

Software Productivity Domains

Software Application Difficulties

- Very Easy
 - Risks are well understood with little loss from failure
 - Business or operational logic is straightforward
 - Limited interface to other software applications
 - Mostly stand-alone functionality
 - Simple tests
- Easy
 - Not a new type of application
 - Risks are understood and mitigation strategies exist
 - Business or operational logic is straightforward
 - Requires low reliability due to small or little loss when unavailable
 - Limited external interface and security requirements
- Nominal
 - Somewhat complicated business logic
 - Risks exist and may need additional study to find mitigation
 - May require distributed environment with additional security requirements
 - Moderate, easily recoverable loss for nominal reliability
 - Not a new type of application
- Challenging
 - High reliability due to greater impact of loss or high probability of risk
 - Risks are challenging to resolve
 - Very complicated business logic, external storage may be necessary due to distributed environment
 - New type of application
 - Hard real-time control and security requirements
 - Additional communication interfaces necessary for external components or systems
- Very Challenging
 - Extremely complicated business logic
 - Risks are very challenging to resolve and loss is great (disastrous consequences)
 - Many automated controls with limited human control
 - New type of application
 - Hard real-time control and security requirements
 - Communication to external components through different interfaces

Table 1. Application Domains

	Name	Examples	Definition
1	Business Systems	<ul style="list-style-type: none"> • Management information systems (Personnel) • Financial information systems • Enterprise Resource Planning systems • Logistics systems (Order Entry, Inventory) • Enterprise data warehouse • Other IT systems 	<p>Software that automates business functions, stores and retrieves data, processes orders, manages/tracks the flow of materials, combines data from different sources, or uses logic and rules to process information.</p> <p><i>Environment: Fixed Ground</i></p>
2	Internet	<ul style="list-style-type: none"> • Web services • Search systems like Google • Web sites (active or passive) that provide information in multi-media form (voice, video, text, etc.) 	<p>Software developed for applications that run and utilize the Internet. Typically uses web services or middleware platforms (Java, Flash) to provide a variety of functions, e.g. search, order/purchase and multi-media.</p> <p><i>Environment: Fixed Ground</i></p>
3	Tool and Tool Systems	<ul style="list-style-type: none"> • Integrated collection of tools for most development phases of the life cycle • Rational development environment 	<p>Software packages and/or integrated tool environments that are used to support analysis, design, construction and test of other software applications</p> <p><i>Environment: Fixed Ground</i></p>
4	Scientific Systems	<ul style="list-style-type: none"> • Seismic survey analysis • Experiments run on supercomputers to unravel DNA 	<p>Software that involves significant computational and scientific analysis. It uses algorithmic, numerical or statistical analysis to process data to produce information.</p> <p><i>Environment: Fixed Ground</i></p>

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5	Simulation and Modeling	<ul style="list-style-type: none"> • Computer-in-the-loop • Guidance simulations • Environment simulations • Orbital simulations • Signal generators 	<p>Software used to evaluate scenarios and assess empirical relationships that exist between models of physical processes, complex systems or other phenomena. The software typically involves running models using a simulated clock in order to mimic real world events.</p> <p><i>Environment:</i> Fixed ground</p>
6	Test and Evaluation	<ul style="list-style-type: none"> • Test suite execution software • Test results recording 	<p>Software used to support test and evaluation functions. This software automates the execution of test procedures and records results.</p> <p><i>Environment:</i> Fixed ground</p>
7	Training	<ul style="list-style-type: none"> • On-line courses • Computer based training • Computer aided instruction • Courseware • Tutorials 	<p>Software used to support the education and training of system users. This software could be hosted on the operational or a dedicated training system.</p> <p><i>Environment:</i> Fixed ground, mobile ground, or manned airborne.</p>
8	Command and Control	<ul style="list-style-type: none"> • Satellite Ground Station • Tactical Command Center • Battlefield Command Centers • Telephone network control systems • Disaster response systems • Utility power control systems • Air Traffic Control systems 	<p>Software that enables decision makers to manage dynamic situations and respond in real time. Software provides timely and accurate information for use in planning, directing, coordinating and controlling resources during operations. Software is highly interactive with a high degree of multi-tasking.</p> <p><i>Environment:</i> Fixed ground, mobile ground or large manned airborne platforms.</p>

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9	Mission Management	<ul style="list-style-type: none"> Operational Flight Program Mission Computer Flight Control Software 	<p>Software that enables and assists the operator in performing mission management activities including scheduling activities based on vehicle, operational and environmental priorities.</p> <p><i>Environment:</i> Mobile ground, manned airborne or manned space.</p>
10	Weapons Delivery and Control	<ul style="list-style-type: none"> Target location Payload control Guidance control Ballistic computations 	<p>Software used to select, target, and guide weapons. Software is typically complex because it involves sophisticated algorithms, fail-safe functions and must operate in real-time.</p> <p><i>Environment:</i> Fixed ground, mobile ground, manned or unmanned airborne.</p>
11	Communications	<ul style="list-style-type: none"> Radios Microwave controller Large telephone switching systems Network management 	<p>Software that controls the transmission and receipt of voice, data, digital and video information. The software operates in real-time or in pseudo real-time in noisy environments.</p> <p><i>Environment:</i> Fixed ground, mobile ground, manned and unmanned airborne, or unmanned space.</p>
12	Controls and Displays	<ul style="list-style-type: none"> Heads Up Displays Tactical 3D displays 	<p>Software that provides the interface between the user and system. This software is highly interactive with the user, e.g. screens, voice, keyboard, pointing devices, biometric devices.</p> <p><i>Environment:</i> Fixed ground, mobile ground, shipboard, manned airborne, or manned space.</p>

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13	Infrastructure or Middleware	<ul style="list-style-type: none"> • Systems that provide essential services across a bus • Delivery systems for service-oriented architectures, etc. • Middleware systems • Tailored operating systems and their environments 	<p>Software that provides a set of service interfaces for a software application to use for control, communication, event handling, interrupt handling, scheduling, security, and data storage and retrieval. This software typically interfaces to the hardware and other software applications that provide services.</p> <p><i>Environment:</i> Fixed ground, mobile ground, shipboard, manned airborne, or manned space.</p>
14	Executive	<ul style="list-style-type: none"> • Real-time operating systems • Closed-loop control systems 	<p>Software used to control the hardware and operating environment and to serve as a platform to execute other applications. Executive software is typically developed to control specialized platforms where there are hard run-time requirements.</p> <p><i>Environment:</i> Mobile ground, manned and unmanned airborne, missile, manned and unmanned space.</p>
15	Information Assurance	<ul style="list-style-type: none"> • Intrusion prevention devices 	<p>Software that protects other software applications from threats such as unauthorized access, viruses, worms, denial of service, and corruption of data.</p> <p>Includes sneak circuit analysis software. A sneak circuit is an unexpected path or logic flow within a system that, under certain conditions, can initiate an undesired function or inhibit a desired function.</p> <p><i>Environment:</i> All</p>

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16	Maintenance and Diagnostics	<ul style="list-style-type: none"> Built-in-test Auto repair and diagnostic systems 	<p>Software used to perform maintenance functions including detection and diagnosis of problems. Used to pinpoint problems, isolate faults and report problems. It may use rules or patterns to pinpoint solutions to problems.</p> <p><i>Environment: All</i></p>
17	Mission Planning	<ul style="list-style-type: none"> Route planning software Tasking order software 	<p>Software used for scenario generation, feasibility analysis, route planning, and image/map manipulation. This software considers the many alternatives that go into making a plan and captures the many options that lead to mission success.</p> <p><i>Environment: Fixed ground, mobile ground, shipboard and large manned airborne.</i></p>
18	Process Control	<ul style="list-style-type: none"> Power plant control Oil refinery control Petrol-chemical control Closed loop control-systems 	<p>Software that provides closed-loop feedback controls for systems that run in real-time. This software uses sophisticated algorithms and control logic.</p> <p><i>Environment: All</i></p>
19	Sensor Control and Processing	<ul style="list-style-type: none"> Image processing software Radar systems Sonar systems Electronic Warfare systems 	<p>Software used to control and manage sensor transmitting and receiving devices. This software enhances, transforms, filters, converts or compresses sensor data typically in real-time. This software uses a variety of algorithms to filter noise, process data concurrently in real-time and discriminate between targets.</p> <p><i>Environment: All</i></p>
20	Spacecraft Bus	<ul style="list-style-type: none"> Earth orbiting satellites Deep space exploratory vehicles 	<p>Spacecraft vehicle control software used to control and manage a spacecraft body. This software provides guidance, attitude and articulation control of the vehicle.</p> <p><i>Environment: Manned and unmanned space</i></p>

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21	Spacecraft Payload	<ul style="list-style-type: none"> • Earth orbiting satellites • Deep space exploratory vehicles 	<p>Spacecraft payload management software used to manage and control payload functions such as experiments, sensors or deployment of onboard devices.</p> <p><i>Environment:</i> Manned and unmanned space</p>