

# New Paths Through the Function Labyrinth

A variety of tools help to find the way more quickly through the labyrinth of function development. Now there is another option: the SCODE-ANALYZER and SCODE-CONGRA software tools from ETAS, based on a brand new methodology, make it even easier to navigate the labyrinth! Read more about these unique tools.

### Methodology

The tools are based on the approach of functional morphology – that is, studying the structure of functions and their relationships with each other; and automated cognition – the reorganization of information in a system that controls behavior.

### Fields of application

System, function, and software developers can describe, visualize, analyze, and optimize their complex systems from the very start of the development process.

### What benefits do the new tools bring?

They free up developers from simple routine tasks, such as analyzing dependencies, solving equations, and generating code for the next work steps. Furthermore, they support creativity to find the best solution.

### Simulink® connection

SCODE-ANALYZER and SCODE-CONGRA can be integrated easily into MATLAB®/Simulink® environments. Both tools generate code that can be further processed in MATLAB®/Simulink®.

### Demonstrably safe

Automatic verification of the complete description of the decision paths and mathematical relationships supports the requirements for proving functional safety as per ISO 26262. The completeness of the analysis is mathematically demonstrated – that is unique.

### Reaching your goal faster

Initial projects have shown that the work involved in function development can be reduced by more than **30%** in some cases with SCODE-ANALYZER and SCODE-CONGRA.

### Enthusiasm

The team that brought the prototypical tools from research to the production stage in ten years of development work had a lofty goal. Their ambition was to rewrite the book of embedded software development – and we think they have achieved it.

### AUTHOR

#### Jürgen Crepin

is Senior Expert Marketing Communication at **ETAS GmbH**.

### Goethe, Zwicky, and Michael Jackson?

Taking a long view, the story of SCODE-ANALYZER and SCODE-CONGRA begins in the 18th century. In his studies of morphology, Johann Wolfgang von Goethe described the relationships of the various forms of life on our planet. This basic idea inspired Bosch researchers from the fields of mathematics, computer science, engineering, and philosophy. SCODE-ANALYZER and SCODE-CONGRA were influenced by ideas from the astronomer Fritz Zwicky, the scientists Stephen M. McMenamin and John F. Palmer, and the British computer scientists Michael Jackson and George J. Friedman – augmented by the graph theory of Markus Behle, the product manager responsible for the software tools.

### Eclipse and ready to go

Using Eclipse interfaces, the new tools can be easily integrated into existing tool chains.

### Secure connection

The tools' interdisciplinary approach brings together the separate paradigms of classic IT development and the development of closed-loop control functions.

### Always at your service

ETAS also offers consulting services to help you familiarize yourself with the new methodology and to use the new tools efficiently.

**Curious?** Find out more at [etas.com/scode](http://etas.com/scode), [etas.com/congra](http://etas.com/congra), or listen to the ETAS Expert Talk playlist on our YouTube channel.

### SCODE-CONGRA (CONstraint GRaphs)

With the SCODE-ANALYZER add-on SCODE-CONGRA, the **function developer** can describe and graphically visualize the system in clear, easy to comprehend terms based on exact mathematics. Rule violations, inconsistencies, algebraic loops, and other relevant characteristics of the system are displayed precisely. The user immediately receives options and functions in order to correct errors. The effects of changes in the system are displayed in a way that is very easy to understand. Experimentation by modifying the individual components enables users to try out and evaluate different variants in a short period of time.

**Calibration engineers** receive excellent pre-calibrated parameters and a display of the system's sensitivity at relevant operating points. This allows them to concentrate in a targeted manner on the important parts of the system and optimize the pre-calibrated parameters in real operating conditions.

### SCODE-ANALYZER (System CO DEsign)

This tool enables users to describe and analyze in a clear and structured manner the complex relationships of systems of any kind. To do this, the overall system is broken up into operating areas known as modes. This is especially useful when the software makes a lot of decisions or has a lot of versions. The result is a massive reduction in complexity.