

# Your AP Data is Telling You Something

Five Analytics to Identify Duplicate  
Payments and Other Irregularities

*e*prentise®

**CRYSTALLIZE**  
ANALYTICS®

**Automated**  **Audit**®

# Who Are We?

## In 2007 eprentise was founded on its original product, FlexField

- Enables customers to make unprecedented changes to their financial chart of accounts while maintaining transactional history and data integrity.



## In 2009 we introduced our Consolidation, Divestiture, and Reorganization products

- Transformational software which can copy, change, filter, or merge all elements of Oracle EBS financial systems to address ever-changing business needs, such as regulatory compliance and growth opportunities.

Transformation to Optimization

One-time usage to subscription model

## In 2020 we began expanding to new markets with our C Collection analytics suite, and our Audit Automation software

- C Collection analytics provides transparency and identifies potential problem areas with transactional data. This allows users to reduce costs, leverage opportunities across the enterprise, improve business processes, and increase the confidence level of the users in their data, processes, and operations.
- Automated Audit provides finance teams with drill-down data from a balance sheet report into the transaction-level detail. The software covers hundreds of substantive procedures for the entire enterprise domain and builds in consistent audit processes and workflows across the organization.



ORACLE

Partner



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# Learning Objectives

- ❑ Learn Benford's analysis to identify manipulated or adjusted invoice amounts
- ❑ Create a periodic (annual/monthly) flux report to identify unusual or altered vendor purchasing patterns
- ❑ Learn three rule of thumb analytics to identify unusual vendor billings and payments

# Agenda

- ❑ Standard & Data Driven Risk Assessment
- ❑ Getting AP Data Out of Your ERP
- ❑ Macro Analysis
  - Benford's Law Analysis
  - Periodic Flux Test (Monthly, Annually)
- ❑ AP Analytics to Identify Wonky Invoices
  - Duplicate Amounts Test
  - Duplicate Amounts in the Same Month
  - Invoice Number Format Test
  - Duplicate Amounts with Duplicate Invoices

# Standard & Data Driven Risk Assessment

## Standard Audit Risk and Control Assessment-

- Identify the critical business processes

Example: Procure to Pay

- ❑ Purchasing
- ❑ Accounts Payable
- ❑ Cash Disbursements
- ❑ Identify the risks (what could go wrongs)
  - Identify a control that mitigates the risk

### ❑ Accounts payable

What could go wrong?

- A duplicate, incorrect, or fraudulent invoice could be submitted and paid
- Control?
  - ERP won't allow vendor duplicate invoice numbers

# Standard & Data Driven Risk Assessment



# Standard & Data Driven Risk Assessment

## Data Driven Audit Risk and Control Assessment-

- Interrogate the data to identify what is going wrong

Example: Procure to Pay

- ❑ Purchasing
  - ❑ Accounts Payable
  - ❑ Cash Disbursements
- 
- ❑ Accounts payable

# What did go wrong?

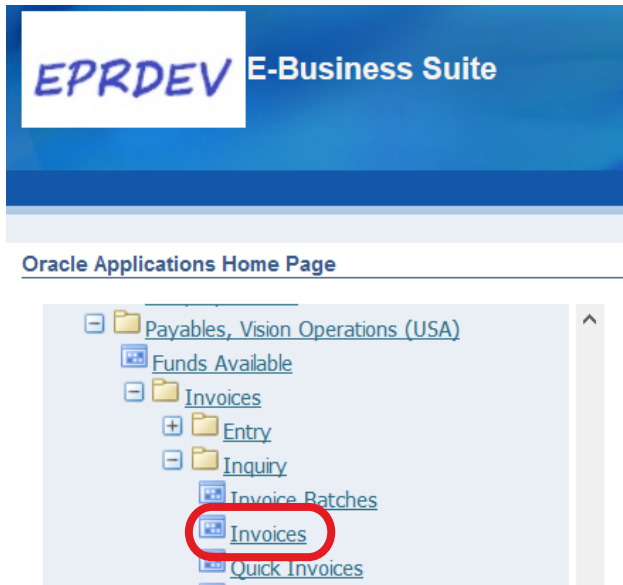
*Let the data tell you.*

# Getting AP Data Out of Your ERP

- ❑ Two Comparable Time Periods (Year, Month)
- ❑ Required Key Data Fields
  - Invoice Number
  - Invoice Date
  - Supplier Name and Supplier Number
  - Invoice Amount
  - Description
  - Add a Year Column - year()
  - Add a Month Column – month()



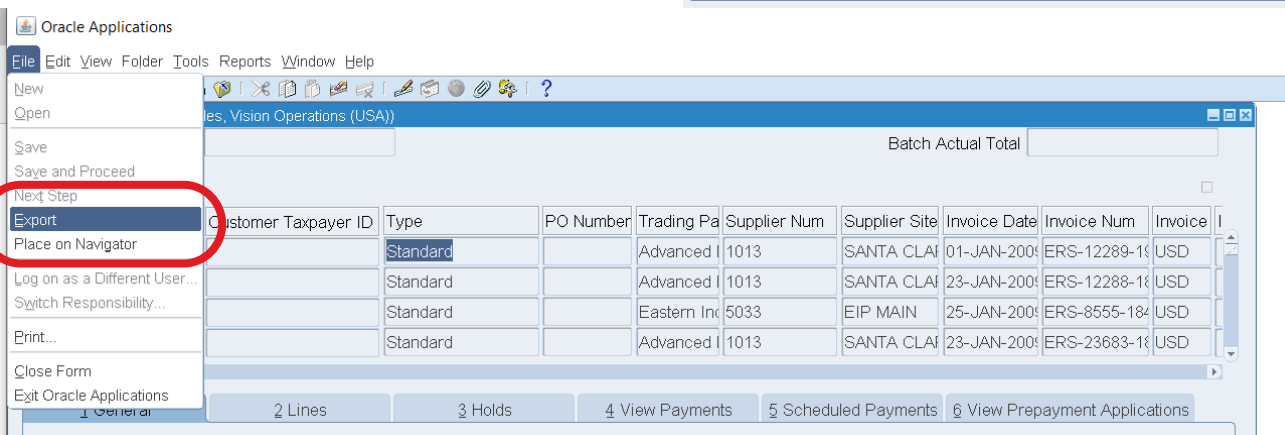
# Example Oracle EBS



The 'Find Invoices' window is shown with the following fields and values:

- Trading Partner:** Name, Supplier Site, PO Num, Supplier Number, Taxpayer ID, PO Shipment.
- Invoice:** Number, Type, Amounts, Dates (01-JAN-2009 to 31-DEC-2010, highlighted with a red circle), Terms, Pay Group, Invoice Batch, Currency.
- Invoice Status:** Status, Approval, Accounting, Payment.
- Voucher Audit:** Category, Name, Numbers.
- Holds:** Status, Name, Reason.

Buttons at the bottom include 'Calculate Balance Owed...', 'Clear', 'New', and 'Find' (highlighted with a red circle).



# Example Oracle EBS

Trading Partner	Supplier Num	Supplier Site Name	Invoice Date	Invoice Num	Invoice Amount	Description
Advanced Network Devices	1013	SANTA CLARA-ERS	1-Jan-09	ERS-12289-190052	4,143,423.03	Receipt Invoice automatically created on 01-JAN-09
Erickson, Barry	8056	OFFICE	1-Jan-09	W37620	4,054.06	Sales Overview - Benefit Features
Erickson, Barry	8056	OFFICE	1-Jan-09	W35124	3,929.06	Sales Overview - Benefit Features
Eastern Industrial Products	5033	EIP MAIN	2-Jan-09	ERS-8538-183718	124,124.00	Receipt Invoice automatically created on 02-JAN-09
Lang, Inga R	8024	OFFICE	2-Jan-09	W11621	3,807.99	Financials Demonstration
Lewis, David	20059	OFFICE	2-Jan-09	W11630	6,773.00	Customer Conference
United Parcel Service	1003	UPS - HQ	2-Jan-09	OPS200939084	57,461.60	
TT Services	5017	TT SAN FRAN	3-Jan-09	ERS-8537-183717	613,676.00	Receipt Invoice automatically created on 03-JAN-09
TT Services	5017	TT SAN FRAN	3-Jan-09	ERS-8539-183720	76,384.00	Receipt Invoice automatically created on 03-JAN-09
Building Management Inc.	2012	HQ - NYC	3-Jan-09	OPS200939085	144,467.76	
Office Supplies, Inc.	1008	OFFICESUPPLIES	4-Jan-09	OPS200939086	27,374.56	
Boise Cascade	5030	BC HQ	5-Jan-09	BC-012009	500	
Industrial Dressler	2005	US HEADQUARTERS	5-Jan-09	IND-012009	1,500.00	
Consolidated Supplies	1014	SPRINGFIELD	5-Jan-09	OPS200939087	4,489.80	
American Telephone and Telegraph	1005	AT&T - HQ	6-Jan-09	OPS200939088	65,262.76	
McGwire, Patrick	20025	OFFICE	7-Jan-09	W11614	4,300.91	Management Meeting
Advanced Network Devices	1013	FRESNO	7-Jan-09	OPS200939089	110,342.18	
Staples	5029	STAPLES LA	9-Jan-09	ERS-8544-183789	477,400.00	Receipt Invoice automatically created on 09-JAN-09
Bailey, Sara	8020	OFFICE	9-Jan-09	W11620	3,739.97	Team Meeting
Beckman, Lisa	20065	OFFICE	9-Jan-09	W11625	2,927.00	Regional Meeting
Brown, Casey	8022	OFFICE	9-Jan-09	W11618	3,426.69	Applications Demo - Kansas City
United Parcel Service	1003	UPS - HQ	9-Jan-09	OPS200939091	57,461.60	
Building Management Inc.	2012	HQ - NYC	10-Jan-09	OPS200939092	144,467.76	
Office Supplies, Inc.	1008	OFFICESUPPLIES	11-Jan-09	OPS200939093	27,374.56	

# Benford's Law Analysis

## **Purpose: To Identify Unusual Data Pattern in AP that May Indicate Manipulation, Errors, or Other Irregularities**

“Briefly explained, Benford's Law maintains that the numeral 1 will be the leading digit in a genuine data set of numbers 30.1% of the time; the numeral 2 will be the leading digit 17.6% of the time; and each subsequent numeral, 3 through 9, will be the leading digit with decreasing frequency. This expected occurrence of leading digits can be illustrated as shown in the chart ‘Benford's Law.’”

<https://www.journalofaccountancy.com/issues/2017/apr/excel-and-benfords-law-to-detect-fraud.html>

*Genuine data sets are driven by the tendency to purchase more \$1,000 items than \$9,000 items. Real world purchases conform closely to the Benford's First Digit Expected Distribution. This is true because it is harder to justify or gain permission to purchase the larger dollar amounts.*

# Benford's Law- Setting Up the Analytic

## Extract the First Digit

	A	B	C	D	E	F	G	H
2	Trading Partner	Supplier Num	Supplier Site Name	Invoice Date	Invoice Num	Invoice Amount	Description	Digit 1
3	Advanced Network Devices	1013	SANTA CLARA-ERS	1-Jan-09	ERS-12289-190052	\$ 4,143,423.03	Receipt Invoice	4
4	Erickson, Barry	8056	OFFICE	1-Jan-09	W37620	\$ 4,054.06	Sales Overview	4
5	Erickson, Barry	8056	OFFICE	1-Jan-09	W35124	\$ 3,929.06	Sales Overview	3
6	Eastern Industrial Products	5033	EIP MAIN	2-Jan-09	ERS-0520-182718	\$ 121,121.00	Receipt Invoice	1
7	Lang, Inga R	8024	OFFICE	2-Jan-09	W37620	\$ 707.99	Financials Demo	3
8	Lewis, David	20059	OFFICE	2-Jan-09	W37620	\$ 73.00	Customer Confe	6
9	United Parcel Service	1003	UPS HQ	2-Jan-09	ERS-12289-190052	\$ 4,143,423.03	Receipt Invoice	4

=LEFT(F3,1)

## Analyze the 1<sup>st</sup> Digit Distribution Against the Benford's Expectation

	A	B	C	D	E	F	G	H	I	J	K	L
1	Digit	Frequency	Expected Frequency	Difference	Number of Invoices							
2	1	0.29918033	0.301	-0.18%	1095							
3	2	0.17868852	0.1761	0.26%	654							
4	3	0.15136612	0.1249	2.65%	554							
5	4	0.11120219	0.0969	1.43%	407							
6	5	0.07377049	0.0792	-0.54%	270							
7	6	0.08114754	0.0669	1.42%	297							
8	7	0.03852459	0.058	-1.95%	141							
9	8	0.03879781	0.0512	-1.24%	142							
10	9	0.02677596	0.0458	-1.90%	98							

=COUNTIF('2009-2010 AP Data'!H\$3:H\$3662,'Benfords Analysis'!\$A2)/COUNTA('2009-2010 AP Data'!H\$3:H\$3662)

**Conclusion- Some Variance- Slight bias toward amounts beginning in 3. Significant variance would indicate a manipulated data set.**

# Periodic Flux Test (Monthly, Annually)

**Purpose: To Identify Significant Variances in Vendor Purchasing Patterns that May Indicate Greater Risk or a Need to Understand the Change (Note: Same AP Data as Prior Slides)**

	A	B	C	D	E	F	G
1			Volume				
2	Trading Partner	Supplier Num	2009	2010	% Change	\$ Change	
3	Advanced Network Devices	1013	\$ 55,444,131.54	\$ 36,516,596.53	-34%	\$ (18,927,535.01)	
4	Advantage Corp	1010	\$ 6,178,577.92	\$ 7,416,707.30	20%	\$ 1,238,129.38	
5	Allied Manufacturing	2007	\$ 3,200,455.02	\$ 3,944,563.19	23%	\$ 744,108.17	
6	American Telephone and Telegraph	1005	\$ 3,205,958.28	\$ 1,502,030.80	-53%	\$ (1,703,927.48)	
7	Apt, Peter M.	8019	\$ 32,235.60	\$ 27,690.04	-14%	\$ (4,545.56)	
12	Boise Cascade	5030	\$ 5,127.81	\$ -	-100%	\$ (5,127.81)	
13	Brown, Casey	8022	\$ 35,046.90	\$ 30,220.21	-14%	\$ (4,826.69)	
14	Building Management Inc.	2012	\$ 7,097,158.88	\$ 5,529,312.08	-22%	\$ (1,567,846.80)	
15	CDS, Inc	5102	\$ 25,175.01	\$ 10,927.35	-57%	\$ (14,247.66)	
16	Consolidated Electric	8059	\$ 28,406,691.16	\$ 42,238,552.85	49%	\$ 13,831,861.69	
17	Consolidated Supplies	1014	\$ 1,718,896.99	\$ 316,654.56	-82%	\$ (1,402,242.43)	
18	Corporate Express Office Supply	5028	\$ 14,528.18	\$ 1,500.25	-90%	\$ (13,027.93)	
19	Dell Computers	5092	\$ 1,510.23	\$ -	-100%	\$ (1,510.23)	
20	Eastern Industrial Products	5033	\$ 11,822,811.00	\$ 10,152,345.00	-14%	\$ (1,670,466.00)	
21	Eastern Industrial Products		\$ -	\$ -		\$ -	
22	Erickson, Barry	8056	\$ 45,619.66	\$ 36,199.54	-21%	\$ (9,420.12)	
23	=SUMIFS('2009-2010 AP Data'!\$G\$2:\$G\$3661,'2009-2010 AP Data'!\$E\$2:\$E\$3661,'2009-2010 Flux'!D\$2,						
24	'2009-2010 AP Data'!\$B\$2:\$B\$3661,'2009-2010 Flux'!\$C3)						
25							



# AP- Duplicate Invoice Amounts

**Purpose: To Identify Invoices with Duplicate Amounts**

	A	E	F	G	H	I	J	K	N
1									
2	Duplicate Amounts	Trading Partner	Supplier Num	Supplier Site Name	Invoice Date	Month	Year	Invoice Num	Invoice Amount
1675	No	Allied Manufacturing	2007	SAN JOSE-ERS	8-Nov-09	11	2009	ERS-12781-203465	5,420.26
1676	No	Allied Manufacturing	2007	SAN JOSE-ERS	7-Aug-10	8	2010	ERS-13564-224383	4,645.94
1677	Yes	Industrial Dressler	2005	US HEADQUARTERS	24-Apr-09	4	2009	ERS-23689-191605	7,641.57
1678	Yes	Industrial Dressler	2005	US HEADQUARTERS	25-Apr-09	4	2009	ERS-23690-191606	7,641.57
1679	Yes	Industrial Dressler	2005	US HEADQUARTERS	4-Jan-10	1	2010	ERS-23692-206218	7,641.57
1680	Yes	Industrial Dressler	2005	US HEADQUARTERS	8-Oct-10	10	2010	ERS-23697-230055	4,248.40
1681	Yes	Industrial Dressler	2005	US HEADQUARTERS	8-Oct-10	10	2010	ERS-23696-230054	4,248.40
1682	Yes	Industrial Dressler	2005	US HEADQUARTERS	8-Oct-10	10	2010	6567-RR	1,069.00
1683	Yes	Industrial Dressler	2005	US HEADQUARTERS	8-Oct-10	10	2010	6567ADV	1,069.00
1684	No	Industrial Dressler	2005	US HEADQUARTERS	8-Oct-10	10	2010	6567-CM	-1,000.00
1685	No	Industrial Dressler	2005	US HEADQUARTERS	28-Oct-09	10	2009	ERS-23691-202534	58,840.13
1686	No	Industrial Dressler	2005	US HEADQUARTERS	3-Jan-09	1	2009	ERS-012009	45,432.50
1687	No	Industrial Dressler	2005	US HEADQUARTERS	3-Jan-09	1	2009	ERS-012009	2,124.20
1688	No	Industrial Dressler	2005	US HEADQUARTERS	3-Jan-09	1	2009	ERS-012009	1,500.00

**=IF(COUNTIFS(\$F\$3:\$F\$3662,\$F1677,\$N\$3:\$N\$3662,\$N1677)>=2,"Yes","No")**

*Formula Explanation: countifs() counts the rows where the Supplier Num AND the Invoice Amount are both the same. If the count is greater or equal to 2, then the formula returns a "Yes."*

While it can be useful to see duplicate invoice amounts. The problem with this analysis is that it is not unusual to pay a vendor the same amount for as payments or as standard order.

# AP- Duplicate Invoice Amounts in the Same Month

**Purpose: To Identify Invoice Duplicate Amounts w/ Same Month**

	A	B	E	F	G	H	I	J	K	N
1	Duplicate Amounts	Same Month	Trading Partner	Supplier Num	Supplier Site Name	Invoice Date	Month	Year	Invoice Num	Invoice Amount
1679	Yes	Yes	Industrial Dressler	2005	US HEADQUATERS	8-Oct-10	10	2010	ERS-23697-230055	4,248.40
1680	Yes	Yes	Industrial Dressler	2005	US HEADQUATERS	8-Oct-10	10	2010	ERS-23696-230054	4,248.40
1681	Yes	Yes	Industrial Dressler	2005	US HEADQUATERS	8-Oct-10	10	2010	6567-RR	1,069.00
1682	Yes	Yes	Industrial Dressler	2005	US HEADQUATERS	8-Oct-10	10	2010	6567ADV	1,069.00
1683	No	N/A	Industrial Dressler	2005	US HEADQUATERS	8-Oct-10	10	2010	6567-CM	-1,000.00
1684	No	N/A	Industrial Dressler	2005	US HEADQUATERS	28-Oct-09	10	2009	ERS-23691-202534	58,840.13
1685	No								ERS-23684-183855	45,432.50
1686	No								ERS-23695-230050	2,124.20
1687	No								IND-012009	1,500.00
1688	No								IND-032009	1,300.00

**=IF(A1681="Yes",IF(COUNTIFS(\$F\$3:\$F\$3662,F1681,\$I\$3:\$I\$3662,I1681,\$J\$3:\$J\$3662,J1681)>1,"Yes","No"),"N/A")**

*Formula Explanation: If the invoice amount is a duplicate AND if the Supplier Num AND the Month AND the Year are the same, a "Yes" is returned.*

This is a more useful analytic, because it is more unusual to have a supplier invoice a duplicate amount in the same month and year and may indicate an invoicing error and a related duplicate payment if not caught early. But what if this can be taken a step further?

# AP- Duplicate Invoice Amounts in the Same Month w a Duplicate Inv. #

**Purpose: To Identify Invoice Duplicate Amounts w/ Same Month**

	A	B	C	E	F	G	H	I	J	K	N
1	Duplicate Amounts	Same Month	Same Invoice #	Trading Partner	Supplier Num	Supplier Site Name	Invoice Date	Month	Year	Invoice Num	Invoice Amount
3657	No	N/A	N/A	General Electric	1002	MEDFIELD-CTR	24-Mar-10	3	2010	ERS-8900-211573	54,572.24
3658	Yes	Yes	Yes	Great Rug Company	14	BELMONT	11-Feb-10	2	2010	GRC11FEB10	422,255.00
3659	Yes	Yes	Yes	Great Rug Company	14	BELMONT	11-Feb-10	2	2010	GRC11feb10	422,255.00
3660	No	N/A	N/A	Sunshine ElectroCity			4-Feb-10	2	2010	4225891	327,883.62
3661	No	N/A	N/A	Eastern Industrial Products			20-Oct-09	10	2009	3978620	1,000.00
3662											
3663	=IF(A3659="Yes",IF(COUNTIFS(\$F\$2:\$F\$3661,F3659,\$N\$2:\$N\$3661,N3659,\$L\$2:\$L\$3661,UPPER(L3659))>=2,"Yes","No"),"N/A")										
3664											
3665											

*Formula Explanation: If the invoice amount is a duplicate AND if the Invoice Num is the same, a "Yes" is returned. Most ERP systems should prevent a duplicate invoice number, but an inadvertent or intentional miskeying Can circumvent this control. For Oracle EBS, a lowercase letter is different From the same upper case letter. This is why the formula transform the Invoice number to upper case – upper(). Note Great Rug Company- this upper lower case control hole has potentially caused a \$422,255 duplicate invoice and potential a duplicate payment.*



# Accounts Payable – Advanced Analytics

## ❑ Invoice Number Format Test

- Caused primarily by the invoice process urgency, one of the more common ways that invoices and payment are duplicated is altering, prefixing, or suffixing invoice number to circumvent the system control that prevents a duplicate invoice number for the same vendor.
- Invoice numbers that are in a different format, length, or with unusual characters may indicate a fraudulent invoicing scheme.

# Accounts Payable – Advanced Analytics

## □ Invoice Number Format Test

1	Trading Partner	Supplier Num	Supplier Site Name	Invoice Date	Month	Year	Invoice Num	Invoice Number Format	Invoice Amount
1157	Staples	5029	STAPLES LA	6-Oct-10	10	2010	ERS-9066-2300	AAA-####-#####	127,487.50
1158	Staples	5029	STAPLES LA	8-Feb-10	2	2010	ERS-8848-2085	AAA-####-#####	238,700.00
1159	Staples	5029	STAPLES LA	8-May-10	5	2010	STAPLES-01	AAAAAAA-##	238,700.00
1160	Staples	5029	STAPLES LA	7-Jul-10	7	2010	STAADJJUL-01	AAAAAAAAA-##	238,700.00
1161	Staples	5029	STAPLES LA	7-Jul-10	7	2010	ERS-9000-2198	AAA-####-#####	238,700.00
1162	Staples	5029	STAPLES LA	8-Aug-09	8	2009	ERS-8740-1965	AAA-####-#####	124,775.00
1163	Staples	5029	STAPLES LA	8-Aug-09	8	2009	ERS-8736-1963	AAA-####-#####	124,775.00
1164	Staples	5029	STAPLES LA	8-Aug-09	8	2009	ERS-8739-1965	AAA-####-#####	124,775.00
1165	Staples	5029	STAPLES LA	8-Aug-09	8	2009	ERS-8738-1964	AAA-####-#####	124,775.00
1166	Staples	5029	STAPLES LA	9-Jan-09	1	2009	ERS-8544-1837	AAA-####-#####	477,400.00
1167	Staples	5029	STAPLES LA	8-Jun-09	6	2009	ERS-8689-1926	AAA-####-#####	477,400.00
1168	Staples	5029	STAPLES LA	8-Dec-09	12	2009	STA-02	AAA-##	455,700.00
1169	Staples	5029	STAPLES LA	9-Jan-10	1	2010	STA-01	AAA-##	455,700.00

This test convert invoice numbers to a code where letters become “A”, Numbers become “#”, and hyphens are preserved. This allows an automated Audit routine to compare and identify the unusual invoice # format.

# Accounts Payable – Advanced Analytics

	K	M	O	P	Q	R	S	T	U	V
1			Digits							
2	Invoice Num	Invoice Number Format	1	2	3	4	5	6	7	8
20	W36715	A#####	A	#	#	#	#	#		
21	W35365	A#####	A	#	#	#	#	#		
22	W37645	A#####	A	#	#	#	#	#		
23	W11625-2	A#####-#	A	#	#	#	#	#	-	#
24	W38369	A#####	A	#	#	#	#	#		
25	W36908	A#####	A	#	#	#	#	#		
26	W36684	=IF(ISNUMBER(VALUE(MID(\$K23,O\$2,1))),"#",IF(MID(\$K23,O\$2,1)="-","-",IF(O\$2>LEN(\$K23),"","A")))								
27	W36201	A#####	A	#	#	#	#	#		

*Formula Explanation: If each digit, taken one at a time is a number ISNUMBER() it is replaced with a “#”, if it is not a number, it is replaced with an “A”, and if it is a hyphen, it remains a hyphen.*

*Instead of comparing an exact invoice number match (as presented in the Prior slides), this allows easier identification of odd or manipulated format.*

# Other AP Analytics – RPA Opportunities

- ❑ Purchase invoices above authorized limits
- ❑ Split purchases
- ❑ Invoices containing line items that are duplicates of line items on other invoices
- ❑ Invoices from phantom or unauthorized vendors
- ❑ Redirected payment addresses
- ❑ Purchase/invoice pattern recognition

# Automating Audit and Assurance

## ❑ Maturity Cycle (Standard)

- Analytics and audit procedures developed manually in Excel or other scripting tools
- Based on the success of the manual analytics and audit procedures, write custom scripts or programs and begin developing dashboards to report results graphically and summarily
- Continually promulgate and follow up on results.
  - Document cleared identified findings to ensure they are excluded from future results
  - Update the developed automated analytics and audit procedures as requested by users (auditors and management)

# Conclusion

Your accounts payable data is telling you something. By implementing periodic and continual analytics, you can take advantage of what it is saying.



# Thank you!

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