SHORT COURSE PROPOSAL TO EuCAP 2014, The Hague, THE NETHERLANDS

Course title: System Concepts for the Radar of the Future

The first Radar has been patented almost 110 years ago. Meanwhile the applications became numerous and the system concepts have been adopted to the available technologies for the special application requirements. Typical examples are the pulse Radar, Synthetic Aperture Radar, Phased Array or automotive Radar, to name only four. In the next years the state of the art Radar system concepts will experience almost a revolution; the implementation of the technologies that are available since quite some years, mostly resulting from communication technologies, has been too long delayed. The major ideas/technologies for future Radar system concepts are:

- intelligent signal coding
- MIMO Radar
- Digital Beam-Forming (DBF)
- array imaging
- combination Radar x communication = RadCom

The *Intelligent Signal Coding* covers time/spectrum simultaneously, f.e. by OFDM. This increases the efficiency of the rare spectrum significantly and allows also a much more efficient signal processing. The *MIMO Radar* is regarded as inevitable for an efficient Radar space coverage. It includes as minimum two transmit and two receive antennas, in practice the number of receive antennas will be much higher. These are the basis for *Digital Beam-Forming*, with single or multiple beams in the 2D- or 3D-space (range, azimuth, elevation). The *Array Imaging*, based on MIMO Radar with highly de-correlated transmit signals radiated, allows to virtually increase the receive antenna array basis and by this the resolution of the Digital Beam-Forming. The *Intelligent Signal Coding* is the basis for including information in the radiated signals. The identical radiated signals are used simultaneously for the Radar operation and for Communication – RadCom.

These new technologies will allow completely new functions and applications and they can replace most of the existing system concepts. The Radars of the future will render more information, be more flexible and it will also be smaller and significantly cheaper. The presentation will explain these new technologies and show their integration for the *Radar of the Future*.