



Rutgers Business School
Newark and New Brunswick

26wcas

**10th CarLab Advisory Board Meeting
after the storm**

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Some news

- We started our certificate in Audit Analytics
- The Digital Library is progressing diligently
- Very active progress in text mining, conference, papers, incipient dissertations

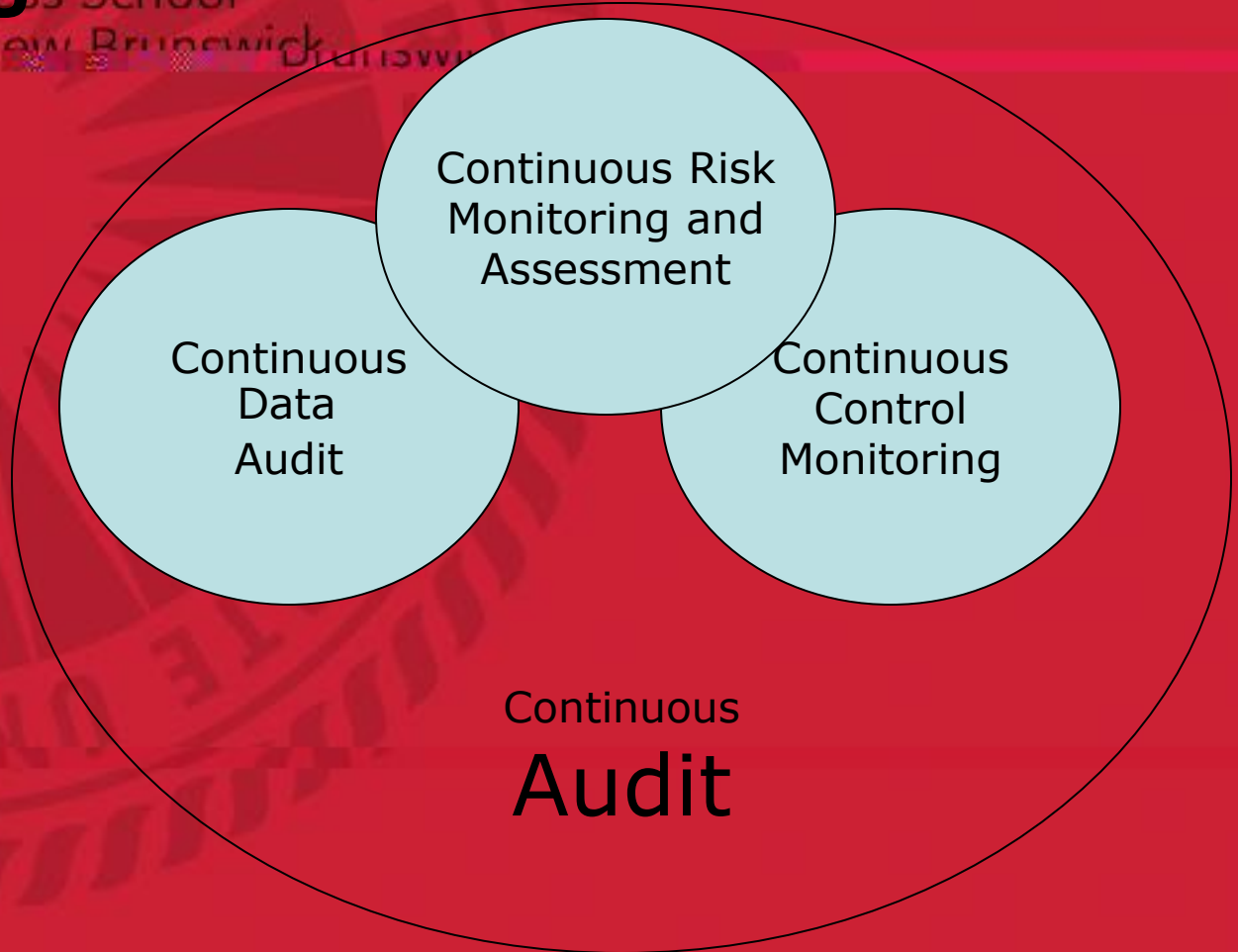
Audit Data Standard

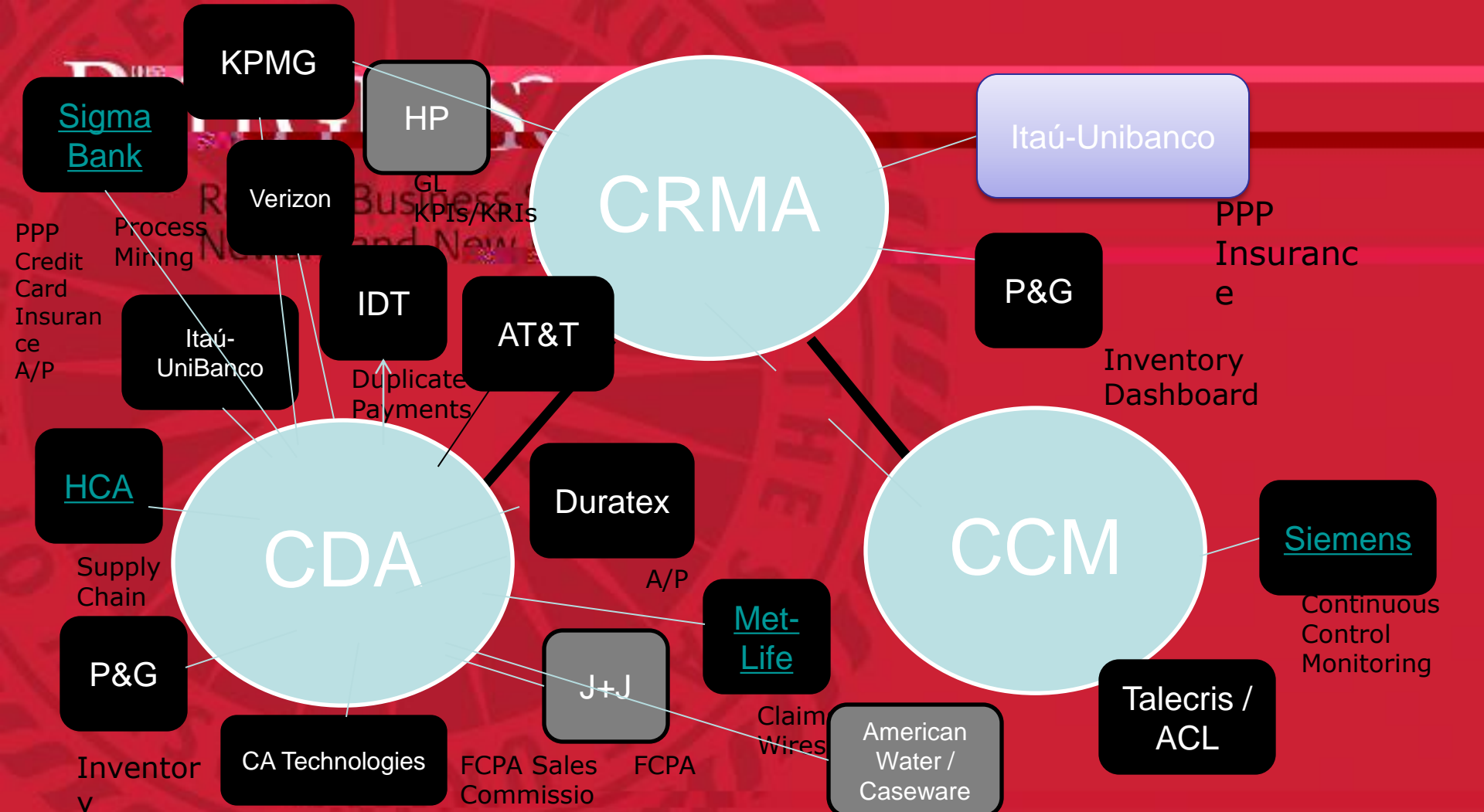
- GL and O2C standards exposed
- Comments received and standards revised
- Experiment being performed at Rutgers

- ASEC and ASB met
- ASB agreed to reconsider obsolete standards and to consider new technologically wise standards
- What should be reconsidered... proposed???

An evolving continuous audit framework

- Automation
- Sensing
- ERP
- E-Commerce



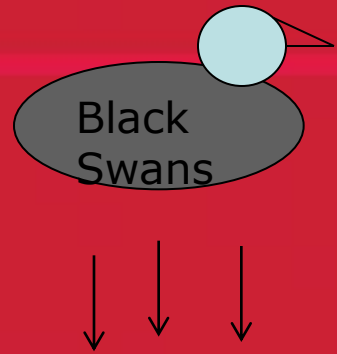
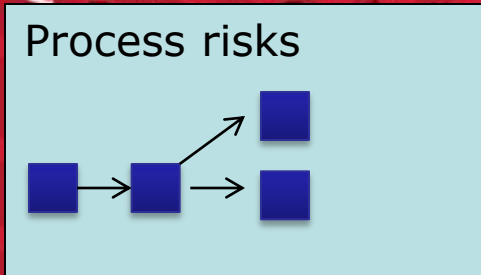


Audit Automation

P&G: Order to Cash
Auditor Judgment
Siemens- AAS Automation
AICPA – ADS / APS

Audit Methodologies

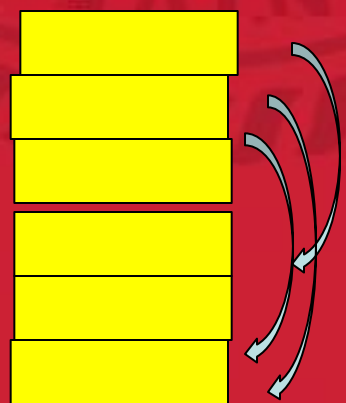
- [Multidimensional Clustering](#)
- [Process Mining](#)
- [Continuity Equations](#)
- [Predictive Auditing](#)
- **Visualization**
- **Analytic Playpen**



Variable selection algorithms (heuristics expert based)

Risk minimization / audit return maximization algorithms

Audit
Procs.
Re-
arrang
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The CarLab Research Efforts

- Siemens
 - Continuous control monitoring (CCM)
 - Audit automation
- Continuity equations at HCA
- Verizon
 - **Construction budget**

The CarLab Research Efforts

- Itau Unibanco
 - Branch monitoring and analytics
 - Transitory Accounts
 - Product sales monitoring
 - **Credit cards**
 - Pagadoria
 - Predictive audit
 - **Insurance**
 - **Continuous card monitoring**
 - **New product risk assessment**

The CarLab Research Efforts

- Insurance company
 - Forensics as CA -> the wires project
 - Claims
- P&G
 - KPI project
 - Vendor / payments project
 - Order to cash project -> selective automation
 - **P-Card**
 - **Logit prediction of audit results**
- Duratex
 - Pagadoria (payables)
 - Supply chain CM / CA

The Carlab Research Efforts (3)

- KPMG projects
 - Technology adoption at CPA firms
 - Technology adoption at IA departments
 - The future of audit

- **Rapid Prototyping Environment for data research (RPE)**
- **Dashboard / visualization / Advanced Analytics Representation (DVAA)**

- **Maturity model**
- **KRIs and audit plans**

- **New methodology project**

The Carlab Research Efforts (4)

- Telecom and Real Estate Co (TRE)
 - Duplicate Payments detection
 - Customer reimbursements

- CA International
 - FCPA
 - **Customer discounts**
 - **Control structure maturity model**

- Major International consumer Goods Co
 - FCPA / semantic interpretation / payables

RARC and our teaching mission

The VPA effort

- Automatic course recording experiment just started
- A vision of free unencumbered educational stream for less developed nations

The video library

Clickers

- Experimentation with response system uses in different contexts

Out of the box

- Standards Formalization: issuing standards in autocode
- The MACCY diversification
 - Audit Analytics
 - ~~Forensic~~
 - IRM
- Standards are over-estimated: they are just a layer
- Active lobbying of FASB and PCAOB



APPENDIX

Some analytic technologies used at the CarLab

Technique	Data	Project
Anomaly Detection: using cluster analysis	IDT	check for outlying refunds
Decision rules: duplicate payments	IDT payments by checks	
Association rules	IDT new file (credit card info).	association rules in order to determine some relationships with the fraudulent transactions
Decision Trees: C4.5 Rule Induction: JRip Large Margin Classifiers: Support Vector Machines Ensemble Methods: Random Forests simpler ones such: the Nearest Neighbor and Naïve Bayes	P&G data	

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Technique	Data	Project
Decision Trees: C4.5 Rule Induction: JRip Large Margin Classifiers: Support Vector Machines Ensemble Methods: Random Forests	XBRL Bank call reports	
traditional statistical techniques such as logit and probit (both the standard binary version, and the ordered one).	P&G data	
Logit model:	P&G data	logit model to relate audit scores and controls self assessment, as well as KPIs. This is still in its first stage (understanding the data and preliminary results)
causality model	ITAU's pagadoria	to create a dashboard, and then relate some KPIs & KRIs to this dashboard.

Technique	Data	Project
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J48	Itau sales transactions	Decision tree technique to identify group of outcomes via branches (paths). I use it to identify the status of sales transaction
Logistic regression	Itau sales transactions	Regression technique to predict the outcome of the event. Applied to categorical data in my work.
Support vector machine	Itau sales transactions	Supervised machine learning technique use for classification. I use it to classify the outcome of sales transaction with specified characteristics
clustering	Itau sales transactions	Unsupervised machine learning technique used to group similar data. Can used to identify groups and/or outliers.

Technique	Data	Project
correlation test for overall pattern, prediction interval for abnormal amount check, frequency test for abnormal event, true/false test for validity test,	Metlife	
shape of amount distribution through skewness and kurtosis for abnormality, graphical representation to check potentially risky areas	Itau	
exploratory data analysis	Itau insurance	
Cluster Analysis	- Itau Transitory account-	Using cluster analysis for data exploratory to gain additional information on the transaction.
Cluster Analysis - group life insurance claim	MetLife Group Life Claim	- Using cluster analysis for anomaly detection in the

Technique	Data	Project
Robust Regression (RR)	Itau ppp	was used for detection of outliers
Ratios / Classification	Procter & Gamble	In automating a series of audit procedures for accounts receivables, we are using simple analytics to build relationships between data. We use ratios as a benchmarking technique and classification to test aging and validate high risk customer and account hold overrides.
decision trees	P&G	to guide auditors in alert resolution
Rule-based validation	Siemens PLM	We implemented a rule-based controls monitoring and validation platform in St. Louis