

Cyber Risk: From the Control Room to the Board Room



Romy Rodriguez-Ravines

We Are DeNexus

// Build the global standard of industrial cyber risk quantification for agencies, shareholders, investors, boards and risk transfer market

Jose M. Seara, CEO

2019
Funded

\$9m
Pre-A

24
Employees



"With DeRISK, we understand our cybersecurity posture and can prioritize risk reduction and mitigation actions based on actionable financial data"

Ken Young
COO at Apex Clean Energy



"We are impressed with the DeNexus team and their approach to assessing and prioritizing cyber risk"

John Franzino
CEO at GridSEC



What is Cyber Risk?

Just another enterprise level risk...

INDUSTRIAL CYBER RISK

IN-DUS-TRIAL CY-BER RISK / IN'DƏSTRĒƏL 'SĪBƏR RISK/

THE POTENTIAL LOSS OF LIFE, INJURY, DAMAGED ASSETS, FINANCIAL LOSS, AND OTHER HARM FROM THE FAILURE OR MIS-OPERATION OF DIGITAL TECHNOLOGIES AND COMMUNICATION NETWORKS USED FOR OPERATIONAL CAPABILITIES.



When will the next phishing email arrive?

Will you suffer a data breach?

When will a cyberattack on my organization happen?



Germany Ransomware Attack Tied to Colonial Pipeline Hackers | Time
A Russia-linked cybercrime gang was allegedly responsible for ransomware attacks that took down a swath of Germany's fuel-distribution system this week and hindered payments at some filling ...
time.com

industrialcyber.co

www.mandiant.com

www.securityweek.com

DOI: 10.2139/ssrn.3940329 • Corpus ID: 243833032
Cyber Risk Frequency, Severity and Insurance

DOI: 10.1088/1755-1315/645/1/012064 • Corpus ID: 234005125
DOI: 10.1109/CyberSA49311.2020.9139703 • Corpus ID: 218560014
The Data that Drives Cyber Insurance: A Study into the Underwriting and Claims Processes

DOI: 10.3386/W2891
The Anatomy of Cyber Strategies against Advanced Persistent Threats in Modern Enterprises

DOI: 10.1007/S10462-021-09976-0 • Corpus ID: 233631696
Artificial intelligence in cyber security: research advances, challenges, and opportunities

DOI: 10.1007/978-3-030-61111-1_10
Artificial Intelligence in Cyber Security: Research Advances, Challenges, and Opportunities

cyber

Two Stakeholders. One Challenge

Cybersecurity stakeholders are vulnerable, insurance firms are exposed and blind



The Industrial Enterprise

75%

of CEO's could be personally liable by 2024

500%

Growth in Ransomware in 2020 targeting ICS/OT

\$20 Billion

In estimated costs due to Ransomware in 2020



The (re)insurers

58%

of US organizations do not have Cyber Risk coverage

66.9%

Average Loss Ratio in 2020

96%

Pricing increase year/over/year in Q3 2021
40% increase compared to Q2 2021

1.Gartner - Predicts 2020: Security and Risk Management Programs
2.FORTINET - 2020 State of Operational Technology and Cybersecurity Report
3.Purplesec.- 2021 Ransomware Statistics, Data, & Trends

1. Insurance Insider February 11, 2021
2.NAIC-s 2020 Cyber Insurance Report
3.Marsh Cyber Insurance Market Overview: Q4 2021

Quantify, Manage, and Solve Cyber Risk

Unanswered Questions



Industrial Enterprise

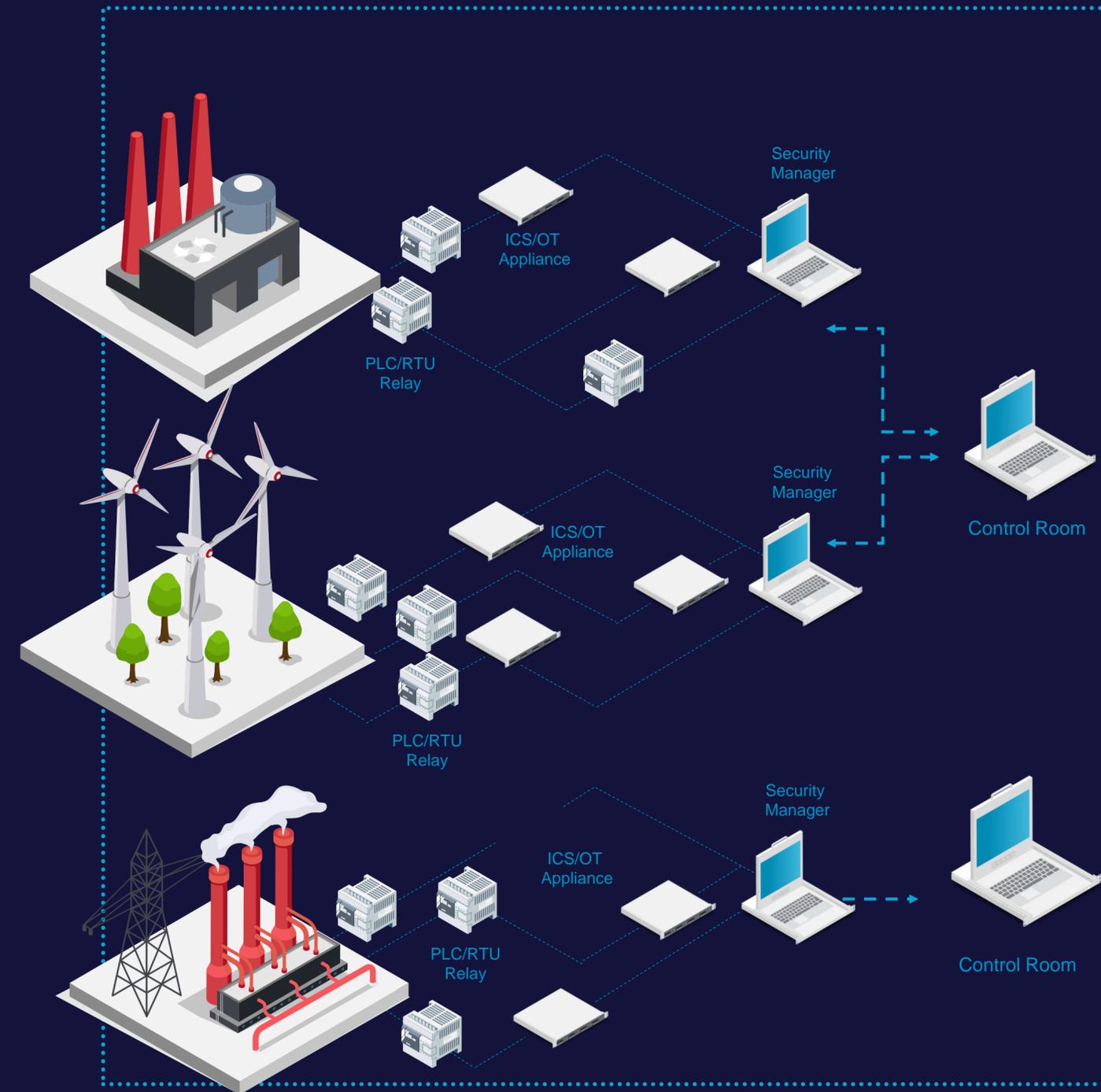
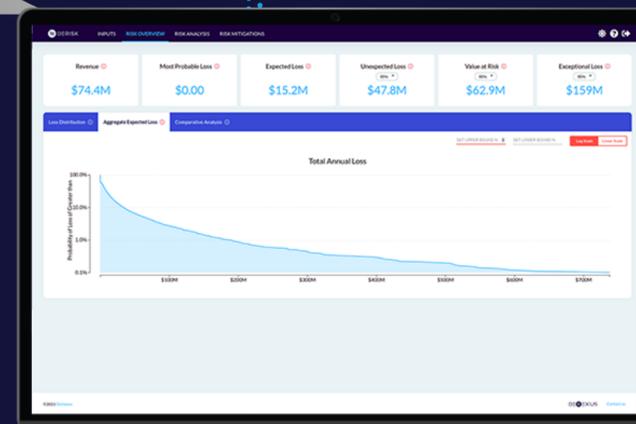
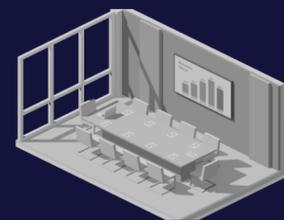
- What is our risk-reduction ROI on cybersecurity investments? (tools + talent + training)
- Are we spending our security team's time and resources optimally?
- Are we overspending on duplicate defenses where your risk just doesn't justify the price?



Insurance / (Re)insurance

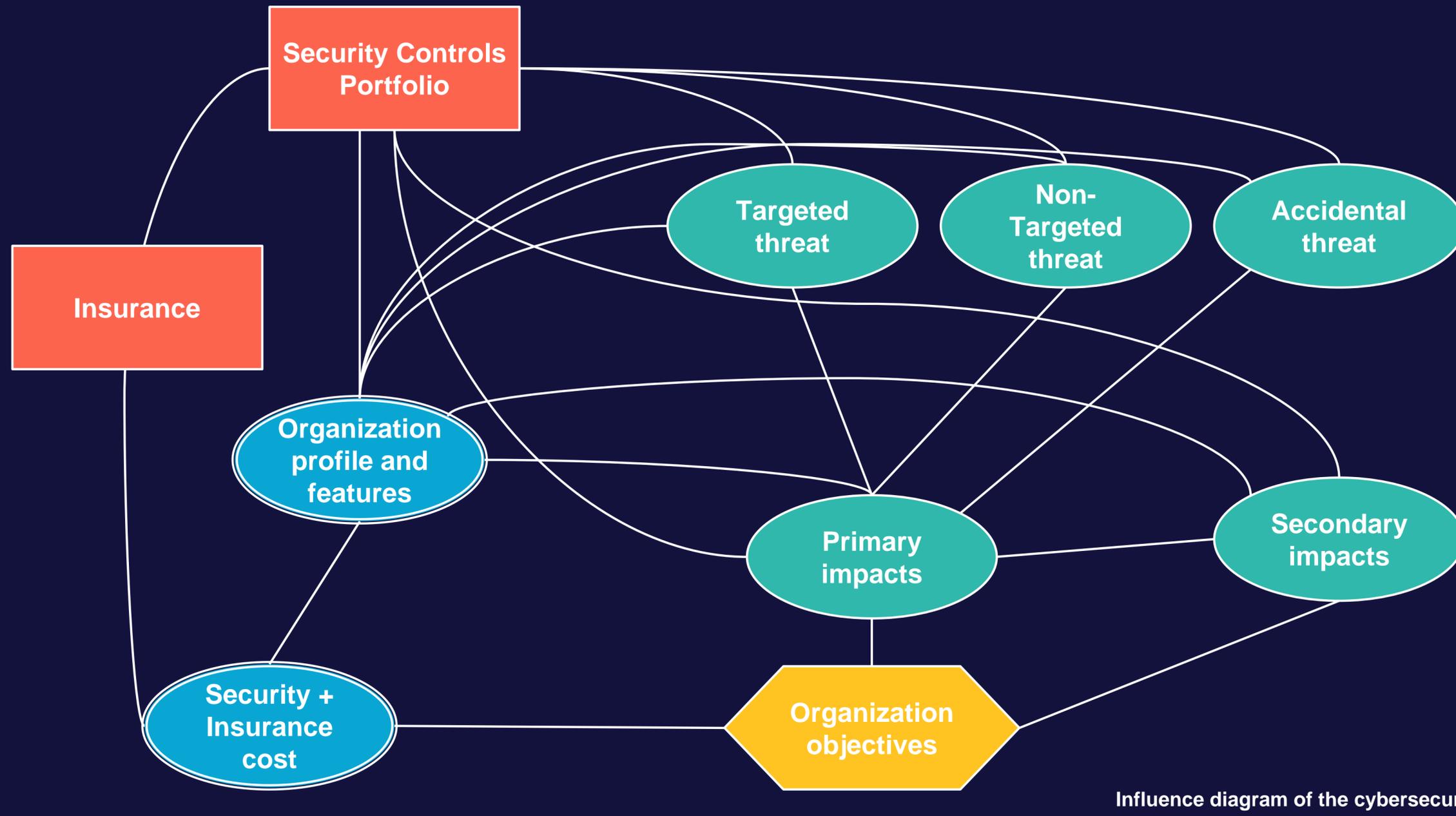
- Are we doing a proper risk selection?
- Are we allocating the right amount of capital to cover future claims/losses?
- Are our accumulation assessments and catastrophic scenario analysis, correct?

Chief Risk Officer/CISO



Industrial Cyber Risk

Quantifying risk in the financial gamble of investing in cyber defense



Influence diagram of the cybersecurity risk management problem

What is the Point?

Qualitative information is not sufficient for efficient Risk Management



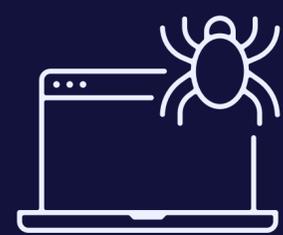
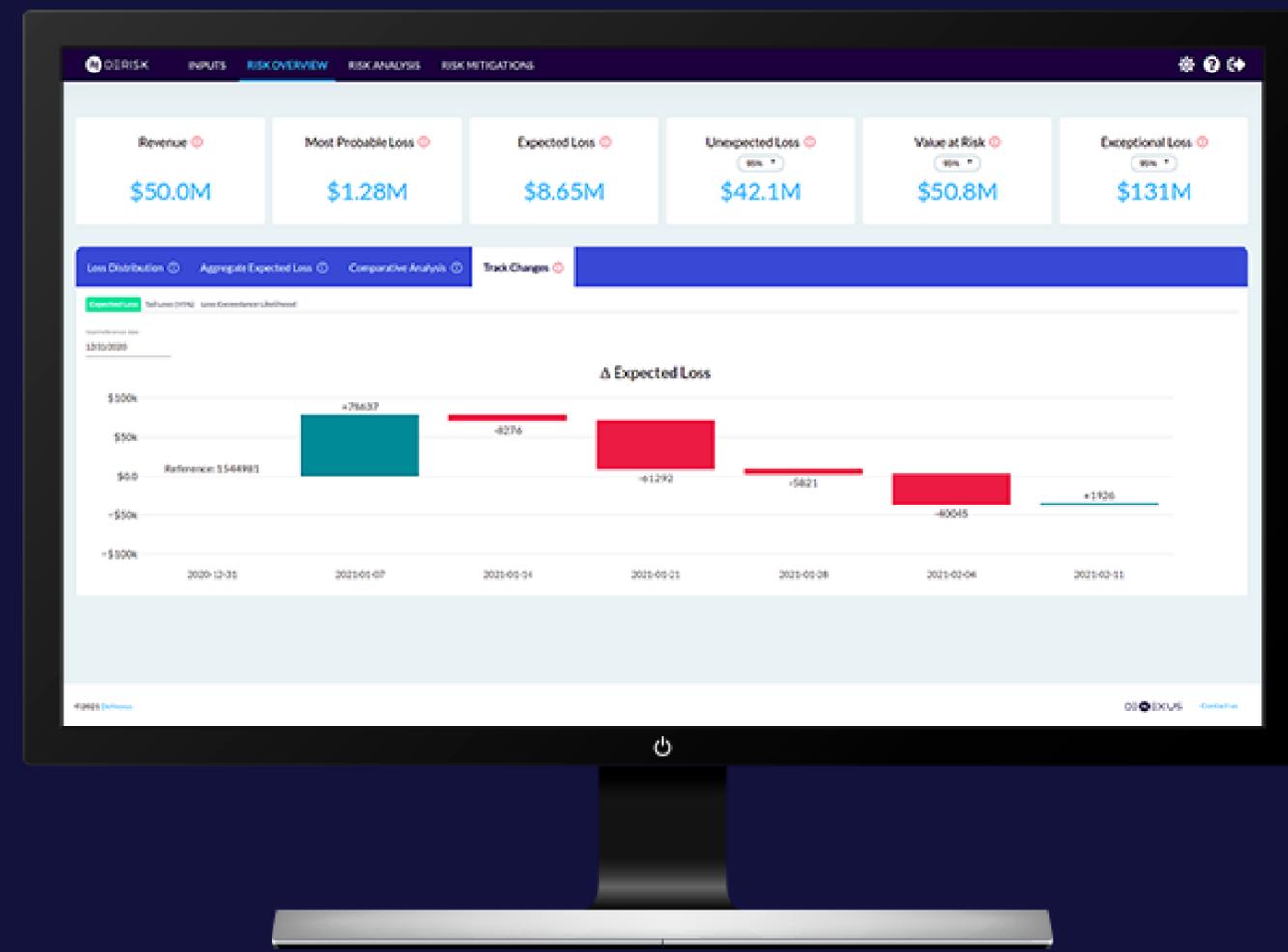
- Poorly understood – Insufficient empirical data
- Highly dynamic – Fluid risk drivers
- Impacted by both internal and external factors
- Impacted by human behavior, intentional or not
- That could result on systemic risk insurable? ... or even systematic risk uninsurable ? under certain circumstances

Quantifying Cyber Risk and Uncertainty with Rigorous Analytics Methodologies

There is no full risk picture without data and science

DeRISK Platform

Evidence-based **cyber risk quantification SaaS platform** for industrial environments and (Re)insurers of cyber risk.



Evidence-based



Data-driven



Self-adaptive



Automatic



Continuous

Leveraging The DeNexus Knowledge Center

Data Ecosystem



Inside-out



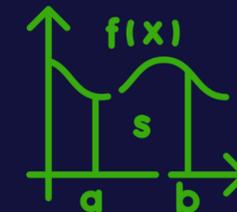
Outside-in



Business



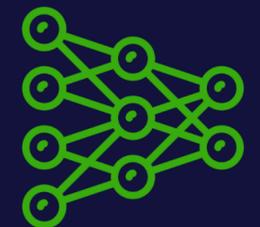
Risk Modeling



Models



Bayesian

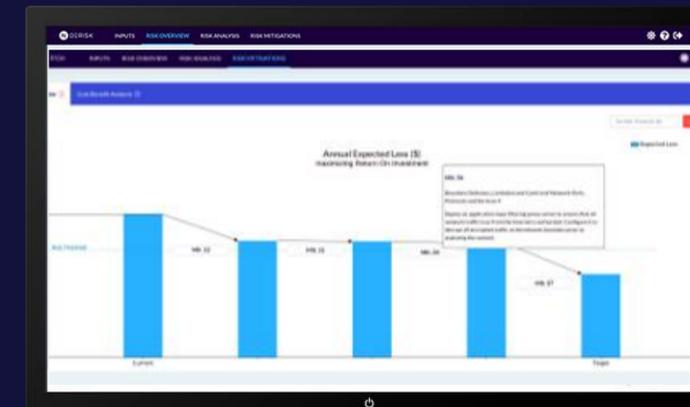
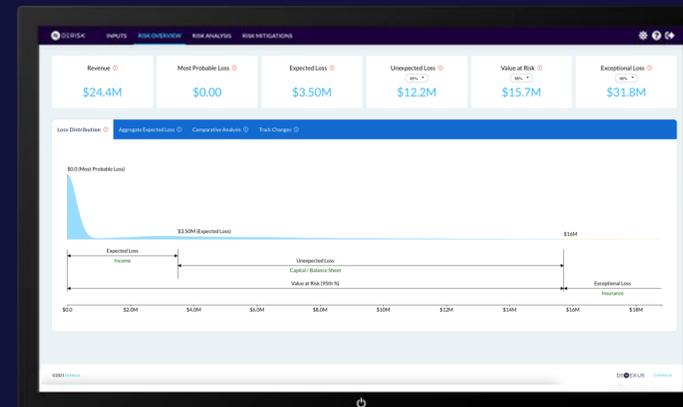
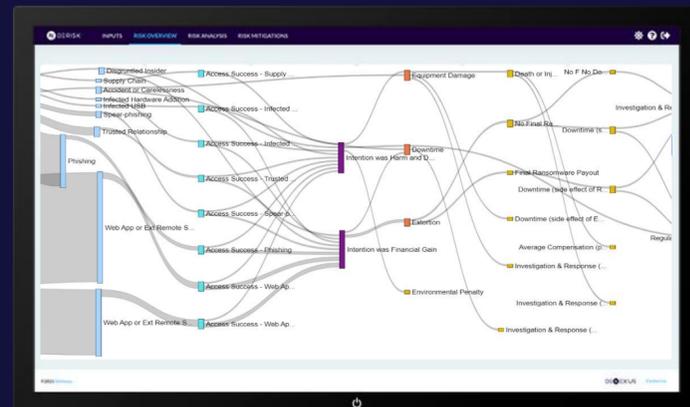


Simulation

Likelihood

Impact

Mitigations



Risk Modeling

Source and Technique Only

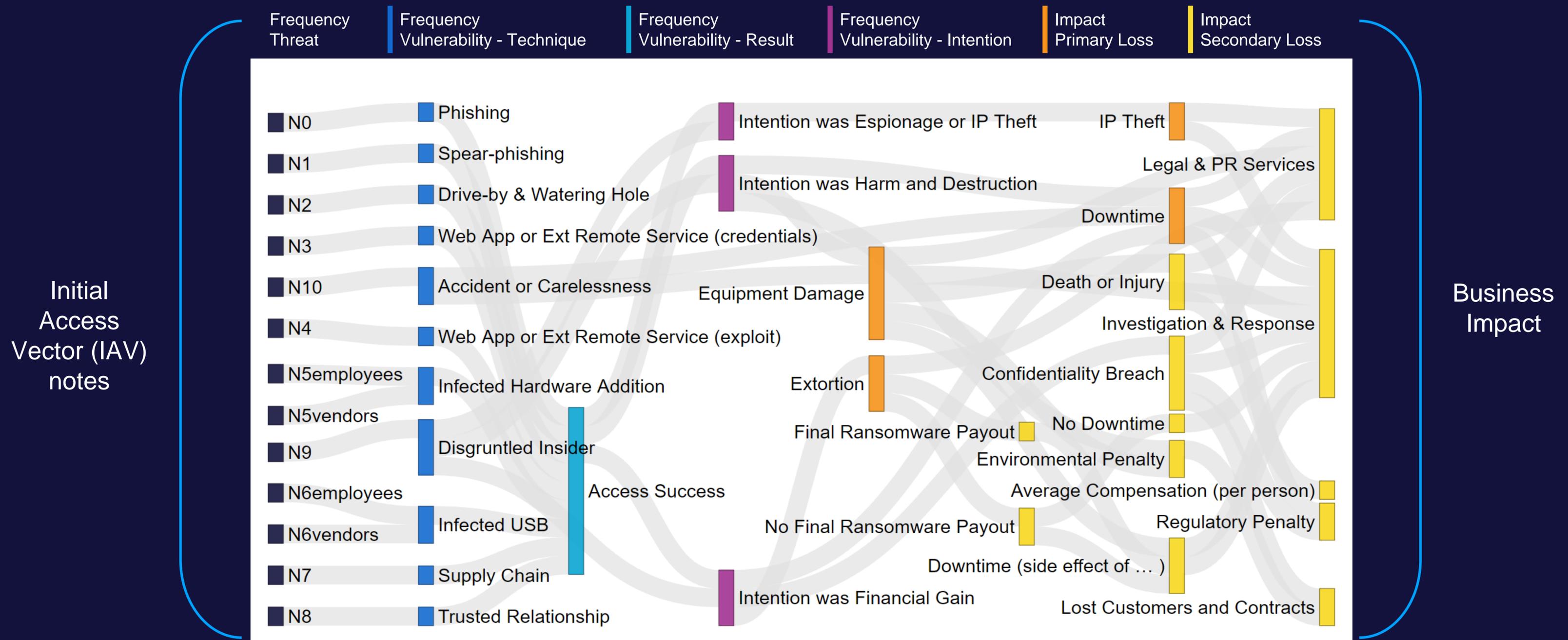


Initial
Access
Vector (IAV)
notes

Business
Impact?

Risk Modeling

Attack Flow with a Financial Outcome Approach



Risk Modeling

Quantifying Uncertainty

Threat

Vulnerability

Impact

Response variable

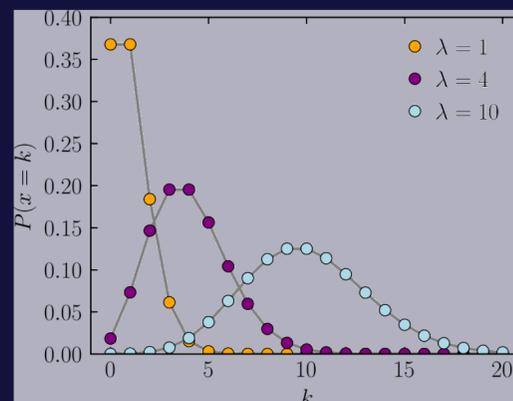
Number of Attempts

Probability of Success

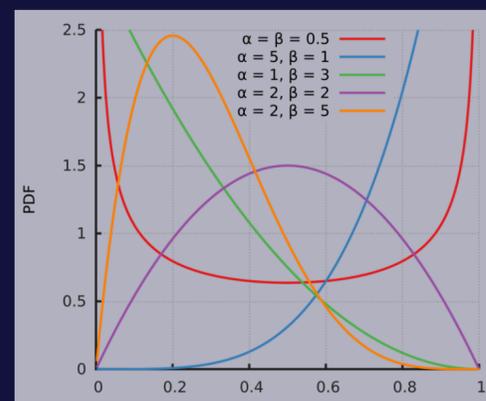
Loss Distribution

Type of variable

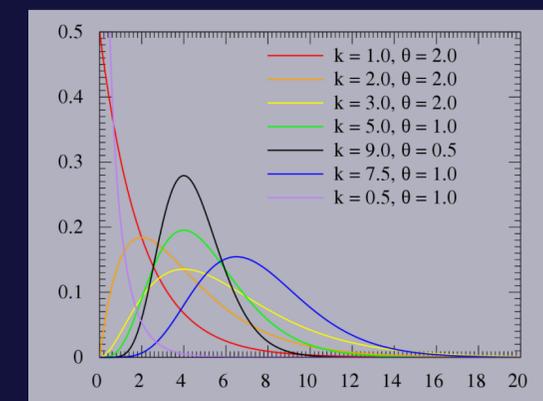
Integer between 0 and +inf:
Poisson Distribution



Value between 0 and 1:
Beta Distribution



Value between 0 and +inf: Gamma Distribution
Value between 0 and 1: Beta Distribution



Model class

Hierarchical Models
Bayesian Inference

Mean and Two Order Statistics
Bayesian Inference

Generalized Linear Models
Bayesian Inference

13 individual models

28 individual models

54 + 16 individual models



CYBER
DERISK

in Action



The Data

There is no full risk picture without empirical data

Business



Owler Search any company by name or URL

Advanced Search, Newsfeed, Followed Companies, Email Settings

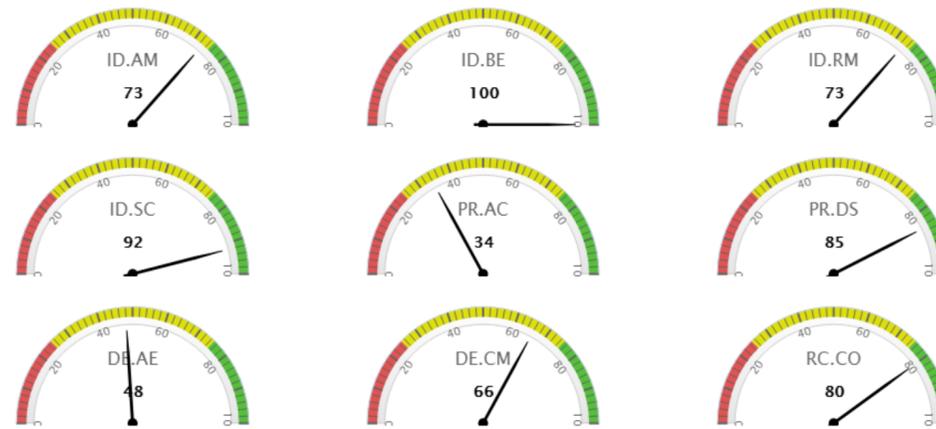
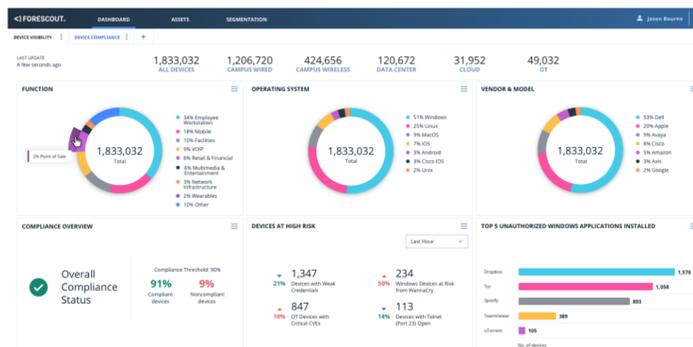
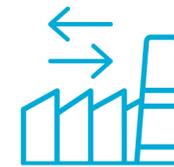
GE
GE is a Massachusetts-based industrial conglomerate that operates in industries such as aviation, power generation, heal

Vestas
Vestas is a Denmark-based designer, manufacturer and installer of wind turbines and related products for the energy inc

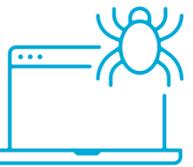
Company + Vendors

| | |
|---|---|
| Chairman & CEO H. Lawrence Culp Jr | Annual Revenue \$78.6B |
| CEO Approval Rating 88/100 | Employees 283,000 |
| President & CEO Henrik Andersen | Annual Revenue \$19.1B |
| CEO Approval Rating 96/100 | Employees 29,665 |
| Founded 1898 | Funding \$2.4B |
| Headquarters Aarhus, Central Jutland | Industry Energy & Utilities |
| Status Public, Independent Company, PA, VWS | Sector Renewable Energy |
| SIC Code 1382 NAICS listing | |
| Website https://www.vestas.com/ | |
| Social Links | |

Inside-out



Outside-in



Leak Credentials, Open VPN, Mentions in blogs ...

Constella Intelligence

Total Exposures: **125,023,119**

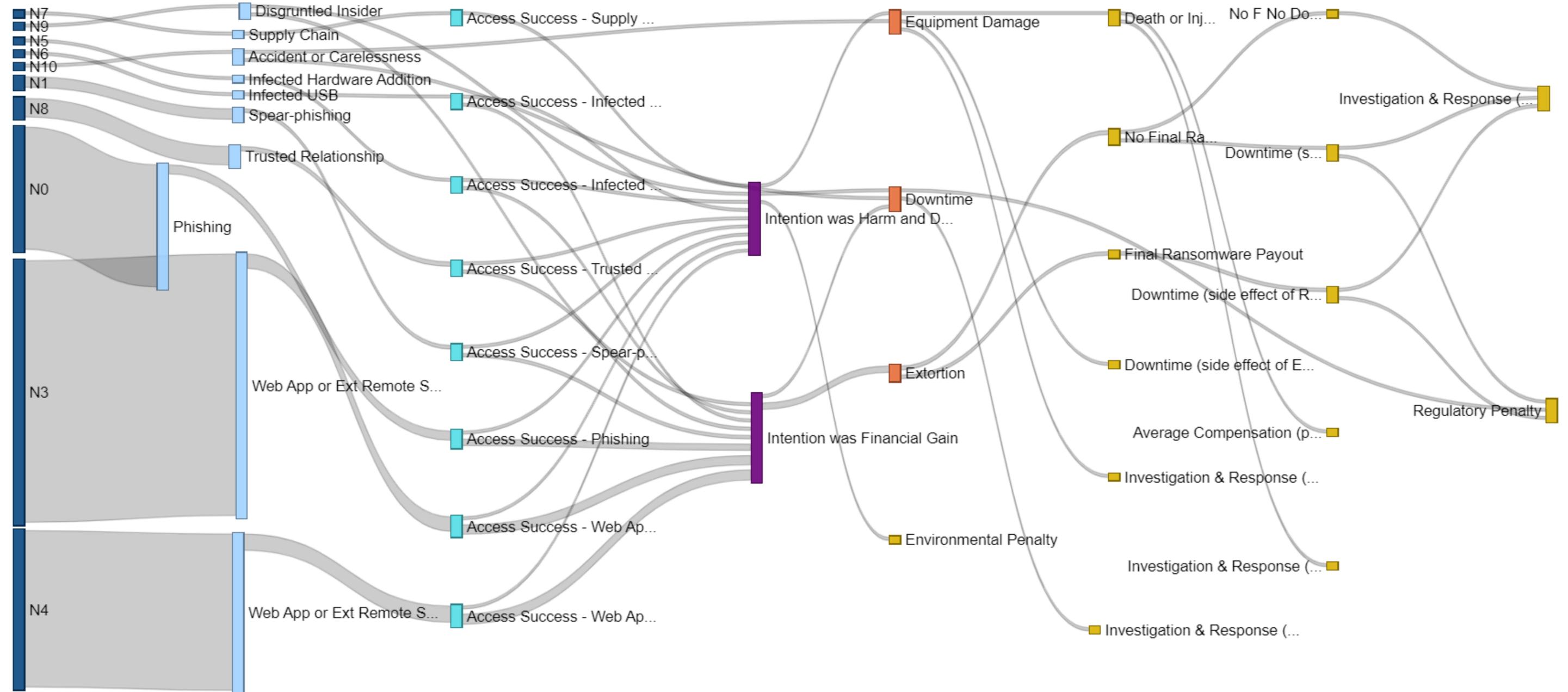
Category of Breaches: 6 categories

Timeline activity: Line chart showing activity from Jan 20 to Dec 20

Breach Exposure: Bar chart showing exposure levels

The Likelihood

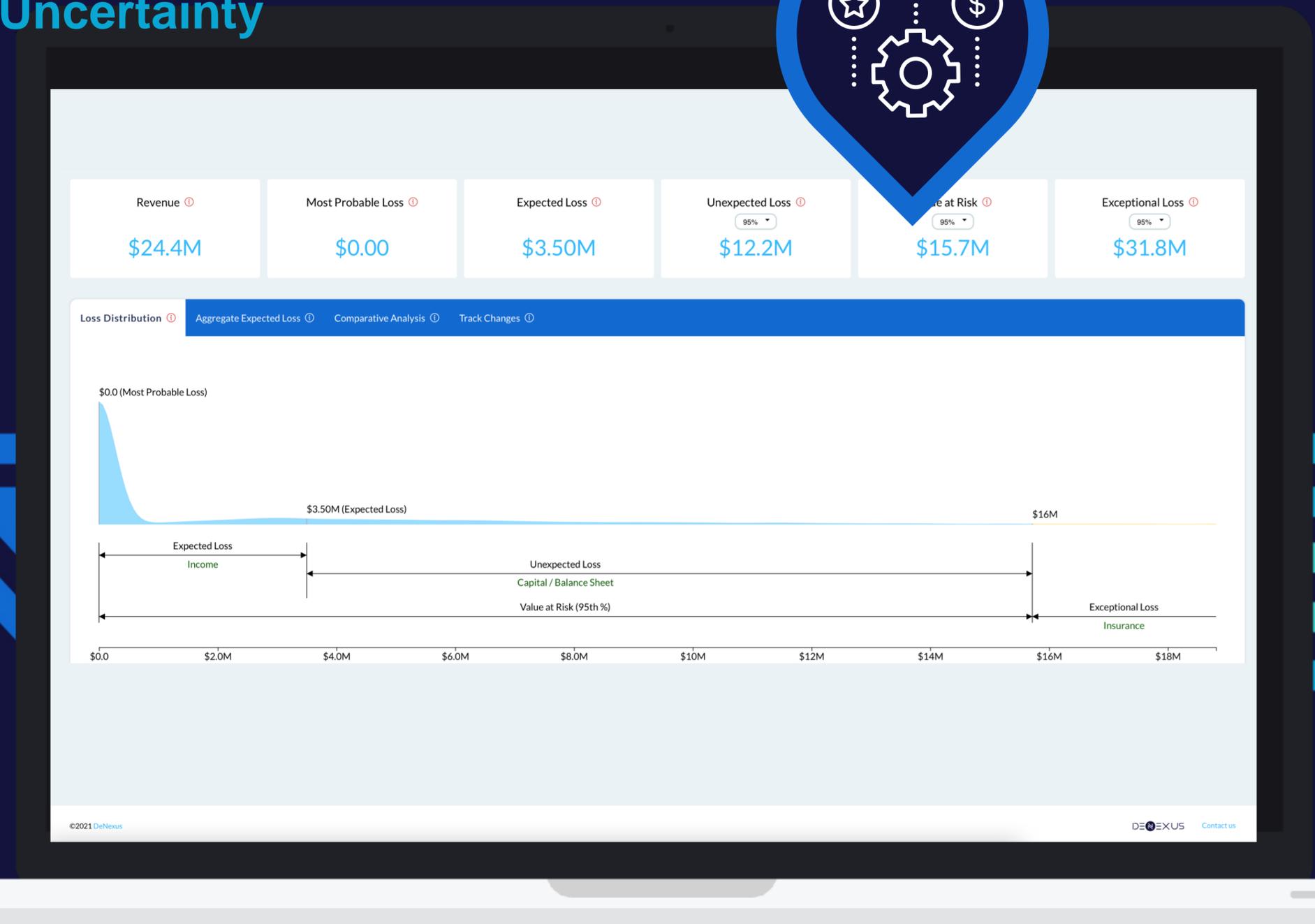
Simulated attack flow



How much risk do we have?

Value your Cyber Risk. Risk -> Uncertainty

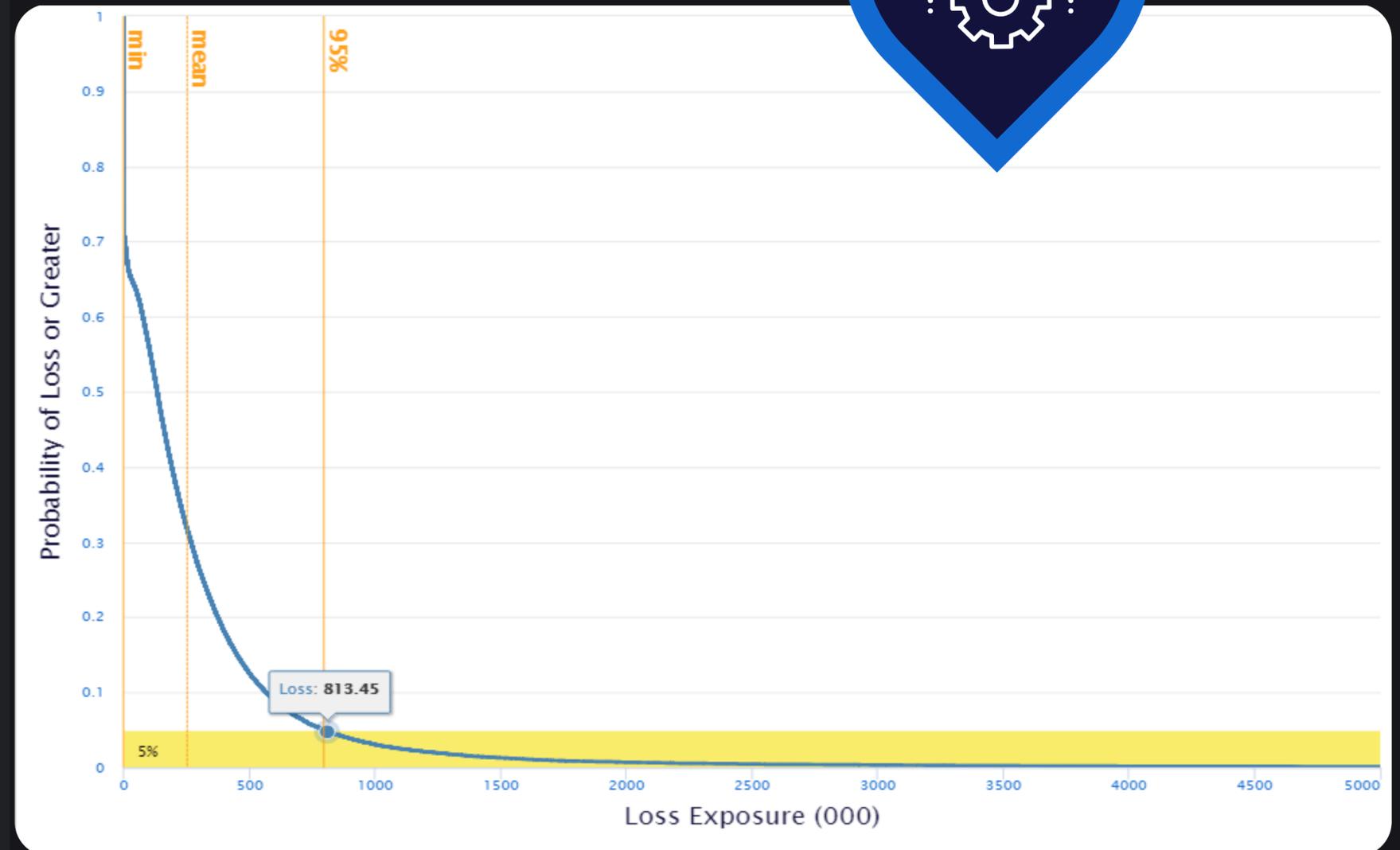
- Expected loss
- Most probable loss
- Value at Risk
- Tale risk
- Impact in income
- Impact in reserves and balance sheet



How much risk do we have?

Value your Cyber Risk. Risk -> Uncertainty

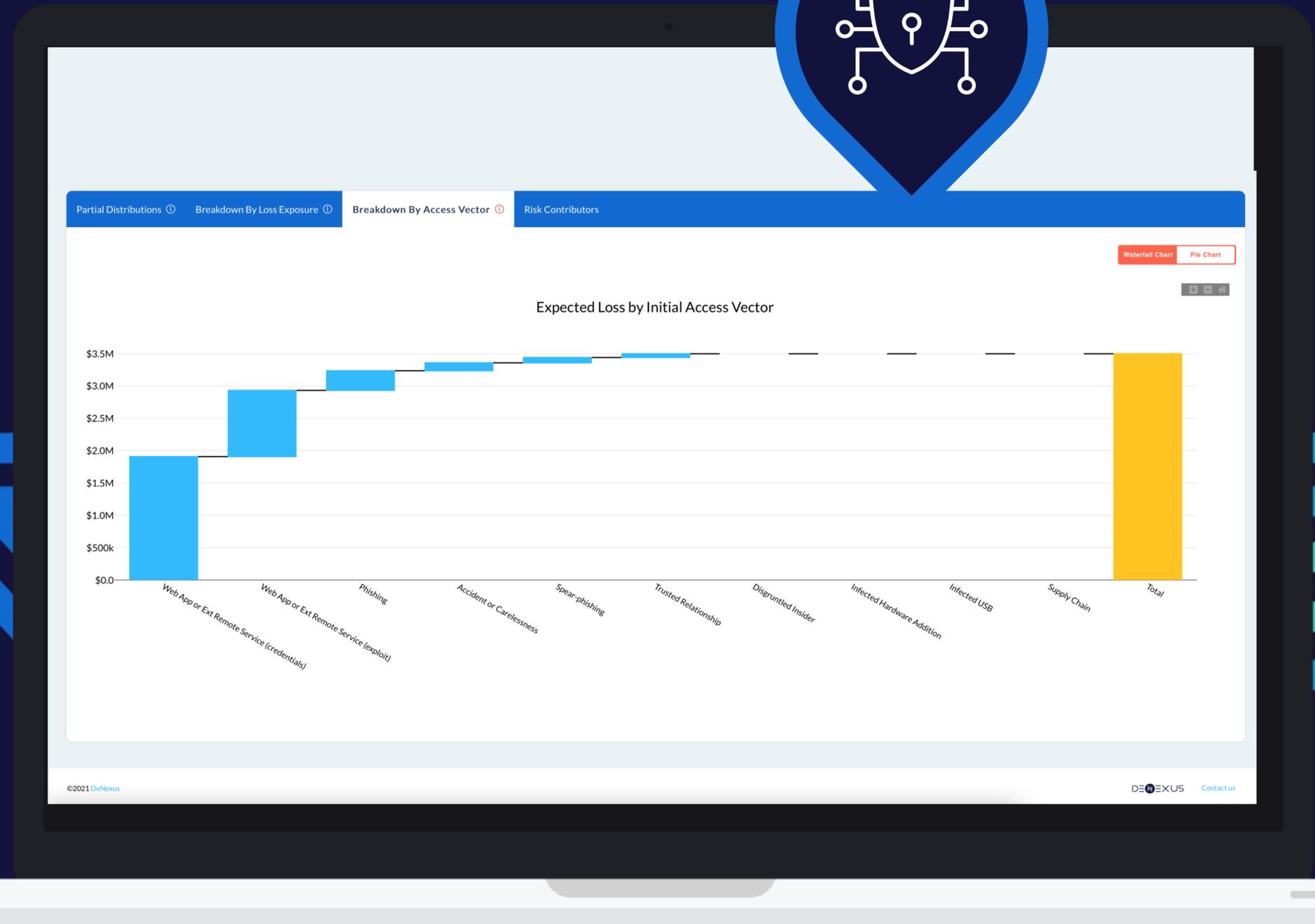
- Expected loss
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What are our top risks?

Breakdown risk sources

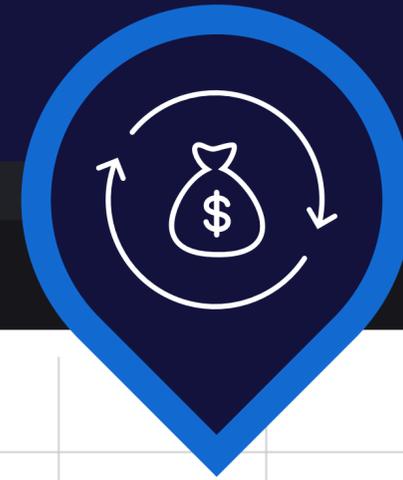
- Loss exposures
- Risk partitioning
- Initial Access Vectors (IaV) with assigned business impact



What type of loss can we expect?

Understand your Cyber Risk

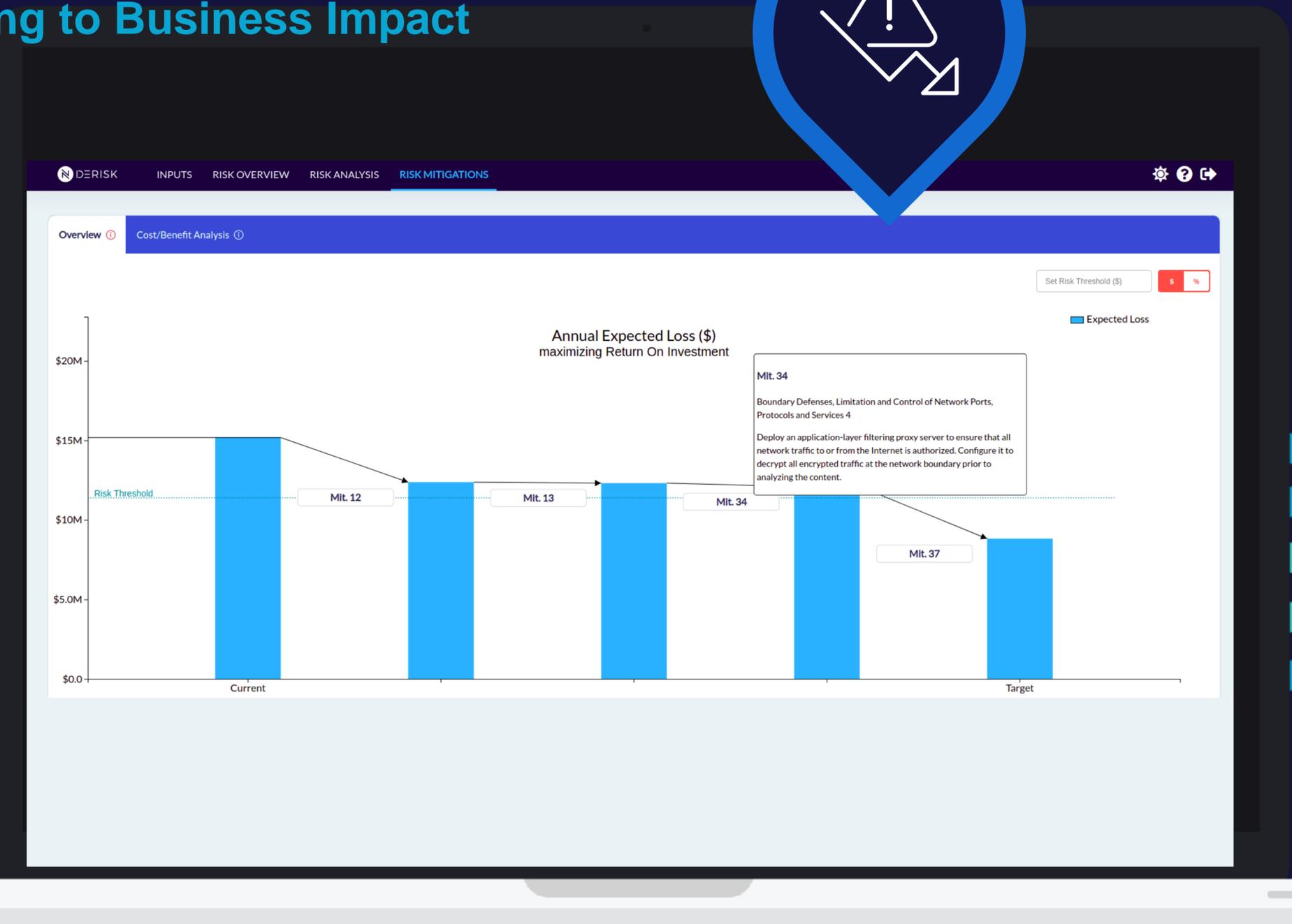
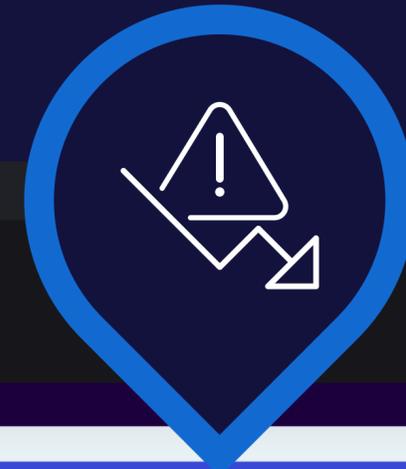
- Breakdown by risk by sources
- Assign loss Exposures



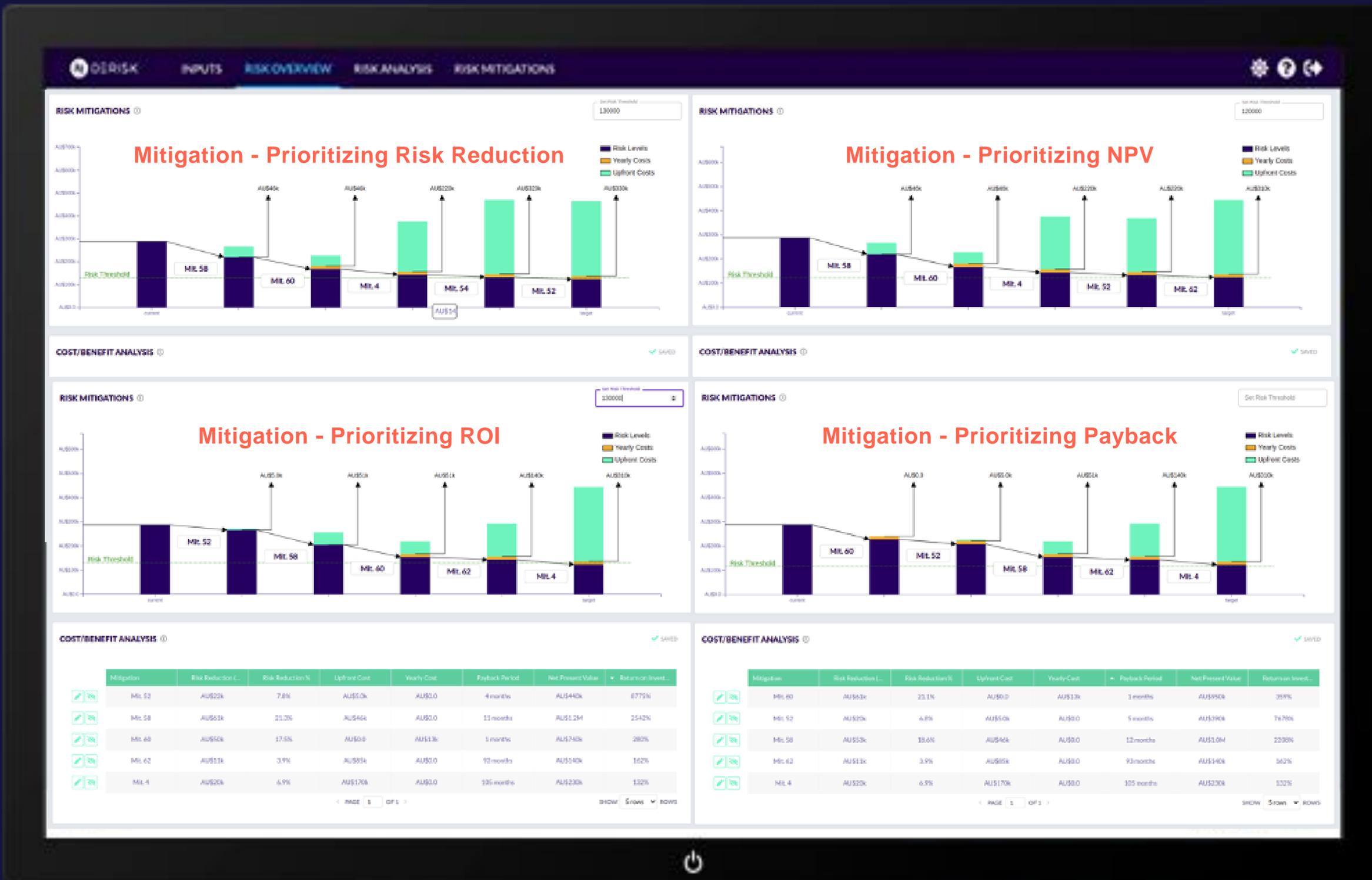
What is the benefit of mitigation?

Manage and Transfer Risk According to Business Impact

- Understand Risk Reduction options
- Choose Risk Reduction criteria. From fastest risk reduction to ROI to fastest Payback Period or other financial KPIs
- Optimize the use of your Cyber Security dollars
- Prepare cyber security budgets
- Run sensitivity analysis



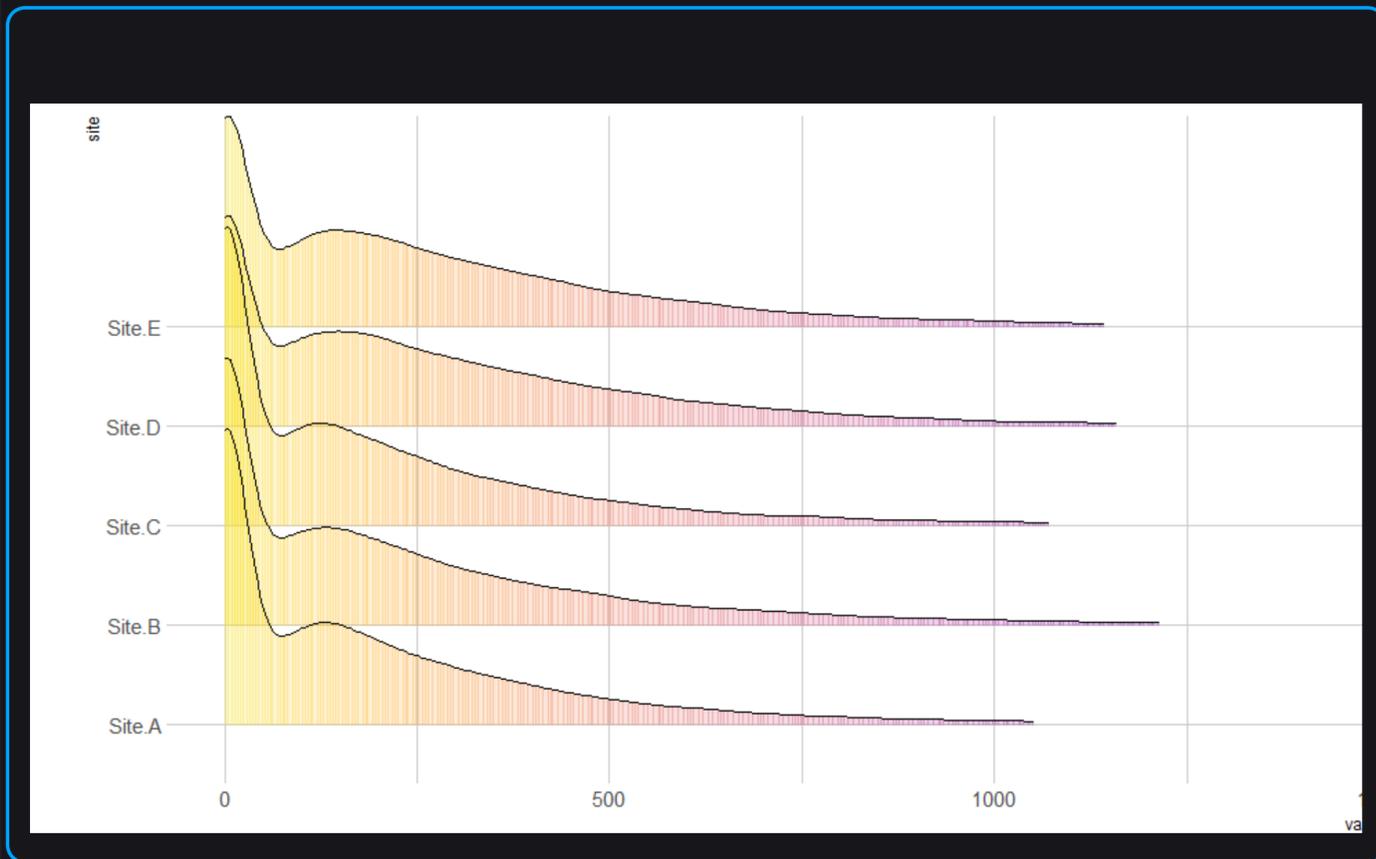
What is the cost/benefit of this project?



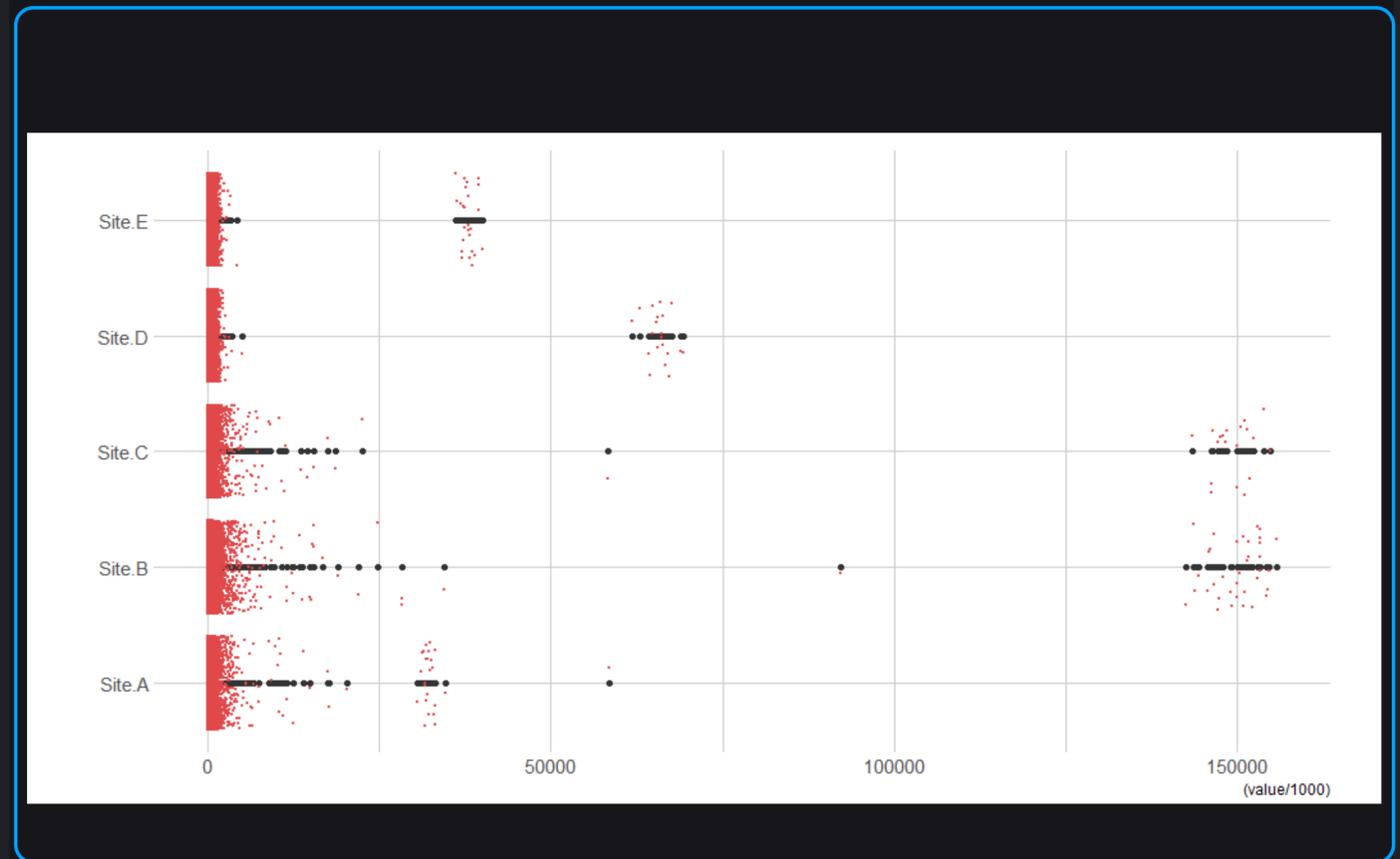
Multisite Decisions

Annual Loss Exposure in 5 sites

Annual Loss Exposure per site

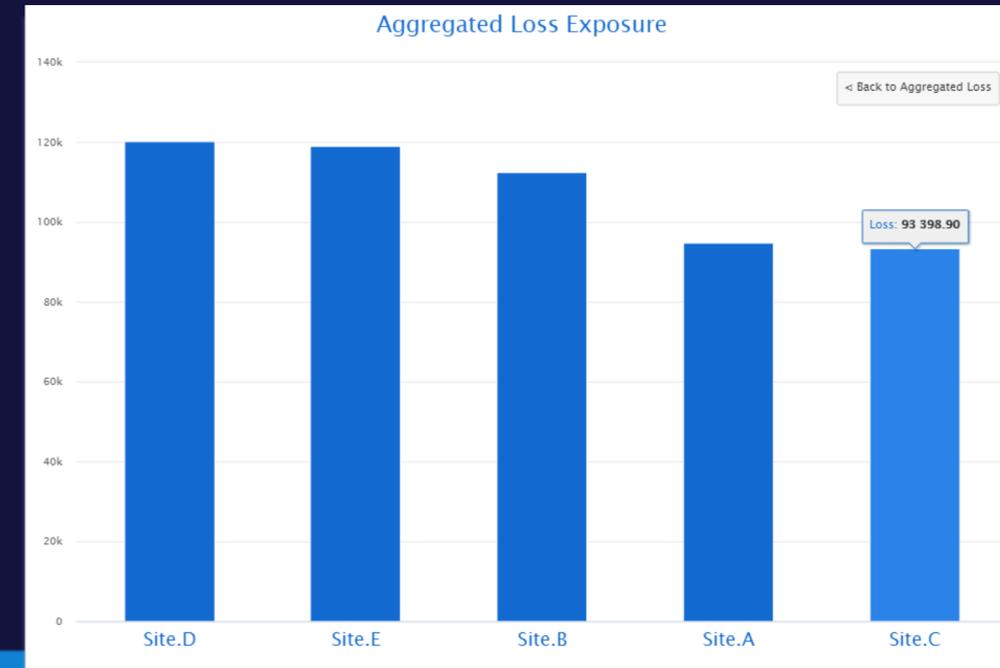
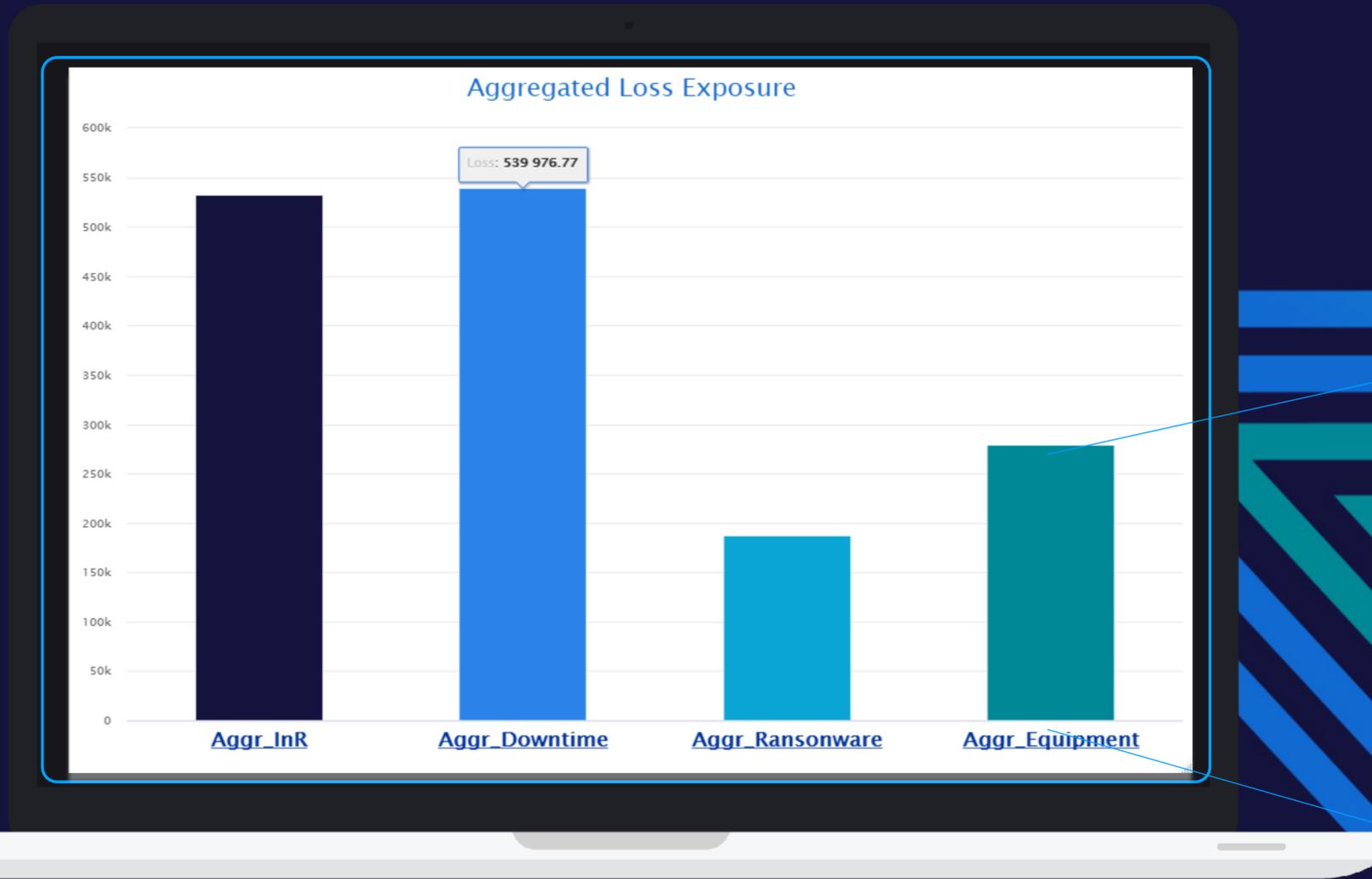


What can we expect?



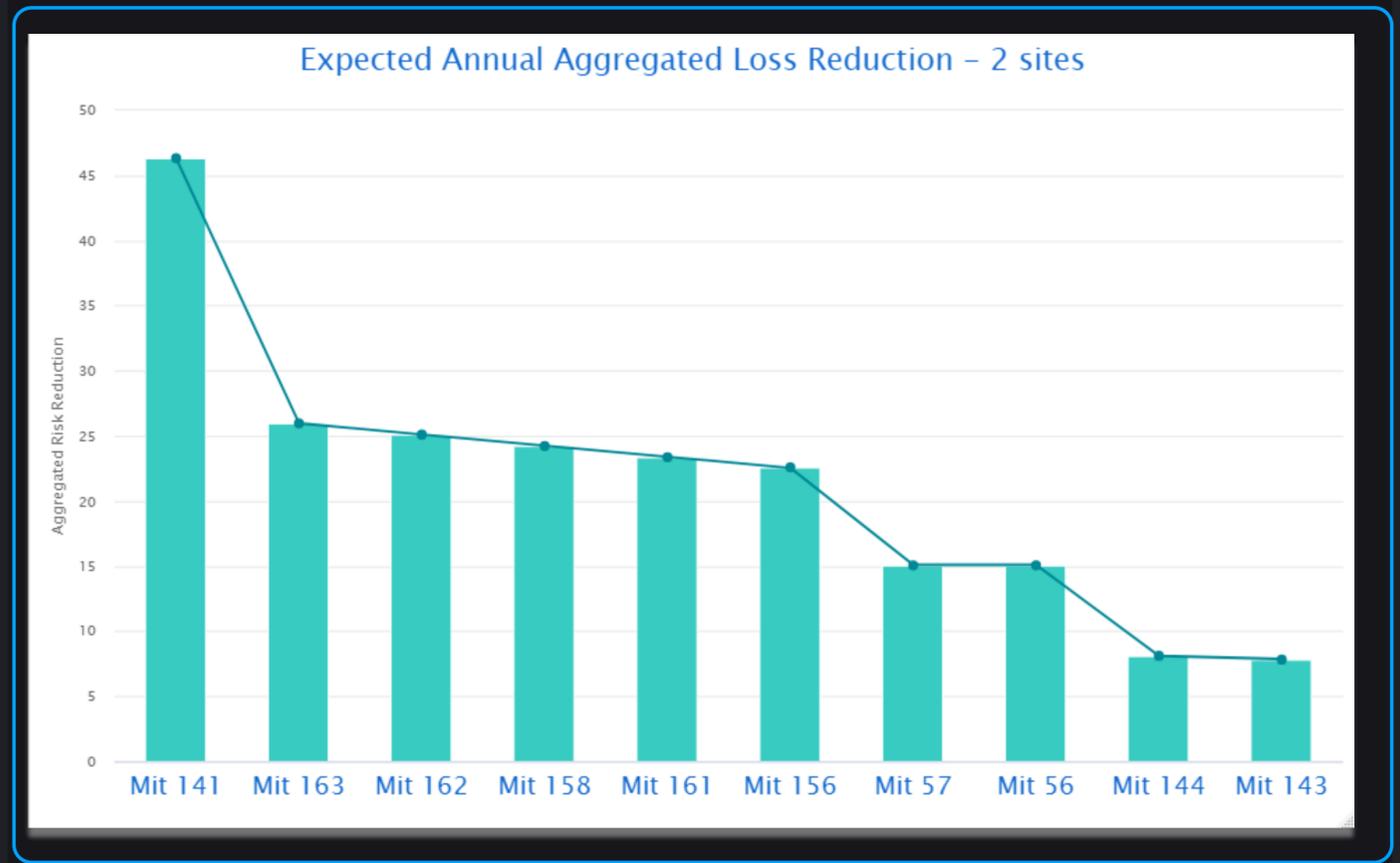
Identify Risk Contributors

Aggregated Cyber Risk – 5 sites



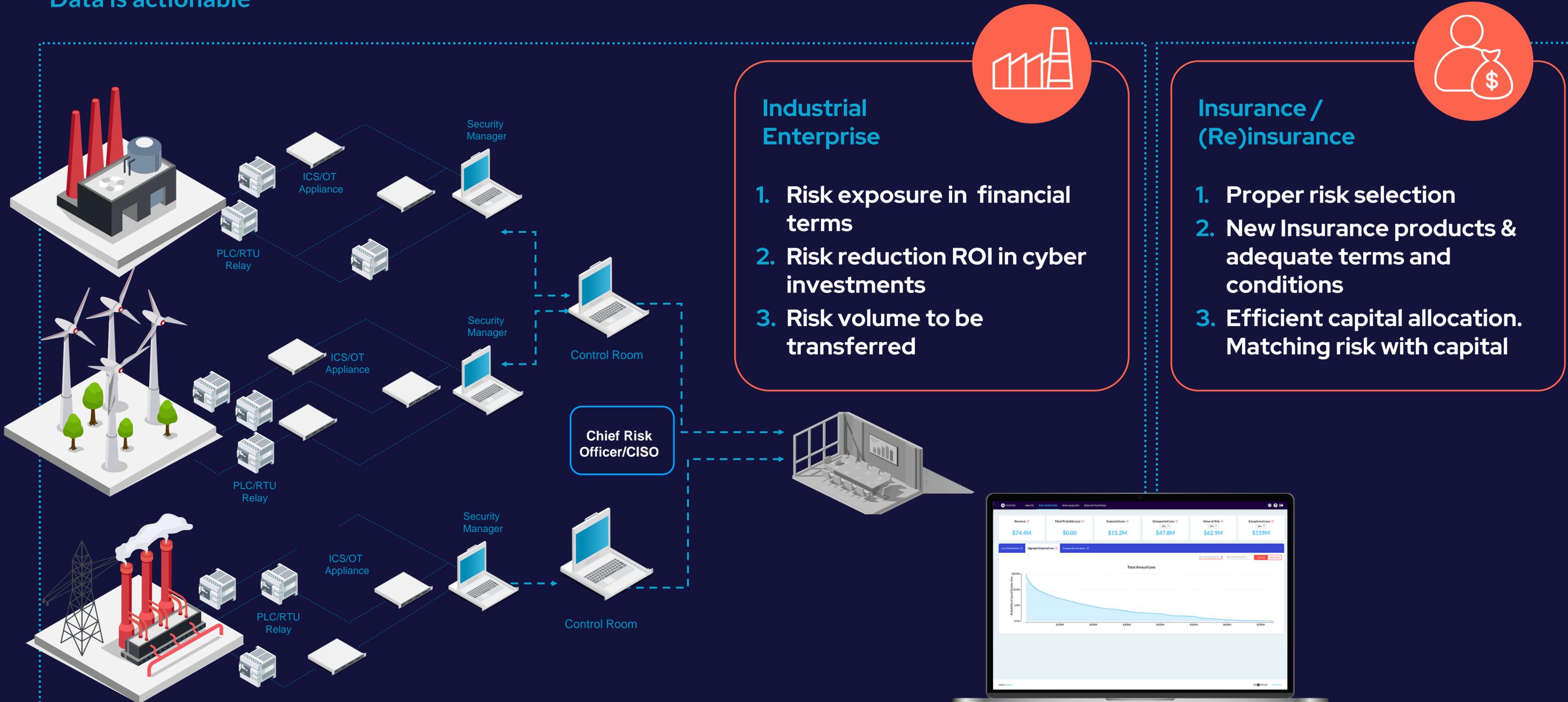
Cyber Risk Mitigation

Aggregated Cyber Risk – 2 sites



From the Control Room to the Board Room

Data is actionable



Industrial Enterprise

1. Risk exposure in financial terms
2. Risk reduction ROI in cyber investments
3. Risk volume to be transferred

Insurance / (Re)insurance

1. Proper risk selection
2. New Insurance products & adequate terms and conditions
3. Efficient capital allocation. Matching risk with capital

From the Control Room to the Board Room

Cyber Risk Quantification for ICS/OT

With transparent data and models that can be audited



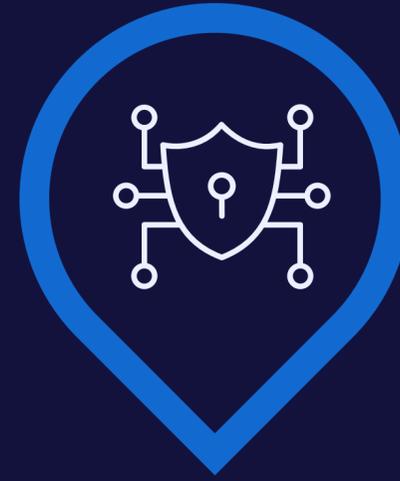
**Value Cyber
Risk**



**Mitigate Risk
Exposure**



**Operationalize
ROI-based Actions**



**Transfer
Cyber Risk**



**Data-driven
Decisions**



Thank You

Learn more @ [DeNexus.io](https://denexus.io)



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