CPS Week Opening

Good Morning everybody, good morning CPS week!

Ladies and Gentlemen,

On behalf of the Federal Ministry of Transport, Innovation and Technology I would like to welcome you here at the Hofburg in Vienna to the 2nd Day of the CPS week.

It’s a real great pleasure and honor to welcome you here today; we were all very much looking forward to this week, this special moment: a hall with more than 1000 people, full of world class experts in the Area of CPS from all over the world! I would like to also welcome the Members of ARTEMISIA, a pan European Industry Association of Companies active in the Area of Embedded Systems and Cyber Physical Systems, who have wisely decided to collocate their Spring Event here with the CPS week in Vienna. Welcome Industry!

Thus let me first of all thank the Local Organizers Prof. Tom Henzinger, Prof. Radu Grosu and their teams who made this happen – I do hope that the stress and lack of sleep that you accumulated over the last weeks, has already payed off. Let me thank the organizing and selection committee of the CPS week for choosing Vienna as hosting city for this important event. And let me express my admiration for the wisdom to do this – in
fact Vienna is a somehow **ideal place** to host such an event dealing with scientific problems and technologies full of complexity and diversity.

Why is this so? Why shall we claim that Vienna or Austria is a special place?

Well, Ladies and Gentlemen, let me first **share an observation with you**: think for a moment of all those technology oriented conferences taking place over the planet. What do they have in common? When it comes to science and technologies, we are always talking about what **lays ahead of us**; we are always talking about the future. If technologies had a face their face would always direct into the future: into the next development, the next insight, the next step, the next integration, the next breakthrough. So let’s make a little experiment at the beginning of this conference day: let’s **turn the face of technology for a second** in the opposite direction and see what **history** may offer.

Vienna is the capital of Austria, an 8 Mill. People country and one of 28 EU-Member states. Yet 100 years ago this was different. During the **longest period of the existence of this place** Vienna has been the center of quite a huge Empire, the so called Habsburg Empire, from the midst of the 19th Century up to its end the Austro-Hungarian Monarchy. At that time Aus-
tria was the second largest country on this continent in terms of area, the third largest in terms of population. As such the Monarchy incorporated more than a dozen nationalities distributed among the state territory, 6 religions and had several official languages: German, Hungarian, Czech, Romanian, Serbian, Ukrainian, Slovenian, and Italian. Vienna, the Capital and by far the largest agglomeration in this Empire, was the third biggest City in Europe (after London and Paris) and has been the administrative center of this very complex country. By this it was a true melting pot of different cultures, heritages, languages and ideas. And for some decades – late 19 Century until the 20ties, this place became an extraordinary fruitful breeding place for Science, Engineering and the Arts.

In the Area of Science, with a strong emphasis on Physics, Mathematics and Logic Vienna has been the hometown and working place of the following persons: Kurt Gödel, Ludwig Wittgenstein, Karl Popper, Ludwig Boltzmann, Ernst Mach, Karl Menger, Liese Meitner, Wolfgang Pauli, Cofounder of CERN, Eugene Kleiner 1923–2003 Engineer and Cofounder of Fairchild Semi-conductor, Joseph Schumpeter, economist and pioneer in theory of Innovation, Peter Drucker 1909–2005 pioneers of modern Management theory. Vienna was not only hometown of masters in rational domains, in mathematics, and logics but also homeland for the masters in understanding the
illogic: the brightest star of them was surely Sigmund Freud, who proved that the nonlogic (dream, slips, neurosis) is fully logic in itself if we accept a deeper form of rationality behind it: the unconscious.

In the Domain of the Arts you will find persons like: Michael Curtiz Filmdirector of Casablanca, Fred Zinnemann, Billy Wilder, the wonderful Hedy Lamarr, actress and inventor of the frequency hopping, Otto Preminger, Josef von Sternberg, Arnold Schönberg (Music), Max Reinhardt (Theater), Gustav Klimt, Egon Schiele (Painting), Stefan Zweig, Arthur Schnitzler, Robert Musil (Literature) and so on.

Of course: each biography of those heroes of the human mind is different, incomparable in its singularity and determined by countless factors. Yet what they all have in common is that they grew up on a soil of dazzling variety, that all of them received decisive inspirations in their work and thoughts in an atmosphere of cultural diversity, complex heritage and variety of languages. Living in this diversity meant: to deal with the daily business of bridging from well-known and familiar routines (the own ethnic group, the own culture, the own religion, the own language) towards less known identities (other cultures, other languages, other heritages).

And of course let’s not forget how this story ended in the 30ties, the darkest period in recent Austrian history: a massive exo-
duis of almost all leading intellectuals, who had to leave the country for political or racial reasons.
Since 20 years or so Vienna has become a very international city again - Close to a half of all Viennese are not born here. And both Vienna and Austria have become a Country and City of Science and Technology again: over the last decade Austria has been one of the EU-countries with fastest growing rate of RTD-Investment, the share of RTD spending recently reached the magical 3% mark, which puts us in the TOP 5 in Europe. Several technology domains such as Embedded Systems, Robust Systems Design, Smart System Integration, Systems on a Chip, Packaging, Safety and Security Technologies have reached World Class Levels (I just mention a few, which are relevant for CPS).
So no doubt: if the Vienna of today would have a face, it definitely would head into the future!

I am telling you this for two reasons:
First to impress you a little bit and to invite you to extend your stay here. In fact Vienna is a place with an enormous density of history for Science, Technology and Arts. So stay tuned with the magic this City has to offer.

Second: I want to give you an answer, why this place is ideal for CPS. I do think that exactly complexity and diversity are key features when it comes to CPS. One might say that CPS is a
topic with a strong Viennese flavor, CPS itself is a melting pot of different disciplines, languages, cultures and ideas.

Not by chance the **CPS-week is a multiformat and multidisciplinary event**, bringing together various communities and disciplines: Hybrid Systems, Computation and Control, Information Processing in Sensor Networks, Real Time and Embedded Technology and - this is very important – the **Industry active** in this area itself.

Since in fact: what we are facing in times of accelerated technological development is a kind of **emerging ubiquity of smartness**, a **pervasiveness of smartness**.

In our world this smartness has several well know names: IoT, M2M, the cloud, Big Data Analytics, the swarm, Industry 4.0 or Industrial Internet, Smart City aso.
And for me, it seems that CPS is not just another name for it, but exactly the **missing horizontal element**, the glue between them, the force that should bring those elements together in a common ecosystem and a common kind framework of architectures. Perhaps CPS can be considered as the promise of being a kind of systemic **infrastructure for smartness in the future**.

So, where do we stand with this infrastructure for smartness?
**Well I have learnt from your community**, that there are still mountains of questions and **challenges** to be solved, some of
them very fundamental and rooting into deep mathematical science and logic. I have learnt from you that we will have to deal with very different mathematics, different forms of understanding time and space in the Cyber and the Physical world, the problems of emergence, deterministic systems, uncertainty, verification and robustness. I have learnt that we have to deal with questions of all form of complexity, complexity in terms of interactions between physical, social and virtual world’s interactions, processing units, components, Embedded Systems, Infrastructures, applications systems, interactions betw. all kinds of various sensors and actuators.

Where do we stand with these various challenges? Well, some few days ago a professor made an interesting remark: he said that after 10 years of CPS research, on a scale from 0 to 10 we have reached the level 0,5!. Of course it’s not up to me to validate if this is fully right, if it’s more 0,7 or even 1,3. Yet, I fully agree with him that the biggest part of the CPS avenue is still in front of us. There is a lot of deep science and deep engineering necessary to climb up those mountains. We still have to get the design principles and fundamentals right!

Because in the end: the more the intrusion of smartness in our physical world advances, the more we have to rely on their performance, their robustness, their security.
In 20 years from now, we will be still able to update our smartphones, we will be able to send or cars or washing machines to repair. But we won’t be able to **reboot a hospital**, an energy system or a smart city. We won’t be able to **reset a digitized world**.

Ladies and Gentlemen, let me conclude by wishing you the most inspiring days possible here at the CPS Week. A lot of new ideas, new insights full of **diversity** and **complexity**. I can assure you that Austria is and will be a **strong and committed partner** on the CPS Avenue into the future!

Thanks for your attention!