of the important public media; then presence, we drove from the very beginning. I remember we have been talking *ad nauseam* about engaging with other websites, social networking websites, and I just got sick and tired of it and I said in a meeting, 'Well let's do it now.' Okay, Dick Price, you're active in Facebook, create Facebook site for *Computing Now* and I've done it for LinkedIn, and that was one of the first times when it happened. Now everyone is doing it, but that was more than eight years ago when we'd done it. And now it's a common approach to measure success by how many followers do you have in one or the other social media. But I don't remember which other social networking site, we got like tens of thousands of hits, many tens of thousands just by appearing there, by being mentioned. So the paths are peculiar. I remember how we had to go to Google to index — these were early times — how to fix search engine, and all kinds of things that are now common. We were sort of pioneers with that.

Yost: I assume that *Computing Now* like other publications had a reporting and structure just like the other publications. Is that correct?

Milojicic: I insisted that editor-in-chief be the real editor-in-chief, although at times I felt it should be the same as IEEE *Computer*, that the two should merge. They still haven't but I see similar roles. So in that regard the EIC was attending magazine operation committees and was reporting there but there was also clear financial reporting, which I think is even elevated compared to magazines because magazines fall under pubs and *Computing Now* is contributing to the baseline of Computer Society. *Computing Now* through advertisement, which is a new business model, was and is important for

Computer Society. I mean, Computer Society and IEEE are not for-profit organizations but you need to bring some revenue; being non-profit doesn't mean that you don't bring revenue. You earn revenue then you invest it back, this is how you distribute these profits. It's not whether you are profitable or not. So it was real important that we bring money in, and money was one way of reporting contributions of *Computing Now*. The other was relevance because it's really being relevant that is important. For the Computer Society in general, you need both. You need to be financially sustainable but more importantly, you need relevance and they go hand in hand. If you just bring money and you're not important it will eventually go down. If you're just relevant but can't find financially sustainable model, you won't last for long. So you really need both and we focused on both; bringing interesting themes every month and making sure that through ads and other ways, we can be financially sustainable for a long time. So when they report, there was all pubs, and then there's separate contributions by *Computing Now*, both financially and then in terms of numbers of downloads, etcetera.

Yost: You mentioned that the parent, the IEEE was influenced by this model.

Milojicic: I think so. I remember when, as president, I would go to IEEE meetings [that] I never did before. So I remember the TAB executive director Mary Ward Kellen would mention both *Computing Now* and special technical communities as the core influence to IEEE, because both models were adopted subsequently. IEEE is now all about communities, and we started these Special Technical Communities (STCs) much earlier. So IEEE notices what we are doing as innovators and adopting these approaches for newsletters, *Computing Now* dissemination model, for communities, STCs.

Yost: You were chair of the technical committee on operating systems when?

Milojicic: That was back in 1990, I think.

Yost: So you did that early on.

Milojicic: Yes.

Yost: In 2011 you began service on the board of governors. Can you talk about that experience, prior to the time you're president? What were the major issues of the day and just tell me a bit about that role?

Milojicic: When I joined, there were all kinds of thoughts going on there. I think they were trying to strengthen the board, as they always do. Some people were leaving and new people were coming onboard. They, as always, wanted younger people on the board who can bring more experience of what younger members need. At about that time, the financial situation started going down. I think the balance of money, in my mind, still was favoring IEEE; the leveling off at least the largest societies. That's how I see it. So we were, and still are, the largest society in IEEE but the membership model and financial distribution wasn't going in our favor so our reserves started dropping at about that time, 2011 or so, 2010 — started dropping down — so we were concerned. We were bringing the most revenue, yet we couldn't have favorable membership model if we just have members of Computer Society, we would have to almost subsidize the members in order to get the membership. And distribution from conferences and magazines, again, were not in our favor. We were planning to switch the CS Digital Library completely to IEEE Explorer; we were losing money in the whole process. So many things weren't as good. We were still struggling to move into the new models. *Computing Now* was starting to work, but communities weren't there. That's when I was asked to help with Special Technical Communities. And there were all kinds of expected career paths in terms of getting on some board, running some major board, and then being the second VP and first VP. I was deemed as a promising new member who could be potentially on the path to president, but I was expected to go through all kinds of VP positions on that path. But instead of worrying about positions, I undertook addressing problems. I focused on a couple of special communities that I was asked to drive to conclusion. I was working well with many people because I somehow knew how to do these things well, based on past experience you've seen with cloud computing testbed Open Cirrus with GGF. So I worked well across boundaries, worked well with people. Then I was asked to do Special

[Technical] Communities, which I undertook. It was thought of by Sorel Reisman for quite some time, then David Alan Grier helped formulate them in terms of governance. John Walz was tirelessly helping while I was driving it; and that's when I'm in the driver's seat. My wife only doesn't think that way. I started driving that in the first year, so I became the chair of all STCs. We coined a few ones. At that time, technical committees weren't as successful so they started fixing them. When I was the chair of Technical Committee on Operating Systems and attended meetings, similar to magazine operations committee, there was the meeting of the chairs of all technical committees and I felt it was a disaster, at that point. So after a year, I didn't want to run again because I didn't see much value there. It was a clique of people that were strange to me, basically. I didn't find much joy in that, okay? I felt that a lot of them did not have a goal. They were basically powerless because technical committees, they approve conferences but they don't get any revenue so it was just administrative oversight. Some of them were very successful, such as PAMI, or TCSE, but many others weren't producing value so we wanted to create new types of community model where people get engaged, where they use new social networking techniques, where they run meetings and conferences remotely, and basically create something in parallel. And so it started growing and it's still growing. Later on when I was president, I pushed STCs out of the board of technical committees and towards the membership board. I wanted them to have more freedom and I felt that they could balance off. I thought that was also revolutionary, although some people completely disagreed with me. I moved them to the membership board because I think communities also contribute to the membership, plus IEEE sections and chapters have conferences so it makes sense that these help in that regard. So I think I helped STCs settle down through the transition, and then also transition to new leader, who took them off later. Technical committees were meant to be for stable technologies and STC for new technologies.

Yost: In thinking of the presidency and becoming president elect, what were the key focal points that you ran under? Your platform.

Milojicic: So it's this paper where I discuss that. Basically I was focusing first on technology, second on impact, and third on financial sustainability. One of the contributions I had somehow coincided with all this; I started the 2022 report (http://www.computer.org/2022). I gathered eight people who I trusted, and we met together once, and then second time, and then we wrote this report which I thought was impactful. It was influential even for HP, I think it was influential for others. We came up with 23 technologies that would make a difference by the year 2022. That was a new way of thinking about the trends and it was the broader, lighter way of description of important technologies, so that the common layman or technologists from other areas can learn from it. I've seen similar concept done within ComSoc, but we wrote it much differently, more technically deep, and we selected these technologies on purpose. I think I got a lot of constructive criticism afterwards from IEEE fellows, who I reached out to. That was another thing that I thought was a good idea because when I became fellow, no one reached out to me. I completely felt okay I got that fellow appointment, but nothing. So I created a mailing list for fellows, and then sent to them also; I said basically, 'Okay hey, guys, no one approached me, I'm approaching you as president.' Then I said, 'Here's this report, if you want, get back to me.' I got very enthusiastic feedback from them. I wanted to run the conference but that never happened for various reasons and I'm going to do it now, as past president, past past past president. But anyways, so technology was key; always focusing on new technologies driving new technologies.

The second thing is impact; how do we make impact? So picking up impactful approaches; impact on community in whatever way it's important. And then I focus on financial sustainability and I really was forcefully pushing that agenda. For every board I created an ad hoc committee, appointed people who would, in parallel to the boards, evaluate and make recommendations what to do. I started with the boards and then they didn't get back to me; eventually staff was more knowledgeable. So I carefully formed these ad hocs, and formed some more, and they made some good recommendations. But that whole process was scrutinizing all costs, so that we can eliminate them while focusing on the bottom line, and I think the whole society was really shaken by that. I mean the leadership and the staff, and we went through the process, after process, after

process; and if you look back, I think it resulted in improvement by the end of the year. Still, it was really hard work to be done by different people. Again, you chose some leaders; some deliver, others don't. You focus on those that deliver, replace those who don't.

Yost: Vint Cerf was president of the ACM when you were president of the Computer Society in 2014. What was the relationship in terms of collaboration and competition with and between the ACM and were there things you did to try to change and influence the relationship?

Milojicic: When I was the president there was really nothing much going on with ACM. First, as a disclaimer, at about the same time I became a member of IEEE and Computer Society, I became a member of ACM and USENIX. Throughout my lifetime as individual member of all of these, I don't look down or up to any of professional societies, I am a respectful member of both ACM and IEEE Computer Society and I think they are both great organizations. They do compete, and they also don't entirely overlap so there's some intersection I think that IEEE Computer Society is more focused on engineers; ACM is more focused on academics. I think ACM has some great conferences, some great journals; I think Computer Society has great magazines and a number of other important products that we are focusing on. One of the past presidents tried to go all the way to establish some sort of merger between the two; it never resulted in anything. My focus was on these three areas: impact, technology, and financial sustainability. I decided that I didn't want to spread too thin, and restart any discussion with ACM in any form or fashion. I estimated it wouldn't lead anywhere. I did reach out to Vint and asked him whether he wanted to do that interview. I have tremendous respect for Vint, he's a great ambassador for whole of technical community; he was such for ACM and he's still for Google, so all the best about him. And it was really a pleasure going for interview; you can take a look at it.

Yost: Can you talk about your interaction with the leadership of IEEE during your time as president?

Milojicic: First, I focused on people that can bring some value to both sides. So from the very beginning I highly respected Mary Callan Ward and worked with her closely. And she was also familiar with my contributions and respected them. I didn't spend too much time with others; I did attend these meetings that I was supposed to. As a president, I was extremely careful about traveling; so I minimized my traveling to the absolute must travels. I didn't see much opportunity for influence on IEEE as a whole, because as a president you sit on the TAB, Technical Activities Board. I just started to understand whole of IEEE a little bit later, and I'm still trying to understand it. I don't think I understand it entirely yet, but just like becoming president of Computer Society didn't require me to sit on any board; basically I was put on the slate after my first year. I became president elect during my second year of Board of Governors. So I think it reflects, also, you focus on the most important things and just ignore the rest. So similarly, I was seeking what was important within IEEE, where I can contribute rather than trying to understand this huge body. So what I've done a little bit later; during presidency I was asked to attend one of the ad hoc committee on relationship to industry, but I was more of an HP person. I was invited by the president of IEEE at that time, who invited me personally. During the presidency I reached out and spoke to presidents every time, all three of them (current, past and elect). I made sure to explain to them what was going on, including — I always sought advice from those people — Peter Stacker was the past president at that time, and he gave me advice, he still does today. The current president at that time, he invited me to this meeting; and then the next president, Howard Michel, invited me to lead two ad hoc committees on board outreach, which was supposed to be just an initiative the staff ran, and also ad hoc on engagement with industry. And that's what I've done this year. We came up with some projects; I invited the people who I thought could make contributions, some came on their own; and I also helped drive this board outreach. The other committee I was just supposed to have the chair title, but I changed I think the culture of these meetings. That committee really helps organize visits by the board to different countries around the world, and I insisted that they also make recommendations. I presented it to the board. It was sufficiently deemed important that I was asked both in June and then in November to present the outcomes of both ad hocs.

Actually, they initially were interested in board outreach, but I insisted on presenting the industry engagement because I'm already there. So board outreach came with a number of recommendations; and I also organized a visit at HP when the board came to Silicon Valley. So inside of HP Labs, we had the meeting. On the other hand, at the ad hoc on industry engagement, we came up with three interesting projects. One was the proposal that I made in adding more deep learning analytics to Explorer so that we can make recommendations — all kinds of trending and these kinds of things based on the data in Explorer.

Yost: And this had been used throughout IEEE?

Milojicic: That was planned to be. I mean, you have to lower expectations; we just came up with the requirements for that. But I engaged the right person; I engaged the person who used to be director of analytics team on Amazon, and is now playing the same role in Uber. So you got a person who can really tell us how to do that, plus engage a student whose writing the requirements.

Yost: And who is that?

Milojicic: Danny Lange. The student, Gustavo Oliva; and then SN, a volunteer from India. And as always, it doesn't happen on the first try, you have to keep on trying. So I thought I had some amazing students here over the summer, I thought they'll do it. They wouldn't bite; they said we got to focus on Ph.D. Then I reached out to others; they didn't do it. Well, first we wanted to hire contractors. It wasn't possible. So you just keep on trying, keep on trying until you find something that works out. Finally, SN accepted and so we're working on it. And then the second project was about opening up some of the standards for free. We'd intend to broaden the impact and making up the loss of revenue through some other means. I thought that was pretty creative. And the third is industrial summits, which will go across the societies.

Yost: Can you speak more about these industrial summits?

Milojicic: Well a gentleman, Michael Condry, is already running summits but he felt he was insufficiently supported. So he was seeking support through IEEE for venues, speakers, attendees, advertisement, etc., in general, how to improve the relevance and they trusted me I can do that. And I've done it; at least made them visible to the whole of the board and the leadership. So with these summits, he will not be the only one to run them. He will be surrounded with other different events. He is bringing additional choices of venders and others. He's running one in 2016, Silicon Valley. But he wanted presence from other societies, so I reached out to Computer Society, for example, to co-organize event with him at the same time. We try to do that with other societies; we're seeking support at the whole of IEEE to help with his conference, increase visibility, have free ads in *Spectrum* and other places, I think. And we plan to continue this so the current president, having seen that we made progress, invited me to do the same thing next year, so I'm planning with him even more to do next year.

Yost: So leadership in the Computer Society, of course, is that you're president elect then president and past president, so in that regard, you've been on the leadership team with David Grier, who preceded you, and Tom Conte, who succeeded you as president. Can you talk about working with those two individuals?

Milojicic: I think everyone has to be very careful not to burn out. And when I look at it, it's not just time, it is the pressure that you have on you. You're like CEO; there's a reason why CEOs are paid a lot because they are undergoing tremendous pressure. The same is true for presidents, other than salary. President is not like president elect; past president is not like president. President is responsible for everything and it is the pressure that comes with it. Everyone comes to him for everything and he needs to deal with all kinds of things. You need to prepare the Board of Governors meetings; you need to have strategy coming in; but then once you're in, it's all about tactics and execution, and trusting others; delegating and trusting others. With David Alan Grier, I think he was guiding me, recommending what to do, and I worked well with him. I remember starting with him even many, many years earlier, before he became president elect. I think he was

magazines operations committee chair, then he was pubs VP, and then president elect. And I had good relationship with him. He came many years ago to give a talk at HP Labs, I invited him. I was his reference on IEEE Fellow application. I think I helped him a bit there by doing extra work in qualifying his impact through the number of downloads he had for his articles. It's always good to quantify that; that's advice for when you want to apply for fellowships or other positions, quantify precisely. With Tom Conte, when I was president and he was president elect, I trusted him fully. I supported him entirely from the very beginning, and I still do support him, and I'll continue. I think that David Alan Grier made impact through his publications and visibility traveling around the world. Tom Conte made some deep technical contributions in rebooting computing, I really credit him for that, that's amazing impact and I think the world has yet to get there. He also introduced this model of journal first, conference second; or adopted it, or widely deployed it. And he established research advisory board, which I think is really important in bringing back researchers to the Computer Society. This new model of publishing also came out of Research Advisory Board; and bringing important people on these boards. And then probably both of them have done other contributions. But again, president is one, and that's during the president's year.

Yost: I asked you about CS staff with regard to *Computing Now*. What about your time as president, can you talk about working with senior staff?

Milojicic: Extremely important. Extremely important; without that there is no success. You have to work, you have to respectfully work with them, and the success of Computer Society only exists if both teams work well. As a president elect and past president, I worked closely with Anne Marie Kelly, during presidency with Angela Burgess, but you work with everyone all the time, and you know when to reach for what to others. It's also the next level of directors below Angela Burgess; with Chris Jenson, even now I work on trending and business models; with Evan Butterfield I work closely on publishing models. When I'm working on this conference for the Fellows, I will have to work with Evan and Anne Marie; and many other things. During both STCs and *Computing Now* I worked with the IT director. I didn't have much chance to work enough with Eric, the director for

membership, not the finance director, Sunny, but all of them are real important. You reach out to people; whenever you get some idea you go tell them, and they tell you if it makes sense or not. All of them, and then you even go deeper, so for conferences you work with Lynn; you need to know who to work with for what. But again, very respectfully and they're just like us; and truth to be told, they have much longer history and knowledge about Society than we do so you got to respect them and learn from them.

It was interesting, though, that Angela introduced me to her staff as impatient, disruptive and persistent. I believe that I met all those expectations during my presidency. I was impatient to get results, persist in asking for results, and disruptively innovative in the ways we achieved them. As a president you have to work through others.

Yost: What accomplishments are you most proud of in your time as Computer Society president?

Milojicic: As a president, I think that I revitalized Society, that's probably it. I also initiated financial turnaround. Then I reached out to IEEE. I spent a lot of time with industrial advisory board; I started the Fellows engagement; I tried to recruit new people; worked closely with other societies; I think it's just the breadth of all kinds of contributions. Plus then there are these smaller things that were delivered at about the same time, such as this 2022 report. But as a president, as I said, it's the quality of people you choose to work with, and then continuously bring and recruit new people. Every time, I tried to bring somebody new who will be good. Sometimes they don't succeed, other times they do, but you've got to keep trying.

Yost: Were there things you wanted to get accomplished when you were president that you were unable to get?

Milojicic: Yes. I believe that the presidency should be two years, and there is split opinion about this. I think the board strongly believes that's true; some of the past presidents strongly disagree.

Yost: Long ago it was two years.

Milojicic: Long ago it was; and there are societies which have two plus two plus two, like power and energy society. The down sides are that sometimes presidents burn out and stop delivering, or their lives change and then they just can't deliver anymore, and then they're not as successful. But there are various ways to handle that, such as you can have the second year optional. I started preparing for the presidency the moment I became elected, and I was working hard from the very beginning. And still, once I became president I couldn't execute everything I wanted. I think that this financial revitalization requires many years; even though Tom Conte was deeply interested in continuing everything I wanted — and he did — still, he had his priorities on what he wanted to contribute, what he felt was important, so he would de-emphasize other things that I would've done, which is very natural, I completely understand that. So I think that the president should really be at least two years because you really need more time to execute on it. It should not be given that it's two years, but give an option of the second year.

Yost: Was HP supportive of you taking on this major responsibility?

Milojicic: Yes. Every time I would go for any election, I would ask my managers and even my manager's manager just to make sure. They were all supportive. They said you are one of the few here who is president; you're successful in it, you're doing well, so why don't you continue. At the same time, I'm very conscious not to spend too much time. Many times I would travel; so this year, for example, and last year I would travel to Computer Society in New Brunswick, return here for two days, then go back again for the IEEE level meetings. It does take a toll on body. But then, you know, if you are away too much, away from your work, things don't get done; especially if you are also managing people you have responsibility for. But you have to be present at work all the time even if it is remotely by email, phone, messengers…..

Yost: Would a two-year appointment possibly be more challenging in getting employers to be supportive?

Milojicic: Maybe, it all depends on how capably you can multi-task. If you can focus, you can accomplish a lot of things. So I traveled this year substantially more than last year as a president; this year primarily on HP business. Last year I was so much focused that I don't spend traveling even a minute more than I am supposed to. I organized only one travel that wasn't planned, and that was to Singapore and Korea, and that resulted in signing a sister relationship with Singapore and resigning with Korea. Plus eventually we're opening an office in Singapore, and there are other side benefits enjoyed thereof. But I opted out of some other travel opportunities to India, where I felt there wasn't any opportunity to impact. You don't go there just for the sake of travel and be present. Impact is the only criteria everyone should follow. If you can make impact, do it; if you can't make impact, don't do it.

Yost: You mentioned trying to engage other IEEE Fellows when you became president. In 2008 you became ACM Distinguished Engineer and the following year, IEEE Fellow. Can you tell me what these very high honors meant to you?

Milojicic: It may be surprising to you, but going through the process I think is probably most rewarding. By being able to look back on your career and understand what were the aspects where you made the most impact, I think that is most rewarding. The stamp of approval is good, but by the time you write your nomination you understand what you've done, and that reflection is most important because then you prepare yourself not to repeat mistakes and try to repeat successes. Stamp of approval is nice, but the process is most important, I think. So I have, for example, helped write a nomination for one gentleman for ACM Distinguished Technologies. I told him he wouldn't get it, and he didn't. But he was extremely happy with the process; he and I went through iterations, and iterations. I also nominated another and he was elected. I helped them both with the same energy, but I knew one would, the other wouldn't. And I knew about myself that I would, as well. I just felt the right mold of both, that I would. For example, for ACM

Fellow, I don't think I fit the mold of ACM Fellow yet because of the specific expectations. One needs to understand and then plan his future if he cares about it. But it's important, it's very visible. I would like to change it, actually, to make it much more effective. I have a lot of ideas and I've been working with Fellows Committee Chair and vice chair and with C.J., Cecelia Jankowski, who's overseeing the fellows, as a membership director at the IEEE level. I have many ideas how we can improve it, and some of these ideas are to organize more gatherings of IEEE Fellows, to make a community out of them. But also potentially to introduce the next level above Fellow; maybe Senior Fellow, maybe Society Fellows would be chosen among IEEE Fellows. I think that would improve the leadership of all IEEE Fellows, which I believe are the best hidden secret inside of IEEE. Alternative or addition would be to introduce distinguished level. Also, we need to make it more appealing and more accessible to people from industry.

Yost: What do you see as the greatest strategic opportunities for the Computer Society, and what are the greatest challenges?

Milojicic: Today, I think that the strength of Computer Society is first, in publishing. I think it is either publications or conferences, that's where their strength is. I think that the second one is probably in standards. I think it's completely underutilized because the way it's being run. They're very successful but I don't think we're utilizing standards as much. And then membership and education. I think that membership model has to change. We've been working on it; I felt that STCs should bring different kinds of membership. I think that education should turn more towards industry, and there's future opportunity there, an unmet need and we should focus on that. The whole industry approach is important. And when I say industry, it's not just industry it's also academics with strong practitioner aspect. I think we were successful also with new conference models. We should expand it with these rock stars — the title that I hate — but the model works extremely well.

Yost: With standards utilization, what do you mean there?

Milojicic: Well, both recognition and financial model really speaks in favor of standards association, which is a separate body. So Computer Society and other societies do all the work, but everything goes into standard association. So we need to leverage existing contributions in a way that benefits society more. I don't mind that model that exists, but it's not in favor of society, I think.

Yost: Problem with financials; revenue I think.

Milojicic: All financials going to standards association and nothing to us, so we should find ways how we can leverage it; not to earn the money and pile up money, but to make it more financially sustainable for us. Otherwise, I have huge respect for standards association, and KK, who's running it, Konstantinos, as well as many SA presidents, Karen, Bruce, Don, etc.

Yost: Before we conclude, are there topics or themes that I haven't brought up that you'd like to discuss?

Milojicic: I'd just like to repeat some things. And these are that people should focus on impact and where they can contribute and forget everything else. I think that being a leader in volunteer organizations is a commitment. It is obligation more than recognition and people should observe it that way, how they can help it to grow. I think it's extremely fulfilling when you look back and see that you've made some impact. And finally, it's also about people you meet there, who you learn from, who you work with— like you and I know each other — so I knew who was coming here to talk to me; I was looking forward to it. I remember you from the days when we were both on the Magazines Operations Committee. And then a number of other leaders. And finally what I mentioned a number of times, every extra effort pays off so people shouldn't be afraid of working. But not everyone has that perception. Some people contain their work, which I respect as well, contain energy and focus only on the small select things, where others like to go broad.

Yost: Thank you so much for your time, recollections, and insights today.

Milojicic: Okay, thank you.