



Implementing Measurements for Systems Acquisition Process Improvement: The IRS Business Systems Modernization Program

Don Gantzer, MITRE
Lloyd Anderson, IRS

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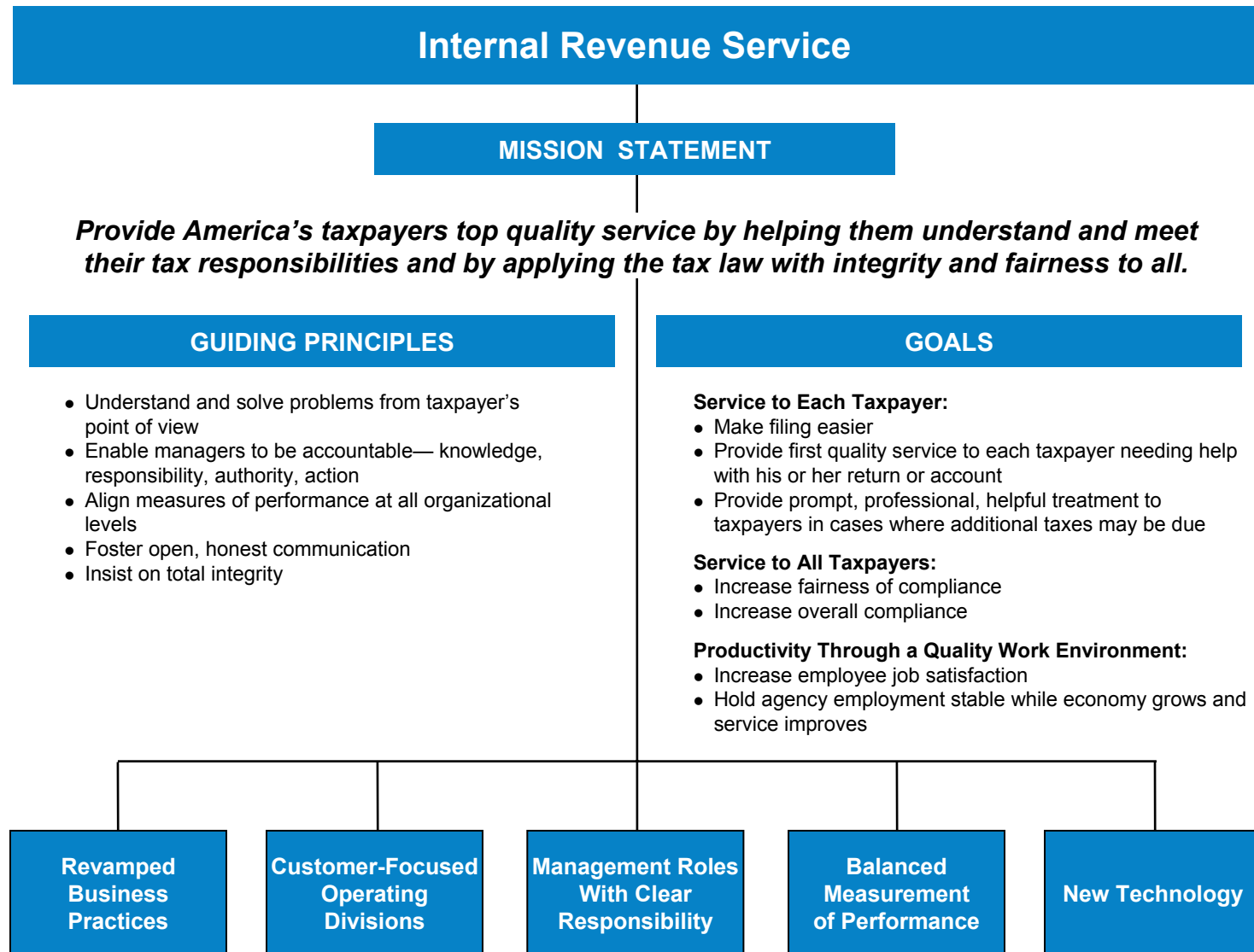


Center for Enterprise Modernization
I R S F F R D C
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Agenda

- **Introduction to the IRS**
- **Overview of Business Systems Modernization (BSM) Program**
- **MITRE's IRS FFRDC Role**
- **Background on Process Improvement (PI)**
- **Application of the Software Acquisition Capability Maturity Model (SA-CMM®)**
- **Measurement Aspects of SA-CMM® and PI**
- **Experience So Far**
- **Next Steps**

Vision for Modernizing America's Tax Agency



IRS Modernization: An Enormous Business Systems Project



170 Million Individuals



45 Million Businesses



**5 Million Tax Exempt
and Government Entities**

**IRS Directly Serves More
Americans Than Any Other
Institution—Private or Public**



102,000 People

1,000 Sites

200 Tax Law Changes / Year

23 Million Calls / Week

200 Million Returns / Year

**IRS is a Large, Complex
Operation by Any Measure**



**Confidence
Service
Integrity
Fairness**



**1.9 Trillion / Year
Tax Revenues**

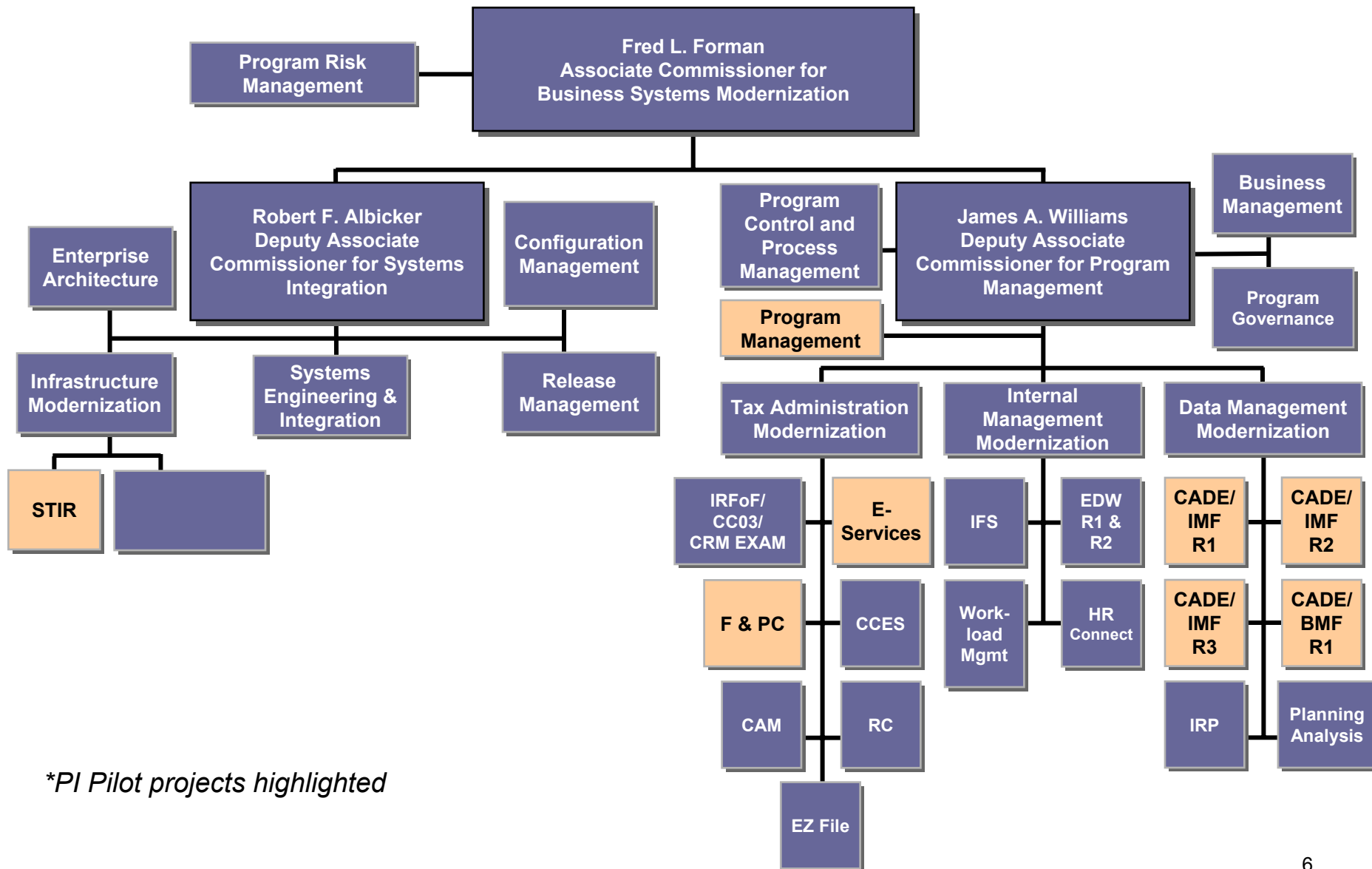
**The Nation's Well Being
Requires Trusted and
Effective Tax
Administration**

IRS Business Systems Modernization Office Overview

Business Systems Modernization Office (BSMO) manages the acquisition of the business solutions (products, services, systems) provided by the PRIME

- In December 1998, IRS awarded the modernization contract to the PRIME Alliance for up to 15 years
- IRS BSMO is the Acquisition Organization
- Solution Provider—CSC and PRIME Partners
- Program Size—\$5–\$8B
- BSMO current staffing—approximately 165
- Program encompasses large scale IRS systems including tax administration systems and agency internal systems

IRS BSMO Organization Structure

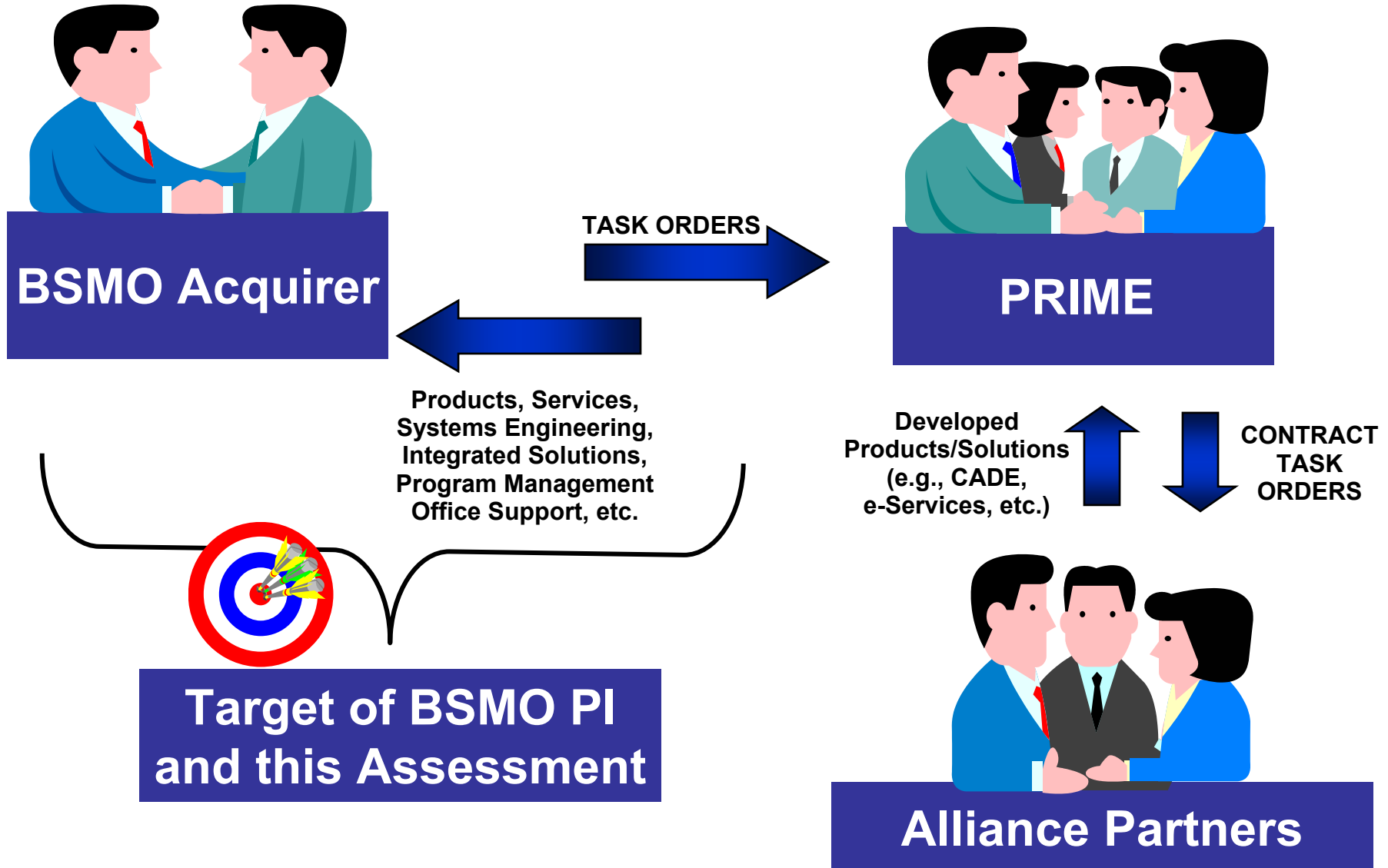


**PI Pilot projects highlighted*

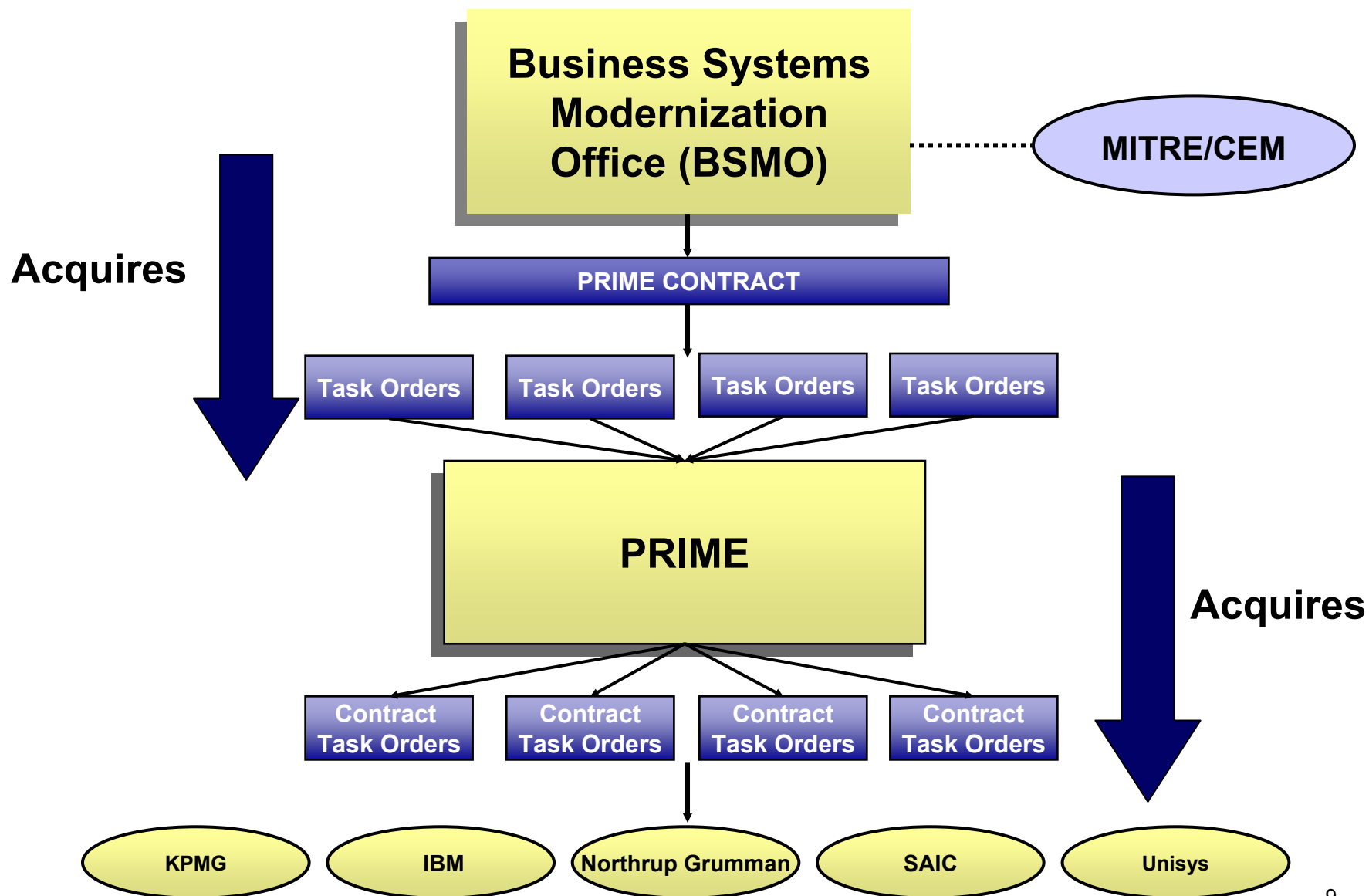
BSMO Drivers for Process Improvement

- **BSMO realizes that its performance cannot improve without process improvement**
- **Meets Congressional mandate to set up a “world class” acquisition organization by following Software Engineering Institute’s (SEI) Capability Maturity Model (CMM) methodologies**
- **General Accounting Office (GAO) builds on and fosters this expectation and will audit using the SEI SA-CMM®**
- **Makes BSMO more “accountable, predictable and timely,” as required by John Reece, IRS CIO**

Participants and Relationships in Systems Acquisition for Modernization



IRS Modernization Acquisition Relationships



IRS / MITRE Strategic Partnership is Based on a Formal Foundation

IRS: Sponsor

- Needs a trusted FFRDC partner
 - For long-term critical need integral to its mission and operations
 - To work objectively and independently
 - Who recognizes IRS objectives as its own
- Supports the FFRDC partnership
 - Access to IRS people, resources, and data
 - Continuity of support
 - Investment in building domain and program knowledge

Strategic Partnership

MITRE: FFRDC

- Strives to be a trusted, vital, and accountable partner
 - Shared mission accountability
 - Sustained technical excellence, knowledge base, and capacity
 - Strategic direction aligned to IRS needs
- Ensures sound basis for trust
 - Not-for-profit public interest
 - Free from organizational conflicts of interest
 - Restricted business activities
 - Full disclosure

IRS FFRDC Sponsor is John Reece

IRS FFRDC Program Manager is Fred Forman

MITRE FFRDC Director is Gene Cross

Relationship Governed by the Federal Acquisition Regulations (FAR)

Federally Funded Research and Development Center (FFRDC) Role and Scope of Work

- Leadership and objective advice
- Essential resource for critical skills
- Development of management and technical processes and capabilities
- Objective voice within established channels to provide guidance and perform assessments
- Special studies for problem assessment, consensus building, and decision purposes
- Enterprise leadership and integration, playing role of “honest broker”

FFRDC Role and Scope of Work

MITRE has specific Process Improvement Tasks in support of the BSMO Program Management Office; there are also other process improvement support activities

Background on Process Improvement at the IRS / BSMO

- **GAO conducted an audit in 1998 recommending improvements in IRS systems acquisition processes**
- **IRS / BSMO developed SA-CMM[®]-compliant processes in 2000**
 - January 2001 informal assessment conducted on BSMO with Software Engineering Institute (SEI) indicated weaknesses
 - Instability in Organization made implementation problematic
 - Did not completely reflect intricacies of BSM environment
- **Organizational stability occurred in early 2001**
 - Process Improvement (PI) Management (BSM executives) Steering Group formed in August 2001
 - Solutions Acquisition Process Group (SAPG) chartered to implement PI
- **Initial Goal**
 - Software Capability Evaluation (SCE) for SA-CMM[®] Level 2 maturity in December 2002 (will be led by SEI)

Key Success Factors for an Effective Process Improvement Effort*

Before major change can even be contemplated, top management must recognize the need and be sold on the idea

The Must Haves



1. A compelling reason for change



2. Leadership of the change effort by the top executive in the organization—responsibility cannot be delegated



3. Informed commitment of the top management team



4. Designation of a primary PI Leader and an adequate mandate for change

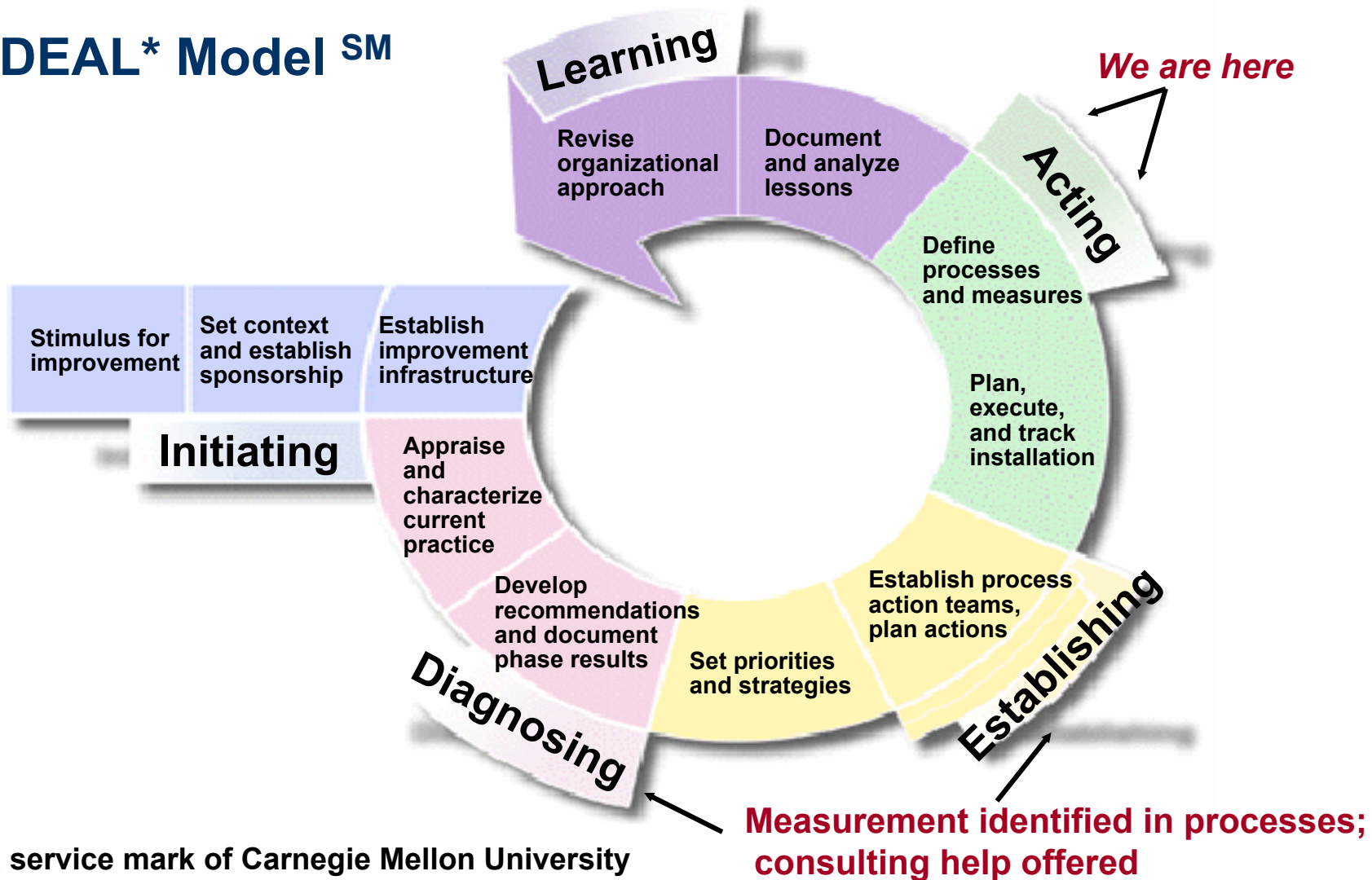


5. Sound performance measures that drive change

*source: SEI/CMU

The Process Improvement Process

The IDEAL* Model SM



IDEAL is a service mark of Carnegie Mellon University
*source: SEI

Software Acquisition Capability Maturity Model (SA-CMM®) Overview*

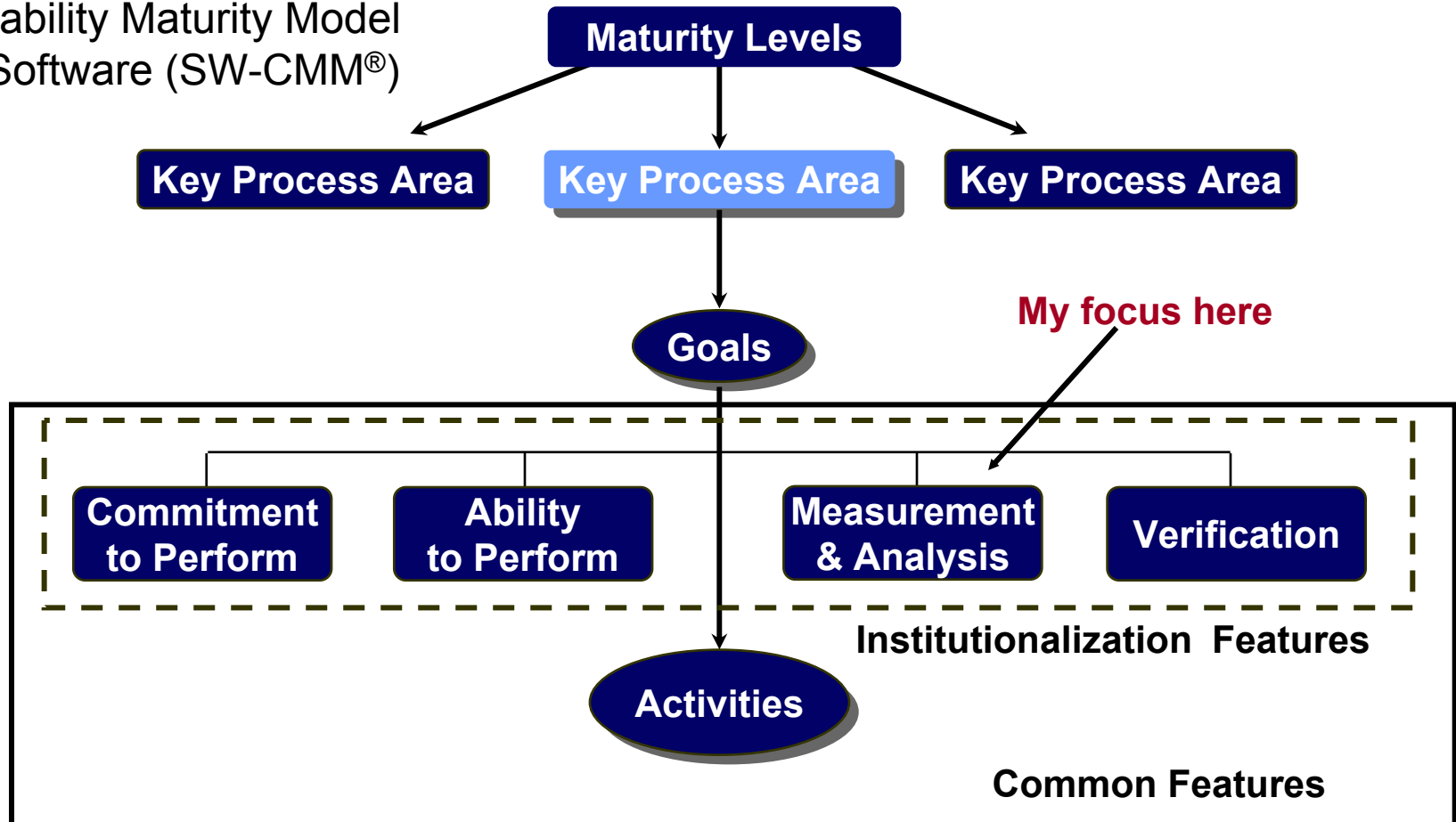


- **Application of the SA-CMM® helps establish the infrastructure to better manage acquisitions (software and systems)**
- **Forces an “introspective” of how the organization does business and how it wants to do business—not on how the supplier (contractor) does business**
- **Key concepts of the SA-CMM®**
 - It targets acquisition and management
 - Someone is in charge from the acquisition organization for the management of each acquisition: a team is established
 - Each acquisition is planned using specific processes and procedures
 - The plan is executed and tracked
 - Work is verified by senior management
 - Policies, processes, descriptions, and procedures are consistent with the SA-CMM® and the way the organization wants to do business

***source: SEI/CMU**

SA-CMM® Structure: Key Process Areas*

SA-CMM® is a “staged” model, similar to the Capability Maturity Model for Software (SW-CMM®)



*source: SEI/CMU

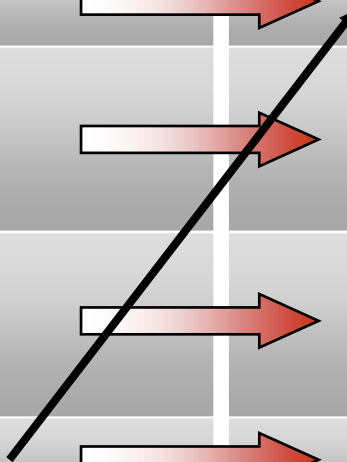
Acquisition Management Terminology Mapping

CMM Terminology		BSMO Terminology
Software Acquisition		<i>Solution</i> Acquisition
Acquisition Organization		BSMO
Project Manager		IRS Acquisition Project Manager
Project Team is the entity that is responsible for executing the specific acquisition		IRS Acquisition Project Manager and the Acquisition Team (staff, MITRE, Contracting Officer, Contracting Officer's Technical Representative)
Solicitation means preparation of a solicitation package and the selection of a contractor		Developing and issuing a task order
Contract		Task Order
Acquisition planning documents		Acquisition Management Plan (AMP)
Policies		Directives

***BSMO defined 7 major processes and many procedures to cover all the SA-CMM® relevant activities**

Process Area Mapping for Level 2

CMM Key Process Area—Level 2		BSMO Process Area
Software Acquisition Planning		Acquisition Project Planning
Project Management		Acquisition Project Management
Contract Tracking and Oversight		Task Order Monitoring
Solicitation		Task Order Development and Issuance
Requirements Development and Management		Requirements Development and Management
Evaluation		Systems Evaluation
Transition to Support		Transition to Support



Business Systems Modernization Office

Process Improvement Infrastructure

**Charter
& Strategic Plan**

**Management Steering
Group (MSG)**

The Enablers

**Charter
Tactical Plans
Major processes
Some procedures
Process measurement**

**Solutions Acquisition
Process Group
(SAPG)**

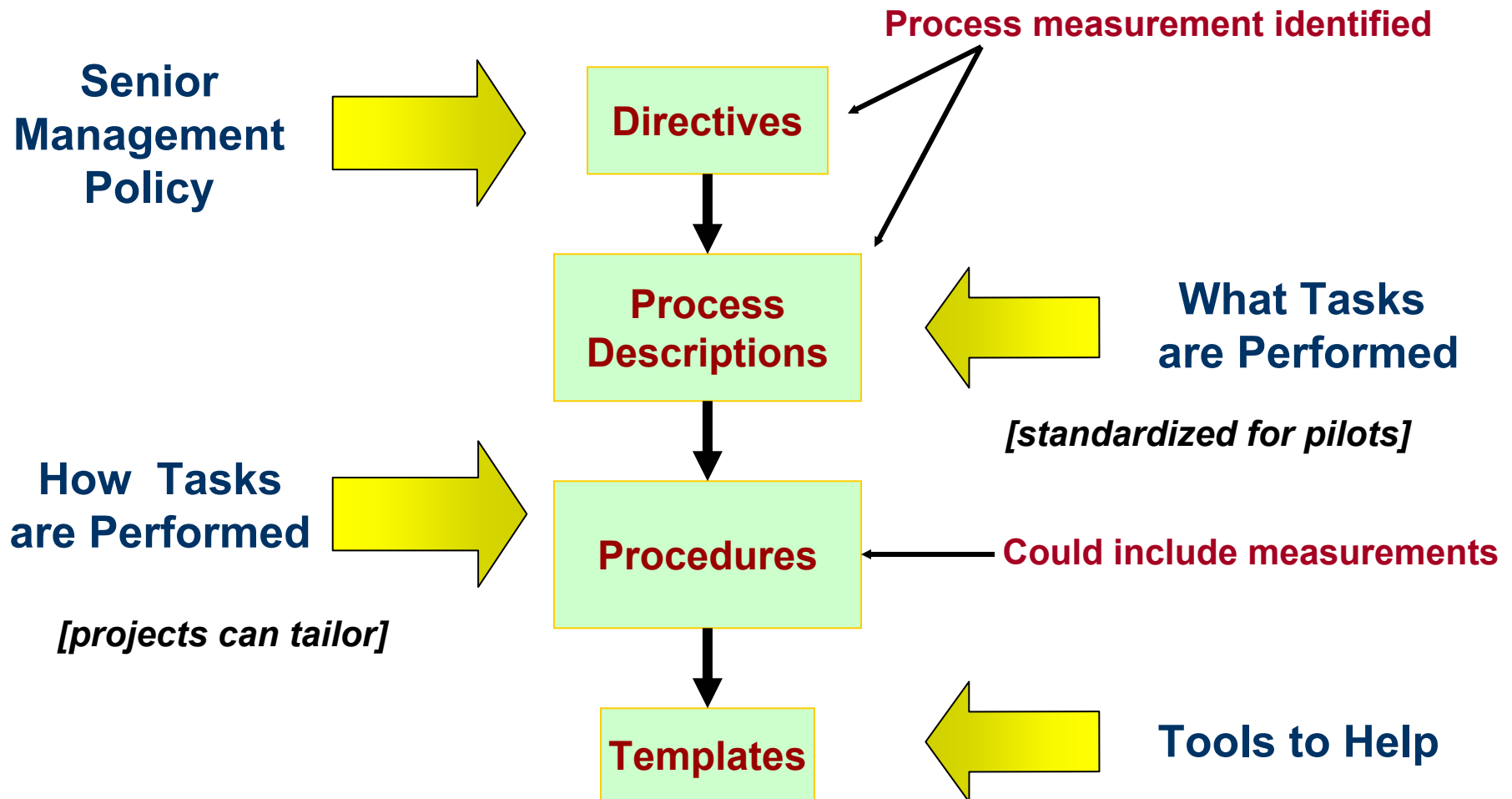
The Change Agents

PI Plans

**Process Improvement
Focus Groups
(PIFGs)**

The Practitioners

BSMO PI Process Document Hierarchy



Major Steps to Date in BSMO PI

- **Obtained BSMO executive management sponsorship**
- **Identified BSMO pilot PI Management Steering Group (MSG) and Solutions Acquisition Process Group (SAPG)**
- **Developed BSMO PI Strategic Plan and Schedule**
- **Developed Process Architecture (mapping, procedures*)**
- **Developed BSMO PI Communications and Training Plans**
- **Provided PI training to SAPG team members, projects, executives**
- **Developed and rolled-out 7 major processes and associated procedures*; Process Measurement is integrated**
- **Conducted informal CMM Based Application-Internal Process Improvement (CBA-IPI) with SEI-led team in June 2002 to determine status, strengths, and PI opportunities (MITRE is part of team)**

*e.g., some procedures for Task Order Monitoring are status meetings, deliverable reviews, cost and schedule evaluation, issue tracking

Process Improvement Measurement Approach for IRS / BSMO

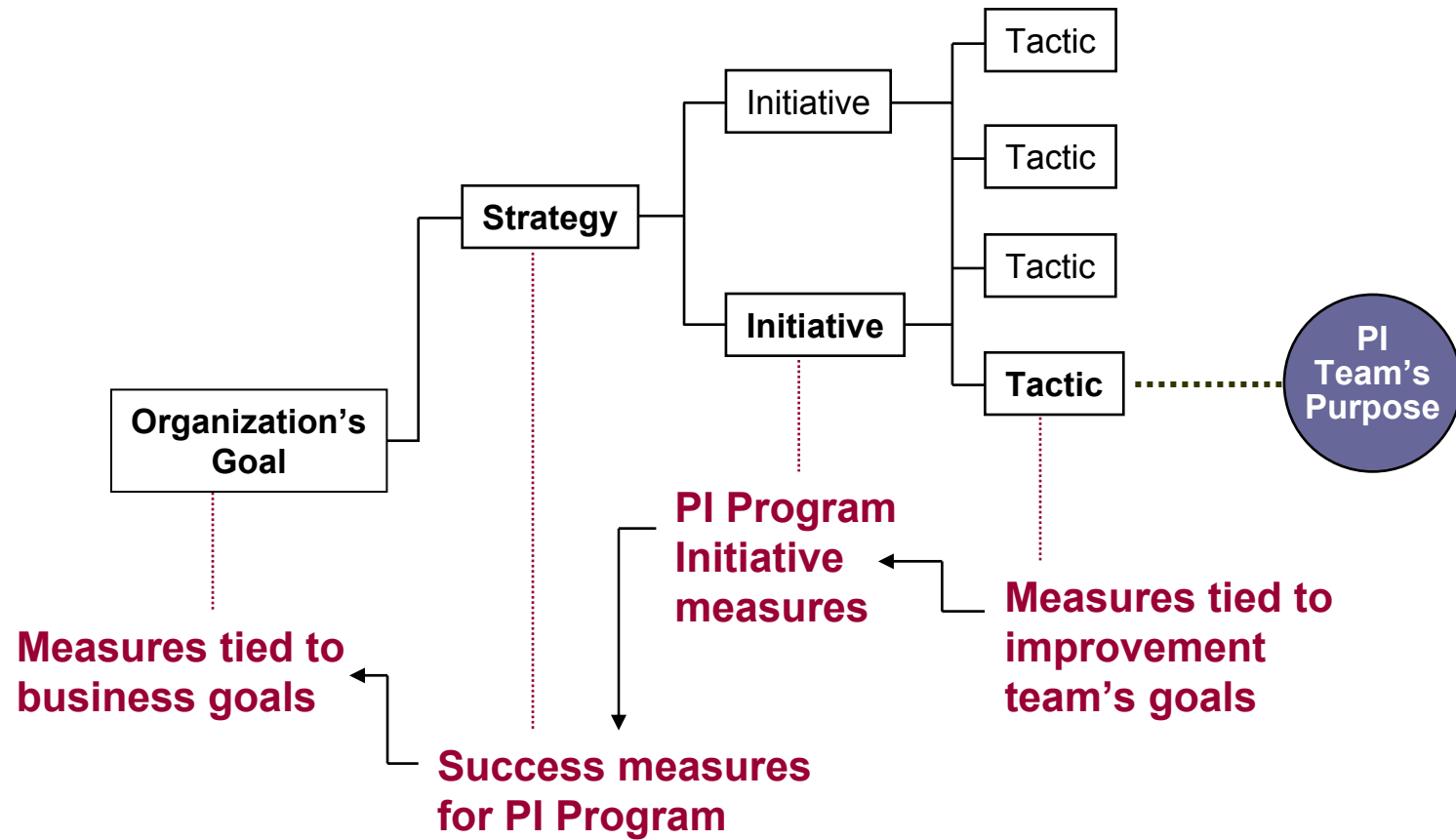
- **Developed a Measurement Plan**
- **Provided PSM Executive Overview for SAPG**
- **Ensured each Process Description had a section on Process Measurement; also emphasized in Acquisition Project Planning process / procedure**
- **Developed some typical examples: plan vs. actual progress**
- **Offered Measurement workshops to projects using PSM methodology; terms tailored for IRS / BSM**
 - Conducted one (to date) and drafted measurement implementation plan with project consideration
 - Offered consulting / guidance as needed*
- **Using June 2002 CBA-IPI findings to focus on measurement activities to improve by December 2002 SCE**

*SEI has provided consulting support to us

Business Goals and How They are Measured Drive Performance of PI Teams



Long Range Perspective of BSMO PI Measurement Program



source: SEI/CMU

BSMO PI Measurement Workshop Agenda

- **Measurement Overview (why, what, how)**
- **Conduct Workshop exercise (PSM Methodology)**
 - Identify concerns (e.g., objectives, constraints, issues, risks)
 - Group into similar concerns; prioritize importance
 - Clarify into concrete, measurable terms (ask questions)
 - If time permits, outline some possible visual graphics
 - Identify any current measurements (may be applicable)
 - Capture implementation issues
 - Resources, responsibilities, tools, validity, ad hoc demands
- **Next Steps after initial workshop**
 - Draft measurement plan and review
 - Assist and follow up

PI Measurement Workshop Introduction:

Types of Measurements



- **By Organization Level**

- Enterprise
- Program
- Project
- Process
- Product

- **By Type (e.g., PSM categories)**

- Cost
- Schedule
- Technical / Quality

The focus here is on *Process Measures*, which are similar to project measures (e.g., effort, schedule, product), but have a different purpose (e.g., to baseline, to characterize and understand, and to improve)

Measurement Orientation for Process Improvement

- **Executives want to know impact / return on investment**
 - Long term: requires stability and capability to roll-up across organizations
 - Links with BSMO Enterprise Performance Management
- **Most Capability Maturity Models will indicate need for certain projects / product measures (e.g., cost, schedule, requirements, defects, TPMs, etc.) for particular process areas**
- **Common feature for institutionalization requires need for measures of each process area (e.g., resources, cycle-time, output quality)**

Workshop Continued: Why Measure?

- **The SA-CMM® says so: it's a best practice!**
- **You can't improve what you don't measure**
- **Need objective evidence to understand**
 - How long something takes
 - How much effort is necessary to do it right
- **It's difficult to know when you'll get there if you don't know where you are or how you got there**
- **You need a baseline for planning and estimation**

Workshop Continued:

What's Valuable for Your Project ?

- **Credible, objective evidence to make your life easier**
 - Demonstrate successes
 - Identify critical issues / risks early
 - Guide difficult decisions
- **If it's not used, don't bother collecting it**
 - Collect it, store it, manage it
 - Analyze it, report it, present it
 - Review it and take corrective actions as necessary

Workshop Continued:

Typical Candidates for Measurement

- You need to status your process activities and products to become effective*
- Typical examples
 - Process compliance
 - Schedule and cycle-time
 - Effort and resources expended on process activities
 - Quality defects in work products and deliverables; rework effort, time

** not only for statusing, but for developing a database for understanding and planning / estimation*

Workshop Continued: **Keep it Simple!**

- **Keep it simple and practical**
- **Measure what you really need**
 - Reuse existing measures if possible
- **Integrate with processes—not separately**
- **Let all know what is being collected and why**
 - Share results
 - Don't use to punish, but to inform and learn
- **Measures are an aid—not a replacement for all one needs to manage efficiently and effectively**

BSMO PI Interim Assessment Results

June 2002 Informal CMM Based Assessment - Internal Process Improvement

Some Draft / Preliminary Results

- Not enough time has past to implement all new processes / procedures across full acquisition life cycle
- Some pilot projects are not yet in a phase to trigger some processes / activities
- Some pilot projects cannot fully implement process measurements until new processes / procedures are fully underway [e.g., stable]
- Opportunity of doing additional measurements beyond the very simple / basic [e.g., plan vs actual key activities] is a challenge
- A few indicate contractor measures (e.g., EV) would relate to acquisition project's process measures

BSMO PI Measurement Experience So Far

- **Projects attempting Level 2 of a CMM must first be first fully aware of new processes / procedures before process measurements can be most useful**
- **Start simple and small...but useful**
 - Limited resources dictate that only the most useful and efficient measures be implemented (keep asking why for each desired measure)
 - Collecting effort data in an organization is challenging if not part of an infrastructure with a Work Breakdown Structure at an appropriate level
- **Some projects are schedule driven and resource constrained, and additionally react to “ad-hoc” work requests**
 - This behavior illustrates need for effort, schedule, and quality measurements to back up need for more resources and reasonable schedules
- **BSMO has traditionally depended mostly on PRIME for detailed planning and estimation**
 - This recognized shortcoming is now being worked (with MITRE support)
 - Again, illustrates another reason for the need for a good measurement program and database to improve planning / estimation capability

BSMO PI and Measurement Next Steps

- **Update processes and procedures, including measurements, based on CBA-IPI findings**
- **Implement more training, including measurement workshops, to institutionalize and gain further experience in repeatability**
- **Develop more specific measurement examples as appropriate**
- **Begin developing an organizational measurement database for improving estimation and impact analysis, risk analysis, etc.**
- **After Software Capability Evaluation in December**
 - Further fine tuning, as necessary
 - Begin to roll out processes / procedures to all BSMO projects
 - Begin preparing for SA-CMM® Level 3 maturity goals
 - Consider Systems Engineering processes (e.g., CMMI, SECM)
- **Integrate Estimation and Enterprise / Program Performance Management measurement aspects into an overall approach**

Contact Information

- **Lloyd Anderson, IRS Business Systems Modernization Office (BSMO)** - IRS Sponsor, PI Lead
 - LLOYD.L.ANDERSON@irs.gov
- **Don Gantzer, The MITRE Corporation** - supports IRS PI program
 - dgantzer@mitre.org
- **Matt Fisher, Software Engineering Institute** - consults to IRS
 - mjf@pil.net
- **Dave Zubrow, Software Engineering Institute** - consults to IRS
 - dz@sei.cmu.edu
- **Dennis Goldenson, Software Engineering Institute** - consults to IRS
 - dg@sei.cmu.edu
- **Arnold Smith, The MITRE Corporation** - leads support to IRS PI Program
 - awsmith@mitre.org



Questions?



Backup Slides

IRS Organizational Modernization Overview

Taxpayer Characteristics (Estimates)

	Wage and Investment	Small Business and Self-Employed	Large and Mid-Size Business	Tax Exempt and Government Entities
Number of Filers	88 million	45 million	210,000	2.4 million
Number of individual taxpayers	116 million	—	—	—
Total tax liability (billions)	\$380	\$915	\$466	\$103
Average tax liability per filer	\$4,310	\$20,231	\$2,231,274	\$42,698
Gross cash paid (billions)	\$46	\$790	\$712	\$221
Average number of transactions with IRS per filer/year	1 – 4	4 – 60	60+	60+
Percent preparing own returns	59%	20%	—	—
Assets regulated	—	—	—	\$7 trillion
Average number of returns filed per filer	1.1	2.7	3.5	1.7

MITRE's Center for Enterprise Modernization

The MITRE Mission:

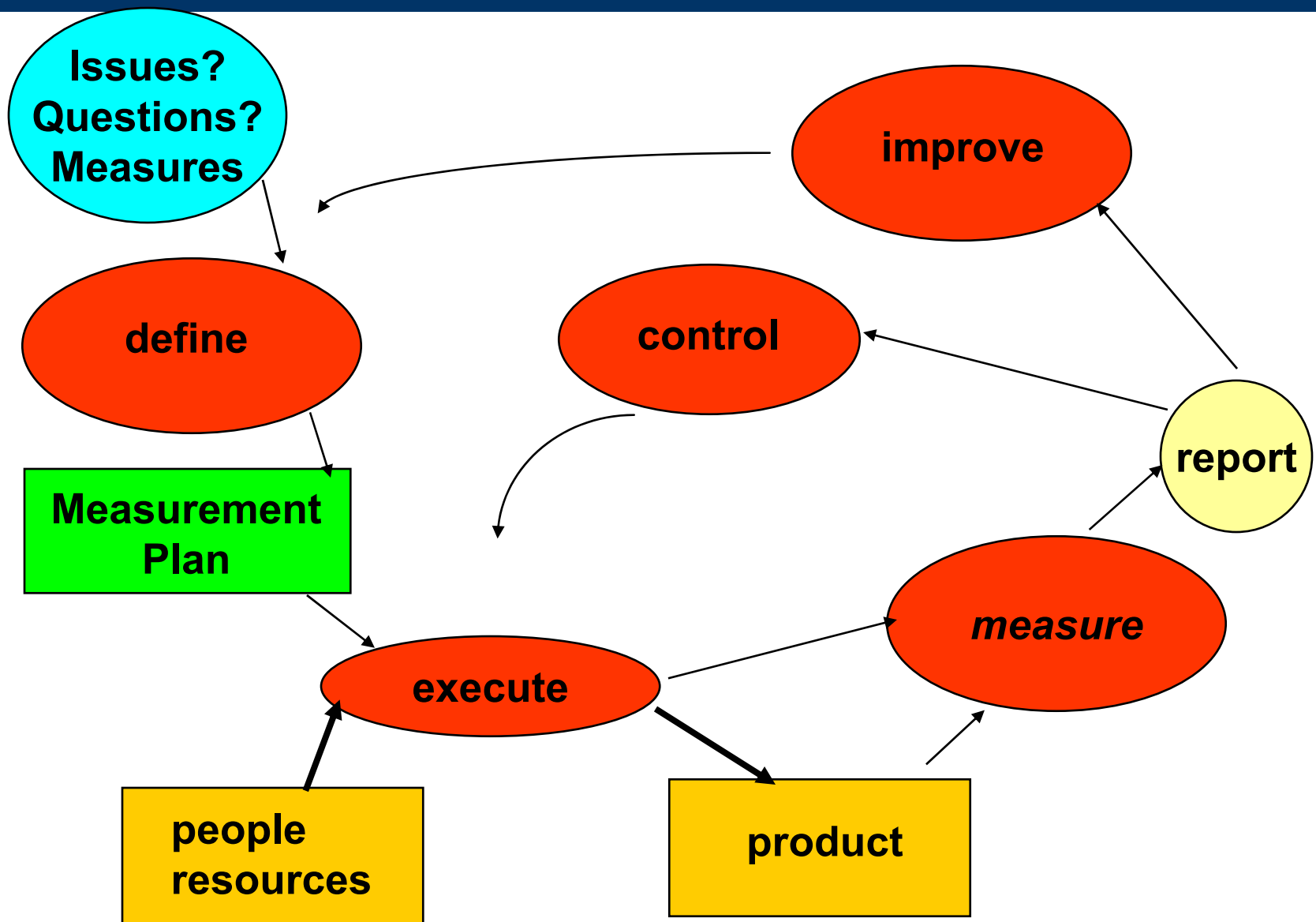
As a **public interest company**, in partnership with the **government**, MITRE addresses **issues of critical national importance**, combining **systems engineering** and **information technology** to develop innovative, **viable solutions that make a difference**.

The Center for Enterprise Modernization (CEM)* Mission:

Working in the **public interest** to operate a **federally funded research and development center** under the sponsorship of the IRS, we are **dedicated** to **advancing enterprise modernization** across government.

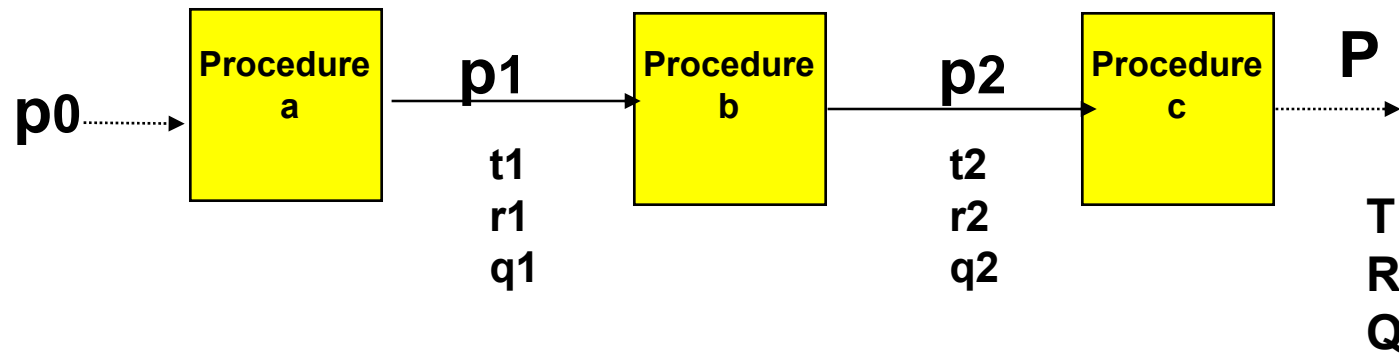
*CEM is MITRE's IRS FFRDC

Process Measurement Activity Flow



Measuring a Process

Pre-process



Post-process

t = time [cycle-time]
 r = resources [\$, effort]
 q = quality [defects]
 p = product size, units

Effectiveness = q/p
Productivity = p/t , p/r
Efficiency = f
[productivity, effectiveness, a norm]