

Framework for Grant Oversight



INTERNATIONAL WORKSHOP ON ACCOUNTABILITY IN SCIENCE AND RESEARCH FUNDING

JUNE 18-20, 2012

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Overview



- **Overview of Financial Assistance in the U.S.**
- **Framework for Grant Oversight**
- **Federal Grant Reform Initiatives**



U.S. Financial Assistance Overview



- **\$550 billion in awards**
 - 88,000 awardees and 26 Federal grant making agencies
 - Project and research, block, and formula
- **Outcomes are designed to promote public good**
- **Challenges**
 - Limited visibility of how Federal funds are spent by awardees
 - Support for funding requests much less than for contracts
- **American Recovery and Reinvestment Act (2009)**
 - \$840 billion of assistance to stimulate the economy
 - Greater accountability and transparency over spending than ever
- **Opportunities to enhance oversight with less**
 - Automated oversight



Grants Differ From Contracts

GRANTS

Promote services for the
Public Good

- Merit review (competitive)
- Multiple awardees
- Award budget
- No government ownership
- Grant payments
 - Summary drawdowns
 - No invoices for claims
 - Expenditures not easily visible
- Salary percentages

CONTRACTS

Specified deliverables
(Goods and Services)

- Competitive bid process
- One awardee
- Contract Price
- Government ownership
- Contract payments
 - Itemized payment requests
 - Invoices to support claims
 - Detailed costs
- Salary hourly rates



OMB Circular A-133 Single Audit Act



- Annual audits of grantees with expenditures of \$500,000+
 - Compliance and financial testing
 - Internal controls evaluated
 - Sample of award costs tested
 - Institution arranges for CPA firm to conduct audit
- A-133 reports are submitted annually
 - Federal Audit Clearinghouse (electronic report)
 - NSF OIG uses report data for risk assessments
- Offices of Inspectors General (OIGs) have oversight of the CPA firm's audit quality
- A-133 is primarily a management oversight tool
- 40,000 of 88,000 award institutions subject to A-133



Framework for Grant Oversight



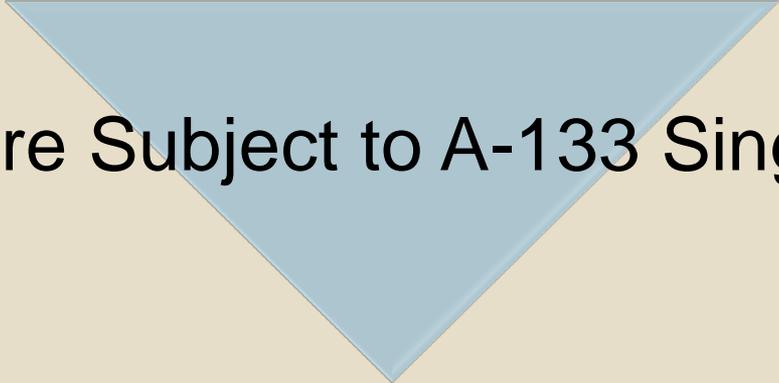
- **Data analytics-driven, risk-based methodology for improving oversight**
 - Identify institutions that may not use Federal funds properly
 - Techniques to surface questionable expenditures
- **Life cycle approach to oversight**
 - Mapping of end-to-end process to identify controls
 - 100% review of key financial and program information
 - Statistical sampling is limited
 - Focus attention on award and expenditure anomalies
- **Complements traditional oversight approaches**
 - Techniques to review process and transactions are similar
 - Transactions for questionable activities are targeted



Audit Capacity to Award Universe



88,000 Recipients of Grant Funding



40,000 are Subject to A-133 Single Audit

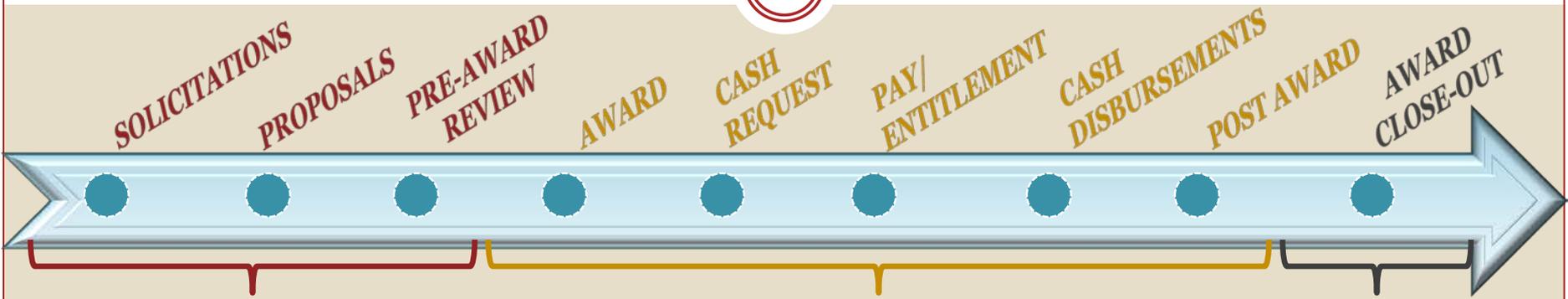
200 OIG Audits

Framework for Grant Oversight
focuses limited resources on
highest risk activities



End to End Process for Grant Oversight

6



PRE-AWARD RISKS	ACTIVE AWARD RISKS	AWARD END RISKS
<ul style="list-style-type: none"> •Funding Over Time •Conflict of Interest •False Statements •False Certifications •Duplicate Funding •Inflated Budgets •Candidate Suspended/Debarred 	<ul style="list-style-type: none"> •Unallowable, Unallocable, Unreasonable Costs •Inadequate Documentation •General Ledger Differs from Draw Amount •Burn Rate •No /Late/Inadequate Reports •Sub-awards, Consultants, Contracts •Duplicate Payments •Excess Cash on Hand/Cost transfers •Unreported Program Income 	<ul style="list-style-type: none"> •No /Late Final Reports •Cost Transfers •Spend-out •Financial Adjustments •Unmet Cost Share



D A T A A N A L Y S I S



Data Sources



- **Internal**
 - Proposals: budgets, panel scores
 - Agency award systems, recipient reporting
- **External**
 - Excluded Parties List System (EPLS)
 - Central Contractor Registration (CCR)
 - Dun and Bradstreet risk scores
 - Tax filings and public records
 - OMB A-133 Single Audit Act reports
- **Recipient financial system records**
 - General ledger and subsidiary ledger
 - Property
 - Travel and purchase card

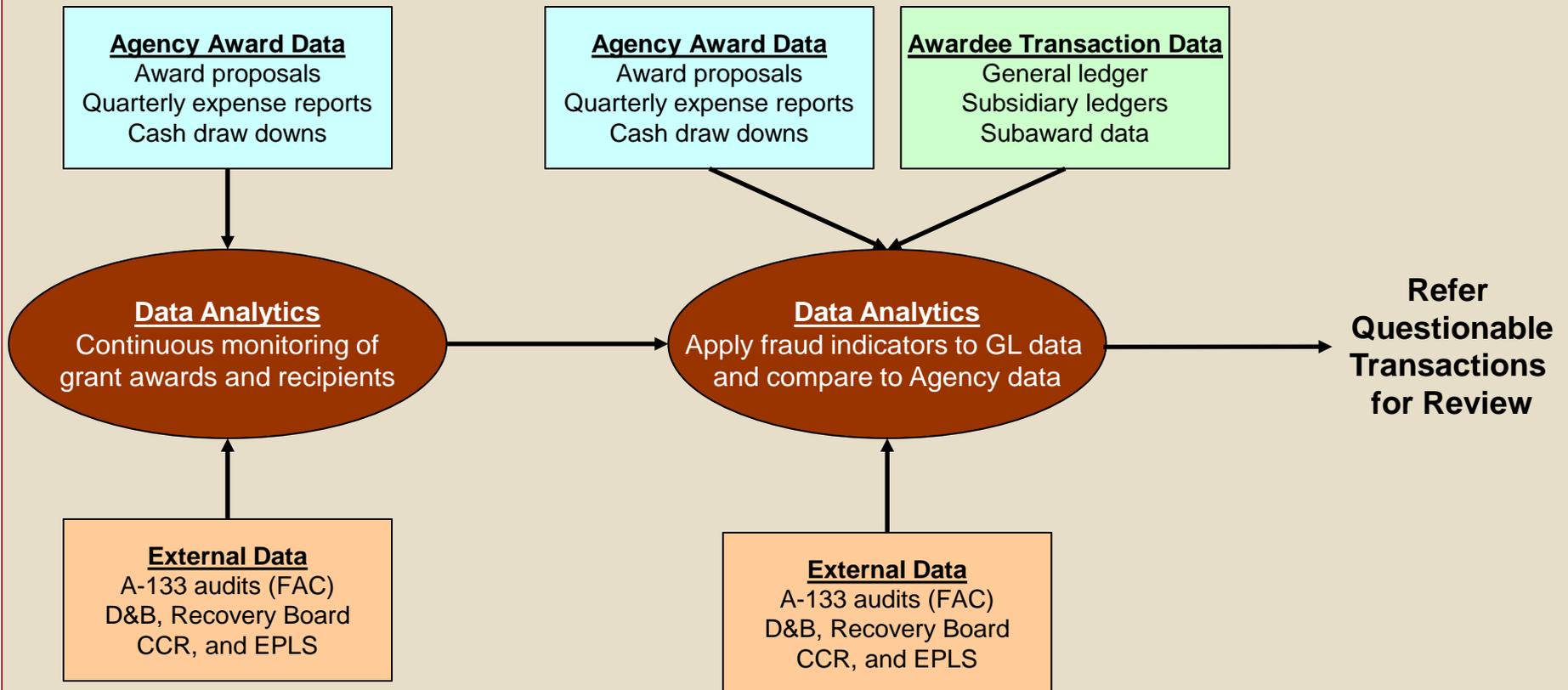


Risk Assessment and Identification of Questionable Transactions



Phase I Identify High Risk Institutions

Phase II Identify Questionable Expenditures





Data Analytics Helps....



- **Determine reliability data fields**
 - Shape of the data (statistics)
 - Completeness of transactions and fields
- **Show anomalies....**
 - within a database
 - between databases
 - and changes in behavior over time
- **Develop risk profiles for comparisons**
 - Awardee profiles
 - Award-type profiles
 - Program profiles

Identification of Higher Risk Institutions and Transactions

Agency Award Data
(Grant Level)

Institution ID	Award ID	Proposal Score	Award Amount	Grant Expiration Date	Expenses To Date	Grant Extensions
XXXX01	X11	51	535,000	12/31/11	325,000	Y
XXXX01	X12	82	875,000	03/31/12	915,658	N
XXXX01	X12	76	1,465,000	06/28/12	998,254	N

Risk Flags
(Grant Level)

PI S&D Flag	Burn Rate Flag	Spend Out Flag	Extension Request Flag	Special Payment Flag	Risk Score
		1	1	1	3
		1			1
1	1				2

Compare grant level risks to GL analysis



Agency Institution Data
(Summarized Award Data at Institution Level)

Institution ID	Active Awards	Dollars	Number Of Draws	Special Payment Status
XXXX01	20	15,120,963	72	Yes
XXXX02	37	34,361,394	10	No
XXXX03	45	66,452,125	27	Yes

External Data
(Institution Level)

ELPS	D&B	ROC	FAC	990

Risk Flags
(Institution Level)

Draw Spike Flag	Spend Out Flag	ELPS Match Flag	FAC Findings Flag	Special Payment Flag	Risk Score
	1	1	1	1	4
1		1			2
1	1	1	1	1	5

PHASE I

Review Institutions with higher risk scores

Web-accessible Sources

Institution's General Ledger Data
(Transaction Level)

Award ID	Source Code	Award Expiration Date	Transaction Date	Dollars	Data Entry Staff Code	Comment Field
X11	PAY	12/31/11	2/15/11	84,456		
X11	AP	12/31/11	9/13/11	31,742		Equip
X11	AP	12/31/11	9/16/11	22,541		Trav

Risk Flags
(General Ledger Transaction Level)

Draw Spike Flag	Burn Rate Flag	Spend Out Flag	Travel Expenses Flag	Cost Transfer Flag	Risk Score
1		1		1	3
1		1			2
			1		1

PHASE II

Review transactions and groups with higher risk scores



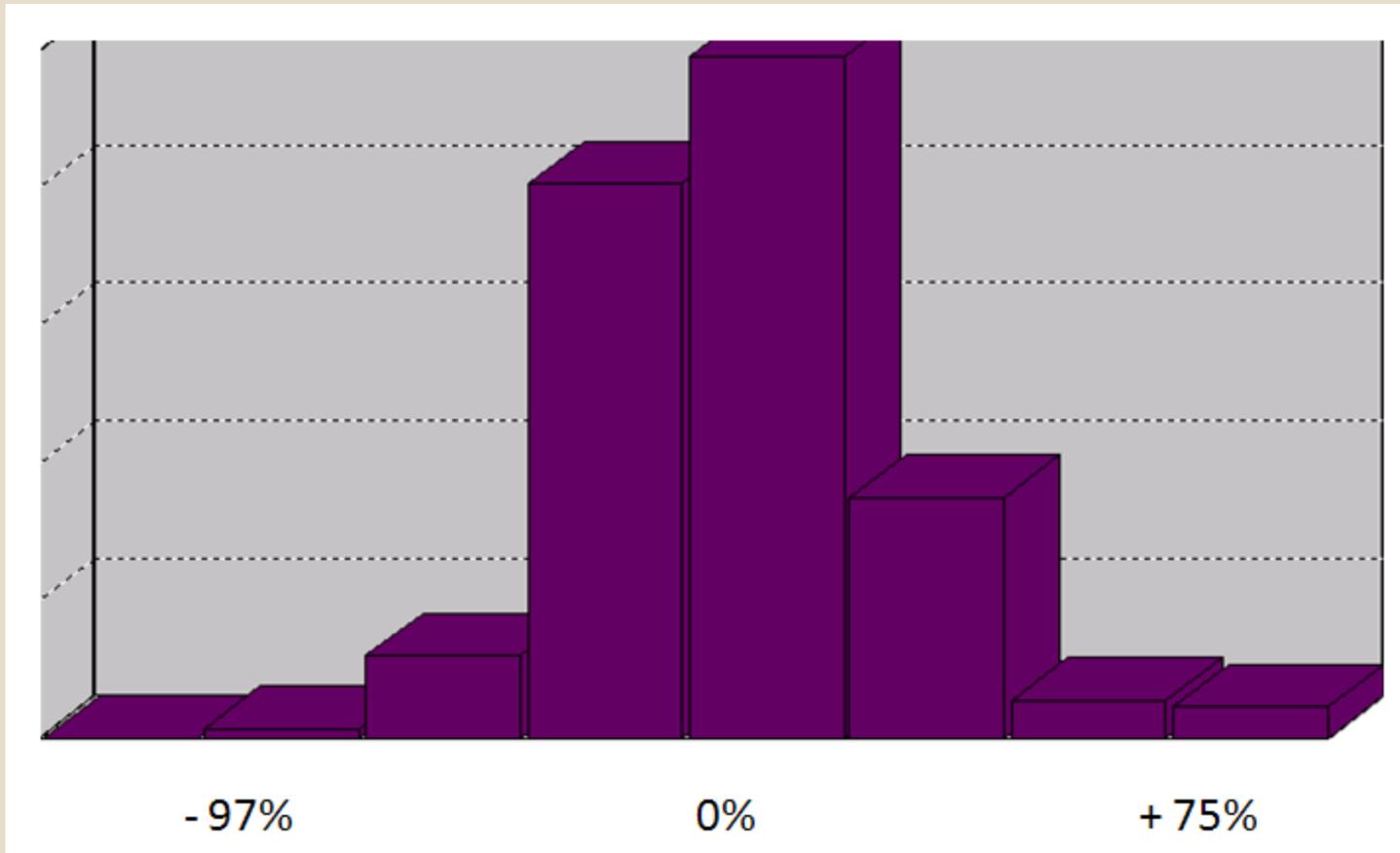
Awardee Profile – Burn Rate



Award	Amount (\$K)	Expended (\$K)	% Expend	Total Days	Days Active	% Total Days	Burn Rate
1	10,000	9,000	90%	1095	769	70%	+28%
2	5,000	4,000	80%	1095	524	48%	+67%
3	2,000	1,500	75%	1095	404	37%	+103%
4	1,000	995	99%	366	200	77%	+30
5	20,000	12,000	60%	1826	500	27%	+122%
6	10,000	7,000	50%	1826	1600	88%	-43%
Awardee Totals	48,000	34,495	72%	7,303	3,997	47%	+53%

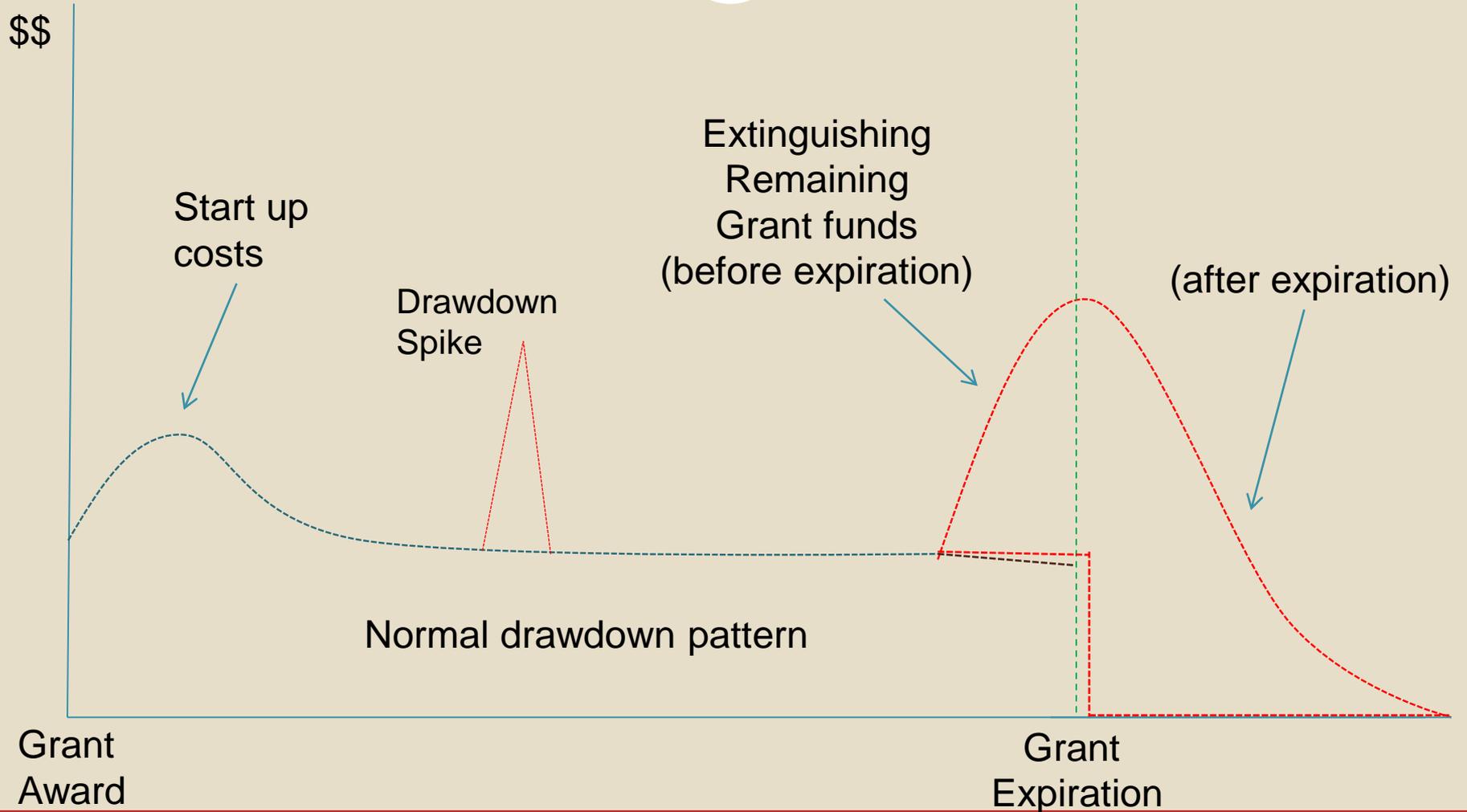


Awardee Burn Rate Profile Comparison





Anomalous Grant Drawdown Pattern





Example: Transfer of Payroll Charges 6 Months After the Grant Expired



Expense SubCategory	Ledger Post Date	Expiration Date	No of Days	Financial Amount
GENERAL ASSISTANCE	3/4/2008	8/31/2007	186	42,392.71
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	4.86
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	11.21
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	456.83
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	26,600.19
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	3.43
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	178.56
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	11.24
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	2,909.66
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	150.90
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	504.45
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	87.63
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	187.32
EMPLOYEE BENEFITS	3/4/2008	8/31/2007	186	63.52
OVERHEAD	3/4/2008	8/31/2007	186	20,925.01
				94,487.52

Resulted in
\$95k of
Questioned
Cost



Example: Equipment Purchased at End of Award



SAMPLE NUMBER	DATE EQUIPMENT RECEIVED	LEDGER POST DATE	NSF AWARD EXPIRATION DATE	FINANCIAL AMOUNT	AMOUNT QUESTIONED	%
W-06-02	06/04/2010	08/11/2010	07/31/2010	\$ 31,621.56	31,621.56	
W-06-03	07/16/2009	09/10/2009	08/31/2009	\$ 23,163.75	23,163.75	
W-06-04	06/05/2009	07/08/2009	03/31/2010	\$ 21,869.25	-	
W-06-05	09/20/2010	11/05/2010	04/30/2011	\$ 19,819.69	-	
W-06-06	04/30/2009	06/05/2009	07/31/2009	\$ 18,425.32	-	
W-06-07	02/18/2010	03/09/2010	07/31/2010	\$ 18,117.75	18,117.75	
W-06-08	06/17/2009	08/12/2009	03/31/2010	\$ 17,761.59	-	
W-06-09	12/18/2009	03/17/2010	07/31/2010	\$ 16,117.91	16,117.91	
W-06-10	10/04/2010	12/08/2010	11/30/2011	\$ 13,385.14		
W-06-11	06/22/2009	02/04/2010	07/31/2010	\$ 12,257.80	12,257.80	
W-06-12	02/25/2008	06/26/2008	06/30/2008	\$ 11,553.76	11,553.76	
W-06-13	04/04/2009	05/11/2009	12/31/2009	\$ 11,152.67	-	
W-06-14	01/20/2010	02/17/2010	02/28/2010	\$ 10,260.27	10,260.27	
W-06-15	05/24/2010	06/08/2010	06/30/2010	\$ 9,954.64	9,954.64	
W-06-16	01/16/2009	03/05/2009	12/31/2009	\$ 9,912.51	-	
W-06-17	10/27/2010	12/08/2010	08/31/2012	\$ 9,049.94	-	
W-06-18	09/14/2009	11/06/2009	05/31/2010	\$ 8,787.00	-	
W-06-19	08/25/2008	09/26/2008	07/31/2008	\$ 8,123.85	8,123.85	
W-06-20	04/28/2008	06/05/2008	08/31/2008	\$ 8,033.84	8,033.84	
W-06-21	01/11/2008	05/20/2008	12/31/2007	\$ 3,580.80	3,580.80	
				\$ 282,949.04	\$ 152,785.93	54.0%



Example: Unbudgeted Equipment Purchases

TRANS NUMBER	EXPENDITURE AMOUNT	QUESTIONED AMOUNT	
W-09-01	48,393.75	48,393.75	
W-09-02	32,312.14	31,212.14	
W-09-03	23,163.75	23,163.75	
W-09-04	22,383.75	22,383.75	
W-09-05	20,550.00	20,550.00	
W-09-06	19,653.60	0.00	WAIVER
W-09-07	19,039.43	0.00	WAIVER
W-09-08	18,425.32	18,425.32	
W-09-09	17,297.00	17,297.00	
W-09-10	13,116.00	13,116.00	
W-09-11	11,362.24	0.00	WAIVER
W-09-12	11,290.05	11,290.05	
W-09-13	10,138.50	10,138.50	
W-09-14	9,954.64	9,954.64	
W-09-15	9,227.44	0.00	WAIVER
	286,307.61	225,924.90	78.91%

*NSF OIG does not endorse any commercial software



Example: Equipment Charges Incurred Immediately Before Grant Expiration Date



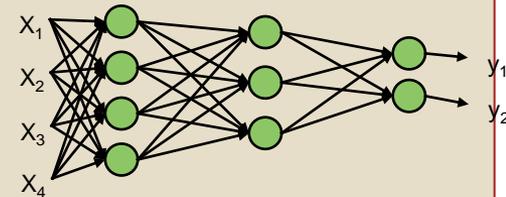
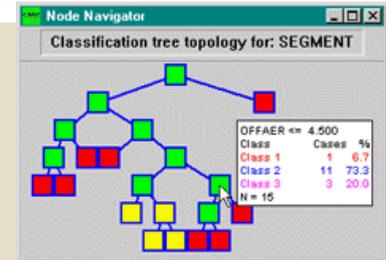
GRANT ID	OBJECT DESCRIPTION	GRANT EXPIRATION DATE	TRANSACTION DATE	LEDGER POST DATE	FINANCIAL AMOUNT
XXXXX42	CONSTRUCTION AND ACQUISITION	09/30/2009	09/30/2009	10/06/2009	51,851.22
GRANT ID	OBJECT DESCRIPTION	GRANT EXPIRATION DATE	TRANSACTION DATE	LEDGER POST DATE	FINANCIAL AMOUNT
XXXXX27	INVENTORIAL EQUIPMENT	07/31/2010	06/04/2010	08/11/2010	31,621.56
GRANT ID	OBJECT DESCRIPTION	GRANT EXPIRATION DATE	TRANSACTION DATE	LEDGER POST DATE	FINANCIAL AMOUNT
XXXXX77	INVENTORIAL EQUIPMENT	08/31/2009	07/16/2009	09/10/2009	23,163.75
TOTAL					106,636.53



Methods of Data Mining

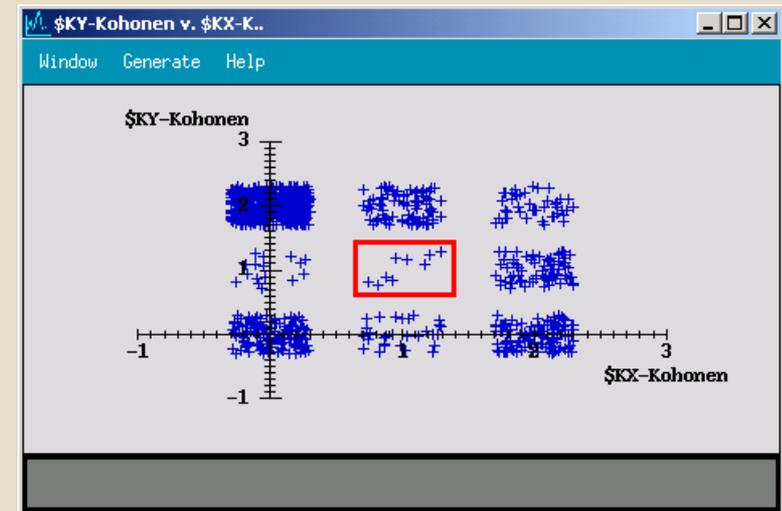
- **Supervised Modeling**

- Predict patterns in data based on patterns of known information
- Decision Trees
- Neural Networks



- **Unsupervised Modeling**

- Identify anomalies or outliers based on grouping of like transactions
- Kohonen Networks
- K-Means Clusters

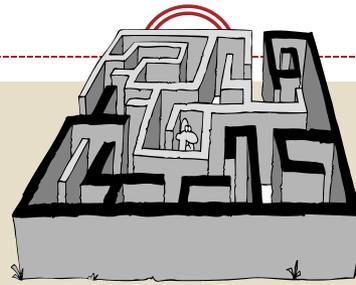




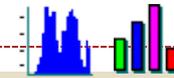
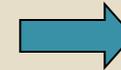
Data Mining Referral Development



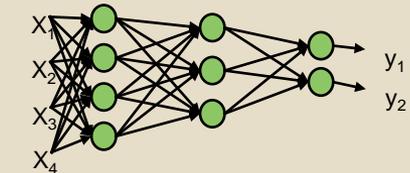
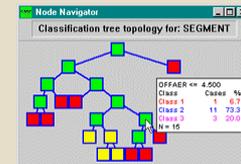
Determine Business Problem to Address



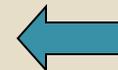
Identify Data To Solve Business Problem



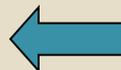
Assess, Clean, and Transform Data



Create Data Mining Models



Score Models and Select Models to Deploy



Look for Needles in the Haystack





Building A Forensic Capability



- **Develop Organizational Capability**
 - All audit staff should have basic skill with data analysis tools
 - Forensic audit units perform more sophisticated analyses
 - Targeted audits are more efficient in time and cost

- **Phased Development**
 - Hardware and software
 - Access to internal and external data
 - Staff: system savvy, analytical, business process knowledge
 - Training, then immediate application to work

- **Very important component is tone at the top**



Government-wide Grant Reform



- **Government-wide effort to streamline the guidance for financial assistance oversight**
 - Cost compliance
 - Administrative principles
 - Audit monitoring and follow-up
- **NSF OIG leading audit community work group**
 - Reducing burden on awardees is good, but maintain accountability
- **Key reforms (proposed)**
 - Single Audit threshold and testing
 - Annual time and effort reporting
 - Flat rate for indirect costs
 - Audit firm rotation
 - Improvements to A-133 information system



Future Opportunities For Automated Oversight



- **Electronic invoices and receipts**
- **Debit Cards**
 - Funding agency can a transaction charges
 - OIGs can run analytics on the digital data
- **Continuous Monitoring**
 - Grantee performs
 - Agency performs
 - Government-wide efforts



Questions?



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