Ethics Opening Statement
at the 1st International Conference Ethics of Engineering Life (ICEEL) in Rome

We all know that over the past years, gene therapy has played a significant role in the treatment of human disease. Today, there are numerous approved therapies available, treating various conditions and helping even the most vulnerable recipients to improve their quality of life. With Molecular Systems Engineering the story goes a bit different. Here, the research focuses on engineering cells, sometimes copying their ways and developing their properties further; we engineer cellular systems by introducing entirely new and complex functions – and this at a stunning speed which makes it very difficult for ethics to get involved and to keep up with the pace.

In a poem, Literature Nobel Laureate Hermann Hesse once gave a beautiful analysis of the profound potential inherent in every *beginning*:

"A magic dwells in each beginning, protecting us, telling us how to live." («Und jedem Anfang wohnt ein Zauber inne der uns beschützt und der uns hilft, zu leben».*)*

Considering the enormous progress Molecular Systems Engineering has made over the past years I am afraid that it is too late for such magic in our discourse. Some of the fundamental research objectives no longer can be subject to groundbreaking ethical debate which can effectively weigh pros and cons; *this science is rolling; the train is moving*. But instead of lamenting over this, we need to take the initiative and hop on that train, intervene and if needed divert it unto another track. We will indeed have to lead a consequentialist debate, weigh the prospective good and bad outcome and make brave decisions. But it will be worthwhile.

The focus of our debate no longer lies on the question *if* we should put engineered molecular or cellular constructs into human bodies but rather on *how* we want this to happen; and how we can agree on a catalogue of binding guidelines that will secure health and well-being for the vulnerable recipients of this engineering life technology. There is a lot at stake as Molecular Systems Engineering challenges our existing concepts of human identity, personhood and the *conditio humana* per se.

The fact that we are willing to offer deliberate engineering of human beings means, in consequence, that we must come to terms as to what exactly our goals are and where the limits lay.

Whenever it comes to research capable of triggering paradigm shift, we need to invite society at large into the process of ethical reflection: scientists, philosophers, religious leaders, politicians, artists, the young generation, the vulnerable and other representatives and groups. In the process of ethical decision-making, each stakeholder involved must own an equal share, on par, eye to eye, with each vote counting as one.

The scientific community plays a leading role in building this *framework for societal discourse*. It must open its labs and fancy new ideas which in the end may help us bridge the existing

communication gap between the engineering life sciences and society at large. We urgently need to synchronize the speed of thought and provide equal access to knowledge despite the tremendous translational efforts this will take.

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