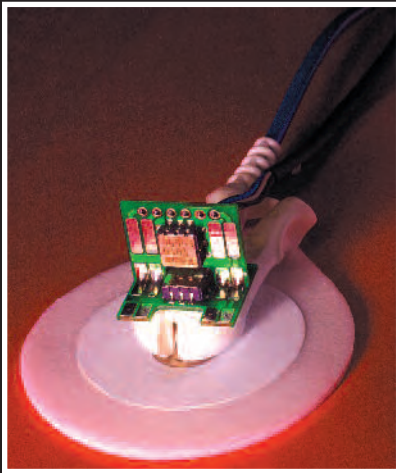


# Systems and Software Engineering

in a High Maturity Organization



Southwest Research Institute®  
San Antonio, Texas

# Systems and Software Engineering in a High Maturity Organization

Southwest Research Institute (SwRI®) is a recognized leader in applied computer science and systems engineering. With more than 30 years experience, the Automation and Data Systems Division at SwRI conducts systems and software engineering projects in accordance with two quality management systems, ISO 13485 for the design of medical devices and Level 5 of the Capability Maturity Model Integration (CMMI®) developed by the Software Engineering Institute (SEI) at Carnegie Mellon University. Additionally, many of our senior staff are certified Project Management Professionals (PMP®) by the Project Management Institute (PMI®).

SwRI employs a multifaceted approach to problem solving to develop customized, high-quality software to meet industrial and governmental needs. Combining outstanding technical capabilities with proven project management techniques, software development projects range from decision support systems to technical engineering applications.

SwRI develops software using a wide variety of programming languages — from assembly to high-level languages such as C++, C# and Java, as well as languages targeted for specific applications such as simulation. Development and target computer platforms range from embedded microprocessors to mainframes, workstations and personal computers.

## Services

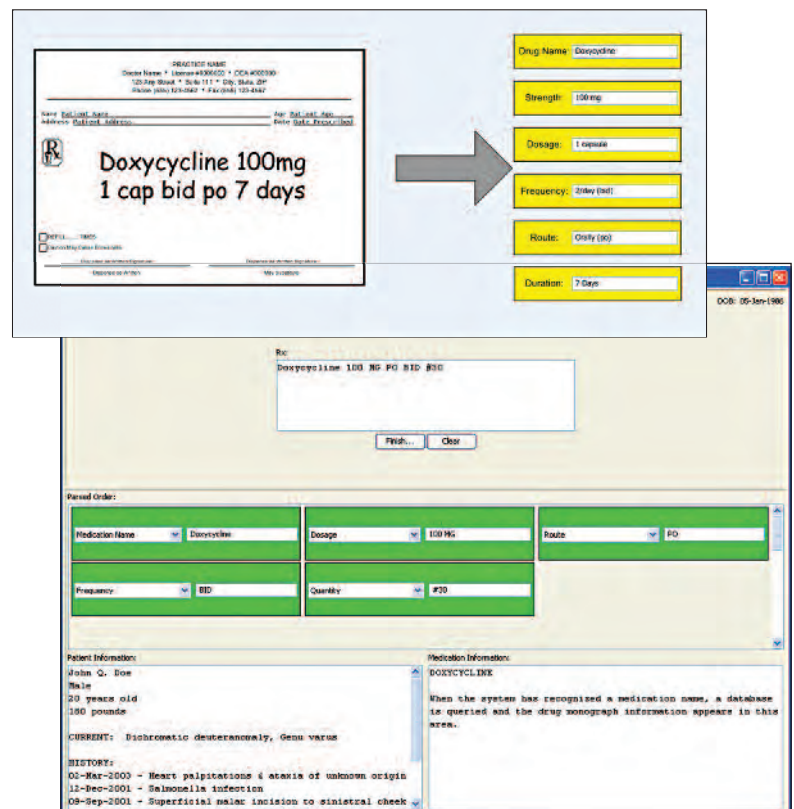
- Business process modeling and re-engineering
- System definition/requirements analysis
- Software specification development
- Rapid prototyping
- Software development and test
- System integration
- System acceptance test plan development
- Independent verification and validation
- Turnkey system development

## Applications

- Automation
- Biomedical engineering
- Decision support systems
- Information systems across a broad spectrum of industries
- Intelligent transportation and intelligent vehicles systems
- Modeling and simulation

## Technologies

- Client server architectures
- Computer networking
- Database/data warehouse technology
- Embedded systems
- Enterprise security technologies
- Graphical user interfaces
- Object-oriented technologies
- Operating systems
- Programming languages
- Service-oriented architectures
- Visualization



The SwRI-developed computerized physician order entry user interface applies innovative parsing and feedback technology to automatically interpret text into electronic format, resulting in an efficient prescription process.

## Systems and Software Development

Our systems and software engineering processes are based upon proven project management approaches and disciplined engineering methodologies and support processes. Projects are conducted in accordance with the highest level of standards, achieving more predictable and efficient results, and producing high-quality systems, on time and within budget. As a CMMI® Level 5 appraised organization, quantitative objectives for quality and process performance are established and used to manage process improvement. The organization follows documented procedures including:



SwRI engineers developed an autonomous vehicle that utilizes enhanced behaviors to traverse roadways with no human in the control loop.

## Proven Project Management Approaches

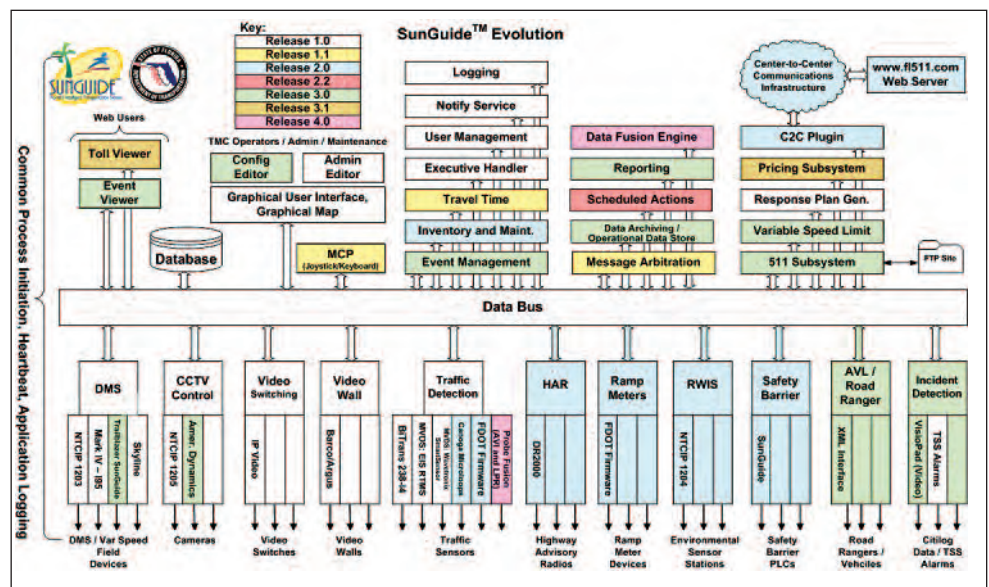
- Business development and proposal development
- Project planning
- Cost estimating
- Project monitoring and control
- Risk management

## Disciplined Engineering Methodology

- Engineering planning
- Software lifecycle selection
- Requirements development and management
- Analysis and design
- Implementation and unit test
- Integration and integration test
- End-user documentation
- Acceptance test
- Delivery and support

## Support Processes

- Reviews (peer reviews, management reviews, client reviews)
- Configuration management
- Measurement and analysis
- Root cause analysis and decision support
- Quality assurance
- Training



SwRI has developed a highly modular software system to perform transportation management functions for the state of Florida.



SwRI developed this spinal implant for a medical device company, resulting in more than 20 patent applications and FDA 510K approval.

SwRI's Automation and Data Systems Division is committed to reliably producing the highest quality work through a proven systems engineering process. Commitment to excellence is evident through the appraised attainment of Level 5 within the Software Engineering Institute's Capability Maturity Model Integration (CMMI®). This distinction is held only by a small number of American companies and even fewer applied research and development institutions.



*Southwest Research Institute, an independent, nonprofit applied engineering and physical sciences research and development organization with 11 technical divisions, uses multidisciplinary approaches to problem solving. The Institute occupies more than 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops and offices for nearly 3,300 employees who perform contract work for industry and government clients.*

***Benefiting government,  
industry and the public  
through innovative  
science and technology***



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