

## HARDWARE CONTROL AND DATA EVALUATION IN ANALYTICAL BIOLOGY

**Rolf Borlinghaus**  
**Leica Microsystems Heidelberg GmbH**  
**Am Friedensplatz 3, 68165 Mannheim, Germany**  
**e-mail: [Rolf.Borlinghaus@leica-microsystems.com](mailto:Rolf.Borlinghaus@leica-microsystems.com)**  
**<http://www.confocal-microscopy.com>**

**KEY WORDS:** Analytical Biology, interactive data acquisition, F-techniques, FRAP, FRET

**1. MOTIVATION:** Current trends in Biology point to analytical measurements of both morphological and kinetic parameters. Especially data acquisition of dynamic phenomena requires special care for hardware control and integration into graphical user interfaces. These days, life cell experiments often mean fluorescence recovery after photobleaching (FRAP), fluorescence loss in photobleaching (FLIP), activation of light induced fluorescence in proteins, photoactivated uncaging of metabolites, fluorescence resonant energy transfer (FRET) and related applications.

**2. SOLUTIONS:** Data acquisition instrumentation which meets the needs for these experiments facilitates the labour by special application wizards – tools which guide the operator through the experimental sequences. A step by step workflow ensures correct instrument parameter settings and process control. Additionally, automatic functions, such as intensity dependent step-forward switches, make data recording more convenient and safe.

Online data acquisition modes allow to change interactively instrument parameters like scan speed, excitation intensity, gain and offset settings. Also available is interactive correction of shape and position of regions of interest during quantification. This is important for long term life cell experiments where objects change coordinates, volume and shape parameters. Triggered or manually activated markers comment internal and external events.

Special hardware control regimes allow to fastly combine bleaching sequences and imaging sequences for subsequential evaluation in FRAP and similar experiments. Instant data collection after bleaching is essential for significant data analysis, which is solved by interlaced scan procedures in the Leica TCS SP confocal microscope.

Concepts for experiment-wizards and integration of advanced scan regimes are presented.