In the year 1975, when Marwedel completed MIMOLA with his Ph.D. thesis, the academic EDA world included only circuit simulation, logic simulation, MOS timing simulation, PCB layout and standard cell placement and routing. The only commercial vendors Calma, Applicon, and Computervision offered turnkey systems. RT level hardware synthesis algorithms have not yet been around. Some academic researchers experimented with RTL simulators accepting ALGOL, APL or FORTRAN dialect sources - but without any synthesis capabilities. Not only with his fully synthesizable MIMOLA language, being a PASCAL dialect, Marwedel has been far ahead of his time, but also with the high level synthesis design tools implemented inside the MIMOLA system. This means, that Marwedel yielded more than one outstanding contribution to the advancement of design sciences. Already with his Ph.D. thesis he ranked at the top of this discipline, when it has emerged years later.

Another key contribution stems from the fact, that, according to the state of the art at that time, „compilers“ for hardware description languages (HDL) have just been parsers with simulator generators - not really different from programming language compilers. Marwedel has been the first to recognize, that compilation techniques can be used for more than just CPU machine code generation and simulator generation. It has been his key achievement to transfer compilation techniques from software industry into EDA design flows for processor synthesis and other hardware synthesis from HDL sources. This technology transfer would not have been possible without the changes made possible by Marwedel’s key contributions.

Marwedel even went further by being the first one developing the methodology needed for retargetable compilers accepting the sources of software to be run on the hardware having been synthesized by his HLS design system. By this outstanding achievement he is an early trailblazer of a methodology which has been developed years later under the acronym ASIP (Application-Specific Instruction Set Processor). The method behind his very early groundbreaking contribution meanwhile is an important ingredient of the technology used by modern EDA firms like TENSILICA.

Marwedels important role as a scientific trailblazer is illustrated by the success of his bestselling book "Embedded System Design", which distributes the knowlegde about all his contributions mentioned above.

It has to be summarized, that Marwedel ranks at the top of several disciplines having emerged later on the basis of several key contributions he has delivered - not only to the advancement of design sciences, but also directly to the initialization of several subdisciplines.