

# CMMI

## How To Help Prevent Medicaid IT Disasters





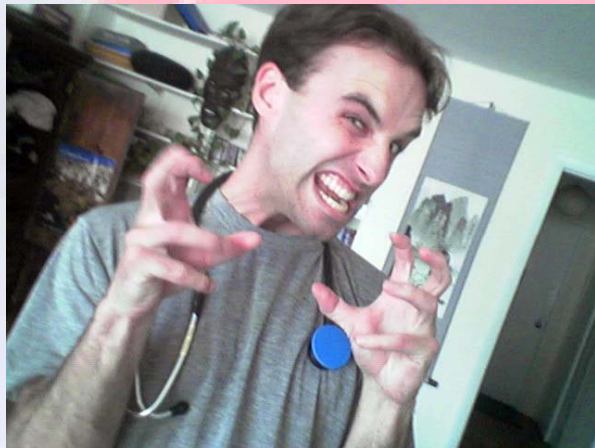
**To err is human but to really foul things up requires a computer.**

**Anonymous**

# Grace Hopper's Bug



# Less Benign Impact of Today's MMIS System Failure



# Overall IT Industry Project Failures

- Meta Group (2001) – 55 to 75% of CRM projects fail
- InfoWorld (2001) - 3 out of 10 projects fail
- Avanade (2007) – 40% of business experienced IT project failures between 2004-2006
- KPMG (2005) - nearly half of survey respondents report at least 1 project failure in past year
- Standish Group Chaos Report (2006) – 34% of projects completed on time, on budget & specified functionality; up from 16% in 1994!

# Those in Government IT Should Not Throw Stones in Glass Houses

- North American Computer Audit, Control & Security Association (2008)
  - More than 40% of responding government agencies recently “killed” an IT project prior to implementation
- Medicaid System Failures
  - Cancelled MMIS projects
  - Major cost overruns
  - Multi-year schedule slippage
  - Inability to perform key functions correctly
  - Throw-away systems that need to be replaced when proprietary technology becomes obsolescent
  - Expensive to maintain and operate

# Top 10 Indicators of Failed Projects (Standish Group)

1. Incomplete requirements
2. Lack of user involvement
3. Lack of resources
4. Unrealistic expectations
5. Lack of executive support
6. Changing requirements & specifications
7. Lack of planning
8. Didn't need it any longer
9. Lack of IT management
10. Technical illiteracy



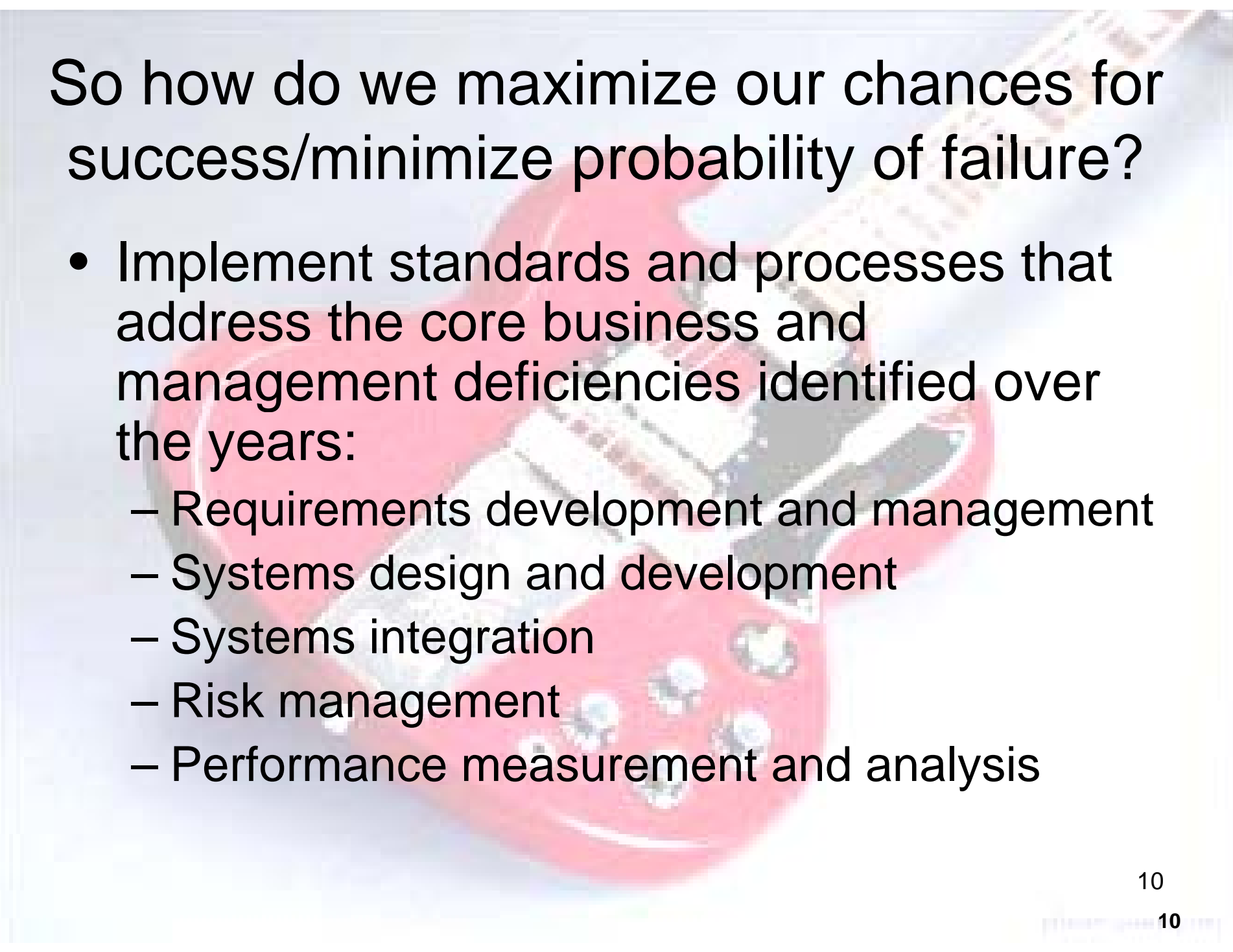
# Top 5 Factors in Successful Projects (Standish Group)

1. User involvement
2. Executive management support
3. Clear requirements
4. Proper planning
5. Realistic expectations

# Lessons



- Most failing projects don't fail because of technology
- Most fail because of problems with the human side of the equation:
  - Defining goals
  - Defining requirements
  - Project management
  - Communication
  - Managing expectations
  - Management support



So how do we maximize our chances for success/minimize probability of failure?

- Implement standards and processes that address the core business and management deficiencies identified over the years:
  - Requirements development and management
  - Systems design and development
  - Systems integration
  - Risk management
  - Performance measurement and analysis

# Capability Maturity Model Integration (CMMI)

- An IT quality assurance methodology focused on process improvement that was developed by the Carnegie Mellon Software Engineering Institute (SEI)
- Originally developed in 1987 and currently incarnated as CMMI Version 1.2 in 2006 in two “constellations”
  - CMMI for Development (developing products and services)
  - CMMI for Acquisition (acquiring products and services)
- New CMMI for Services under development
- Qualifying organizations provide demonstrable adherence to internationally recognized best practices in IT project management and development standards

# Benefits of CMMI-DEV

- Better quality, costs and schedule adherence in software development
- Helps evaluate your potential IT contractors if you are a purchaser of such services
- Improves marketing and business development opportunities if you are a contractor:
  - Recommended by GAO for federal contractors on “high risk” projects
  - Required by DOD for many IT projects
    - Level 2 minimum
    - Level 3 preferred
  - Required by SBA for IT projects over certain size

# Benefits of CMMI-DEV

- SEI developed 7 measures that are measured in CMMI organizations
  - Process adherence
    - “Significant,” “major,” and “improved” adherence to quality engineering standards (multiple companies)
  - Cost
    - Median improvement of 34% per SEI
    - 20% reduction in per unit software costs (Lockheed Martin)
    - 33% reduction in costs to fix defects (Boeing Australia)
    - Increased accuracy in cost estimation (Raytheon)
  - Schedule
    - Median improvement of 50% per SEI
    - 50% reduction in release turn around time (Boeing Australia)
    - Increased % of milestones met from 50% to 95% (GM)
    - Reduced schedule variance by over 20% (undisclosed company)

# Benefits of CMMI-DEV

- SEI developed 7 measures that are measured in CMMI organizations
  - Productivity gains
    - 61% median improvement per SEI
    - 30% increase in software productivity (Lockheed)
    - 25% productivity increase (Siemens India)
    - Significantly improved productivity (Harris Corp.)
  - Quality
    - 48% median improvement per SEI
    - Reduced defects per millions over 50% (Lockheed)
    - Met defect goals (Northrup Grumman)
    - Substantial reduction in code defects (Harris Corp.)

# Benefits of CMMI-DEV

- SEI developed 7 measures that are measured in CMMI organizations
  - Customer satisfaction
    - 14% median improvement per SEI
    - Improved average customer satisfaction rating by 10% (Siemens India)
    - Increased performance award fees by 55% (Lockheed Martin)
    - Earned “Exceptional” rating in every category by customer (Northrup Grumman)
  - ROI
    - 4:1 median improvement per SEI
    - 2:1 ROI (Siemens India)
    - 5:1 ROI (Accenture)
    - 13:1 ROI (Northrup Grumman)

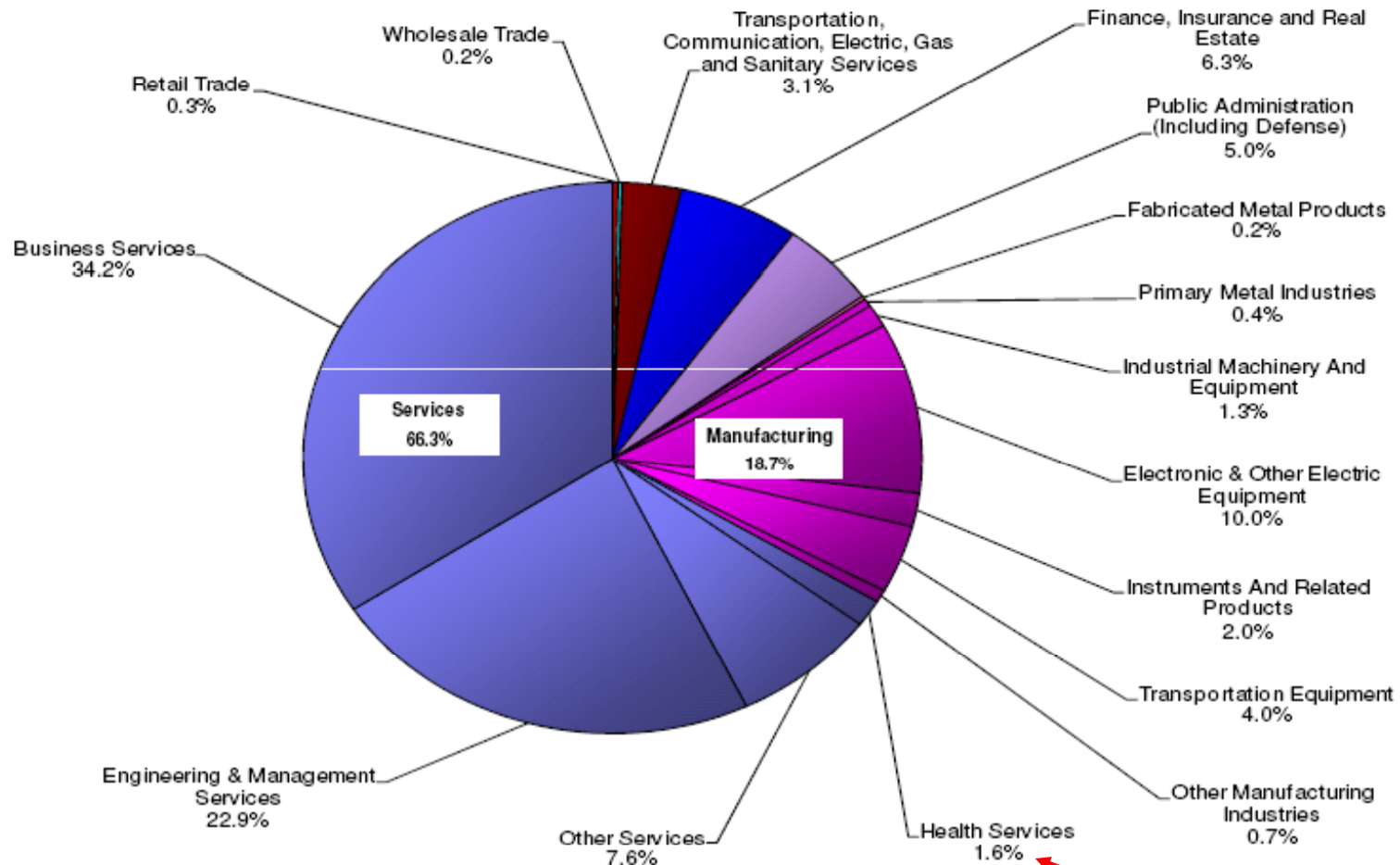
# Who Gets CMMI Appraised?

- Public sector organizations and companies in many industries
  - Arizona AHCCCS IT, only known Medicaid IT organization with CMMI (Level 2)
  - Others in Medicaid industry include Accenture, ACS (older CMM standard) Dyncorp, EDS, IBM, Infosys, KPMG, Lockheed, Northrup, SAIC, Tata, TRW, and Wipro (but may not apply to all civilian federal, state, and local lines of business)
- Organizations and companies in 61 countries
- How appraisals since many to date?
  - 1581 appraisals 2002 - 2006
  - 1377 organizations 2002 - 2006



# Organization Type

Based on Primary Standard Industrial Classification (SIC) Code

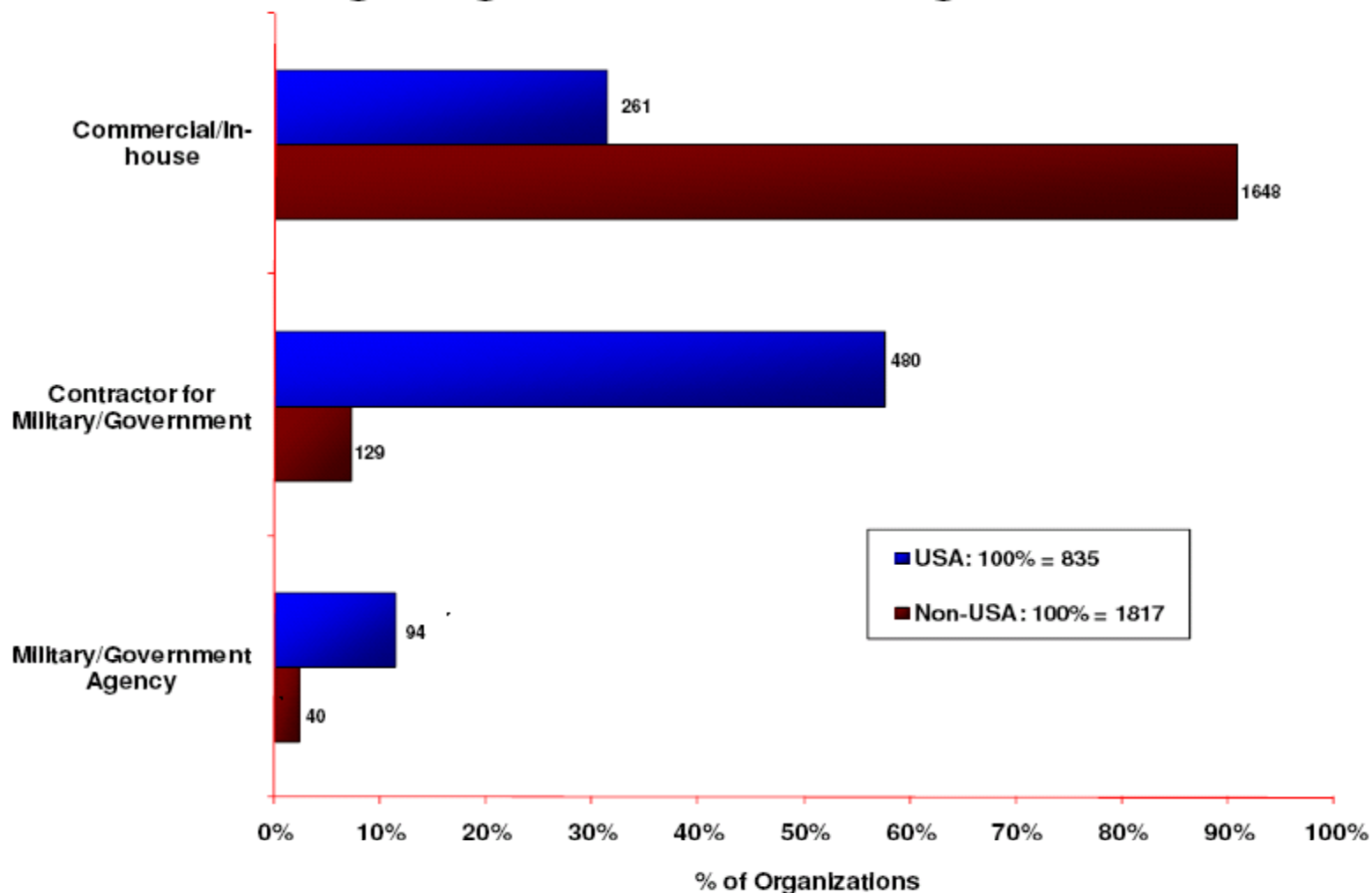


Not very many!

Based on 1784 organizations reporting SIC code. For more information visit: <http://www.osha.gov/oshstats/sicser.html>



# USA and Non-USA Reporting Organization Categories



Based on 839 USA organizations and 1817 Non-USA organizations reporting an organization category

# Climbing the CMMI Maturity Model

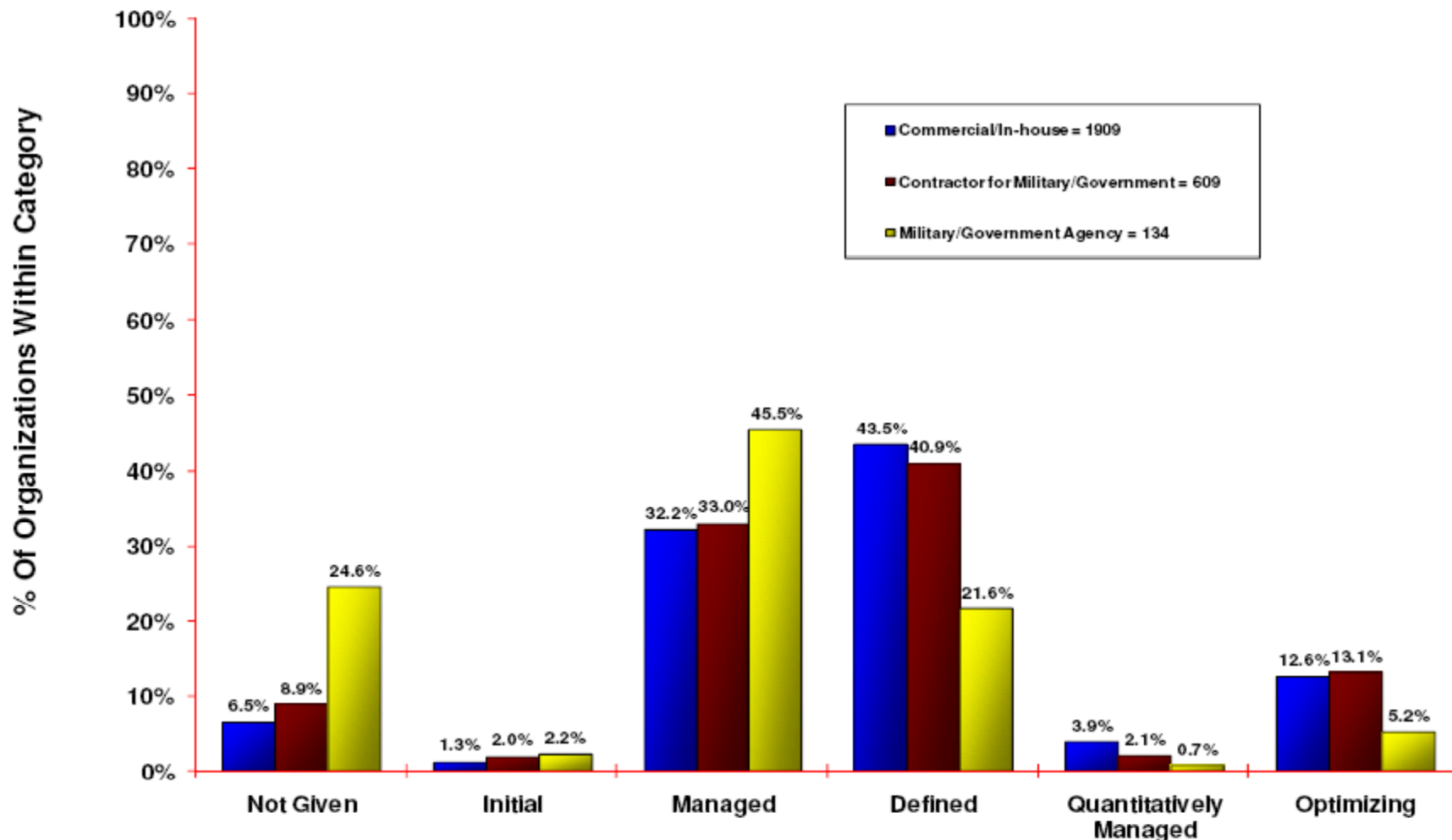


# CMMI Maturity Model

- 5 levels of increasing maturity
  - Level 1: Performed (like MITA Level 1 – everyone does it, but not well, not repeated, and not institutionalized)
  - Level 2: Managed (basic infrastructure in place to support the process)
  - Level 3: Defined (organization-wide standards, process descriptions, and procedures exist)
  - Level 4: Quantitatively managed (processes are controlled using statistical and other quantitative techniques)
  - Level 5: Optimizing (Improving Level 4 processes based on an understanding of the common causes of variation inherent in the process)



# Process Maturity Profile by Reporting Organization Categories

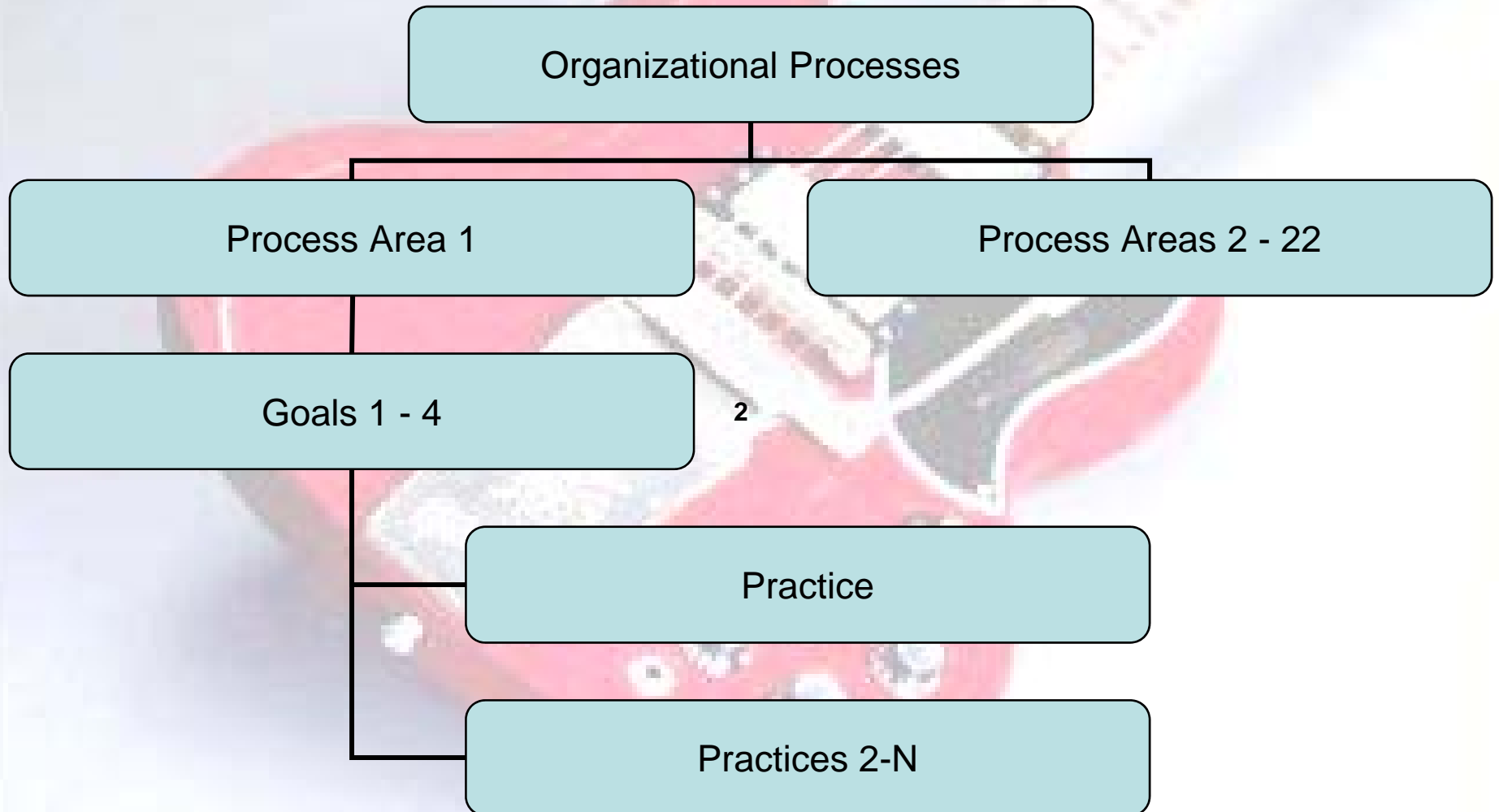


Based on most recent appraisal of 2652 organizations reporting an organization category

# CMMI Approaches

- Two ways to get appraised for Level 2 or above:
  - Staged – most common
    - Based on achieving desired level of maturity model for the applicable 22 Process Areas
  - Continuous – less common, especially for new appraisals
    - Based on achieving desired capability level for desired four major process area categories

# CMMI-DEV Framework



# Staged Appraisal Required Practices by Maturity Level

Maturity Model Level	Number of Practices	Cumulative Practices
1	0	0
2	7	7
3	11	18
4	2	20
5	2	22

# Process Areas by Maturity Level

Abbreviation	Name	Process Area	Maturity Level
REQM	Requirements Management	Engineering	2
PMC	Project Monitoring and Control	Project Management	2
PP	Project Planning	Project Management	2
SAM	Supplier Agreement Management	Project Management	2
CM	Configuration Management	Support	2
MA	Measurement and Analysis	Support	2
PPQA	Process and Product Quality Assurance	Support	2
PI	Product Integration	Engineering	3
RD	Requirements Development	Engineering	3
TS	Technical Solution	Engineering	3
VAL	Validation	Engineering	3
VER	Verification	Engineering	3
OPD	Organizational Process Definition	Process Management	3
OPF	Organizational Process Focus	Process Management	3
OT	Organizational Training	Process Management	3
IPM	Integrated Project Management	Project Management	3
RSKM	Risk Management	Project Management	3
DAR	Decision Analysis and Resolution	Support	3
OPP	Organizational Process Performance	Process Management	4
QPM	Quantitative Project Management	Project Management	4
OID	Organizational Innovation and Deployment	Process Management	5
CAR	Causal Analysis and Resolution	Support	5



# Practices by Goal

(Example: Project Planning Process Area)

Abbreviation	Project Planning Goals	Project Planning Practices
SG1	Establish Estimates	
SP1.1		Estimate Scope of the Project
SP1.2		Establish Estimates of Work Product and Task Attributes
SP1.3		Define Project Lifecycle
SP1.4		Determine Estimates of Effort & Cost
SG2	Develop a Project Plan	
SP2.1		Establish the Budget and Schedule
SP2.2		Identify Project Risks
SP2.3		Plan for Data Management
SP2.4		Plan for Project Resources
SP2.5		Plan for Needed Knowledge & Skills
SP2.6		Plan Stakeholder Involvement
SP2.7		Establish the Project Plan
SG3	Obtain Commitment to Plan	
SP3.1		Review Plans that Affect the Project
SP3.2		Reconcile Work & Resource Levels
SP3.3		Obtain Plan Commitment

# Standard CMMI Appraisal Method for Process Improvement (SCAMPI)

- Method by which CMMI maturity is assessed
- Must be performed by an SEI-approved independent appraiser who compares documented compliance against the CMMI standards
- Requires two or more relevant projects
- Assessment is good for three years
- Three types of assessment:
  - SCAMPI A: only one with official rating
  - SCAMPI B:
  - SCAMPI C:

# SCAMPI Appraisal Classes

Requirements	Class A	Class B	Class C
<b>Types of Objective Evidence Gathered</b>	Documents and interviews	Documents and interviews	Documents or interviews
<b>Ratings Generated</b>	Goal ratings required	Not allowed	Not allowed
<b>Organizational Unit Coverage</b>	Required	Not required	Not required
<b>Minimum Team Size</b>	4	2	1
<b>Appraisal Team Leader Requirements</b>	Lead appraiser	Person trained and experienced	Person trained and experienced

# SCAMPI Appraisal Process



- SCAMPI appraisal process consists of:
  - Preparation
  - On-site activities
  - Preliminary observations
  - Findings
  - Ratings
  - Final reporting
  - Follow-on activities

# What Does It Take?



- Time – 6 to 12 months for most organizations to obtain Level 2 appraisal
- Money – “5 to 6 figures” depending on scope of the appraisal and size and complexity of the organization
- Commitment
  - Executive management
  - Middle management
  - PMs, developers, analysts, and all other team members

# What Can't CMMI Do?

Dr. Rick Hefner, a leading CMMI appraiser, states that “a CMMI appraisal indicates the organization’s capacity to perform the next project, but cannot guarantee that each new project will perform in that way.”

# What Can You Do?

- Adopt CMMI-DEV standards and obtain SCAMPI Level 2 or higher appraisal
- If you cannot be CMMI appraised, incorporate internally as much as possible, e.g., ANSI 748-a Earned Value Management
- Require your IT vendors to either have or achieve Level 2 by start of project and Level 3 by end of project. Could provide additional evaluation points for Levels 4 and 5.
- Evaluate CMMI Services when finalized to see if appropriate for Fiscal Agent business operations
- Could consider alternative QA methodologies such as ISO

# Earned Value Management (EVM)

- Earned Value (EV) is calculated by adding up the budgeted cost of every activity that has been completed using Actual Cost and Planned Value (Cost) to estimate:
  - Schedule Variance (ahead or behind schedule)
  - Cost Variance (ahead or behind on budget)
  - Schedule Performance Index (run rate on schedule)
  - Cost Performance Index (burn rate on budget)

# How Do You Start?

- Learn more about CMMI at <http://www.sei.cmu.edu/cmmi/>
- If you decide to start, hire a competent, SEI-certified CMMI consultant and appraiser



A SCAMPI-A v1.2 appraisal conducted on

**27-30 November 2007**

has determined that

**Fox Systems, Inc.  
Federal Consulting and IT**

has achieved

**Maturity Level 2**

for CMMI v1.2

A handwritten signature in black ink, appearing to read "Rick Hefner".

*Rick Hefner*  
*SEI Authorized SCAMPI Lead Appraiser*

CMMI Maturity Level

