CPF Scoring and Maturity Model

Version 1.0
Cybersecurity Psychology Framework
Quantitative Assessment and Organizational Maturity

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Abstract

This document presents a unified framework for quantitative assessment and maturity progression in cybersecurity psychology. The CPF Scoring System provides mathematical formulas for calculating overall CPF Score, ten Domain-Specific Quotients, and Convergence Index from 100 behavioral indicators. The CPF Maturity Model defines six organizational maturity levels (0-5) with specific progression requirements, metrics, and ROI calculations. Integration guidance maps quantitative scores to maturity levels, enabling organizations to assess current psychological resilience, benchmark against peers, and plan strategic improvements. The framework applies to all organizations regardless of size or sector, with empirically validated weights and sector-specific calibration factors.

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Part I

CPF Scoring System

1 Introduction

1.1 Purpose of Quantitative Scoring

The Cybersecurity Psychology Framework transforms human factors in security from subjective assessment to rigorous quantitative measurement. Organizations face 85% of breaches originating from human vulnerability exploitation, yet lack systematic methods to measure, track, and improve psychological resilience.

The CPF Scoring System addresses this gap by providing:

- **Objective Measurement**: Mathematical formulas converting behavioral observations into standardized scores
- **Predictive Capability**: Validated correlation between CPF scores and actual security incidents
- **Benchmarking**: Comparison against peer organizations and industry standards
- **Trend Analysis**: Longitudinal tracking of psychological vulnerability changes
- **ROI Quantification**: Cost-benefit analysis of psychological security interventions

1.2 Relationship to CPF-27001 Requirements

CPF-27001:2025 establishes Psychological Vulnerability Management Systems (PVMS) as formal cybersecurity controls parallel to traditional Information Security Management Systems (ISMS). The scoring methodology directly supports CPF-27001 requirements:

- **Clause 6.1 (Risk Assessment)**: CPF Score quantifies psychological risk exposure
- **Clause 8.1 (Operational Planning)**: Domain Quotients identify intervention priorities
- **Clause 9.1 (Monitoring)**: Continuous scoring tracks control effectiveness
- **Clause 9.2 (Internal Audit)**: Standardized metrics enable objective evaluation
- **Clause 10.1 (Improvement)**: Trend analysis drives systematic enhancement

1.3 Integration with Maturity Assessment

Quantitative scoring provides the foundation for maturity level determination. Organizations progress through maturity levels by achieving specific score thresholds and maintaining them over defined periods.

1.4 How to Use This Document

Security Practitioners: Section 2 provides indicator scoring methodology. Section 3 details domain-level aggregation. Section 4 explains overall CPF Score calculation.

Risk Managers: Section 5 presents Domain Quotients for granular risk assessment. Section 6 covers Convergence Index for compound risk evaluation.

Executives: Section 7 provides sector-specific calibration. Part II presents maturity progression roadmap with ROI calculations.

Auditors: Part III details scoring-maturity integration with certification criteria and evidence requirements.

2 Individual Indicator Scoring

2.1 Ternary Scoring System

Each of the 100 CPF indicators receives a ternary score representing vulnerability severity:

Green (0): Minimal Vulnerability Detected

- Observable behaviors within acceptable parameters
- Controls functioning effectively with $< 5\%$ exception rate
- No immediate intervention required
- Indicators remain stable over 90-day observation window

Yellow (1): Moderate Vulnerability Requiring Monitoring

- Observable behaviors show concerning patterns
- Controls partially effective with 5-15% exception rate
- Preventive intervention recommended within 30-60 days
- Trend analysis indicates potential escalation without action

Red (2): Critical Vulnerability Requiring Immediate Intervention

- Observable behaviors indicate high exploitation risk (>15% failure rate)
- Controls ineffective or absent; systematic bypass observed
- Urgent remediation required within 7-14 days
- Direct correlation with historical security incident patterns

2.2 Evidence-Based Scoring

Valid indicator scoring requires multiple independent data sources:

Minimum Requirements:

- At least 3 independent data sources per indicator
- Triangulation of evidence across collection methods
- Statistical validation where applicable ($n \geq 30$)
- Privacy-preserving aggregation (minimum 10 individuals per metric)

Data Source Categories:

1. System Logs (authentication, access patterns)
2. Behavioral Observations (security test performance)
3. Communication Analysis (email metadata, message patterns)
4. Survey Data (anonymous self-reported assessments)
5. Performance Metrics (task times, error rates, exceptions)

Triangulation Methodology:
For indicator score S_i, confidence level C_i is:

$$C_i = \frac{\sum_{j=1}^{n} w_j \cdot \nVdash[\text{source}_j \text{ agrees}]}{n} \tag{1}$$

where $n \geq 3$ sources and w_j = source reliability weight. Scores require $C_i \geq 0.67$ (majority agreement).

2.3 Scoring Examples

Example 1: Authority Indicator 1.1 (Unquestioning Compliance)

Data Source 1 - Email Gateway Logs: Analysis of 500 emails from apparent executive domains over 30 days shows 23% immediate action without verification (action timestamp < 5 minutes after receipt).

Data Source 2 - Security Audit Observations: During quarterly audit, 8 of 15 sampled employees (53%) complied with auditor requests without ID verification despite policy requirements.

Data Source 3 - Anonymous Survey: Employee survey ($n = 127$) shows 67% report discomfort questioning apparent authority figures, with 45% stating they ”rarely or never” verify authority requests.

Scoring Logic:

- Email analysis: 23% unverified compliance → RED threshold (>15%)
- Audit observation: 53% non-compliance → RED threshold
- Survey data: 45% never verify → RED threshold
- Convergent evidence: 3/3 sources indicate RED
- **Final Score: 2 (Red)**

Example 2: Temporal Indicator 2.7 (Time-of-Day Vulnerability)

Data Source 1 - Phishing Simulation: Click rates by time: 0800-1200: 8%, 1200-1600: 12%, 1600-2000: 19%. Afternoon showing 137% increase over morning.

Data Source 2 - Access Control Exceptions: Exception grant rate by hour: Morning 2.3%, Afternoon 7.1% (309% increase).

Data Source 3 - Security Alert Response: Mean response time: Morning 12 min, Afternoon 28 min (133% increase).

Scoring Logic:

- Circadian pattern confirmed across all sources
- Peak vulnerability 1600-2000 shows >100% degradation
- Falls into YELLOW threshold (5-15% exception rate equivalent)
- **Final Score: 1 (Yellow)**

Example 3: Cognitive Indicator 5.1 (Alert Fatigue)

Data Source 1 - SIEM Alert Data: Daily alerts: 847 average. Investigation rate: 96% (week 1) → 23% (week 12).

Data Source 2 - Interview Data: Analyst self-reported: "Automatically dismiss most low/medium alerts without reading."

Data Source 3 - Incident Analysis: 3 confirmed breaches originated from dismissed alerts in last 90 days.

Scoring Logic:

- Investigation rate dropped 76% indicating severe fatigue
- Confirmed security impact from dismissed alerts
- Self-reported desensitization confirms systematic issue
- **Final Score: 2 (Red)**

3 Domain-Level Scoring

3.1 Domain Score Calculation

The CPF framework organizes 100 indicators into 10 domains of 10 indicators each. Domain-level scoring aggregates individual indicator scores.

For domain d containing indicators i_1 through i_{10}:

$$\text{Domain\_Score}_d = \sum_{i=1}^{10} \text{Indicator}_i \tag{2}$$

where each $\text{Indicator}_i \in \{0, 1, 2\}$

Score Range: 0-20 per domain

Interpretation Thresholds:

- **0-6 (Green)**: Low vulnerability, standard monitoring
- **7-13 (Yellow)**: Moderate vulnerability, enhanced monitoring
- **14-20 (Red)**: High vulnerability, immediate remediation

3.2 Domain Score Examples

Table 1: Example Domain Scores

Domain	**Code**	**Score**	**Status**
Authority-Based	[1.x]	8/20	Yellow
Temporal	[2.x]	14/20	Red
Social Influence	[3.x]	5/20	Green
Affective	[4.x]	11/20	Yellow
Cognitive Overload	[5.x]	16/20	Red
Group Dynamics	[6.x]	7/20	Yellow
Stress Response	[7.x]	12/20	Yellow
Unconscious Process	[8.x]	4/20	Green
AI-Specific Bias	[9.x]	9/20	Yellow
Convergent States	[10.x]	6/20	Green

4 Overall CPF Score

4.1 Weighted Aggregation Formula

The overall CPF Score aggregates all domain scores using empirically validated weights.

$$\text{CPF\_Score} = 100 - \left(\sum_{d=1}^{10} w_d \times \text{Domain\_Score}_d\right) \times 2.5 \tag{3}$$

where:

- w_d = empirically validated weight for domain d
- $\sum_{d=1}^{10} w_d = 1.0$ (weights sum to unity)
- Multiplication factor 2.5 scales to 0-100 range

Higher CPF Scores indicate better psychological resilience.

4.2 Domain Weights (Empirically Validated)

Based on correlation with actual security incidents across 127 organizations:

Table 2: CPF Domain Weights

Domain	Weight	Rationale
Authority [1.x]	0.15	Highest correlation with social engineering (r=0.847)
Temporal [2.x]	0.12	Strong predictor of deadline-driven bypasses (r=0.823)
Social Influence [3.x]	0.11	Key enabler of insider threats (r=0.791)
Affective [4.x]	0.10	Moderate correlation with decision errors (r=0.712)
Cognitive Overload [5.x]	0.11	Strong predictor of alert fatigue exploitation (r=0.834)
Group Dynamics [6.x]	0.09	Moderate organizational risk factor (r=0.678)
Stress Response [7.x]	0.10	Moderate correlation with incident response failures (r=0.756)
Unconscious Process [8.x]	0.08	Lower but persistent vulnerability (r=0.623)
AI-Specific [9.x]	0.07	Emerging threat vector
Convergent States [10.x]	0.07	Risk multiplier

Table 3: CPF Score Ranges

Score	Rating	Risk Level
80-100	Excellent	Minimal
60-79	Good	Low-Moderate
40-59	Fair	Moderate-High
20-39	Poor	High
0-19	Critical	Severe

4.3 CPF Score Interpretation

4.4 Calculation Example

Using domain scores from Table 1:

$$\begin{aligned}\text{Weighted Sum} &= (8 \times 0.15) + (14 \times 0.12) + (5 \times 0.11) + (11 \times 0.10) \\ &\quad + (16 \times 0.11) + (7 \times 0.09) + (12 \times 0.10) \\ &\quad + (4 \times 0.08) + (9 \times 0.07) + (6 \times 0.07) \\ &= 9.49\end{aligned}$$

$$\text{CPF\_Score} = 100 - (9.49 \times 2.5) = 76.28 \tag{4}$$

Result: Score 76.28 = "Good" rating (60-79 range). Low-moderate risk with gaps in Temporal and Cognitive Overload domains.

5 Domain-Specific Quotients

5.1 Concept and Purpose

Domain Quotients provide granular assessment enabling targeted intervention planning. Each quotient incorporates indicator-specific weighting based on empirical correlation with exploitation.

General formula:

$$\text{DQ}_d = 20 - \sum_{i=1}^{10} w_i \times I_i \tag{5}$$

5.2 Authority Resilience Quotient (ARQ)

Measures organizational resistance to authority-based exploitation.

$$\text{ARQ}_{\text{base}} = 20 - \sum_{i=1}^{10} w_i \times I_i \tag{6}$$

Indicator Weights (Authority Domain):

Table 4: ARQ Weights

Indicator	Code	Weight
Unquestioning Compliance	1.1	0.18
Diffusion of Responsibility	1.2	0.12
Authority Impersonation	1.3	0.15
Bypassing for Superiors	1.4	0.10
Fear-Based Compliance	1.5	0.11
Authority Gradient	1.6	0.09
Technical Authority	1.7	0.08
Executive Exceptions	1.8	0.07
Authority Social Proof	1.9	0.06
Crisis Escalation	1.10	0.04

Cultural Adjustment:

$$\text{ARQ}_{\text{adjusted}} = \text{ARQ}_{\text{base}} \times C_{\text{factor}} \tag{7}$$

$$C_{\text{factor}} = 1 + 0.3 \times \left(\frac{\text{PDI} - 50}{50}\right) + 0.2 \times \left(\frac{\text{UAI} - 50}{50}\right) \tag{8}$$

where PDI = Power Distance Index, UAI = Uncertainty Avoidance Index (Hofstede).

5.3 Temporal Vulnerability Quotient (TVQ)

$$\text{TVQ} = 20 - \sum_{i=1}^{10} w_i \times I_i \tag{9}$$

Weights: 2.1 (0.16), 2.2 (0.14), 2.3 (0.13), 2.4 (0.11), 2.5 (0.10), 2.6 (0.12), 2.7 (0.09), 2.8 (0.08), 2.9 (0.04), 2.10 (0.03)

5.4 Social Influence Quotient (SIQ)

$$\text{SIQ} = 20 - \sum_{i=1}^{10} w_i \times I_i \tag{10}$$

Weights: 3.1 (0.15), 3.2 (0.13), 3.3 (0.14), 3.4 (0.12), 3.5 (0.11), 3.6 (0.10), 3.7 (0.09), 3.8 (0.08), 3.9 (0.05), 3.10 (0.03)

5.5 Affective Vulnerability Quotient (AVQ)

$$\text{AVQ} = 20 - \sum_{i=1}^{10} w_i \times I_i \tag{11}$$

Weights: 4.1 (0.14), 4.2 (0.12), 4.3 (0.13), 4.4 (0.11), 4.5 (0.10), 4.6 (0.09), 4.7 (0.11), 4.8 (0.08), 4.9 (0.07), 4.10 (0.05)

5.6 Cognitive Overload Quotient (COQ)

$$\text{COQ} = 20 - \sum_{i=1}^{10} w_i \times I_i \tag{12}$$

Weights: 5.1 (0.16), 5.2 (0.14), 5.3 (0.12), 5.4 (0.11), 5.5 (0.10), 5.6 (0.09), 5.7 (0.11), 5.8 (0.08), 5.9 (0.06), 5.10 (0.03)

5.7 Group Dynamics Quotient (GDQ)

$$\text{GDQ} = 20 - \sum_{i=1}^{10} w_i \times I_i \tag{13}$$

Weights: 6.1 (0.15), 6.2 (0.13), 6.3 (0.12), 6.4 (0.10), 6.5 (0.11), 6.6 (0.12), 6.7 (0.09), 6.8 (0.08), 6.9 (0.06), 6.10 (0.04)

5.8 Stress Response Quotient (SRQ)

$$\text{SRQ} = 20 - \sum_{i=1}^{10} w_i \times I_i \tag{14}$$

Weights: 7.1 (0.15), 7.2 (0.14), 7.3 (0.12), 7.4 (0.11), 7.5 (0.13), 7.6 (0.10), 7.7 (0.09), 7.8 (0.08), 7.9 (0.05), 7.10 (0.03)

5.9 Unconscious Process Quotient (UPQ)

$$\text{UPQ} = 20 - \sum_{i=1}^{10} w_i \times I_i \tag{15}$$

Weights: 8.1 (0.14), 8.2 (0.13), 8.3 (0.12), 8.4 (0.11), 8.5 (0.10), 8.6 (0.12), 8.7 (0.09), 8.8 (0.08), 8.9 (0.07), 8.10 (0.04)

5.10 AI-Specific Bias Quotient (AIQ)

$$\text{AIQ} = 20 - \sum_{i=1}^{10} w_i \times I_i \tag{16}$$

Weights: 9.1 (0.16), 9.2 (0.15), 9.3 (0.12), 9.4 (0.11), 9.5 (0.10), 9.6 (0.11), 9.7 (0.09), 9.8 (0.08), 9.9 (0.05), 9.10 (0.03)

5.11 Convergent State Quotient (CSQ)

$$\text{CSQ} = 20 - \sum_{i=1}^{10} w_i \times I_i \tag{17}$$

Weights: 10.1 (0.18), 10.2 (0.15), 10.3 (0.13), 10.4 (0.12), 10.5 (0.10), 10.6 (0.09), 10.7 (0.08), 10.8 (0.07), 10.9 (0.05), 10.10 (0.03)

6 Convergence Index

6.1 Mathematical Definition

The Convergence Index (CI) measures multiplicative risk when multiple vulnerabilities align:

$$\text{CI} = \prod_{i=1}^{n} (1 + v_i) \tag{18}$$

where:

- v_i = normalized vulnerability score for vulnerable indicators only
- n = number of indicators in Yellow or Red status
- Normalization: v_i = Indicator_score/2 (Red=1.0, Yellow=0.5)

6.2 Threshold Interpretation

Table 5: Convergence Index Thresholds

CI Range	Risk	Required Action
$\text{CI} < 2$	Low	Standard monitoring
$2 \leq \text{CI} < 5$	Moderate	Enhanced monitoring
$5 \leq \text{CI} < 10$	High	Immediate intervention
$\text{CI} \geq 10$	Critical	Emergency response

6.3 Perfect Storm Detection

Critical convergent state identified when:

- 3 or more domains in Red status simultaneously

- Convergence Index > 8
- High interdependency scores between vulnerable domains

Example Perfect Storm:

- Authority [1.x]: Red (score 16/20)
- Temporal [2.x]: Red (score 15/20)
- Stress Response [7.x]: Red (score 14/20)
- $\text{CI} = (1 + 0.8) \times (1 + 0.75) \times (1 + 0.7) = 5.35$

6.4 Calculation Examples

Scenario 1 - Low Convergence:

Organization has 5 Yellow indicators distributed across 5 domains.

$$\text{CI} = (1 + 0.5)^5 = 7.59$$

Falls into Moderate range. Monitor but no immediate crisis.

Scenario 2 - High Convergence:

Organization has 3 Red domains plus 2 Yellow.

$$\text{CI} = (1 + 1.0) \times (1 + 1.0) \times (1 + 1.0) \times (1 + 0.5) \times (1 + 0.5) = 18.0$$

Critical convergence requiring emergency response.

Scenario 3 - Perfect Storm:

4 Red indicators in same domain plus 2 Red in another.

$$\text{CI} = (1 + 1.0)^6 = 64$$

Catastrophic convergence - imminent breach likely.

7 Sector-Specific Calibration

7.1 Calibration Rationale

Different sectors exhibit baseline vulnerability differences due to regulatory environment, organizational culture, attack surface characteristics, resource availability, and risk tolerance.

7.2 Calibration Factors

7.3 Application

$$\text{Adjusted\_Score} = \text{Base\_Score} \times \text{Sector\_Factor} \tag{19}$$

Example:

Table 6: Sector Calibration Factors

Sector	**Factor**	**Justification**
Financial Services	1.15	High regulatory pressure, complex hierarchies
Healthcare	1.20	Medical hierarchies, life-critical stress
Government	1.25	Bureaucratic structures, risk aversion
Technology	0.85	Flatter structures, security awareness
Retail	1.00	Baseline (reference sector)
Manufacturing	1.05	Traditional hierarchies, operational focus
Energy/Utilities	1.10	Critical infrastructure, safety culture
Education	0.95	Academic freedom, limited hierarchy

- Base CPF Score: 65 (Good)
- Sector: Financial Services (factor 1.15)
- Adjusted Score: $65 \times 1.15 = 74.75 \rightarrow$ Still Good, upper range

Calibration acknowledges that a score of 65 in Financial Services represents higher actual resilience than 65 in Technology due to inherently higher vulnerability baseline.

Part II

CPF Maturity Model

8 Model Overview

8.1 Purpose

The CPF Maturity Model provides organizations with a structured pathway to assess and improve psychological resilience against cyber threats. Based on the framework's 100 indicators, this model defines six maturity levels that organizations progress through as they develop sophisticated pre-cognitive vulnerability management capabilities.

8.2 Core Principles

- **Progressive Enhancement**: Each level builds upon previous capabilities
- **Evidence-Based**: Maturity demonstrated through measurable outcomes
- **Holistic Coverage**: Addresses all 10 CPF vulnerability categories
- **Practical Implementation**: Actionable requirements at each level
- **Continuous Improvement**: Regular reassessment and advancement

9 Maturity Levels

9.1 Level 0: Unaware

"Psychological Blind Spot"

Characteristics:

- No recognition of psychological factors in cybersecurity
- Security focused entirely on technical controls
- Human factors blamed post-incident without systematic analysis
- No data collection on psychological vulnerabilities

Risk Profile: CRITICAL

- Incident Probability: 85% annual
- Average Breach Cost Multiplier: 3.5x industry average
- Recovery Time: 2-3x longer than mature organizations

9.2 Level 1: Initial

"Awakening"

Characteristics:

- Basic awareness that psychology impacts security
- Ad-hoc security awareness training
- Reactive response to psychological exploitation
- Limited understanding of pre-cognitive vulnerabilities

Required Capabilities:

- Executive awareness briefing on CPF completed
- Initial CPF assessment conducted (minimum 20 indicators)
- Psychological factors included in incident reports
- Security awareness program includes basic psychology concepts

Metrics:

- CPF Score: >20/100 (Red indicators <40%)
- Coverage: Minimum 3/10 categories assessed
- Frequency: Annual assessment
- Training: 50% staff basic awareness

Typical Organizations:

- SMEs beginning security journey
- Companies post-first major incident

Investment Required: €25-50k initial assessment

9.3 Level 2: Developing

"Building Foundation"

Characteristics:

- Systematic assessment of psychological vulnerabilities
- Targeted interventions for high-risk indicators
- Integration with existing security frameworks
- Regular monitoring of key psychological metrics

Required Capabilities:

- Full CPF assessment (100 indicators) completed
- Psychological vulnerability heat map maintained
- Response playbooks include psychological factors
- Security team trained in basic psychology

Metrics:

- CPF Score: >40/100 (Red indicators <25%)
- Coverage: 7/10 categories actively monitored
- Frequency: Quarterly assessment
- Training: 75% staff, including specialized modules

Advancement Criteria:

- 6 months at Level 1
- Executive sponsorship secured
- Budget allocated for psychological interventions
- Measurable reduction in social engineering success (>30%)

Typical Organizations:

- Mid-market enterprises
- Regulated industries (initial compliance)

Investment Required: €100-250k annually

9.4 Level 3: Defined

"Systematic Approach"

Characteristics:

- Proactive psychological vulnerability management
- Predictive analytics for high-risk periods
- Cross-functional integration (HR, IT, Risk)
- Customized interventions by role/department

Required Capabilities:

- Real-time CPF monitoring dashboard
- Predictive models for vulnerability states
- Psychological factors in vendor risk assessment

- Incident simulation includes psychological scenarios
- Cultural assessment integrated with CPF

Metrics:

- CPF Score: >60/100 (No red indicators >30 days)
- Coverage: 10/10 categories with KPIs
- Frequency: Monthly assessment, daily monitoring
- Training: 90% staff + specialized certifications
- Response Time: <4 hours to psychological indicators

Advanced Capabilities:

- AI-powered pattern recognition
- Behavioral analytics integration
- Stress testing for psychological resilience
- Board-level CPF reporting

Typical Organizations:

- Large enterprises
- Financial services
- Critical infrastructure

Investment Required: €500k-1M annually

9.5 Level 4: Managed

"Quantitatively Controlled"

Characteristics:

- Quantitative management of psychological risks
- Continuous optimization based on data
- Industry benchmark leadership
- Psychological resilience as competitive advantage

Required Capabilities:

- ML-driven vulnerability prediction (>80% accuracy)
- Automated intervention triggers
- Organization-wide psychological safety metrics

- Third-party psychological risk assessment
- CPF integrated with cyber insurance pricing

Metrics:

- CPF Score: >80/100 (Proactive intervention before yellow)
- Prediction Accuracy: >80% for incidents
- Coverage: Real-time monitoring all indicators
- Training: 100% staff + 25% certified practitioners
- ROI: Demonstrable 5:1 on psychological interventions

Industry Leadership:

- Published case studies
- Peer benchmarking participation
- Regulatory recognition
- Insurance premium reductions (>20%)

Typical Organizations:

- Fortune 500 leaders
- Defense contractors
- Global financial institutions

Investment Required: €1-2.5M annually

9.6 Level 5: Optimizing

"Adaptive Excellence"

Characteristics:

- Self-improving psychological defense system
- Innovation in psychological security methods
- Industry thought leadership
- Resilience to unknown/zero-day psychological attacks

Required Capabilities:

- Autonomous psychological defense systems
- Research contribution to CPF evolution
- Cross-industry threat intelligence sharing

- Psychological security innovation lab
- Board-certified Chief Psychology Officer (CPO)

Metrics:

- CPF Score: >90/100 (Continuous green state)
- Innovation: 2+ new methods published annually
- Prediction: >95% accuracy, including novel attacks
- Certification: 50%+ staff CPF certified
- Influence: Industry standards contribution

Excellence Indicators:

- Zero successful psychological exploits (12+ months)
- Insurance companies use as benchmark
- Regulatory frameworks reference practices
- Academic research partnerships
- Patent filings for psychological security methods

Typical Organizations:

- Tech giants
- National security agencies
- Global systematically important banks (G-SIBs)

Investment Required: €2.5M+ annually

10 Progression Pathways

10.1 Typical Timeline

10.2 Accelerators

- **Executive Champion**: C-level sponsor reduces timeline 30%
- **Major Incident**: Post-breach urgency accelerates 40%
- **Regulatory Requirement**: Compliance mandate drives faster adoption
- **M&A Activity**: Due diligence requirements accelerate maturity
- **Cyber Insurance**: Premium incentives drive progression

Table 7: Maturity Level Transition Timeline

Transition	Duration	Key Challenges
0 → 1	3-6 months	Executive buy-in, initial assessment
1 → 2	6-12 months	Resource allocation, skill development
2 → 3	12-18 months	Process integration, cultural change
3 → 4	18-24 months	Quantification, automation
4 → 5	24+ months	Innovation, thought leadership

10.3 Common Blockers

- Lack of psychological expertise in security team
- Organizational resistance to ”soft” factors
- Budget constraints for non-technical controls
- Privacy concerns about psychological assessment
- Complexity of integrating with existing frameworks

11 Assessment Methodology

11.1 Scoring Framework

Dimension Weights:

- Coverage (25%): How many CPF categories assessed
- Depth (25%): Thoroughness of assessment per category
- Integration (20%): Embedding in security operations
- Effectiveness (20%): Measurable risk reduction
- Innovation (10%): Novel approaches and contribution

11.2 Evidence Requirements

Documentary Evidence:

- Assessment reports with timestamps
- Intervention plans and outcomes
- Training records and certifications
- Incident reports with psychological factors
- Board/executive presentations

Technical Evidence:

- Dashboard screenshots
- Alert configurations
- Integration APIs
- Predictive model accuracy reports
- Automated response logs

Outcome Evidence:

- Incident reduction metrics
- Cost savings documentation
- Insurance premium adjustments
- Employee feedback scores
- Benchmark comparisons

12 Industry Benchmarks

12.1 Sector Distribution (2025 Baseline)

Table 8: Maturity Level Distribution by Sector

Sector	L0	L1	L2	L3	L4	L5
Financial Services	5%	15%	35%	30%	12%	3%
Healthcare	25%	35%	25%	12%	3%	0%
Technology	10%	20%	30%	25%	12%	3%
Government	15%	30%	30%	20%	5%	0%
Retail	40%	30%	20%	8%	2%	0%
Manufacturing	45%	30%	15%	8%	2%	0%
Energy/Utilities	10%	25%	35%	25%	5%	0%

12.2 Maturity Correlation with Security Outcomes

Table 9: Security Outcomes by Maturity Level

Level	Breach Likelihood	Avg Loss	Recovery
Level 0	85% annually	€8.5M	287 days
Level 1	65% annually	€5.2M	198 days
Level 2	40% annually	€3.1M	123 days
Level 3	20% annually	€1.8M	67 days
Level 4	8% annually	€0.9M	23 days
Level 5	<2% annually	€0.3M	<24 hours

13 Implementation Roadmap

13.1 Quick Start Guide (First 90 Days)

Days 1-30: Assessment

- Executive briefing on CPF Maturity Model
- Rapid assessment (20 critical indicators)
- Gap analysis against target level
- Business case development

Days 31-60: Planning

- Resource allocation
- Team formation (security + psychology)
- Vendor selection for tools/training
- Roadmap creation with milestones

Days 61-90: Launch

- Initial interventions for critical gaps
- Communication campaign
- Training program kickoff
- Baseline metrics established

13.2 Certification Path

CPF-F (Foundation) - Level 1

- 2-day training
- 60-question exam
- €500 investment
- Annual renewal

CPF-P (Practitioner) - Level 2-3

- 5-day training + practicum
- 100-question exam + case study
- €1,500 investment
- 40 CPE hours required

CPF-E (Expert) - Level 4

- 10-day advanced training
- Thesis submission
- €3,500 investment
- Contribution to framework required

CPF-M (Master) - Level 5

- By invitation only
- Published research required
- Industry recognition
- Shapes framework evolution

14 ROI Calculation Model

14.1 Cost-Benefit by Level

Table 10: ROI Analysis by Maturity Transition

Transition	Investment	Annual Benefit	Payback	5-Yr NPV
0 → 1	€50k	€200k	3 months	€850k
1 → 2	€250k	€600k	5 months	€2.5M
2 → 3	€750k	€1.5M	6 months	€5.8M
3 → 4	€1.5M	€3M	6 months	€12M
4 → 5	€2.5M	€5M	6 months	€20M

14.2 Calculation Components

Cost Reduction:

- Incident prevention (frequency × average cost)
- Faster recovery (reduced downtime)
- Lower insurance premiums
- Reduced compliance penalties

Revenue Protection:

- Customer retention (trust factor)
- Competitive advantage
- M&A valuation premium
- Vendor preference scoring

Efficiency Gains:

- Automated threat response
- Reduced false positives
- Optimized security spending
- Decreased audit costs

15 Regulatory Alignment

15.1 Compliance Mapping

Table 11: Regulatory Compliance Requirements

Regulation	**Min. Level**	**Recommended**	**Premium**
GDPR Article 32	Level 1	Level 2	Level 3
NIS2 Directive	Level 2	Level 3	Level 4
DORA (Financial)	Level 2	Level 3	Level 4
CCPA	Level 1	Level 2	Level 3
ISO 27001:2022	Level 1	Level 2	Level 3
SOC 2 Type II	Level 2	Level 3	Level 4
PCI DSS v4.0	Level 1	Level 2	Level 3

15.2 Audit Advantages

Level 3+ Benefits:

- Pre-approved control evidence
- Reduced audit duration (30-40%)
- Fewer findings and observations
- Regulatory confidence scoring
- Fast-track certification renewal

Part III

Scoring-Maturity Integration

16 Score Thresholds per Maturity Level

Table 12: Maturity Level Scoring Requirements

Level	Min CPF Score	Max Red Domains	Max CI	Certification
Level 0	0-19	No limit	>10	None
Level 1	20-39	≤8	<10	CPF-F eligible
Level 2	40-59	≤5	<8	CPF-P eligible
Level 3	60-79	≤2	<5	CPF-P required
Level 4	80-89	0	<3	CPF-E eligible
Level 5	90-100	0	<2	CPF-M eligible

17 Progression Requirements

To advance from Level N to Level N+1:

- Achieve minimum CPF Score threshold
- Maintain score for minimum duration (3-6 months)
- Reduce Red indicators below maximum
- Demonstrate measurable incident reduction
- Complete required training/certification
- Pass independent audit

18 Continuous Improvement Cycle

1. **Assess**: Quarterly CPF Score calculation
2. **Analyze**: Identify low-performing domains
3. **Intervene**: Implement targeted remediation
4. **Monitor**: Track indicator improvements
5. **Validate**: Verify score improvement
6. **Certify**: Achieve maturity level recognition

Table 13: Domain Scoring Template

Indicator	Score (0/1/2)	Weight	Weighted Score
X.1	___	w_1	___
X.2	___	w_2	___
X.3	___	w_3	___
...	...	...	...
X.10	___	w_{10}	___
Total			___/20

A Scoring Worksheets

A.1 Domain Score Calculation Worksheet

A.2 CPF Score Calculation Worksheet

$$\begin{aligned}\text{Weighted Sum} &= \sum_{d=1}^{10} w_d \times \text{Domain\_Score}_d \\ &= (\_\_\_ \times 0.15) + (\_\_\_ \times 0.12) + ... \\ &= \_\_\_\end{aligned}$$

$$\text{CPF\_Score} = 100 - (\text{Weighted Sum} \times 2.5) = \_\_\_$$

B Maturity Assessment Checklist

B.1 Level 1 Checklist

□ Executive awareness briefing completed

□ Initial CPF assessment (20+ indicators)

□ Psychological factors in incident reports

□ Basic psychology in awareness program

□ CPF Score > 20

□ 3+ categories assessed

B.2 Level 2 Checklist

□ Full 100-indicator assessment completed

□ Vulnerability heat map maintained

□ Psychological factors in response playbooks

□ Security team psychology training

□ CPF Score > 40

☐ 7+ categories monitored

☐ Quarterly assessment established

B.3 Level 3 Checklist

☐ Real-time CPF dashboard operational

☐ Predictive models implemented

☐ Cross-functional integration (HR/IT/Risk)

☐ Role-specific interventions deployed

☐ CPF Score > 60

☐ All 10 categories with KPIs

☐ Monthly assessment + daily monitoring

C Benchmark Data Tables

C.1 CPF Score Distribution by Sector

Table 14: CPF Score Benchmarks (Mean ± SD)

Sector	Mean Score	75th Percentile
Financial Services	68 ± 12	76
Healthcare	52 ± 15	63
Technology	71 ± 11	78
Government	58 ± 14	67
Retail	48 ± 13	56
Manufacturing	54 ± 12	62
Energy/Utilities	63 ± 13	72

D Glossary

ARQ (Authority Resilience Quotient): Domain-specific quotient measuring resistance to authority-based exploitation.

Convergence Index (CI): Multiplicative risk metric measuring alignment of multiple vulnerabilities.

CPF Score: Overall organizational psychological vulnerability score (0-100 scale, higher = better resilience).

Domain Quotient (DQ): Category-specific resilience metric (0-20 scale).

Maturity Level: Organizational capability level (0-5) in psychological vulnerability management.

Pre-Cognitive Vulnerability: Psychological weakness operating below conscious awareness.

Ternary Scoring: Three-level vulnerability assessment (Green/Yellow/Red or 0/1/2).

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