



Jon McBride Software Testing and Research (JSTAR) Laboratory

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Internal Website: <http://itc.ivv.nasa.gov>

ITC Team Members

Justin Morris

Steven Seeger

Brandon Bailey

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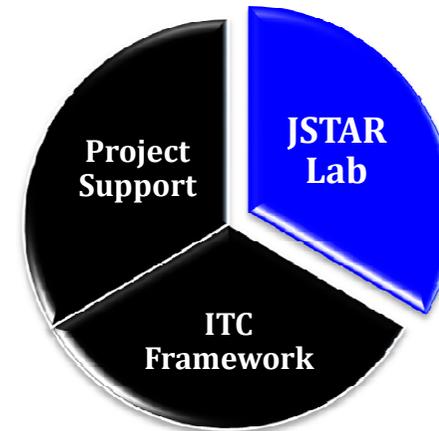
Independent Test Capability

ITC Background

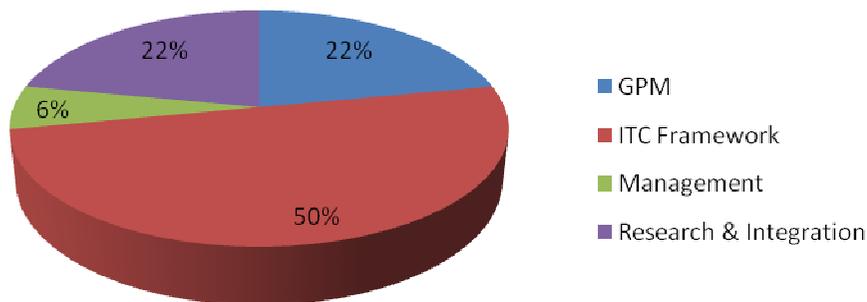
ITC Charter

Develop, maintain, and operate an adaptable test environment for the IV&V Program that enables the dynamic analysis of software behaviors for multiple NASA missions

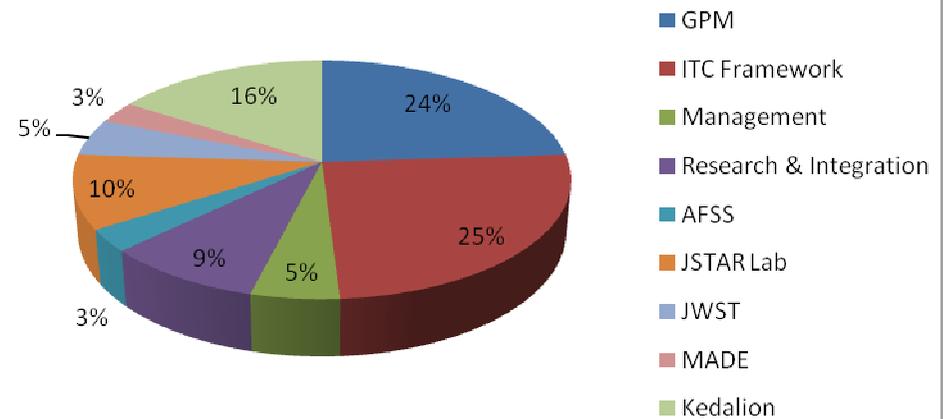
ITC Team = experts in simulation
 IV&V Project Team = experts in systems



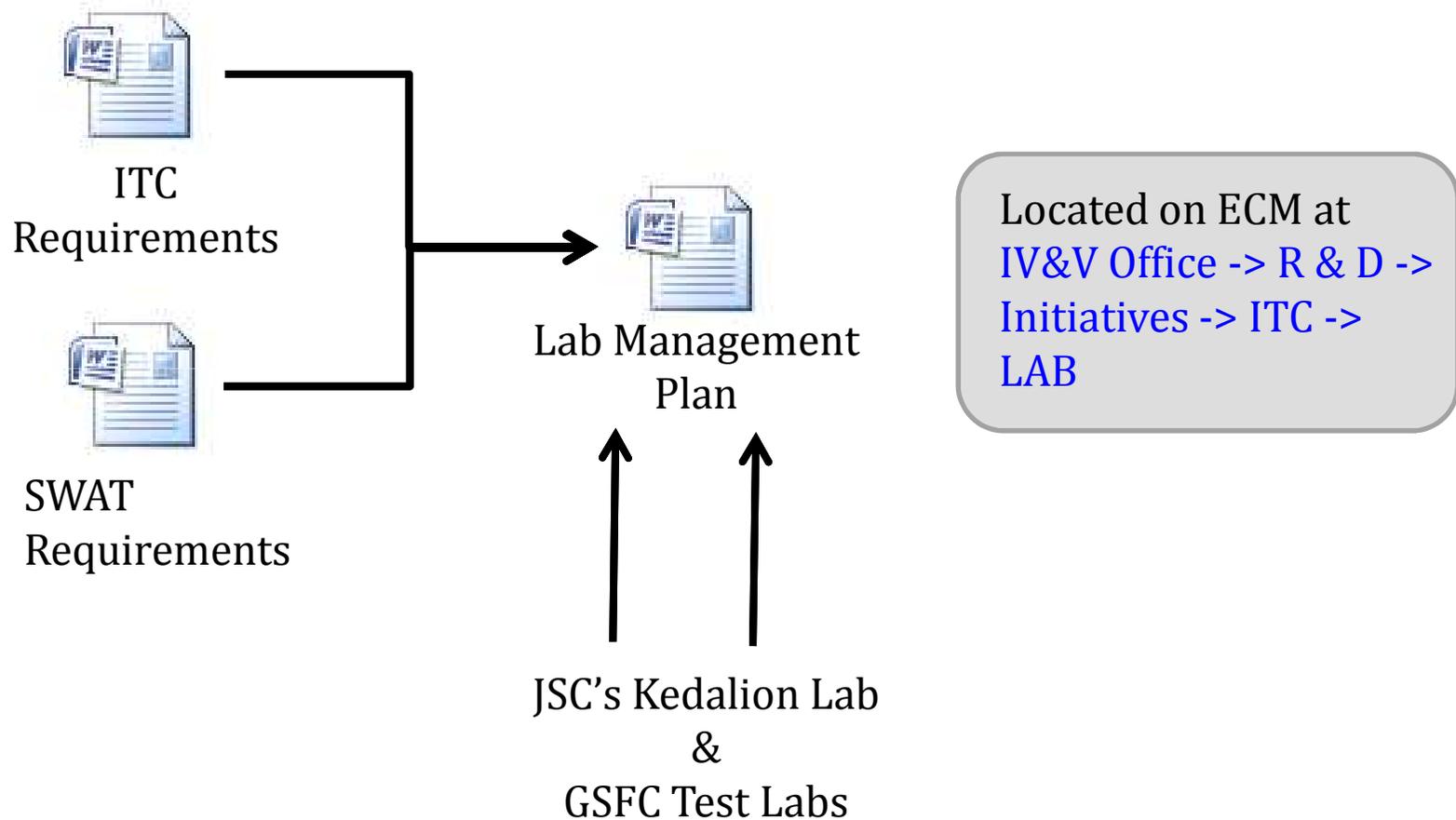
FY 2009-2010



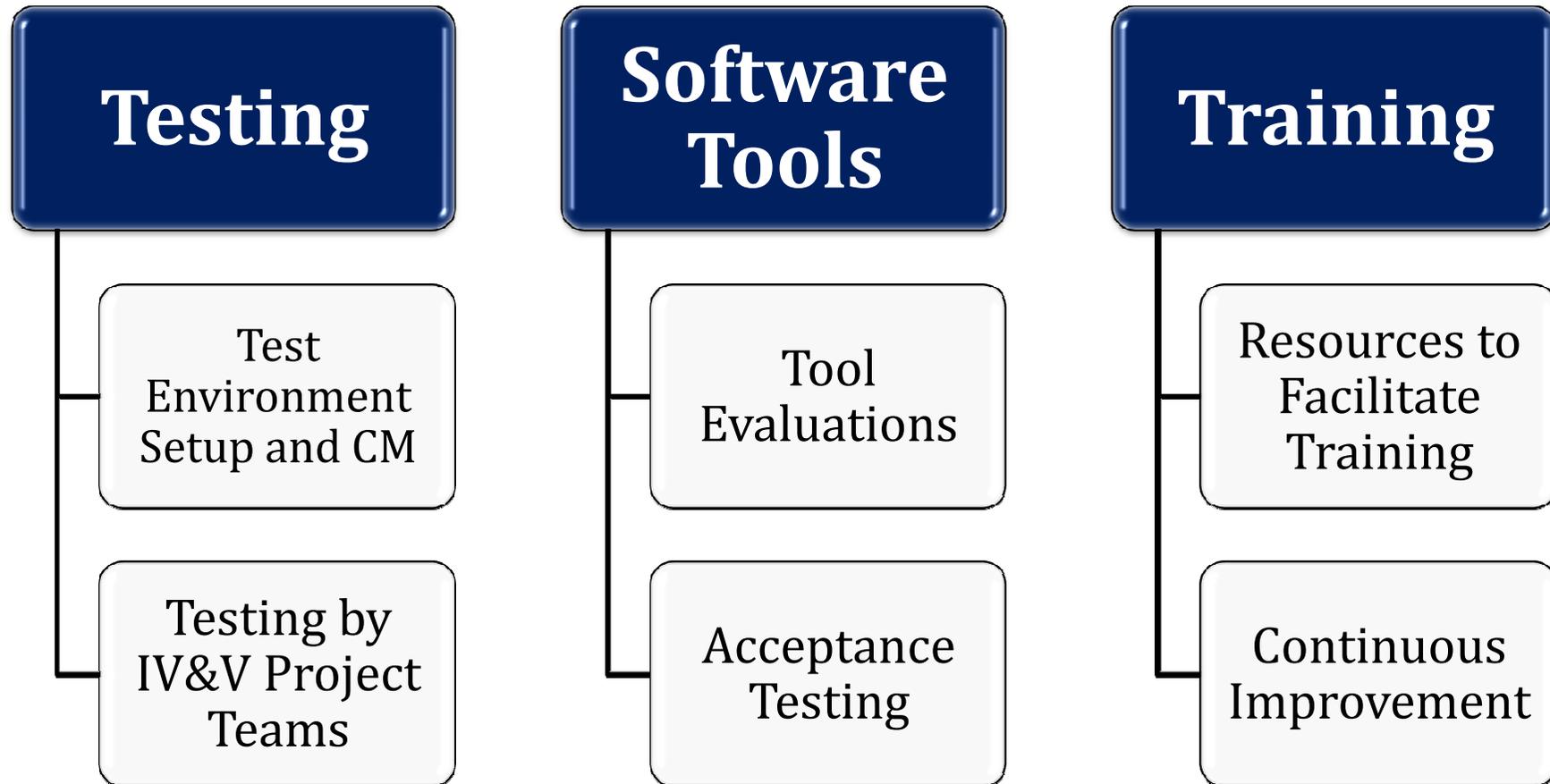
FY 2010-2011



Lab Background



Lab Purpose

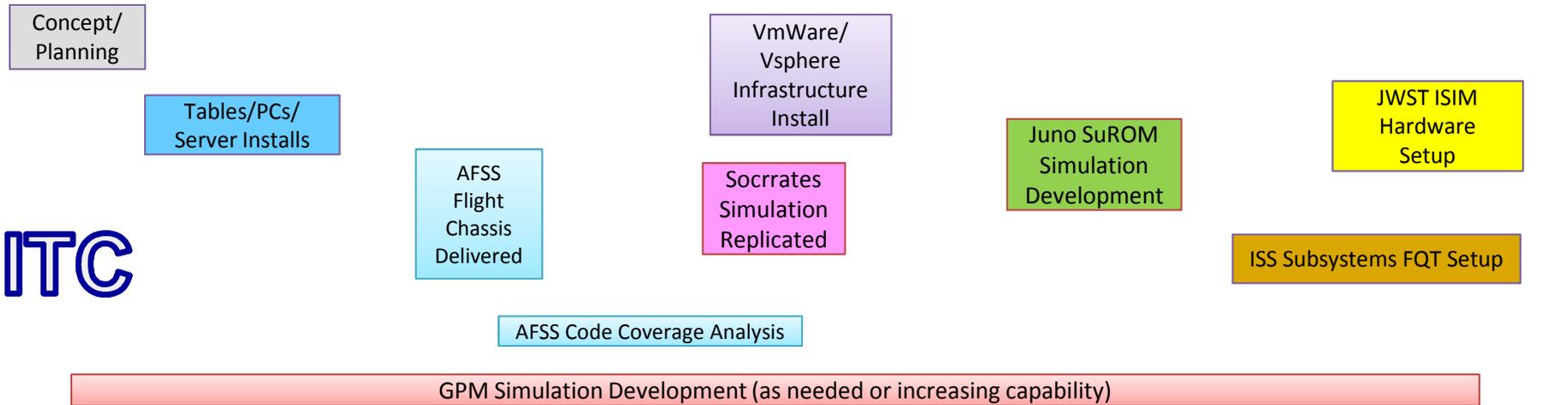
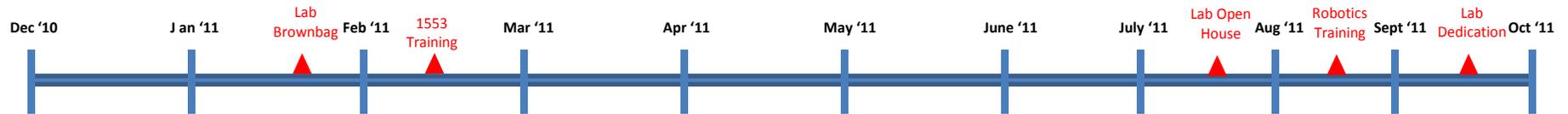




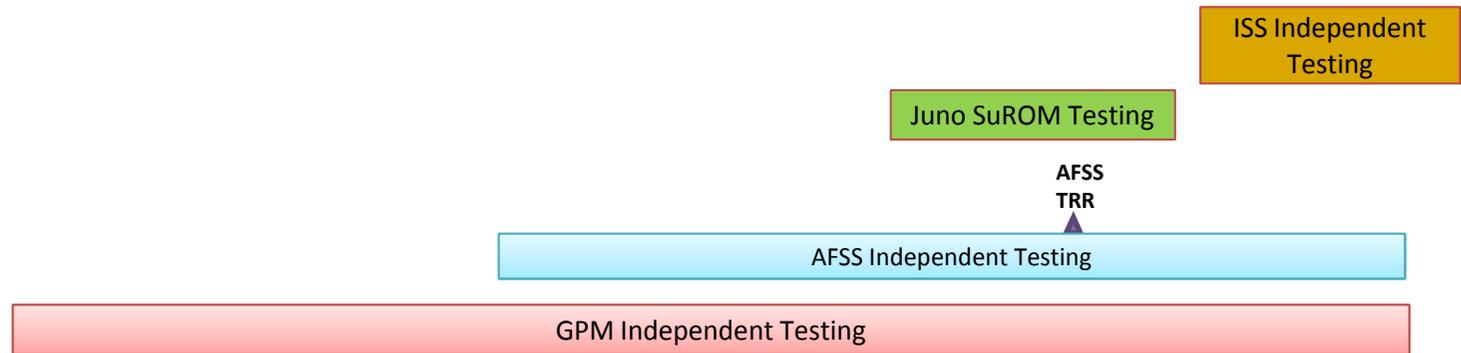
Independent Test Capability

Lab Timeline to Today

Timeline in months

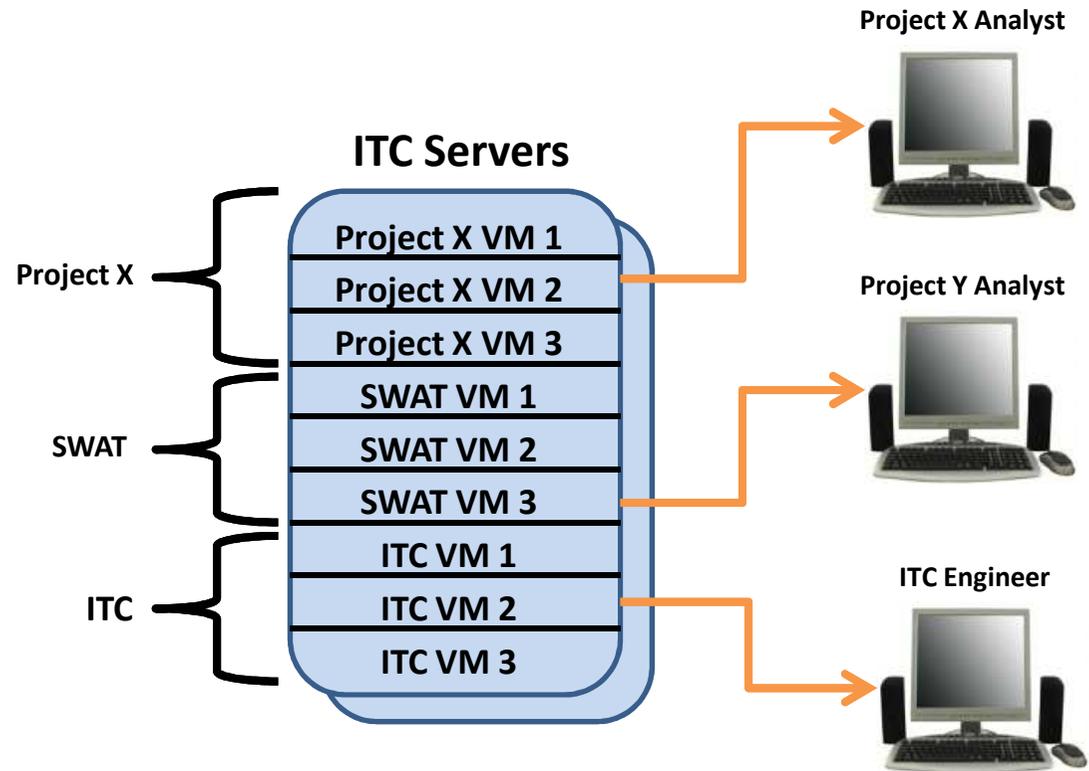


IV&V



Lab Configuration

The lab utilizes server and desktop virtualization to improve the efficiency and availability of resources and tools. This provides the ability to run multiple virtual machines on each physical machine. Virtualization removes the physical server constraints and enables sharing of resources within the lab.



Creating virtual machines of test environments will allow for quick setup of test environments. This will increase efficiency of analysts because they will not have to spend many hours configuring their workstations. Also this will foster smooth transitions when team members transition to other projects.

Virtualization Features

- Vsphere Converter
 - Can take existing physical machine and convert to virtual machine
 - Easy backup of existing configurations
 - Only need Ethernet connection and administrator password
 - Can convert existing virtual machines (VirtualBox, Parallels, etc.) to VmWare format for use in the lab
- Cloning/Templates
 - Once a working configuration is completed a clone or template can be created to spawn multiple copies for multiple users
 - Reduces time for configuration management/updating
- Tool Testing
 - Can provide VMs (Windows, Linux, etc.) to any user to install, checkout, and test new tools
 - Single file delete for Lab Manager once work is complete and VM no longer needed

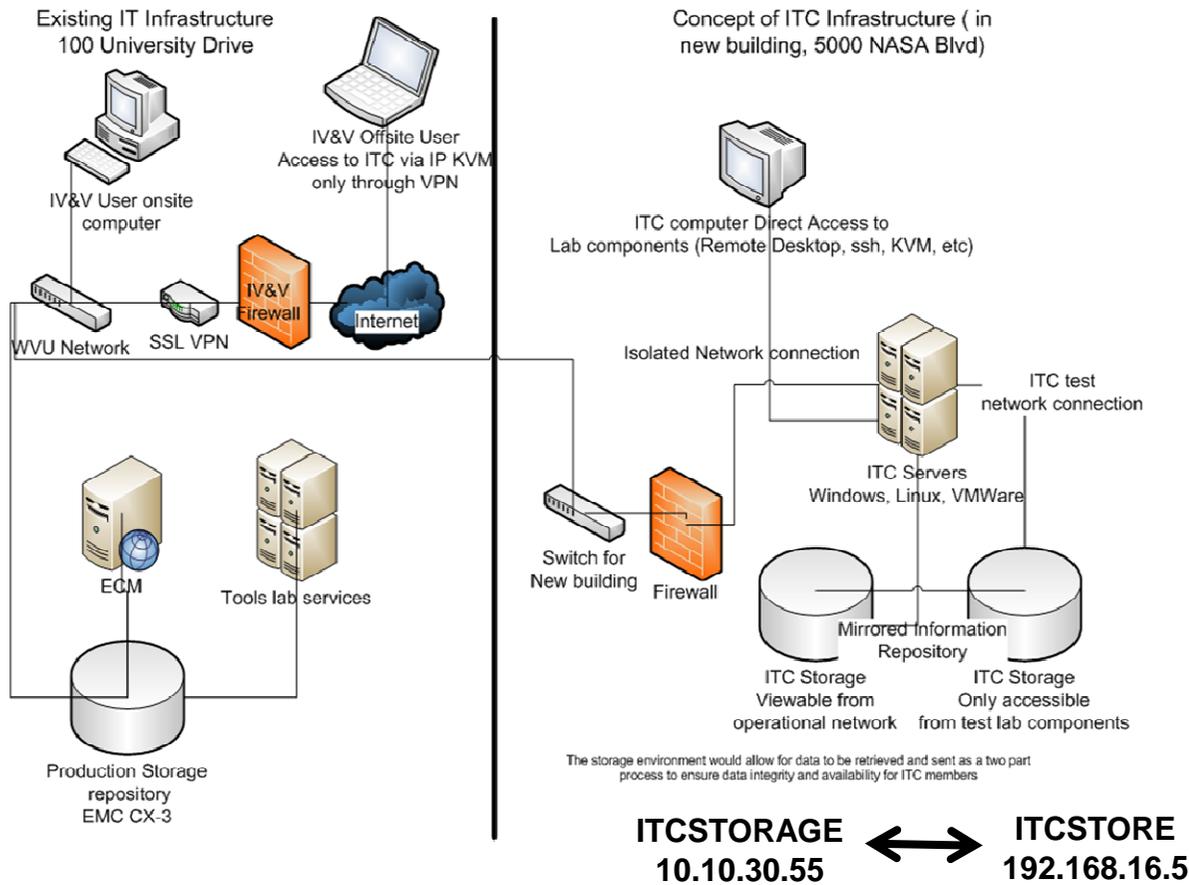
Virtualization Example

- Project Issue Tracking System (PITS)
 - Existing PITS server is a physical server with Windows Server 2003 and it is located in Building 1
 - The plan is to decommission existing hardware but there is a need to retain PITS data and access to PITS
 - ITC provided SWAT with a Windows Server 2003 virtual machine (via VirtualBox)
 - SWAT installed/configured/tested PITS on VM
 - ITC converted and integrated the new PITS virtual machine in the lab
 - PITS data and access is retained and the server can now be decommissioned



Independent Test Capability

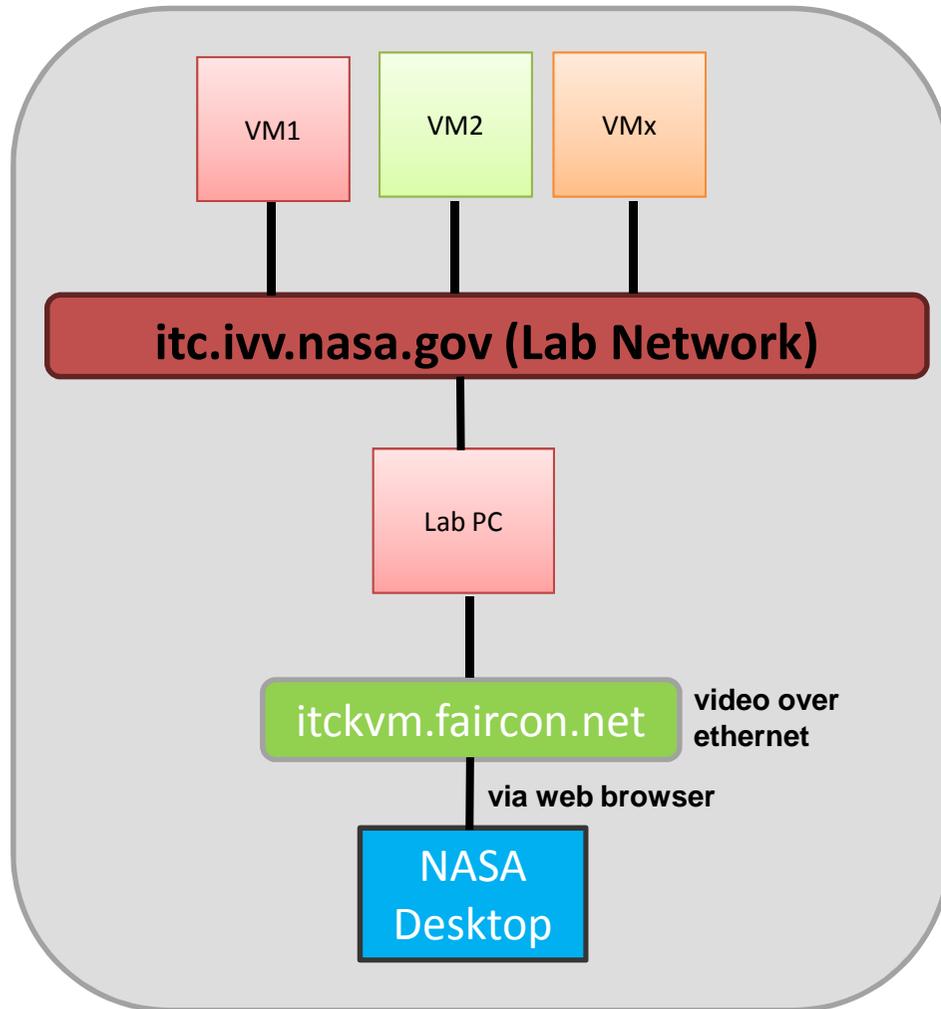
Network Configuration



➤ The ITC Lab is ***NOT*** connected to NASA network or the Internet

➤ All computers in the lab are connected on an internal ITC network

External Connection



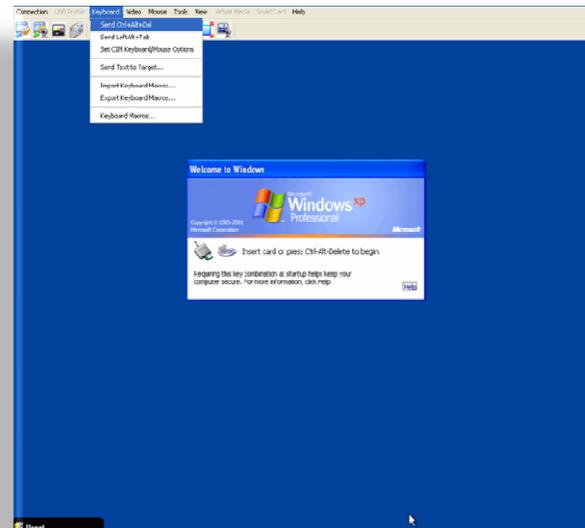
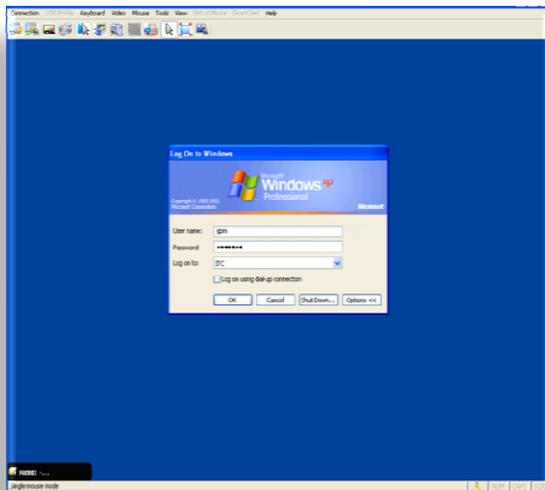
- Once connected to Lab PC, access to VMs is available (ssh, remote desktop, vSphere, etc.)
- Through the KVM lab resources can be controlled/managed/used
 - When connected to KVM via virtual private network (VPN) connection, severe lag/jitter is noticed
 - KVM access over VPN is not meant to be an end solution for external users but it is currently the only mechanism for external users to access lab resources
 - Performance when connected from a NASA desktop computer (inside NASA IV&V firewall) is acceptable
 - However, it is recommended for local users (in Fairmont, WV) to utilize lab resources from inside the lab and not use the KVM connection

Example - KVM

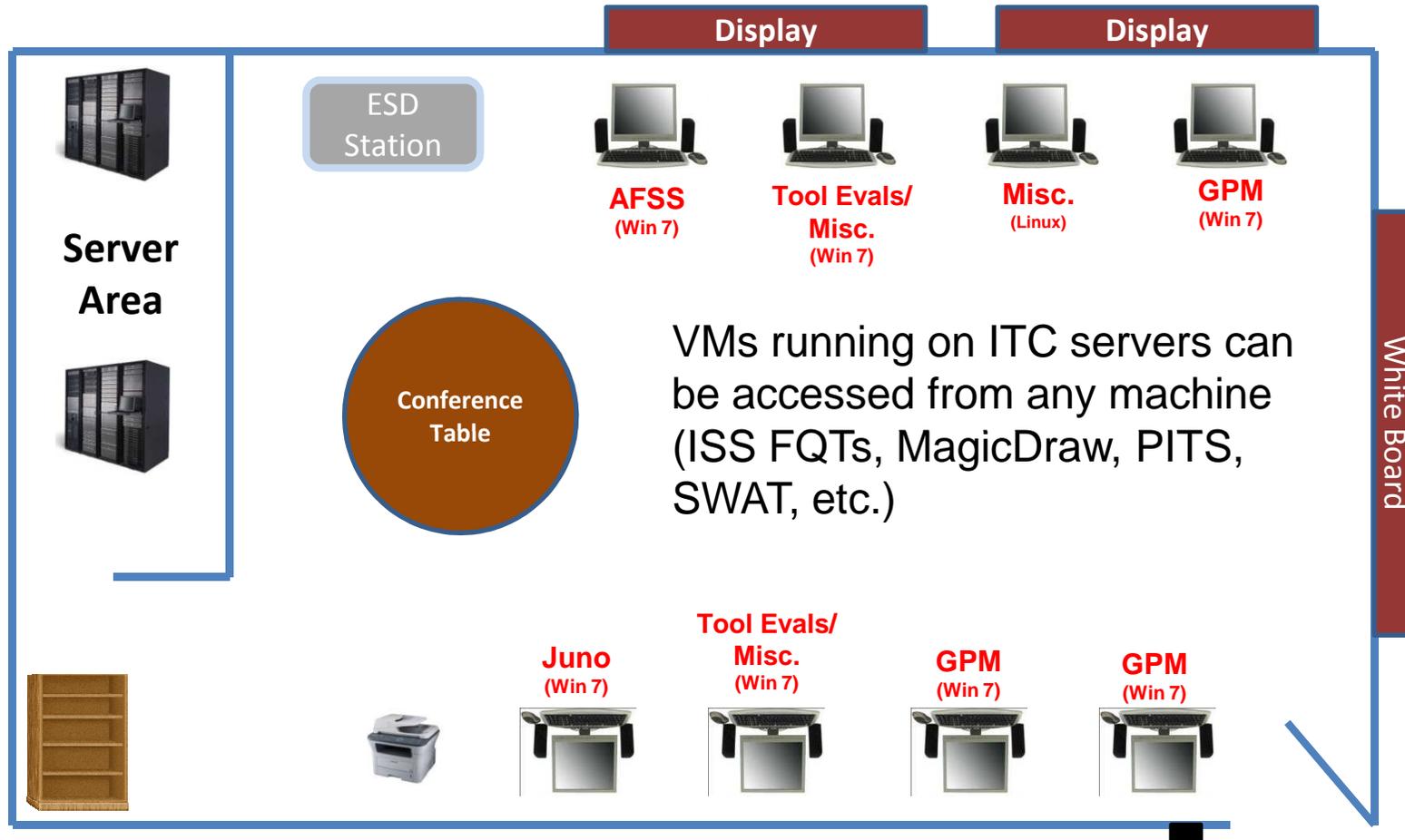
- Login to <https://itckvm.faircon.net> – then select machine to connect to

View By Port	View By Group
▲ No.	Name
2	Connect ng

- Send Ctrl+Alt+Del, login, then sync the mouse



Lab Layout



Single Location – Multiple Preconfigured Tools and Test Environments

- Key card access is **required** for the lab
- Contact
 - Lab Manager (Brandon Bailey)
 - Phone – 681-753-5227(work) & 304-629-8992 (cell)
 - Email -- brandon.t.bailey@ivv.nasa.gov
 - ITC Lead (Justin Morris)
 - Phone -- 304-363-8260
 - Email -- justin.r.morris@ivv.nasa.gov
- Key card access is not meant to be a barrier to the lab
 - Tracks usage
 - Protects equipment (Ex: AFSS flight article)
 - Additional security measure

- ITC Lead (Justin Morris)
 - Leads the overall program and technical direction of the ITC team. Responsible for project tasking, executing to project budget, facilitating interactions with IV&V projects, and identifying future tools and opportunities for collaboration with various projects
 - Responsible for assisting the lab manager with procuring hardware/software and maintaining an inventory of the lab's hardware/software, and maintaining the lab's schedule
 - Controls who has key card access to the lab
 - Requests for access will be handled via email and approved/rejected based on need and availability

- Lab Manager (Brandon Bailey)
 - Responsible for the day-to-day operations of the lab
 - The Lab Manager is also responsible for working with the ITC Lead to procure hardware/software for the lab
 - Maintains an inventory of the lab's hardware/software, and maintains the lab's schedule
 - Responsible for helping coordinate efforts related to the lab (example would be ITC/SWAT requests, requests for lab usage and time, resource usage, etc.)
 - Along with the ITC Lead, the Lab Manager will control who has key card access to the lab
 - Requests for access will be handled via email and approved/rejected based on need and availability

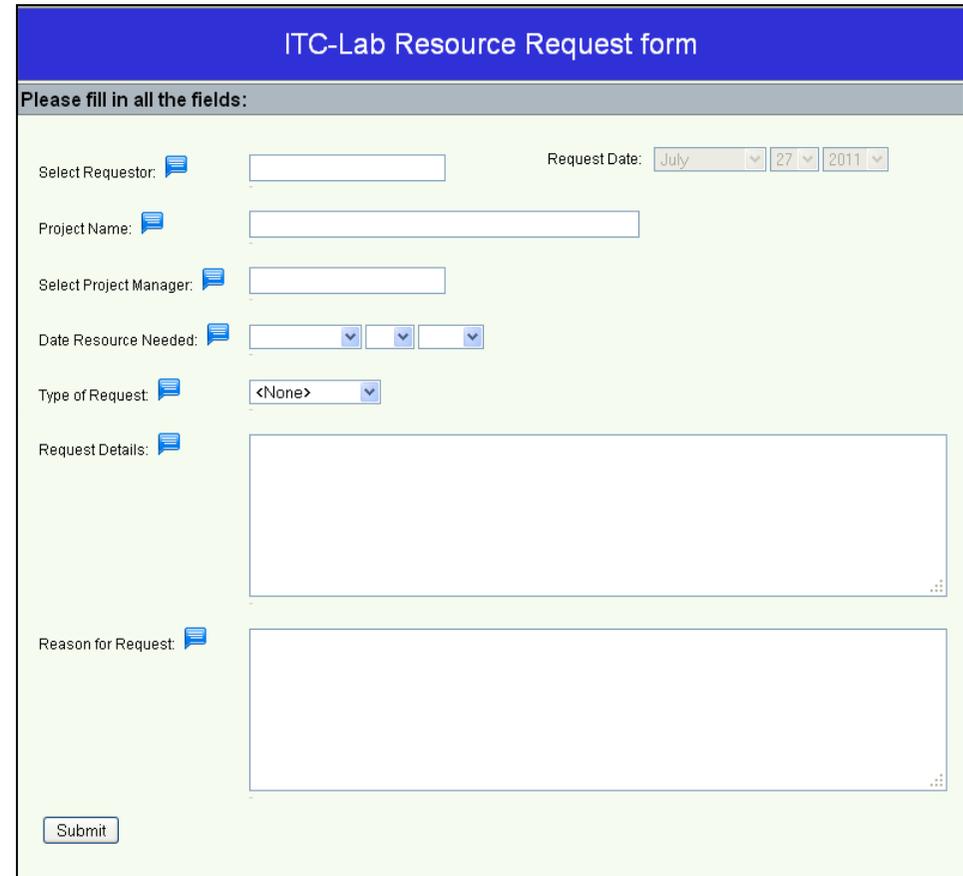
- ITC Engineers
 - Responsible for the development and maintenance of the test environments
 - Considered the experts of the lab environment and resources
 - Not experts of the system under test
 - Facilitates the IV&V analyst's ability to focus on satisfying test objectives and not learning test architecture/setup
 - Also have administrator access to lab resources
 - Work closely with Lab Manager

- IV&V Analysts
 - Perform testing of software using the test environments created by the ITC Engineers
 - IV&V Analysts are considered experts on the system under test (i.e. FSW)
 - Use software tools available on the lab's workstations to aid in their analysis work
 - This will enable analysts to use tools on an as needed basis and not have to worry about procuring or installing themselves
 - Analysts can work with the Lab Manager on procuring and executing trials on new software or upgrades to existing tools that will improve IV&V's analysis work
 - The IV&V analysts are considered users of the lab
 - For any work requiring resources in the lab, the analyst is responsible for submitting a request on ECM

- SWAT Engineers
 - Similar to IV&V analysts, the SWAT Engineers will use the lab to test and perform trials of software tools (or upgrades to existing tools) that will aid in improving IV&V's analysis work
 - SWAT Engineers will also be able to work with the Lab Manager on procuring and executing trials on new software or upgrades to existing tools that will improve IV&V's analysis work
 - The SWAT Engineers are also considered users of the lab
 - For any work requiring resources in the lab, SWAT Engineers are responsible for submitting a request on ECM

Resource Requests

- Request for Resources (RFR) form is the mechanism for individuals within the IV&V facility to request access to resources in the lab
 - Workflow can be initiated on ECM
 - Enterprise Workspace/
WORKFLOWS/ITC LAB REQUEST
[[WebLink](#)]
 - Autonomous system with email notifications
 - Workflow has tracking and reporting mechanism that will aid in collecting metrics on usage



The screenshot shows a web form titled "ITC-Lab Resource Request form". The form has a blue header bar with the title. Below the header, there is a grey bar with the text "Please fill in all the fields:". The form contains several input fields and dropdown menus:

- Select Requestor:** A text input field.
- Request Date:** Three dropdown menus for month (July), day (27), and year (2011).
- Project Name:** A long text input field.
- Select Project Manager:** A text input field.
- Date Resource Needed:** Three dropdown menus for day, month, and year.
- Type of Request:** A dropdown menu with the option "<None>".
- Request Details:** A large text area for providing details.
- Reason for Request:** A large text area for providing the reason.

A "Submit" button is located at the bottom left of the form.

Resource Requests (cont.)

- All submitted forms will be reviewed and on an as needed basis a Resource Allocation Meeting (RAM) will be scheduled between the requester(s) and the ITC Engineers
 - The Lab Manager will approve/reject the request based on availability of resources
- The RAM will ensure that the Lab Manager and/or ITC Engineers understand the request and to resolve conflicts with requirements from other requests
- If high volumes of requests are received the Lab Manager will schedule a RAM that will be held weekly where all requesters will be required to attend along with the ITC Engineers

Lab Schedule

- The lab schedule will be maintained by the Lab Manager and a read-only copy can be viewed in outlook as a shared calendar
 - Shared calendar name ITC
- The lab schedule will be updated shortly after the conclusion of each RAM meeting or when changes to the schedule are needed



Independent Test Capability

Available Software

- List maintained on ECM at [IV&V Office -> R & D -> Initiatives -> ITC -> LAB](#)
- Current Software available
 - Simics 4.4
 - Executes simulated rad750 single board computer with GPM FSW 2.1, 2.3, 3.0, 3.1, 3.3, and 4.0
 - WindRiver Workbench 3.2
 - Can perform source level debugging of FSW as it executes
 - ASIST Ground System
 - Contains GPM command and telemetry databases for GPM FSW 2.x, 3.x, and 4.x
 - MSDN Subscription (all Microsoft products)
 - Tornado
 - LDRA TestBed (code coverage tool and unit test framework)
 - IBM Rational Synergy (JSC R2S access for license is required)
 - IBM Rhapsody
 - MagicDraw UML
 - Understand for C/C++
 - Matlab/Simulink /Stateflow/V&V Toolbox
 - Open Source Tools: cygwin, WinMerge, Notepad++, etc.

Available Virtual Machines

- List maintained on ECM at *IV&V Office -> R & D -> Initiatives -> ITC -> LAB*
- Current virtual machines available
 - GPM FSW tool chain/build environment
 - Linux Gentoo with GCC 3.4.4 and GCC 4.4.4 tool chains to build GPM FSW
 - PITS
 - Solaris 10 (x86)
 - CentOS version 5 (i386 and x86_64)
 - Redhat Enterprise version 5 (x86_64)
 - Ubuntu 10_4
 - ISS MADE
 - Windows (XP SP3 [32bit], 7 [32bit and 64bit], Server 2003 R2, Server 2008 R2)
 - Socrrates Lite and Socrrates Heavy (current as of April 2011)

- List maintained on ECM at *IV&V Office -> R & D -> Initiatives -> ITC -> LAB*
- Current Hardware
 - AFSS Flight Chassis
 - BK Precision Power Supply
 - Compact PCI (cPCI) Chassis
 - cPCI Bus Analyzer
 - MIL-STD-1553 Cards (ExpressCard and cPCI)
 - Gespac 3750 (PowerPC 750)
 - PMC Carrier Card
 - Spacewire Test Set (SWTS)

- JSTAR Lab was designed to meet the needs/requirements of all stakeholders
 - ITC Team, IV&V Analysts, and SWAT
- JSTAR Lab is a resource to be shared among stakeholders
- JSTAR Lab is always evolving
 - New requirements (or ideas) **will always** be considered
 - JSTAR Lab is to be **flexible** and accept changing requirements
- Information is stored on ECM at
 - *IV&V Office -> R & D -> Initiatives -> ITC -> LAB*



Come See ITC's
Demonstration
and
Posters