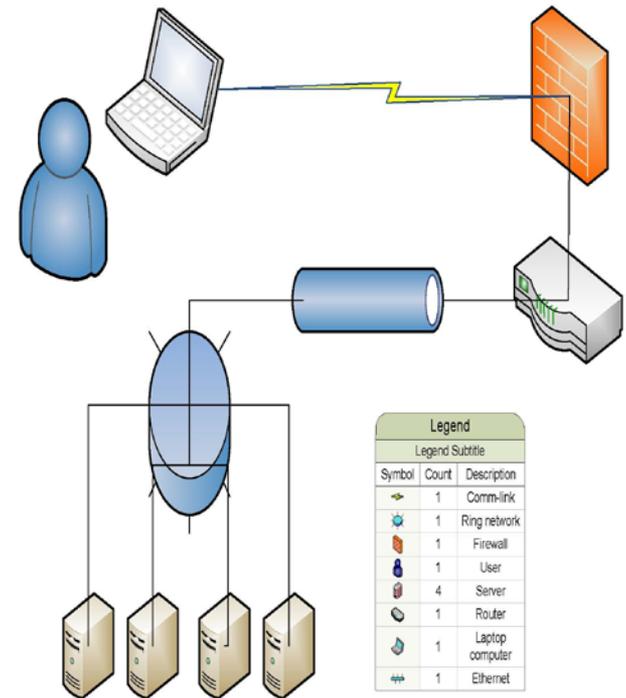




Data Mining (DM) Tools Helping 11 Agencies Identify Fraud in Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs

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SBIR/STTR Controls and Data Mining Overview

- **SBIR/STTR Background:**
 - Definitions; Phases
 - Participating Agencies
 - What Governs
 - Data Stored
 - Data Originate
 - Funds Tracked
 - Certification Controls in the Programs
- **Data Mining (DM):**
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 - Potential Fraud Indicators
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 - DM Example NASA EHB and TECHNet for Certifications Not Completed or Anomalies
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SBIR/STTR Controls and Data Mining Overview (Cont)

- **DM Other Certification Controls:**
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 - No or Inadequate Facilities
 - Exploited Principal Investigator (PI)
 - No Subcontract Certification Agreement / Limits / Report
- **DM Duplication Controls:**
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 - Duplicate Proposal Submission or Duplicate Award Funding
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- **DM Other Controls:**
 - Substandard Performance
 - Defective Pricing
 - Invoice Lacked Certification or Cost Break-out
 - Invoiced for Unallowable Costs or Mischarging Costs
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 - No Procurement Integrity
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SBIR/STTR Definitions

- The Small Business Innovation Research (SBIR) program is a highly competitive program that encourages domestic small businesses to engage in Federal Research/Research and Development (R/R&D) with potential for commercialization, funding for program is computed at 2.5% of the extramural research budget for all agencies with a budget greater than \$100M per year
- Small Business Technology Transfer (STTR) is another program that expands funding opportunities in the federal innovation research and development (R&D) arena, funding for the program is computed at 0.3% of the extramural research budget for all agencies with a budget greater than \$1B per year



SBIR/STTR Phases

- **Phase I**
 - Feasibility Study, Proof of Concept
 - \$150K Max, for 6 Months
- **Phase II**
 - Full Research and Development Effort
 - \$1M Max, for 12 Months
- **Phase III**
 - Commercialization Stage
 - Seek External Funding [No Use of SBIR funds]

**** Only Phase I winners may apply for a Phase II. Phase I and II awardees can move to Phase III.**



11 SBIR/STTR

Participating Agencies

- SBIR DHS Department of Homeland Security
- SBIR DOC Department of Commerce – (NOAA/NIST)
- SBIR/STTR DOD Department of Defense
- SBIR DOE Department of Energy
- SBIR DOT Department of Transportation
- SBIR/STTR ED Department of Education
- SBIR EPA Environmental Protection Agency
- SBIR/STTR HHS Department of Health & Human Services (NIH)
- SBIR/STTR NASA National Aeronautics Space Administration
- SBIR/STTR NSF National Science Foundation
- SBIR/STTR USDA Department of Agriculture



What Governs the SBIR/STTR Programs

SBIR Program Reauthorization Act of 2000, Public Law 106-554, amended section 9 of the Act (15 U.S.C. 638)

- Currently under a CR

Section 9(j) of the Small Business Act (Act)

- Requires Small Business Administration (SBA) to issue an Program Policy Directive for the general conduct of the Program within the Federal Government



Where is the SBIR/STTR Data Stored

Small Business Administration (SBA) General Services Administration (TECHNet)

- SBA Program Management Office (PMO) uses TECHNet an internet-based database of information containing SBIR and STTR awards from Government Agencies
- The Contracting Officer (CO) and PMO relies heavily on the technical officers (TO) to provide insight to the SBC on needs and missions as the SBC performs the research and/or develops the technology

General Services Administration's Federal Procurement Data System (FPDS)

- The FPDS contains government awards and grants with an estimated value is at least \$3K



Where did the NASA's SBIR/STTR Data Originate and Funds Tracked

NASA SBIR/STTR Electronic Handbooks (EHB)

- NASA's PMO utilizes a paperless electronic process for management of the SBIR/STTR programs

NASA's Business Warehouse (BW)

- NASA's BW is an enterprise-wide hub that enables data analysis from NASA's accounting and finance system and other business applications, including external data sources such as databases and the Internet



Certification Controls in the SBIR SBCs

➤ Agencies Develop Certifications

- Ownership (Woman, HUBZone, Minority, Veteran, Service Disabled Veteran)
- Organized as a for-profit US based business, at least 51% owned by US individuals and independently operated, less than 500 employees including affiliates
- Is government equipment or facilities required (cannot use funds)
- Principal Investigator (PI) is at least 51% "primarily employed" by SBC
- Proposed all subcontracts/consultants and within limits
- Work under this project only submitted once for Federal funding, no other Federal funding has been received for work under this project
- Certified the invoice data supplied to the Government (current, complete, and accurate)



Certification Controls in the STTR SBCs

- **All previous certifications plus the following**
 - Signed formal cooperative R&D effort
 - Minimum 40% by SBC
 - Minimum 30% by US research institution
 - US research institution
 - Non-profit college or university
 - Other non-profit research organization
 - Federal funded research and development center (FFRDC)
 - Intellectual Property Agreement
 - Allocation of rights in intellectual property and rights to carry out
 - Follow-on R&D and commercialization effort



How to Exploit the Data Based on Certification Controls

- **Data mining (DM) is**
 - the analysis step of the knowledge discovery in databases process
 - a relatively young and interdisciplinary field of computer science
 - the process of discovering new patterns from large data sets
 - involving methods at the intersection of
 - artificial intelligence
 - machine learning
 - statistics
 - database systems



Potential Fraud Indicators

- **Potential Fraud Indicators**
 - Lacking Certification
 - Broke Program Rule
 - Duplicate Proposal/Award
 - Substandard Deliverable/Performance
 - Defective Pricing
 - Faulty Invoicing
 - Mischarging Costs
 - Excesses Transferred
 - No Procurement Integrity



Criminal Violations

- **Criminal Violations**
 - False Statements
 - Theft of Public Monies
 - Criminal Conspiracy
 - Obstruction of Justice
 - Wire Fraud
 - Fraud Against the US
 - False Claims
 - Providing/Accepting Kickbacks
 - Conflict of Interest
 - Money Laundering



Not Socially and Economically Disadvantaged-Owned SBC

SBC did NOT complete certification or made a false statement on certification orally or written, sworn or unsworn, signed or unsigned, made knowingly and willfully, and made to an US agency, a Government contractor, or someone acting on behalf of Government

DM Step 1: SBC did NOT complete certification

- DM EHB (Proposal~CertificationValue) for certification completion

Potentially indicating SBC did NOT qualify for programs

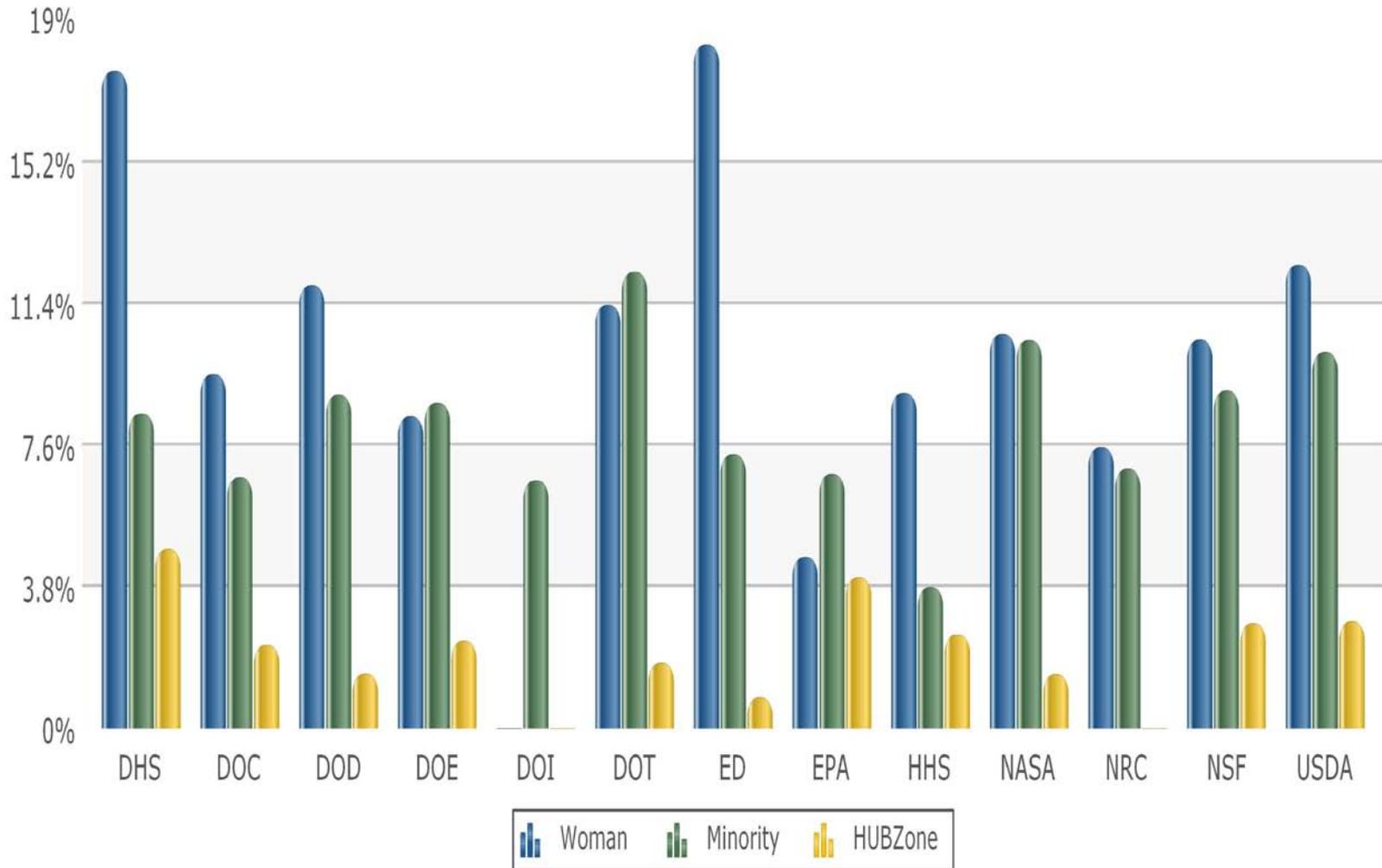
DM Step 2: SBC made a false statement related to the SBC's ownership "at least 51 percent owned by one or more women"

- DM EHB (Firm~Certification) to verify the accuracy of the certification
- DM TECHNet (TECHNET_IMAWRDPHSTBL~WomanOwned) to identify any anomalies
- DM FPDS (IsWomenOwned) to identify any anomalies

Potentially indicating SBC influenced the outcome of the Government's decision/action



Percentage SBIR/STTR Awards to Woman / Minority / HUBZone





DM Example NASA EHB & TECHNet Certifications Not Completed or Anomalies

DM NASA EHB to determine if certifications were NOT completed and to capture certification anomalies

- Relationship Join SQL

SQL Anomalies Results:

- **Zero Matches for certifications were NOT completed**
- **Found 2 SBCs with proposal anomalies**

DM TECHNet to capture certification anomalies

- Summary SQL
- Find Duplicates SQL
- Years Over Lap SQL
- Link Back to Summary SQL

SQL Anomalies Results:

- **Found 1,755 SBCs with SBIR/STTR awards that can't determine if they are woman-owned or NOT**



DM Results TECHNet Certification Anomalies

Five TECHNet SBCs with the largest number of conflicting certifications

| ➤ SBC | Cert | Women | MinOfPhYr | MaxOfPhYr |
|---------|------|-------|-----------|-----------|
| ➤ 1511 | 126 | N | 1997 | 2009 |
| ➤ 1511 | 118 | Y | 1997 | 2009 |
| ➤ 3480 | 334 | N | 1987 | 2009 |
| ➤ 3480 | 106 | Y | 1991 | 2009 |
| ➤ 3514 | 266 | N | 1984 | 2010 |
| ➤ 3514 | 107 | Y | 2007 | 2009 |
| ➤ 9575 | 232 | N | 1987 | 2009 |
| ➤ 9575 | 360 | Y | 1988 | 2010 |
| ➤ 17964 | 31 | N | 1986 | 2009 |
| ➤ 17964 | 101 | Y | 1985 | 2009 |



Exceeded Small Business Limits

DM Step 1: SBC did NOT complete certification

- DM EHB (Proposal~CertificationValue) for certification completion
- **Potentially indicating SBC did NOT qualify for programs**

DM Step 2: SBC made a false statement related to “organized as a for-profit US based business, at least 51% owned by US individuals and independently operated, and less than 500 employees including affiliates”

- DM EHB (Firm~address/DUNS & Proposal~num_ employees) to verify accuracy of certification
- DM TECHNet (TECHNET_IMAWRDPHSTBL~address /DUNS & TECHNET_IMAWRDPHSTBL~IMAWRDPHNSMBOFEMPQTY) to identify any anomalies
- DM FPDS (Address/ countryOfOrigin/ placeOfManufacture/ stateOfIncorporation/ countryOfIncorporation/ DUNS/ COBusinessSizeDetermination/ numberOfEmployees /) to identify any anomalies
- **Potentially indicating SBC influenced the outcome of the Government’s decision/action**



No or Inadequate Facilities

DM Step 1: SBC did NOT complete certification

- DM EHB (Proposal~CertificationValue) for certification completion
- **Potentially indicating SBC did NOT qualify for programs**

DM Step 2: SBC did NOT certify they had adequate facilities to perform the work or did NOT provide a detailed description, availability/location of instrumentation, proposed physical facilities

- DM EHB (Proposal~abstract & Contract~address) to verify the accuracy of the certification
- DM TECHNet (TECHNET_IMAWRDPHSTBL~IMAWRDABSTRCTTXT/ address) to identify any anomalies
- DM FPDS (descriptionOfContractRequirement/ address) to identify any anomalies
- **Potentially indicating SBC did little, if any, actual research**



Exploited Principal Investigator (PI)

DM Step 1: SBC did NOT complete certification

- DM EHB (Proposal~CertificationValue) for certification completion
- **Potentially indicating SBC did NOT qualify for programs**

DM Step 2: SBC did NOT certify PI was 51% "primarily employed" by the SBC

- DM EHB (Contract~DUNS/ Contract/ PI Name/ StartDate/ CompletionDate & Proposal~num_ employees) to capture the universe
- DM TECHNet (TECHNET_IMAWRDPHSTBL ~ DUNS/IMAWRDCNTRCTNMB/ IMAWRDPHSPRININVSTGTRLASTNM/ IMAWRDPHNSNMBOFEMPQTY/ IMAWRDPHSYR) to capture the universe
- DM FPDS (DUNS/ PIID/ principalInvestigatorLastName/ numberOfEmployees/ effectiveDate/ currentCompletionDate) to capture the universe
- Data group by DUNS, PI name, countOfAwards, maxOfEmployees, MinDate, MaxDate to obtain total number of awards assigned to PI, by maximum employees during a period
- **Potentially indicating SBC mischarged, unreported use of sub-firm, failed to perform research, or recycled old research**



No Subcontract Certification Agreement / Limits / Report

DM Step 1: SBC did NOT complete certification

- DM EHB (Proposal~CertificationValue) for certification completion
- **Potentially indicating SBC did NOT qualify for programs**

DM Step 2: SBC did NOT report sub-firms

- DM EHB (Proposal~abstracts) to capture any sub-firms
- DM TECHNet (TECHNET_IMAWRDPHSTBL ~IMAWRDABSTRCTTXT) to capture any sub-firms
- DM FPDS (suncontractPlan) to capture any sub-firms
- **Potentially indicating SBC did NOT perform research, recycled, or plagiarized reports**

DM Step 3: SBC did NOT certify they meet subcontract limits

- DM EHB (Proposal~SBC_PERCENT_OF_WORK/RI_PERCENT_OF_WORK) to capture the agreed upon subcontract limits
- DM TECHNet (TECHNET_IMAWRDPHSTBL ~IMAWRDABSTRCTTXT) to capture the agreed upon subcontract limits
- DM FPDS (suncontractPlan) to capture the agreed upon subcontract limits
- **Potentially indicating SBC used defective pricing, inflated subcontract costs, lacked expertise or facilities**



No List of Federally Funded Awards

DM Step 1: SBC did NOT complete certification

- DM EHB (Proposal~CertificationValue) for certification completion
- **Potentially indicating SBC did NOT qualify for programs**

DM Step 2: SBC did NOT certify to the accuracy of the list of federally funded awards

- DM EHB (Contract~contract/phase_1_contract) for any federally funded awards
- DM TECHNet (TECHNET_IMAWRDPHSTBL~ IMAWRDCNTRCTNMB) for any federally funded awards
- DM FPDS (PIID) for any federally funded awards
- **Potentially indicating SBC intentionally hide duplicate Government funding**



Duplicate Proposal Submission or Duplicate Award Funding

DM Step 1: SBC did NOT complete certification

- DM EHB (Proposal~CertificationValue) for certification completion
- **Potentially indicating SBC did NOT qualify for programs**

DM Step 2: SBC did NOT certify that the SBIR/STTR research proposal was NOT submitted to or funded by another Federal Agency

- DM TECHNet (abstract) to capture any potential duplicate proposal or award candidates
- DM FPDS (requirement)) to capture any potential duplicate proposal or award candidates
- **Potentially indicating SBC did NOT actually conduct research or intentionally sought after duplicate Government funding**



Questionable Research or Duplicate Deliverable

DM Step 1: SBC submitted questionable research product that did NOT conform to award specifications or submitted a recycled or plagiarized deliverable

- DM EHB (proposal/Abstract/progress/research/final reports) to obtain general knowledge of the research product
- DM TECHNet (abstract) to benchmark work related to the research product and determine possible non-compliance issues
- DM FPDS (product service code/requirement) to benchmark work related to the research product and determine possible non-compliance issues
- **Potentially indicating SBC**
 - intentionally substituted inferior materials, conducted improper testing, or falsified test records
 - recycled report from prior research as the deliverable, because they did NOT spend award funds on researcher labor
 - plagiarized report from prior research conducted by someone else, because they did NOT possess the expertise or facilities to complete the research



Substandard Performance

DM Step 1: SBC demonstrated substandard performance

- DM EHB (performance evaluation) the performance evaluation and progress/research/final reports completed under the proposal and award
- DM TECHNet (abstract) to capture work related to the research
- DM FPDS (requirement) to capture work related to the research
- **Potentially indicating SBC**
 - lacked of expertise or facilities
 - spent less on actual research labor than it proposed
 - aware of the TO's lack of oversight to properly assess the progress/research/final reports
 - providing TO a kickback or TO experiencing a conflict of interest



Defective Pricing

DM Step 1: SBC submitted inaccurate, incomplete, or noncurrent cost/pricing data, but did not disclose this to the Government

- DM EHB (budget/cost) to review the proposal's cost or pricing data
- DM TECHNet (amounts) to form a benchmark to evaluate cost or pricing data for accuracy, completeness, and currency
- DM FPDS (modNumber/amounts) to track any modifications to award and form a benchmark to evaluate cost or pricing data for accuracy, completeness, and currency
- DM BW (533M/budget/disbursement) to compare proposal's cost/pricing data and contractor cost reporting to Agency's operating plan and disbursements
- **Potentially indicating SBC**
 - used out-dated standard costs/indirect cost rates
 - failed to disclose the data to significantly increase the award funding
 - created/altered supporting documentation
 - falsified data in proposal resulted in significant variance in proposed/actual costs
 - channeled work or leftover materials through a created company to increase prices and retain materials
 - proposed sub-firm was intentionally substituted with less expensive sub-firm



Invoice Lacked Certification

DM Step 1: SBC did NOT certify the direct labor, material, subcontract, and indirect costs on invoice was current, complete, and accurate

- DM EHB (budget/cost) to review the proposal's cost or pricing data
- DM TECHNet (amounts) to form a benchmark and evaluate invoice data for accuracy, completeness, and currency
- DM FPDS (modNumber/amounts) to track any modifications and evaluate invoice data for accuracy, completeness, and currency
- DM BW (533M/obligation/disbursement) to evaluate invoice data for accuracy, completeness, and currency
- **Potentially indicating SBC's costs were inflated and/or collusion**
 - SBC did NOT certify costs on invoice
 - Agency did establish the accounting obligation stage prior to disbursement
 - Agency did certify invoice for payment

*****DOD, NASA and Coast Guard contractors are required to certify that the data supplied to the Government are current, complete, and accurate at the time of agreement on price for all non-competitive or negotiated procurements exceeding \$500,000**



Invoice Lacked Cost Break-Outs

DM Step 1: SBC did NOT break-out invoice by direct labor, material, subcontract, and indirect costs

- DM EHB (budget/cost) to review the proposal's break-out of cost or pricing data
- DM TECHNet (amounts) to form a benchmark and evaluate invoice data for accuracy, completeness, and currency
- DM FPDS (modNumber/amounts) to evaluate break-out of cost data by direct labor, material, subcontract, and indirect costs for accuracy, completeness, and currency
- DM BW (533M/obligation/disbursement) to compare proposal's break-out of cost data to actual break-out of cost
- **Potentially indicating SBC**
 - overruns on the award were applied to another cost-type award
 - PI's direct labor costs conflicted with program requirements
 - inflated direct labor, material, subcontract, and indirect costs



Invoiced for Unallowable Costs or Mischarging Costs

DM Step 1: SBC invoiced for unallowable costs or mischarged costs

- DM EHB (budget/cost) to review the proposal's for any unallowable or mischarged costs
- DM TECHNet (amount) to evaluate invoice data for any unallowable or mischarged costs
- DM FPDS (modifications/amount) to evaluate invoice data for any unallowable or mischarged costs
- DM BW (533M/obligation/disbursement) to review the invoice for any unallowable or mischarged costs
- **Potentially indicating SBC received public monies through false claim**
 - unallowable: advertising or entertainment or idle facilities costs; bid and proposal costs in excess of a set limit; stock options and some forms of deferred compensation; contributions or donations; contingencies or Interest; losses on other awards; long-term leases of property or equipment; legal costs related to a contractors defense against charges of contract fraud
 - invoiced for: nonexistent employee or sub-firm; inflated direct labor, indirect cost or subcontract work; or excess materials



Funds or Excess Materials Transferred to Commercial Award

DM Step 1: SBC through collusion invoiced for goods not delivered or research not performed, as a result received excess materials or funds to transfer to support a commercial award

- DM EHB (budget/cost) to review the proposal's work orders
- DM TECHNet (awards/abstracts/amounts) to evaluate number of awards, type of work, and cost or pricing data for currency, completeness, and accuracy
- DM FPDS (awards/modifications/product service codes/amounts) to evaluate number of awards, type of work, and cost or pricing data for currency, completeness, and accuracy
- DM BW (533M/obligation/disbursement) to determine if invoices were certified and broke-out by direct labor, material, subcontract, indirect costs, accurate, complete, current, and allowable to the award
- **Potentially Indicating SBC**
 - delivered bulk items in short quantities
 - Inflated quantities of items removed or installed
 - inflated researcher's direct labor rates



No Procurement Integrity

DM Step 1: Agency personnel did NOT annually submit a conflict of interest statement

- DM EHB (Role Desc/Cert Type/Submitted on Date/Assignments) to review annual statements for conflicts submitted by Agency's PMO and TOs
- **Potentially indicating Agency personnel**
 - frequently socialized with the SBC
 - planned to "recommend" that particular SBC or sub-firm for an award
 - planned possible bid rigging scheme for SBC
 - receiving kickbacks from SBC to approve invoice for payment
 - being bribed by SBC using a promised position with the SBC in the future as an incentive

DM Step 2: external evaluators did not submit a statement of interest as required to identify any conflicts

- Contact CO and PMO to review statements for conflicts submitted by external evaluators
- **Potentially indicating external evaluators are influenced the same way Agency personnel are influenced**



DM Websites and Personnel to Contact

- **DM websites and tools to resolve anomalies**
 - Small Business Administration (SBA) (sba.gov)
 - Electronic Subcontracting Reporting System (ERRS) (esrs.gov)
 - Defense Contract Audit Agency (dcaa.mil)
 - Small Business Concerns (SBC)
 - Dun and Bradstreet (dnb.com)
 - Online state incorporation records
 - Online local business license records
 - Google (maps.google.com) (google.com)
 - Yahoo (maps.yahoo.com) (yahoo.com)
 - LexisNexis (lexisnexis.com)
 - iThenticate (ithenticate.com)
 - Tool (WCopyFind)
- **Contact local CO, PMO, and TO and contact other Agencies SA, CO, PMO, and TO with expertise in related or same subject area to assist in resolving anomalies by reviewing the compliance certifications, progress/ research/ final reports submitted, TO's assessment of performance, and any potential indicators of substandard performance**
- **Contact the SBC to resolve anomalies**



Any Questions

Thank You