Seeing the storm ahead
Predictive Risk Intelligence
#DOpsRisk
How **prepared** is your organization to sense and discover significant emerging risks?

**Predictive Risk Intelligence (PRI)** provides you with advance notice of emerging risks, knowledge of potential loss and risk exposures, and increased awareness of the external threats to your company or industry that could affect the decisions you make for your organization.
Bringing Predictive Risk Intelligence to your organization

This paper introduces the concept of PRI, defines various monitoring methods, and describes what you can do to help your organization stay ahead of emerging risks.

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Executive summary

With limited information, time and tools available, C-suite executives are expected to manage emerging risks every day.

Boards, shareholders, regulators, customers and business partners alike not only request transparency, but also demand that companies demonstrate the ability to execute on risk management decisions using established and emerging risk intelligence methods and technologies. Stakeholders are expecting risk functions to provide insights on what went wrong in the past, an accurate and real-time view of what is happening now, and confidence with information on what could go wrong.

This paper introduces the concept of PRI, defines three strategies of risk monitoring, and describes how implementing a PRI program can apply a forward-looking lens on emerging risks, with information on potential losses and trends that could affect your organization.

Risk intelligence has evolved beyond the use of risk indicators and management programs to focus on capturing emerging risks with the use of analytical tools. Stakeholders expect risk monitoring to provide intelligence that supports strategic decision-making such as investment in products and technologies, new business models, and the development of advanced risk strategies. These insights can equip business leaders with the knowledge that drives more informed and compelling decisions.

Advancements in predictive risk intelligence are increasingly recognized as cornerstones to effective risk monitoring programs, but few organizations can demonstrate the effective adoption to predictive risk intelligence to monitoring emerging risks and trends.

Forbes Insights, on behalf of Deloitte Touche Tohmatsu Limited, surveyed more than 300 senior stakeholders around the world...

**Deloitte insights**
Respondents to the Deloitte & Forbes Insight Survey reported that risk management programs help them:

- Increase operational resiliency
- Realize the value of new technologies
- Improve cost effectiveness
- Accelerate time to market
- Optimize return on capital
- Improve stakeholder confidence

The fact that only half of survey respondents acknowledged that they leverage comprehensive risk analytics to make strategic business decisions is further evidence of the need for a more holistic risk monitoring methodology.

**The bottom line**
Many organizations monitor risks without harnessing advanced analytics methods—powerful and effective tools that could help them stay ahead of current risks and improve how they manage and respond to emerging risks.

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**Predictive Risk Intelligence in action**

**Power & Utilities Case Study**
PRI applied to aging infrastructure

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**Step 1—Identify internal and external data**
- Identify & compile data
  - Internal client and third-party data
  - Historical temperatures and climate
  - Customer complaints
  - Construction and subway zones

**Step 2—Data analytics**
- Identify statistically valid correlations
- Identify compile and integrate records
- Cleanse and prepare data

**Step 3—Geographic Information System (GIS)**
- Location of risk factors

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**Step 4—Apply predictive risk analytics**
- Identify risk drivers
- Identify risk scenarios
- Determine probabilities
- Calculate risk values
- Define accountabilities
- PRI

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Understanding of repair prioritizes for an aging infrastructure.

**Three potential benefits resulting from PRI implementation**

- A more resilient, reliable system, capable of delivering cleaner energy in less time
- Fewer “reliability” issues due to the complex process of rotating in new energy sources and retiring infrastructure
- Improved ability to meet consumer demand for higher quality power enabled by construction of a more modern infrastructure

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Many Utilities companies have an immediate need to use predictive risk analytics to determine the best way to target replace and repair priorities for their aging infrastructure. Often times, these efforts take many years to complete.
Risk monitoring strategies

Risk monitoring occurs throughout the risk management lifecycle and can be organized into three categories: Reactive risk monitoring, integrated risk monitoring, and predictive risk monitoring.

Reactive risk monitoring
Reactive risk monitoring is the initial monitoring mechanism where the organization tracks and reports loss events after they happen. Process owners may report these incidents as losses occurring during the normal course of business or discover incidents such as fraud during an audit or the assessment of a particular business process. Central to this technique is the ability to respond post-event with a remediation plan and the ability to prevent recurrence of similar events in the future.

Integrated risk monitoring
Integrated risk monitoring is risk monitoring as a discipline, process, or initiative that an organization has assimilated with overall business strategy. It is the next stage of monitoring that utilizes passive and active risk, performance, compliance, and control indicators to objectively report on risk performance thresholds periodically, or in near real-time. The primary emphasis of this technique is the timely report-out on risks given identified assessment criteria, the status of established benchmarks, and interpretation of risks deviating from performance standards such as organizational risk appetite.
Predictive risk monitoring is a technique that helps organizations discover potential risks and threats, including types of risk not covered by existing risk indicators. Risk monitoring applies analytics to current and historical information from internal and external data sources to identify emerging risks with a short cycle to impact. Such a capability helps modernize an established risk management framework from periodic risk reporting to real and near-real time risk reporting. This is PRi.

Predictive Risk Intelligence in action

Banking & Securities Case Study
PRI applied to conduct risk

Step 1—Describe current bank culture
- Regulatory scrutiny
- Financial fraud schemes
- Internal control failures
- Complex systems
- Reputational risk

Step 2—Define unstructured and structured data
- Internal & external data examples
- Contract and payment compliance notifications
- Employee concerns via email or chat

Step 3—Identify potential trends and correlations
- PRI-enabled risk analytics
- Chronology of events
- Text analytics
- Example fraud scenarios
- Trend analysis
- External alerts
- Cross-database pattern recognition
- Behavioral analytics

Step 4—Understanding of behavioral root causes
- Weak controls
- Disparate subcultures
- "Growth at all costs" model
- Product lifecycle
- Lack of accountability
- PRI

Understanding of overall firm culture, and visibility into areas across the business deviating from policy

Three potential benefits resulting from PRI implementation
- Understanding of behavioral patterns within the organization
- Ability to re-evaluate the business model and balance growth with potential affects to desired cultural values
- Improved techniques for managing human resources and incentives
Reactive
Captures operational losses and identifies near-miss historical events. Reactive risk monitoring develops baseline information that quantifies the impact of risk event losses, reports on the status of current risks, and tracks the progress of ongoing corrective actions.

Benefits
• Synthesizes information to understand past losses
• Aggregates information for a view of overall impact
• Provides a baseline for loss forecasting
• Helps in capital and risk appetite allocations
• Provides actionable lessons learned
• Identifies remediation plans
• Conducts historical trend analysis
• Initiates root-cause analysis to prevent future incidents

Challenges
• Uncertainty of emerging risks
• Loss of opportunities to contain the risk impact
• Information is dated and difficult to manipulate
• No visibility of emerging risk dimensions
• Cannot anticipate potential risk appetite breaches

Integrated
Provides a mechanism to objectively measure risk performance by facilitating the development of KRIs, KPIs, KCIs, and associated threshold measures. Enables description of risk exposure by providing a holistic risk view from across the organization.

Benefits
• Generates near real-time risk alerts
• Reduces subjectivity in risk performance reporting
• Helps contain specific loss exposures
• Reduces potential for overall loss exposure and threshold breaches
• Provides intelligence to augment business decisions
• Reports on policy and procedure non-compliance
• Generates an aggregated view of risk exposure
• Can be automated

Challenges
• Unable to provide a comprehensive understanding of external risk
• Relies heavily on data governance and integrity
• Information is usually dated (by report) and is often manual, difficult to reproduce, and may be laden with inaccuracies

Predictive
Accumulates and aggregates internal and external risk information to provide reporting alerts in near real-time. Describes trends, potential emerging risks, and utilizes reactive and integrated risk monitoring inputs to generate PRi with applied analytics and internal and external data sources.

Benefits
• Capture a comprehensive, 360-degree view of risks
• Predicts potential risks before they materialize into threats
• Identify and monitor emerging risks
• Recognize emerging risk trends
• Helps reduce the occurrence of ‘zero tolerance’ incidents
• Automates analyses through cognitive intelligence and applied robotics
• Allows for prompt escalation and remediation through integrated risk analysis
• Prepares for “long-tail” risk events

Challenges
• Requires reliable and comprehensive risk and performance data
• Reliance on data governance and integrity measures
• Subject to predictive modeling errors
• Cannot replace periodic risk assessment process

2. Key Risk Indicators (KRIs), Key Performance Indicators (KPIs), and Key Compliance Indicators (KCIs)
Moving the needle, introducing PRi

PRi can help turn risk, controls, and performance information into preventative and actionable insights, preparing organizations for a refined understanding of emerging risks.

Explaining the PRi process:

1. Define PRi scope
Management and risk governance teams identify prioritized risk events to better track and monitor on a continual basis.

2. Identify precursors of risk events
Each risk identified within scope is analyzed to identify indicators or incidents that precede risk events and provide reliable indication of an event occurrence. For example, product quality failures may result from an internal process failure or a supplier failure.

3. Identify data sources
Each risk event precursor is prioritized and mapped to internal and external data sources which can supply the baseline data required for analysis and predictive modeling—see Figure 2 for example data sources.

4. Develop static and self-learning predictive algorithms
Through combined analysis of internal and external precursor information, a predictive analytics algorithm (a data-driven statistical model) is selected for fit and applied to predict or detect the heightened occurrence and likelihood of a risk event. Data mining and machine learning capabilities allow these models to be carefully maintained and/or evolve with ongoing improvements to accuracy.

5. Initiate PRi generation
Risk governance functions start collecting the baseline data for each risk category and apply risk predictive algorithms to generate emerging risk alerts and notifications. Results are reported and continuously evaluated against actual results to determine the success rate of the models and enhance the accuracy of insights and outcomes. Formal reports are generated to describe the emerging risk environment for C-suite and board decisioning.

Figure 2. Internal and external data sources
The role of technology

Applying technology across the PRi lifecycle generates faster, more reliable, risk information while creating a risk monitoring process that is modern, effective, and self-evolving.

The following are examples of the important role technology plays at each stage of PRi:

**Data collection**
Applies Robotics Process Automation (RPA) to collect data on a real-time or near real-time basis. RPA is popular for its ability to handle unstructured and nonlinear relationships in data. Data sources may include transactional data, third-party data, and data collected through character recognition and natural language processing from websites, blogs, and social media platforms. With more data collected over time, risk analysis techniques such as regression and event tree analysis improve in accuracy.

**Data standardization and aggregation**
RPA and cognitive intelligence assimilate, cleanse, standardize, and aggregate various formats and types of data procured from internal and external data sources. As large data volumes are collected by RPA and cognitive techniques, data will need to be prepared for predictive modeling techniques. This requires persons experienced in the data management and predictive technologies who also understand the complexity of operational risk in context of the business.
Predictive risk modelling and analysis

‘Big data’ predictive analytics and algorithms are executed by artificial intelligence and machine learning to put the collected data and models developed to work. Based on the risks identified, analytical models interpret outcomes and confirm model parameters to generate PRi. Assumptions and parameters which affect the analytical models may be changed or updated based on the PRi received.

Automated remediation and reporting

Automates remediation plans through front-line applications and business systems to develop integrated, rules-based reporting capabilities. Risk reporting dashboards and mobile smart technologies provide alerts and notifications on threshold breaches, and prescriptive risk mitigation techniques including corrective actions, templates, training, and support from management.

Predictive Risk Intelligence in action

Life Sciences Case Study

PRi applied to insider threat, bribery and corruption

Step 1—Define scope of business relations

Scope of interaction:
- Payments, transactions and deals
- Gifts and Entertainment, travel and expenses
- Political activity and contributions
- Payments to third-party providers

Step 2—Trace business activity

Traces of potential collusion:
- Internal payments and communication data
- News, social media platforms, and watch lists

Step 3—Identify red flags, patterns of collusion and false information

PRi-enabled risk analytics:
- Analysis of voice transcripts and chat forums
- Monitoring of policy breaches
- Determine trends, patterns and relationships
- Data-matching to identify smaller parties and tax havens
- Detect patterns of suspicious transactions
- Mine citizen reports, news media, and census data

Understanding of regulatory and reputational risk of Foreign Corrupt Practices Act (FCPA) noncompliance

Step 4—Identify projects and persons “at risk” for collusion

Conflicts of interest
- Transaction anomalies
- Fraud vulnerability
- Abnormal election activity
- Process inadequacies

Three likely benefits resulting from PRi implementation

Enhanced ability to avoid situations where high risk individuals are concerned

Understanding of geo-political climate and countries with a high perception of corruption

Improved techniques for holding business accountable for involving both internal and external relationships
PRi industry applicability

PRi can help solve complex challenges across industries:

**Industrial technology and operational failures**
PRi concepts can be applied to Automotive, Retail & Distribution, and Technology companies to provide actionable risk information on critical infrastructure components and products. For example, PRi could identify products or supplies that have the potential to be discontinued for support by equipment manufacturers. PRi can predict the source, type, and frequency of loss events affecting the availability and performance of the infrastructure and equipment extending beyond its recommended life. Internal and external data sources might include IoT, PCNs, and social media channels.

**Early warning of potential employee misconduct**
Within the Financial Services Industry, there has been no shortage of well-publicized and damaging misconduct scandals over the past decade. Improving conduct is at the top of everyone’s agenda in banking and securities, and it is well established that innovation is disrupting the industry to improve regulatory compliance outcomes. PRi could provide intelligence on changes in employee behaviors indicative of potential conduct lapses, changes in employee sentiment, and policy breaches that indicate potential conduct and compliance risks (e.g., insider trading, data loss, etc.). Internal and external data sources could include chats, emails, VoIP communication, employee financial changes, and behavioral analytics conducted on social media channels.

**Alerts and warnings on workplace safety incidents**
Power & Utilities entities could apply PRi to reduce unexpected and adverse outcomes within the organization that would improve workplace safety. Workplace safety places heightened concerns about quality, security, privacy, and controls within the organization. Nuclear operators, for example, struggle to remain competitive by striking a balance among safety, reliability, and economic performance. In this instance, PRi could employ internal loss data, safety breaches, maintenance information, and external economic performance data to identify critical trends for these entities to implement efficiencies and identify critical improvements to policies, programs, and processes.

**Complex outsourcing and vendor management**
Life Sciences entities interact with hundreds of third parties, including vendors, contractors, and other service providers. Through layers of outsourcing, contract manufacturing, and alliances, these organizations must also meet strict regulatory requirements and production schedules. In this instance, PRi can utilize external data sources such as news, government publications, and publicized incident reports to provide visibility into third-party operations that often lack transparency.

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The value proposition pays for itself

Organizations that use PRi can modernize their monitoring process tactically and strategically by:

- Predicting risk before loss events occur
- Reducing and preventing operational, reputational, and financial impact
- Delivering customizable predictive risk notifications and alerts
- Attaining a higher degree of stakeholder confidence
- Utilizing technology to employ existing data and provide greater transparency
- Reducing manual intervention and human errors
- Optimizing valuable resources to focus on risk management activities
- Informing the C-suite on ways to limit risk exposure
- Empowering risk accountability and communication for a risk-aware culture
- Promoting organizational resiliency and consumer trust
- Complementing increasingly automated operating models and processes

Taking the first steps toward establishing a PRi program

**Start smart**
Initiate a predictive risk program by identifying risks that have high impact, available performance data, low forecasting complexity, and insufficient current capability.

**Scale fast**
Expand PRi use cases as the proof of concept matures, to other areas supporting the firm’s maximum value proposition.

**Execute effectively**
Establish performance measures and review PRi monitoring outcomes to determine how to integrate PRi more fully into the current portfolio of risk management activities.
Seeing the storm ahead
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