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The Critical Role of Positive Incentives for Reducing Insider Threats

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Acknowledgments

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Executive Summary

Traditional insider threat management involves practices that constrain users, monitor their behavior, and detect and punish misbehavior. Such negative incentives attempt to force employees to act in the interests of the organization and, when relied on excessively, can result in negative unintended consequences that exacerbate the threat.

Positive incentives can complement traditional practices by encouraging employees to act in the interests of the organization, especially through intrinsic motivators. *Intrinsic motivation* comes from a person's internal sense of fulfillment or satisfaction, rather than external rewards or punishments. Preliminary evidence suggests that positive incentives can deter insider misbehavior in a constructive way from the outset of the employee-organization relationship with fewer dysfunctional consequences than traditional practices alone.

This report describes the preliminary results of an internally funded exploratory research project at the Software Engineering Institute (SEI) to assess the potential for positive incentives to complement traditional practices in a way that provides a better balance for organizations' insider threat programs.

We believe there are three dimensions along which we can align an employee's intrinsic incentives with their employer's interests. These dimensions center on the employee's *job*, their *organization*, and the *people* they work with:

- **Job Engagement** involves the extent to which employees are excited by and absorbed in their work. Strengths-based management and professional development are practices known to boost employee job engagement. Strengths-based management focuses primarily on identifying and using an individual's personal and professional strengths in managing both their career and job performance [Buckingham 2009].
- **Perceived Organizational Support** involves the extent to which employees believe their organization values their contributions, cares about their well-being, supports their socio-emotional needs, and treats them fairly. Here, programs promoting flexibility, work/family balance, employee assistance, alignment of compensation with industry benchmarks, and constructive supervision that attends to employee needs can boost perceived organizational support.
- **Connectedness at Work** involves the extent to which employees trust, feel close to, and want to interact with the people with whom they work. Practices involving team building and job rotation can boost employees' sense of interpersonal connectedness.

There has been extensive previous research in these areas that demonstrate their value in terms of employee satisfaction, commitment, performance, and retention. In addition, a related body of research exists to help determine their value for reducing counterproductive work behaviors generally. The SEI's research aims to bolster the evidence that interest-alignment practices reduce the more egregious forms of insider threat, such as employee theft and sabotage.

In summary, this report describes our research progress in several areas:

- *Analyzing several high-profile insider incidents for the levels of job engagement, coworker connectedness, and perceived organization support evident during the incident timeline.* Perceived organizational support was found to be low, but not necessarily in the extreme. These incident case studies suggested focusing on organizational support in our survey research.
- *Conducting a survey of individuals responsible for establishing insider threat programs in organizations.* Supporting and extending previous research, we found a negative correlation between perceived organizational support and intentional (primarily malicious) counterproductive work behaviors. A somewhat weaker negative correlation was also found between organizational justice and these behaviors. The relationships were found to be statistically significant at the 95% confidence level. However, the exploratory nature of our initial analysis does not permit us to generalize this relationship to the larger population of organizations.
- *Developing a simulation model that illustrates the value of positive incentives.* We developed a system dynamics model based on published data and simple (but arguable) assumptions showing how positive, intrinsic incentives can increase a program's operational efficiency with reduced investigative costs and fewer incidents involving disgruntled or exploitive insiders. Our incident analysis and survey work provided validation of the simulation model structure. We will continue to calibrate our model based on future research and expect to demonstrate similar benefits as our work progresses.

Our research raises many questions about how an insider threat program can or should incorporate positive incentives that improve employees' perceptions of support by the organization. We elaborate important principles and practice areas, but this is just a first step. Our future work will focus on what we believe to be the key to a successful insider threat program: identifying the mix of positive and negative incentives that creates a net positive for employees.

The challenge is that people respond to negative incentives differently depending on the culture of the organization, the nature of their job, and their personality. Fortunately, existing theory provides insight into these differences and can illuminate a means for building a general transition process to take an organization from its current state to one that has a balance of positive and negative incentives that promotes employee satisfaction, performance, and retention while also being *more* effective at reducing the insider threat.

Abstract

Traditional insider threat practices involve negative incentives that attempt to force employees to act in the interests of the organization and, when relied on excessively, can result in negative unintended consequences that exacerbate insider threats. Positive incentives that attempt to encourage employees to act in the interests of the organization can complement negative incentives. In our research, we identified and analyzed three avenues for aligning the interests of the employee and the organization: job engagement, perceived organizational support, and connectedness with coworkers. Based on an analysis of three insider threat incidents and a survey of organizations, we developed a model of the disgruntled insider threat problem as it relates to dissatisfaction with the employing organization and the potential benefits associated with positive, intrinsic incentives that improve perceived organizational support and justice. To help organizations understand their options for using positive incentives as part of their insider threat program, we outline workforce management practices to improve employees' feelings of being supported by the organization. This research is a first step toward creating a well-grounded foundation on which insider threat programs can establish a more balanced and effective means of reducing insider threats, one that is a net positive for employees.

1 Introduction

Traditional guidance regarding how to defend against insider threats focuses primarily on negative incentives, which constrain employee behavior or detect and punish misbehavior. These traditional security practices are necessary to reduce insider threats, but their excessive use can result in counterproductive constraints on employees' actions, overreliance on after-the-fact responses that fail to prevent damage, and alienation of staff that can exacerbate insider threats [Moore 2015]. Fortunately, traditional practices are only part of the suite of management practices that organizations have available to reduce insider threats.

Figure 1 provides an abstract view of the spectrum of insider threat countermeasures. The bulk of research has focused on detection of and response to either criminal or at-risk behaviors. Security policies and technical measures provide negative incentives that are intended to deter the threats.

Positive incentives can complement traditional practices by encouraging employees to act in the interests of the organization either extrinsically (e.g., through rewards for following security policies) or intrinsically by fostering a sense of commitment to the organization, the work, and coworkers. Preliminary evidence suggests that positive, intrinsic incentives can deter insider misbehavior in a constructive way from the outset of the employee-organization relationship. In combination with traditional practices, positive incentives offer the possibility of a more balanced and constructive organizational approach to reducing the insider threat with fewer dysfunctional consequences.

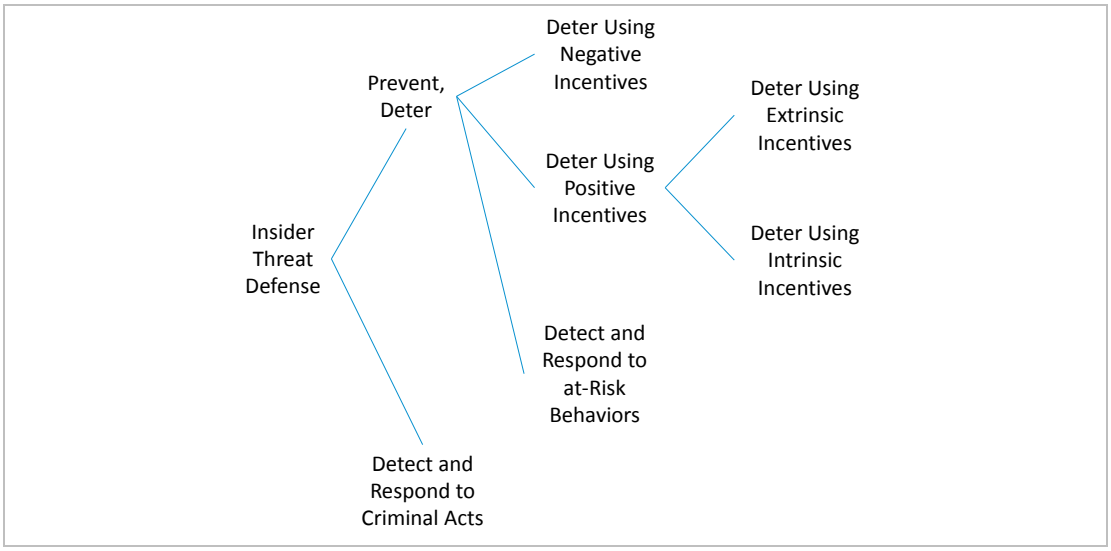

Figure 1: Insider Threat Defense Options

For U.S. Government organizations and their contractors that handle classified information, Executive Order 13587 requires establishing formal insider threat programs. A few forward-thinking sources make the case that positive, intrinsic incentives are a significant missing aspect of insider threat defense [Bunn 2014, DSS 2016, CPNI 2014, Theoharidou 2005, Sarbin 1994].

This report describes the results of a research effort to establish and model the influence of positive incentives on reducing insider threats. With organizations recognizing the downsides of negative incentives, the need for this research has never been more pressing as a means to *prevent* employee alienation that can spur insider threats, and as a complement to their organizational detection and response capability.

1.1 Research Context

The subject of our research intersects issues important to both human resources (HR) and cybersecurity professionals. Figure 2 provides an overview of the context of our research in related research, development, and practice. In general, the top left provides a two-dimensional partition that focuses on the HR domain, while the bottom right provides a two-dimensional partition that focuses on the cybersecurity domain. Our research is at the nexus of these two domains with a focus on early-stage disincentivization of insider threats using positive, intrinsic incentives that benefit both the employee and the organization.

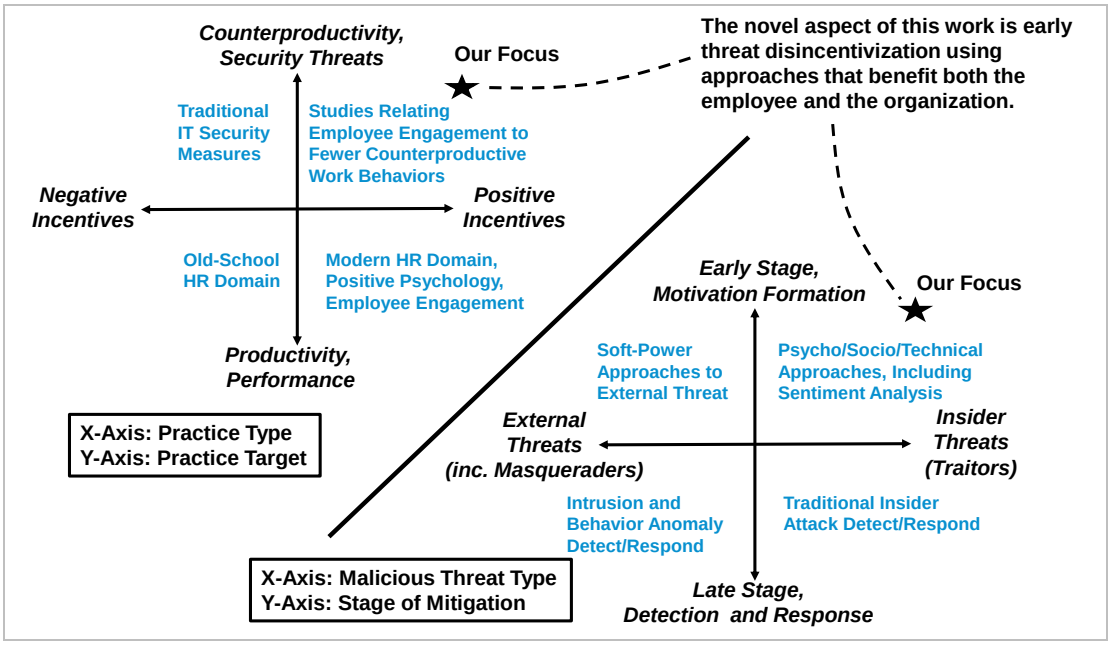

Figure 2: Research Landscape

The partition in the top left of Figure 2 breaks the space by the practice type and practice target. Along the X axis, practice type is split into the following:

- ***Negative incentive-based practices (negative incentives, for short)***: workforce management practices that attempt to *force* employees to act in the interests of the organization
- ***Positive incentive-based practices (positive incentives, for short):*** workforce management practices that attempt to *attract* employees to act in the interests of the organization

Along the Y axis, the target of the practice addresses whether the primary intent is improving employee productivity or performance versus decreasing counterproductivity or security threats.

Negative incentives embody the traditional information technology (IT) security approach of constraining and detective policies and technologies. They are also the core of old-school HR practice that focused on rules for proper employee behavior and punishment for misbehavior.

While a balanced approach focuses on a combination of positive and negative incentives, positive incentives have been studied extensively in the modern era [Levy 2013, Smither 2009]. By far, most of this research focuses on the benefits of this approach for improved productivity, performance, and retention, including relatively recent focus in an area called "positive psychology" [Seligman 2012]. While much of the recent practice-based literature focuses on a concept called "work engagement," researchers have noted that this concept is actually a conflation of a lot of previously established social science theories and domains of research [Meyer 2013].

We believe there are three dimensions along which we can align an employee's intrinsic incentives with their employer's interests. These dimensions are centered on the employee's *job*, their *organization*, and the *people* they works with:

- **Job Engagement** involves the extent to which employees are excited by and absorbed in their work. Strengths-based management[1] and professional development are practices known to boost employee job engagement. Measurement scales for employee engagement have a considerable history, including use by both the U.S. Government [OPM 2015] and academic researchers [Schaufeli 2004a].
- **Perceived Organizational Support** involves the extent to which employees believe their organization values their contributions, cares about their well-being, supports their socio-emotional needs, and treats them fairly. Here, programs promoting flexibility, work/family balance, employee assistance, alignment of compensation with industry benchmarks, and constructive supervision that attends to employee needs can boost perceived organizational support. Extensively validated measures have been widely used since the 1980s [Eisenberger 1986] culminating in a seminal publication that summarizes that research in book form [Eisenberger 2011].
- **Connectedness at Work** involves the extent to which employees trust, feel close to, and want to interact with the people with whom they work. Practices involving team building and job rotation can boost employees' sense of interpersonal connectedness. One important scale is the one associated with Self Determination Theory (SDT), in particular the relatedness aspects of the Basic Psychological Needs at Work Scale [Brien 2012]. Another scale is associated with the Theory of Belongingness [Malone 2012].

Although there has been extensive research in these areas that demonstrate their value in terms of employee satisfaction, commitment, performance, and retention [Levy 2013], a related body of research exists that helps to determine their value for reducing insider threats.

The partition in the bottom right portion of Figure 2 breaks the space into malicious threat type and stage of mitigation. While we do not consider unintentional threats, we represent the insider (employee) threat on the right and the external threat on the left, including non-insiders that break

[1] Strengths-based management focuses primarily on identifying and using an individual's personal and professional strengths in directing their career and managing their job performance [Buckingham 2009].

into an organization's systems and masquerade as an authorized insider. Along the Y axis we include everything from early-stage formation of threat actor motivations to late-stage detection and response to harmful behaviors.

The bulk of cybersecurity research, development, and practice covers the external threat on the left side of the partition, especially in the later stage. Relatively little research has been conducted on early-stage mitigation of the external threat, as might be investigated using soft-power approaches to cybersecurity [Nye 2011]. While traditional insider threat detection and respond approaches focus on later stage activities [Salem 2008], our research focuses on the early-stage motivation formation. And rather than focusing on early-stage detection of at-risk behaviors, such as in [Brown 2013, Brdiczka 2012, Greitzer 2010], we focus on the prevention of employee alienation by fostering positive attitudes about the organization and the employee's work experience.

The strongest connection in the literature to our research are studies that show that positive employee attitudes are linked to reduced counterproductive work behaviors. Counterproductive work behaviors include malicious insider threat behaviors as well as other less egregious, but still counterproductive, behaviors. A well-established body of research on psychological contract that employees (often implicitly) have with their organizations can, if breached, serve as the reason for negative attitudes and behaviors by employees [Rousseau 1995, Restubog 2015].

Research on psychological contract breach aligns with modeling research conducted at the SEI that shows patterns of insider IT sabotage rooted in the insider's unmet expectations [Cappelli 2012]. Generally, counterproductive work behaviors are found to be negatively correlated with the following:

- job engagement [Sulea 2012, Ariani 2013]
- connectedness at work [Sulea 2012]
- perceived organizational support [Bordia 2008, Sulea 2012, Shoss 2013]
- organizational citizenship behavior [Ariani 2013]
- conscientiousness [Shoss 2013]
- employee empowerment [Afsheen 2013]

Especially significant is that perceived organizational support is strongly correlated with organizational commitment [Rhoades 2001].

1.2 Overview of the Report

Our research explores the role of positive, intrinsic incentives on insider threat behaviors through incident analysis and an organizational survey.

Section 2 describes the analysis of three incidents of unauthorized disclosure of classified information to better understand the potential role of job engagement, perceived organizational support, and coworker connectedness in the context of the insider's decision to disclose. Based on the need to narrow the organizational survey, the results of our admittedly limited incident analysis, and some supporting literature, we focus our survey work on perceived organizational support and related issues of organizational justice.

Section 3 describes the survey methodology employed and the analysis of the results of twenty-three respondents.

Section 4 models the disgruntled insider threat problem as it relates to dissatisfaction with the employing organization and the potential benefits associated with positive, intrinsic incentives that improve perceived organizational support and justice.

As a starting point for organizations to understand their options for using positive incentives as part of their insider threat programs, Section 5 provides an outline of workforce management practices based on positive incentives.

Finally, Section 6 summarizes our results and describes avenues for future work. The research described here is a first step toward creating a well-grounded foundation on which insider threat programs can establish a more balanced means for insider threat reduction.

2 Incident Analysis

The purpose of the incident analysis described in this section is to help answer this question: To what extent are the interests of information leakers aligned with the interests of the organization? The previously described breakdown into three dimensions—job, organization, and people—suggests focusing on the following three questions:

1. Are information leakers disengaged in their job?
2. Do information leakers perceive their organizations to be supportive?
3. Are information leakers disconnected from their coworkers?

This section describes our approach to analyzing information leakage incidents and preliminary results associated with analyzing three such incidents. We answer these questions for each incident prior to the start of information leaking and while information leaking occurred.

2.1 Methodology

Our research methodology involves studying multiple incidents of unauthorized disclosure of classified information. We use only public, non-sensitive sources for each incident and code the information about each incident so we can make results from our research generally accessible to other researchers. As shown in Figure 3, we code identified incidents along a five-point scale, ranging from -2 to +2, for each of the three dimensions—job engagement, perceived organizational support, and connectedness with coworkers.

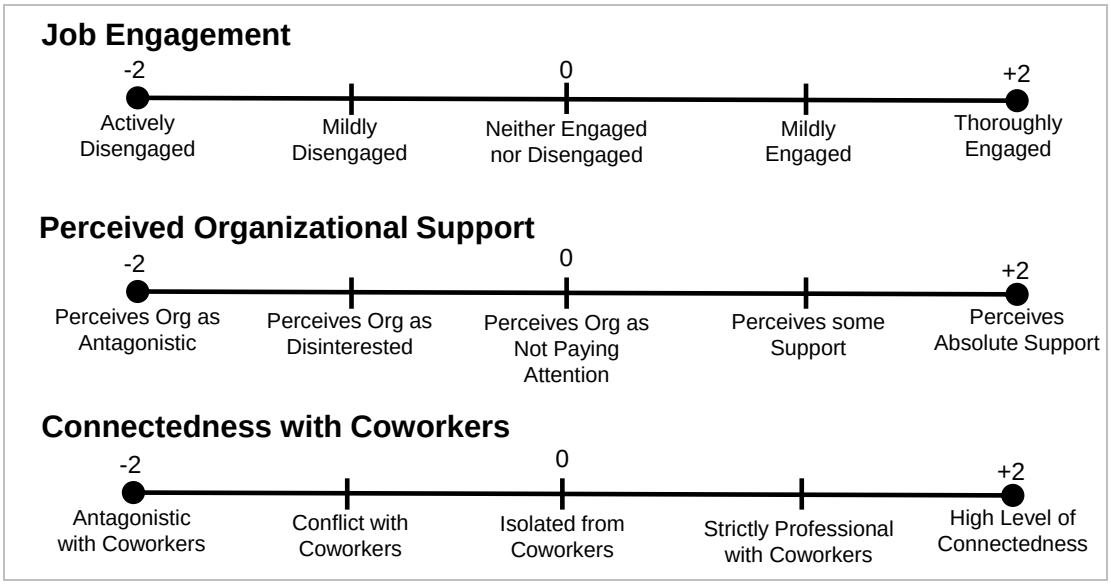

Figure 3: Overview of the Five-Point Scales for Interest Alignment

As might be expected, the high end of the scale (+2) indicates the most positive assessment of the dimension, whereas the low end of the scale (-2) indicates the most negative assessment. The middle point on the scale (0) indicates a rather neutral assessment, although this assessment does not indicate a desired situation for either the organization or the person involved. The points between

the neutral point and the high and low ends (+1 and -1, respectively) indicate exactly that—an assessment that is less extreme than the end point, but more extreme than the neutral point.

To provide coders with a greater sense of the points along the scale, we provided an example at each point and provided previously developed survey questions used in established assessments for each dimension. The final scales used for each dimension—with examples and clarifying questions—are elaborated in Appendix A.

While the information sources for each incident are usually not rich enough to answer the established survey questions individually, they can help to get a sense of where along the five-point scale the information that we do have puts the insider's behaviors and attitudes. Admittedly, this activity is relatively inexact. However, we can increase the accuracy and consistency of the coding process by requiring documentation of the coder's justification for their rating on the scale for each dimension. In addition, since the insiders' ratings may vary over time, we provide ratings along the five points at each of three contiguous time periods during the incident lifecycle. This range of ratings provides a sense of the evolution of the subjects' attitudes and behaviors over time.

2.2 Incident Analysis Results

We rated three incidents where unauthorized disclosure of national security information took place.[2] Figure 4 provides an overview of our analysis of each of the three incidents of unauthorized disclosure rated along the five-point scale from -2 to +2. Each of the three dimensions are represented as separate graphs, and each of the three time periods are indicated. The raters for each case also provided their assessment of the overall score for each dimension.

As shown, Perceived Organizational Support was negative in all three incidents while Job Engagement was negative in only two of the three (Case2 and Case3) and Connectedness at Work was negative in only one of the three (Case2).

This finding was a bit surprising. As we looked at the incidents, it seemed like the individual in Case1 could be fairly engaged in their job while conducting activities counter to the organization. Even more surprising, the individuals in Case2 and Case3 maintained fairly good relations with their coworkers while engaging in a betrayal of their organization and country.

While it is impossible to draw general conclusions from this small number of cases, the results do suggest that perceived organizational support may be more central to our hypothesis that positive incentives can reduce insider threats. Of the three dimensions that we studied, the strongest negative correlation with counterproductive work behaviors found in the literature was also linked to perceived organizational support. This combination of evidence argues in favor of focusing on that dimension in our survey work, especially since we needed to limit the number of questions in our survey to ensure an adequate response rate.

[2] This report does not identify the individuals rated.

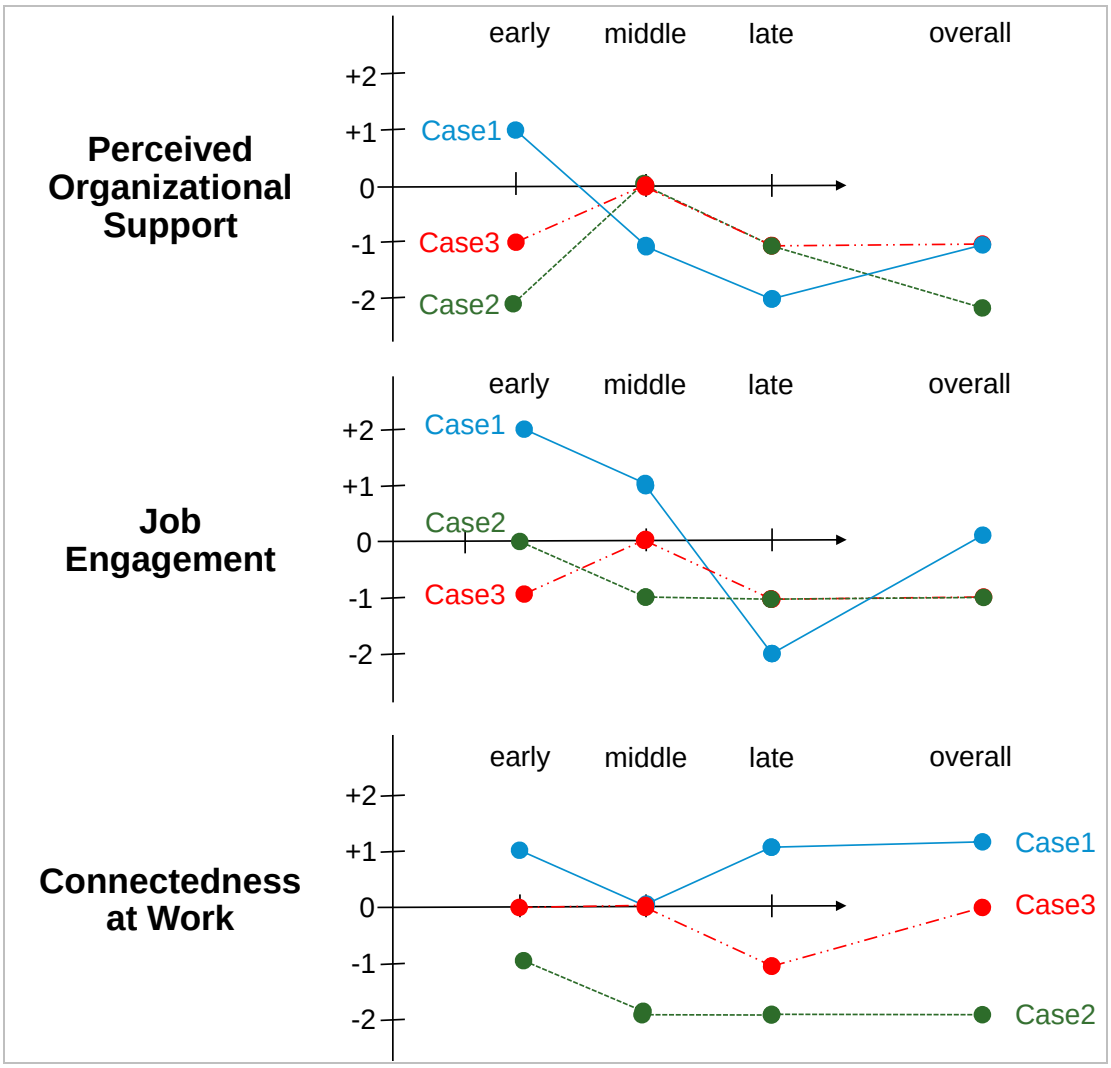

Figure 4: Incident Analysis Overview

The last aspect of our analysis was to evaluate the attitudes of the insider threat actors as they changed over time. There was some fluctuation over time in all three cases, but there was a definite trend downward on all three dimensions through the early, middle, and late periods of the incidents. This trend becomes more apparent in Figure 5, which shows the sum of each dimension across the three cases.

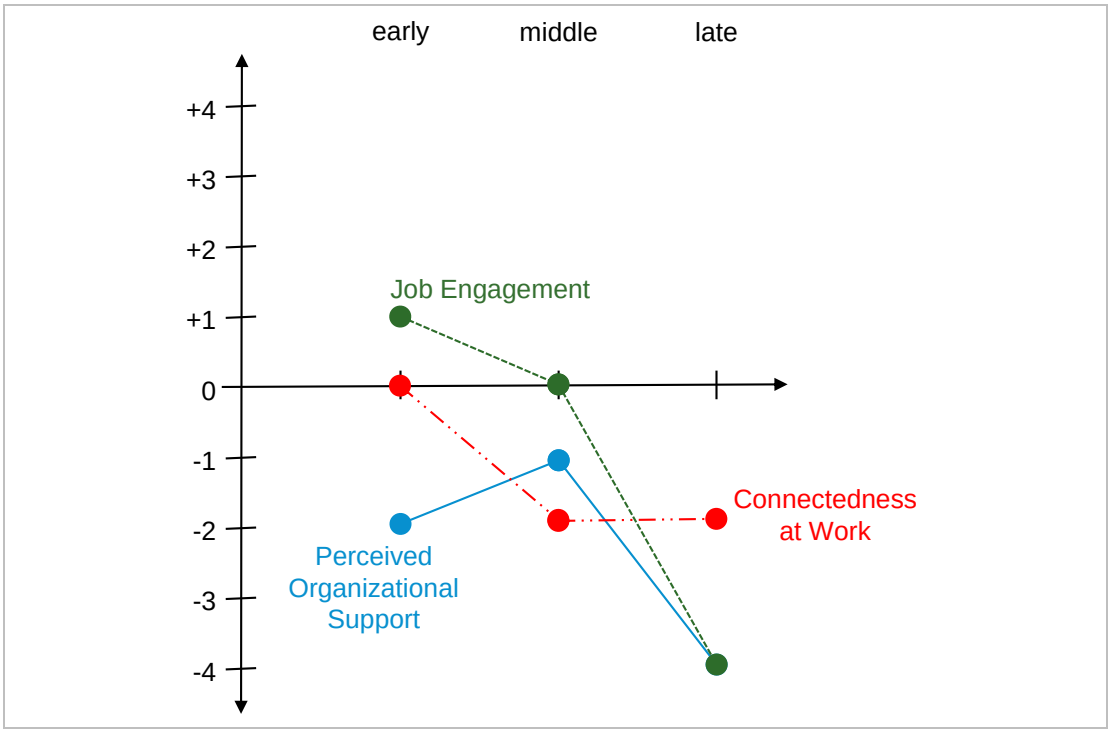

Figure 5: Analysis Rollup Over Time

3 Organizational Survey

The goal of this survey was to understand what types of organizational management practices mitigate the frequency of cyber-related workplace theft and sabotage. The extensive foundational research on the topic of workplace aggression/crime and related topics was hotly pursued from roughly the 1960s to the early 2000s. This corpus of work evaluated possible antecedents and consequences of workplace aggression and crime (called "counterproductive workforce behaviors" or "CWBs"); however, it's difficult to generalize these findings to the digital age wherein different machinations of theft and sabotage have evolved.

Pre-digital age discoveries might be unique to a particular time period or generation of workers, which we call a "cohort effect" [Shadish 2002], and this effect poses a research gap. Because the digital age engendered workplace surveillance, performance monitoring, etc. that employees sometimes maladapted to (loneliness, paranoia, isolation, etc.), we are cautious to infer that antecedents to cyber-related workplace aggression/crime is of the same theoretical framework as pre-digital CWBs.

Little, if any, theoretical research has compared pre-digital and post-digital CWBs and their antecedents. This survey work attempts to understand the relationship between antecedents discovered in the foundational research and cyber-related CWBs or CY-CWBs. CY-CWBs are those digital counterproductive workplace behaviors that are deleterious to the productivity and well-being of fellow employees within an organization.

3.1 Background

"Psychometrics" are inventories used commercially or in academia to measure psychological phenomenon of interest. The style of the inventory and respective theory and scoring is often endemic to a particular class of psychological phenomenon (cognitive abilities, behavioral frequencies, attitudes, etc.). Most psychometrics are designed and vetted with various scripted reliability and validity metrics. It is common practice to use an existing psychometric to build on prior research, if that inventory fits the research constraints. Thus, we chose psychometrics to measure antecedents of interest but generated our own CY-CWBs inventory.

To generate CY-CWBs, we reviewed prior conceptual and theoretical research on the counterproductive workplace behaviors and authored new cyber-related questions reflecting each dimension. We evaluated three theoretical frameworks of CWBs and related constructs and chose the most comprehensive framework, which was Buss's 1961 typology. Each of the 40+ matrix items reflected Buss' CWB dimensionality; however, we needed to choose a subset of matrix items for scoping purposes.

From our prior SEI insider threat research, two prominent dimensions emerged from the case studies—sabotage and theft—and those became the two CY-CWB dimensions of interest. Section 3.2, Method, discusses the detailed process of generating CY-CWB questionnaire items.

The antecedents of CWBs are well documented but conceptually disorganized. One of the most notable antecedents is *perceived injustice*,[3] and when coupled with a *lack of perceived organizational support*,[4] employee's report a reduced sense of socio-emotional and intellectual well-being. Other antecedents include the following:

- lack of supervisor trust [Konovsky 1994]
- low levels of work engagement [Saks 2006, Schaufeli 2004b, Shantz 2014, Sonnentag 2003]
- abusive leadership [Restubog 2011, Shoss 2013]
- high workload [Schaufeli 2004b]
- supportive organizational climate [Luthans 2008]
- lack of worker autonomy [Baard 2004, Gagné 2005]

Some of the comorbid emotional states include the following:

- *anger* [Cropanzano 1989, Westman 2001]
- *aggression* [Bowling 2011, Neuman 2005, Penney[5]]
- *negative mood in general* [Bushman 2001, De Quervain 2004, Penney[5]]
- *emotional exhaustion* [Krischer 2010]
- *stress* [Vermunt 2005]

You may be overwhelmed by the array of factors and no less relieved to know that the list above is far from comprehensive. A few meta-analytic papers [Dalal 2005, Kurtessis 2015, Rich 2010, Saks 2006, Simpson 2009] have attempted to organize these factors into layers of antecedents and consequences. Two meta-analytic papers [Dalal 2005, Kurtessis 2015] stress the importance of perceived organizational justice and its impact on perceived organizational support, feelings of job satisfaction, and ultimately the frequency of counterproductive workplace behaviors. Thus, justice, support, and satisfaction became the antecedents of interest but further scoping was needed.

Systematically paring down the antecedents list is required to minimize the question load on the participant. The paring down process we used is multifaceted.

First, psychometric quality is intimated with reliability and validity coefficients that are published in the foundational survey design documentation as well as follow-on validation studies. Our literature review effort itemized reliability and validity coefficients by psychometric name, which we used in selection.

Second, we considered psychometric type (e.g., metrics for cognitive abilities, knowledge, attitudes, behavioral frequencies). Since we cannot interview employees who committed an insider threat behavior, we were forced to ask attitudinal questions (e.g., "How often do you believe this

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[3] [Aquino 2001, Greenberg 1998, Bolino 2015, Colquitt 2001, Dalal 2005, Jermier 1994, Krischer 2010, Kurtessis 2015, Moorman 1998, Saks 2006, Skarlicki 1997, Vermunt 2005, Westman 2001]

[4] [Abas 2015, Baard 2004, Ferris 2009, Gagné 2005, Kurtessis 2015, Moorman 1998, Rhoades 2002, Rhoades 2001, Saks 2006, Shantz 2014, Shore 1993, Wayne 1997]

[5] Penney, L. M.; Spector, P. E.; Goh, A.; Hunter, E. M. & Turnstall, M. A motivational analysis of counterproductive work behavior (CWB). Un*published manuscript*, University of Houston. Houston, Texas. 2007.

behavior occurs across the organization?") of employees privy to cases of insider threat. An attribute of attitudinal psychometrics is the use of agreement response scales for each question. However, studies rarely publish response scale formatting, and we know that response scale formats bias respondents implicitly. Thus, our team documented the scale formats with the highest response bias. Furthermore, we had to decide whether people in our sampling frame could speculate on fellow employee behaviors, experiences, and attitudes. Speculation is uncertain, so to reduce measurement error, we included 'don't know' and 'does not apply to me' response options.

To further pare down psychometric candidates, we also considered the statistical implications of 'antecedents *predicting* CWBs' versus 'antecedents *explaining* CWBs'. Given our non-generalizable sampling method discussed below, 'explanation' was more important than 'prediction' and detailed survey questions are better suited for explanatory purposes; whereas predictive inventories comparatively include more parsimonious sets of generically worded items. The tradeoff we faced was that detailed items can be confusing or can exhaust study participants, lengthening the time to complete surveys and resulting in elevated non-response rates, especially when no fiscal incentives are used to counter non-response.

In sum, we removed job satisfaction from our antecedent list because of the generic item wording. We chose the 36-item Survey of Perceived Organizational Support (SPOS) because of the detailed questions, high number of citations, stable factor loading across studies and moderately high reliability and validity. We chose the organizational justice survey [Moorman 1991] because it was the only inventory we could find with a published item set. We generated our own CY-CWB items reflecting cyber theft and cyber sabotage.

> *This is an exploratory study of the relationships between CY-CWBs, organizational support, and organizational justice. Our research question is*
>
> *To what extent does an organization's support practices and typical sentiment of organization justice relate to the perceived frequency of cyber related counter productive workplace behaviors (CY-CWBs) across an organization?*

The results are reported at the aggregate level.

3.2 Method

This section describes the survey and other materials, sampling method, and procedures used to conduct the survey.

3.2.1 Survey and Other Materials

This section first describes the survey logic and then the survey design.

The impossible gold standard of survey design is to execute a matched sample of employees who committed CY-CWBs to those who did not commit them within the same organization. We would survey and measure the perceptions of both samples on organizational support and justice that they themselves experienced.

However, asking participants about CY-CWBs committed has two prominent problems:

1. People are unwilling, for a variety of reasons, to report transgressions honestly.
2. Some transgressions can be severe enough to warrant punishment, so disclosure puts these people at risk.

To relieve the burden of reporting uncomfortable events, we asked insider threat professionals who are privy to the frequency and types of cyber insider threat cases (those who commit CY-CWBs), to estimate the frequency of CY-CWBs occurrences within their own organization. We then asked these same individuals to report on what they themselves believed to be the cultural norm with respect to perceived organizational support and justice. We then tried to find a relationship between beliefs about their organization and beliefs about the frequency of CY-CWBs. One person per organization responded.

The survey was built from two existing psychometric inventories (see Appendix A) measuring perceived organizational support: the 36-item Survey of Perceived Organizational Support or the SPOS [Eisenberger 1986] and the 20-item perceived organizational justice or the OJ [Moorman 1991]. Short descriptions of these two inventories are included below.

Inventory items were slightly modified to use the third-person perspective. CY-CWB items were generated to reflect cyber-related theft and sabotage. Due to resource constraints, we could not pilot test the CY-CWB inventory, conduct factor analytic analyses to reduce item loads, or conduct reliability and validity testing. However, we did conduct three cognitive task analyses on the CY-CWBs to ensure the item wording reflected the dimension intended.

The survey had six sections:

1. consent form
2. survey download
3. SPOS inventory (see copies of the inventories in Appendix B)
4. OJ inventory
5. CY-CWB inventory
6. closing comments

Participants were not allowed to advance to the first page of the survey until they provided consent. Because we recognize the sensitivity of the topic and the privacy required to honestly complete the study unsurveilled, the next section included an option to allow the participant to download a PDF copy of the survey to mail to our lab.

We then asked the number of years the participant worked in the current organization. The next part of this section included basic survey instructions followed by our inventories presented in random order. Each participant had a different order of inventories and also a different ordering of questions within each page of the inventory (a common practice to reduce the impact of nuisance variables emerging from question ordering).

In the closing comments section, we asked participants to list their job title and then asked for recommended organizational practices that they believed would significantly reduce CY-CWBs. The final page thanked the participant for their assistance and no fiscal compensation was provided.

The two inventories we used (the third we created) are described below:

Perceived Organizational Support (POS). The survey of perceived organizational support (SPOS) [Eisenberger 1986] was based on Organizational Support Theory and Social Exchange Theory. The SPOS measures the positive and negative perceived orientation the employees feels the organization takes globally with respect to employee contribution and welfare. The original SPOS included 36 items comprising two latent variables, then was reduced to 17 items and 2 factors in the short version. We used the long version to explore relationships. The two latent variables are a valuation of the employee's contribution and the care of the person's well-being. Known to be high in internal reliability, the survey also boasts, to date, 1923 citations [Eisenberger 1986], which details the derivation and validation of the SPOS. The samples used to derive the SPOS were white collar workers in manufacturing, credit bureau clerical workers, telephone company line workers, law firm secretaries, bookstore bookkeepers and clerks, postal clerks, financial trust company employees, and high school teachers. Originally used to predict absenteeism, the SPOS is widely used to test an array of antecedents to and consequences of perceived organizational support.

Organizational Justice (OJ). This scale was designed to be a parsimonious measure of three latent variables of justice: distributive justice, interactional justice, and procedural justice. Distributive justice is the degree to which rewards are allocated in an equitable manner [Niehoff 1993]. Procedural justice is the "degree to which job decisions included mechanisms that insured the gathering of accurate and unbiased information, employee voice, and an appeals process" [Niehoff 1993, pp. 537]. Interactional justice is the manner in which an employee is treated during typical decision making within an organization. Twenty items were placed on a seven-point agreement scale. The inventory reports reliabilities for all three dimensions above [Moorman 1991].

3.2.2 Sampling

The parameters of the sampling frame included the following:

1. must be at least 18 years old
2. must be employed by your current employer for at least one year
3. must possess knowledge of employee management practices across the organization
4. must have knowledge of the insider threat cases discovered within the organization

The people who met these parameters often had a variety of job titles in the cybersecurity, HR, and legal professions. These individuals could be analysts, chief information security officers (CISOs), chief information officers (CIOs), chief human resources officers (CHROs), or legal counsel. Given the variability of background professions and job titles, the type of job training to prepare them for insider threat work is moot. We have no data on the level of education of these people in our sampling frame.

We have reason to believe that this population is fairly rare and challenging to reach with optimal sampling techniques (random sampling, etc.). Therefore, we used a non-probabilistic snowball (perhaps chained) sampling method.

We used an information sharing consortium that, through monthly teleconferences, discusses challenges facing insider threat programs, including implementing technical monitoring, obtaining

international approval to operate, and building a new program. Over 90 organizations from a variety of different sectors (e.g., banking, transportation) are a part of this consortium, but a small percentage of those organizational representatives attends each teleconference. The SEI's position as trusted participant in this consortium allowed sampling of these generally hard-to-reach participants.

We have no way of discerning how many people from each organization took the survey, so we anticipate snowball sampling. Many publications [Biernacki 1981, Magnani 2005, Spreen 1992] contest the generalizability of snowball sampling methods for hard-to-reach 'special' populations; 'special' because these people are usually impenetrable to outsiders, so response rates are contingent on trusted relationships [Sudman 1986]. Snowball sampling is a non-probability sampling method making it impossible for generalizable inference.

3.2.3 Recruitment Procedure

All participants were invited verbally during a weekly Open Source Insider Threat information sharing group (OSIT) consortium call. The call took place around the first week of August, 2016, and the verbal invitation was followed by an email invite with the hyperlinks to the survey the same day. The survey was available to participants August 7-30, 2016. Participants reviewed the consent form and answered survey questions. No debriefing was conducted.

3.2.4 Analysis Procedure

The survey instrument was designed with an augmented Likert scale of 5 scaled responses and 2 additional responses. The five point scale ranged from "1 = Strongly Disagree" to "5 = Strongly Agree." The two additional responses were "I don't know" or "Does not apply to me".

Due to the limited sample size of our survey (23 valid organizational responses for 55 questions), we were unable to analyze the Likert scale as an ordinal scale with traditional psychometric techniques. We instead made the following three assumptions. First, we assume that the Likert scale values were quantitative, e.g. the difference between respondent A's rating of a 1 and a 2 is precisely the same as A's rating difference between a 2 and a 3, and so on for all categories, all scales, and all respondents. Second, we assume that the scale is reversible such that questions with negative valence, e.g. POS 22: The organization fails to appreciate any extra effort from me., can be recoded to match the positive valence questions by simply reversing the five point scale. Finally, we assume that the average of a respondent's answers on all the questions on a given scale form a consistent estimate of the respondent's position on that scale, e.g. the average of all the POS questions is a consistent estimate of the respondents true POS value.

The "I don't know", "Does not apply to me", and unanswered questions were coded as missing. We used multiple imputation to generate 5 plausible values for every missing response. We used the MICE algorithm [van Buuren 2012] as implemented in the mice R package [van Buuren 2011] with the random forest method with a maximum 50 iterations. Every variable was included in the conditional model for every other variable.

Deming regression was used to compare the organizational averages of the CWB scale against the POS and OJ scales. The a priori variance ratios were estimated across all 5 of the multiple imputation datasets and the regression was calculated for each individual dataset with 95% bootstrap

confidence intervals calculated on the slope parameter [DiCiccio 1996] and then pooled across the multiple imputations.

3.3 Results

A survey of members of the Open Source Insider Threat information sharing group (OSIT) yielded 25 responses, 23 of which contained information about the frequency of counterproductive work behaviors in the organization. Of these 23 responses only 22% fully answered all questions.

Rates of missingness for individual questions ranged from a maximum of 65% missing (one question, CWB 20: Plagiarizing a co-worker) to a minimum of 0% missing (24 questions). The interquartile range of questions with missing data spanned 9% to 26% missing.

Exploratory data analysis suggests that data were not missing at random, which further suggests that our multiple imputation approach is necessary for unbiased estimation. For example, the choice of a respondent to answer question CWB 19: Wiretapping was strongly associated with the number of years the respondent had been employed at the organization with respondents choosing "Don't Know" or leaving the question blank having typically 5 years fewer experience compared to respondents who gave a non-missing response.

Figure 6 visualizes the negative correlation between Perceived Organizational Support and Insider Misbehavior. The resulting Deming regression estimate of the slope is -1.04, with a 95% confidence interval ranging from -2.71 to -0.41. Note that the negative association is statistically significant.

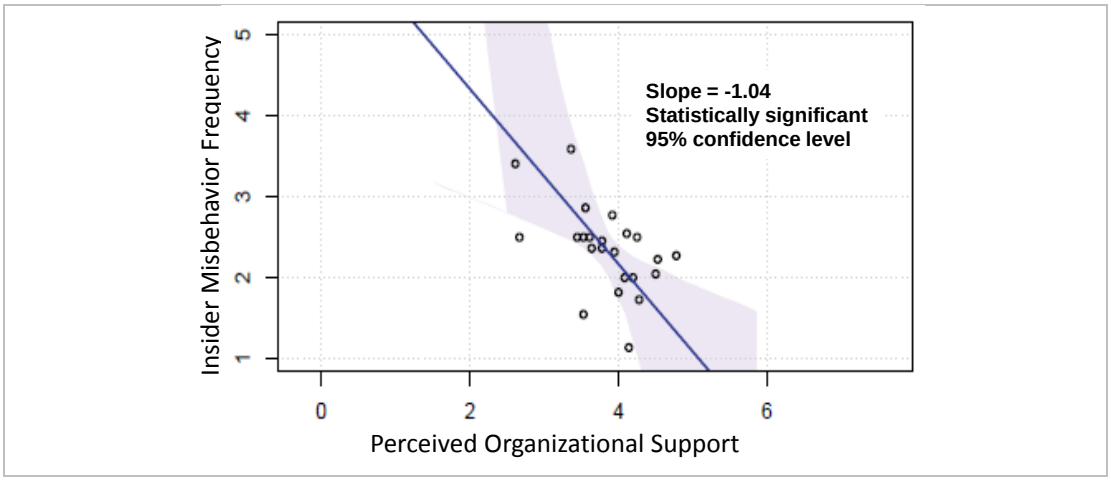

Figure 6: Negative Correlation Between Perceived Organizational Support and Insider Misbehavior

Figure 7 visualizes the negative correlation between Organizational Justice and Insider Misbehavior. The resulting Deming regression estimate of the slope is -0.36, with a 95% confidence interval ranging from -0.78 to -0.12. Note that the negative association is statistically significant.

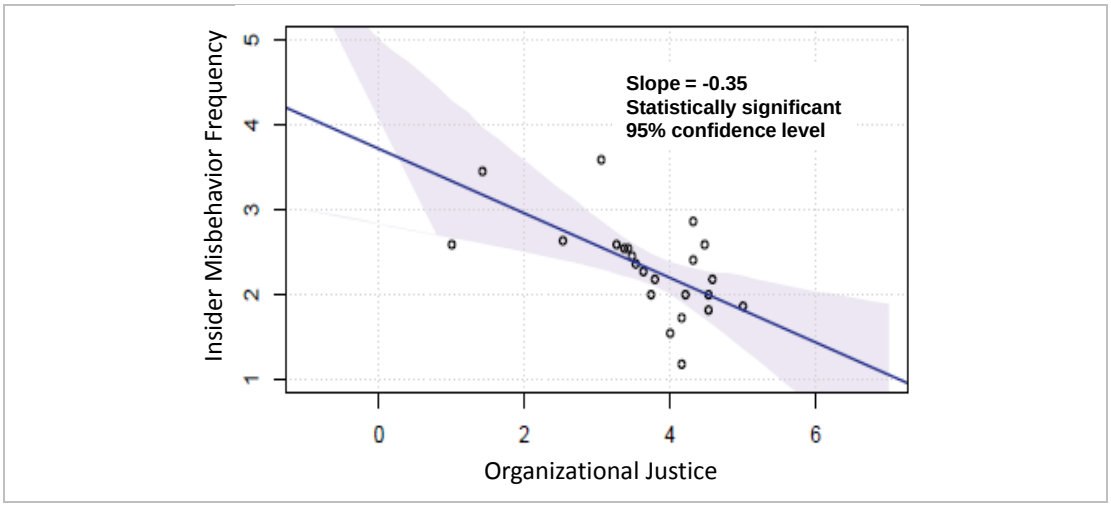

Figure 7: Negative Correlation Between Organizational Justice and Insider Misbehavior

The results above make it clear that more positive employee attitudes concerning organizational justice and support correlate with lower frequency of insider misbehavior. It is somewhat surprising that organizational justice is less negatively correlated than perceived organizational support. One might expect that unfair treatment would be a strong reason for insider misbehavior. But perceived organizational support includes aspects of fair treatment as part of the standard instrument for measurement. But it also includes other aspects such as effective communication and supervisor supportiveness. A plausible conclusion to draw is that breadth of coverage across the various aspects of perceived organizational support is more important than in depth coverage, at least as it relates to organizational justice. Section 5 will elaborate workforce management principles and practice areas associated with perceived organizational support. But first we turn to developing a simulation model for what we know so far.

4 Model of the Problem

This section describes a simulation model of the problem associated with employees being so dissatisfied with the organization that they become an insider threat as a means to further their own self interests.

4.1 System Dynamics Background

System dynamics helps analysts model and analyze critical behavior as it evolves over time within complex socio-technical domains. It is one of several modeling methods applicable to insider threat and has been used extensively in that domain [Moore 2016, Cappelli 2012]. Figure 8 summarizes the notation used in our system dynamics model.

The primary elements are variables of interest, stocks (which represent collection points of resources), and flows (which represent the transition of resources between stocks). Signed arrows represent causal relationships, where the sign indicates how the variable at the arrow's source influences the variable at the arrow's target. A positive (+) influence indicates that the values of the variables move in the same direction, and a negative (–) influence indicates that they move in opposite directions.

A connected group of variables, stocks, and flows can create a path that is referred to as a feedback loop. At this stage in our modeling effort, we have not identified any significant feedback loops.

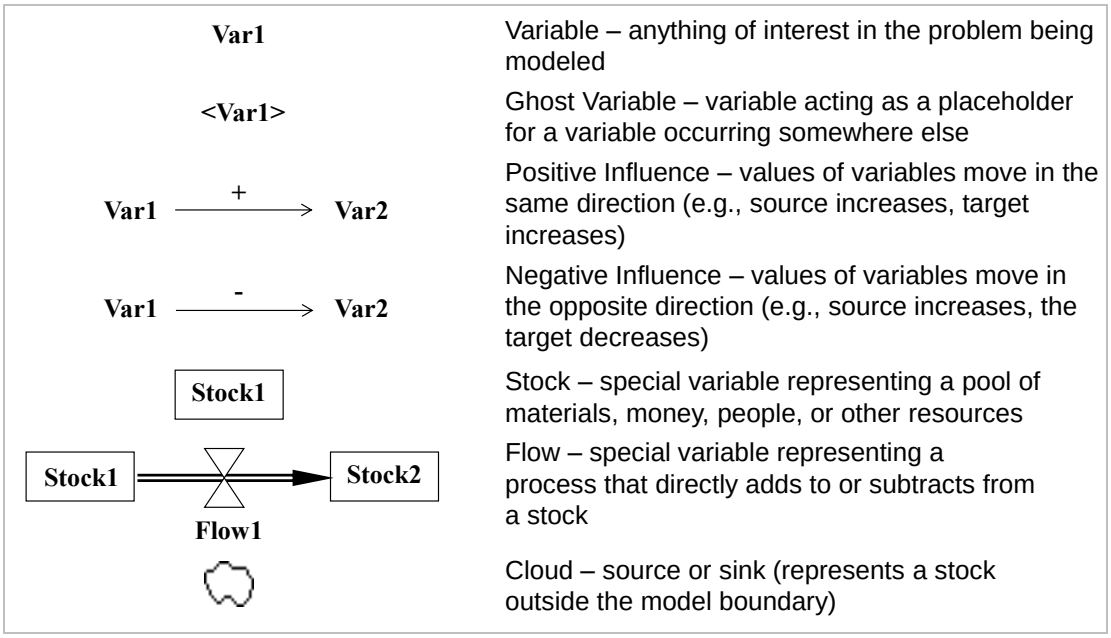

Figure 8: System Dynamics Notation

As a convention in our model, we format model input variables with ***italics, bold, and underline*** since these variables can be dynamically manipulated during model execution.

4.2 The Model

The core stocks and flows associated with an employee's changing satisfaction with their employing organization is shown in Figure 9. We take a simple view that employees are either satisfied with the organization or not, represented as the two primary stocks involved. We assume that newly hired employees may be dissatisfied with the organization, perhaps as a result of a negative hiring or onboarding process.

The user-settable variable ***percent satisfied at hire*** represents the percentage of those hired that are satisfied. Of course, satisfied employees can become dissatisfied at some rate; ***percent becoming satisfied*** represents the percentage per month of satisfied individuals that become dissatisfied. Likewise, there is a user-settable percentage per month of dissatisfied individuals that become satisfied; however, we assume there is some percentage of the workforce that is perpetually dissatisfied that is not included in the flow of employees becoming satisfied.

Finally, while employees leaving the organization may be either satisfied or not, we expect a larger percentage of dissatisfied employees will leave. The next section discusses factors involved with setting the variables in the execution of the model based on existing data and our project analysis.

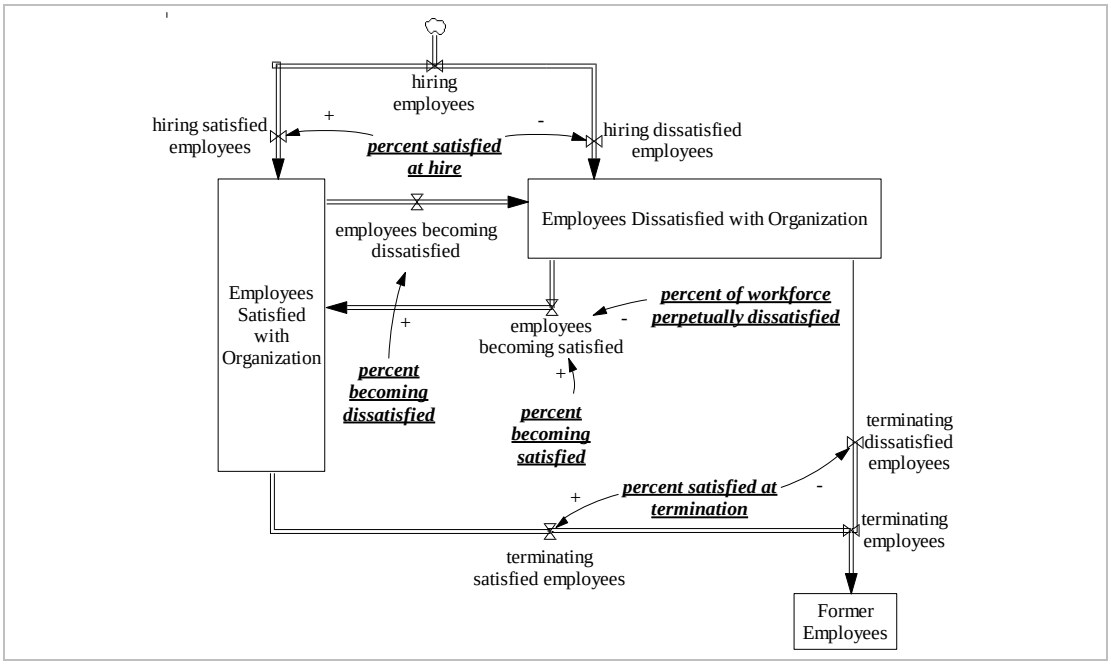

Figure 9: Core Stocks and Flows in the Organizational Context

Figure 10 extends the model to include the potential for dissatisfied employees to become disgruntled and potentially become insider threat actors. We separate the stock of disgruntled insiders from the stock of those that actually go on to cause insider threat incidents. Once someone causes an incident, there is no turning back; they may be stopped from causing further harm, but they will forever be insider threat actors.

However, those that are only disgruntled may get pulled back from the brink either through their departure from the organization or by their re-engagement in the mission of the organization. We make the following simplifying assumptions:

- The rate of re-engagement is proportional to the rate of dissatisfied employees becoming satisfied.
- The rate of departure is proportional to the rate of termination of dissatisfied employees.

While these assumptions are debatable, they seem reasonable for an initial approximation. We discuss the interpretation and measurement of various aspects of the model in the next section.

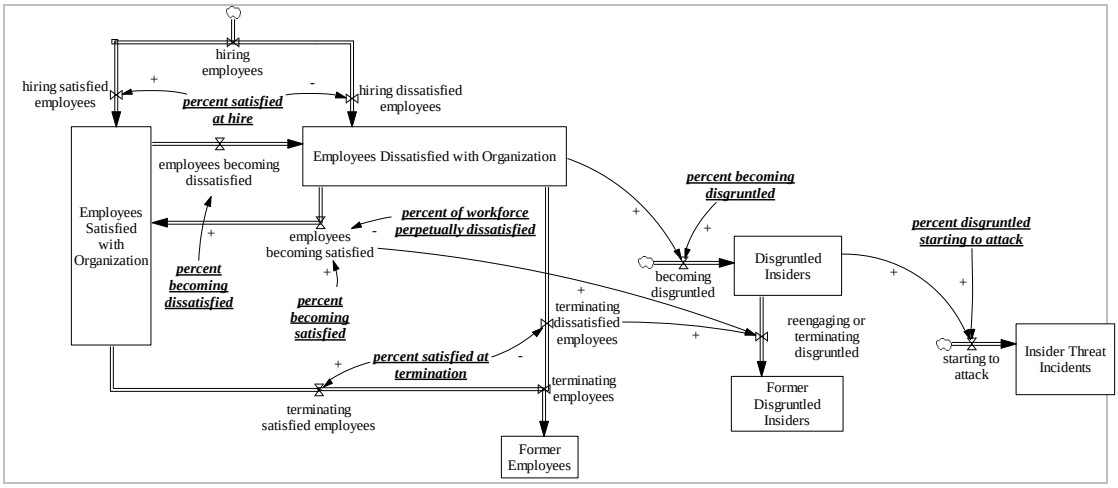

Figure 10: Emerging Physics of Organization Dissatisfaction and the Disgruntled Insider Threat

4.3 Model Settings

The model described in the previous section raises the question of what the values should be for all of the input variables during model execution. We used the following values in model execution, at least initially:

- ***percent satisfied at hire*** = 90%
- ***percent satisfied at termination*** = 20%
- ***percent becoming satisfied*** = 10%/month
- ***percent becoming dissatisfied*** = 10%/month
- ***percent of workforce perpetually dissatisfied*** = 5%
- ***percent becoming disgruntled*** = 10%/month
- ***percent disgruntled starting to attack*** = 0.2%/year

So how did we derive these values?

We started by determining values from previous research that we could use with sufficient confidence and then directed our research to determine reasonable values for other variables of interest. We developed a preliminary version of this model prior to conducting the research described in this report and used it to decide what additional data to collect.

As a starting point, we reviewed several studies that are regularly conducted to assess employee attitudes. Because of our focus on the U.S. Government, a very important study for us is the Federal Employee Viewpoint Survey Results [OPM 2015]. This report shows that employee satisfaction within their organization has been steady at about 55% over the past several years. For simplicity, we assume these survey results mean that 55% of the employees are satisfied with their organization and 45% are dissatisfied.

Finally a Gallup study has fairly consistently found that about 18% of the workforce is actively disengaged, which means that the employee is "more or less out to damage their company" [Gallup 2013]. This actively disengaged employee is also what we refer to as the disgruntled insider in the model. The values for the input variables listed above were derived by a combination of identifying plausible values and getting the percentages in the previous paragraph to work out as a result. We'll describe the application of sensitivity (Monte Carlo) simulation in the next section to analyze the behavior of the model over a range of parameter values that represent the uncertainty associated with those values.

4.4 Model Execution

Simulation results are described with respect to a model equilibrium, which is shown in simulation graphs as a "baseline" simulation run. The equilibrium of the model described in this paper ensures that the rate of change of all stocks remain at a constant value (possibly zero). In equilibrium, a model is easier to experiment with since the analyst can more easily determine how small changes in input affect the overall behavior of the simulation. Any change in behavior (as seen in the behavior-over-time graphs) can be attributed to that single changed input and only that change. It is analogous in scientific experiments to keeping all variables constant (i.e., the independent or controlled variables) except the ones being studied (i.e., the dependent variables).

The baseline run of our model represents an organization with the percentages of the total workforce described above: specifically, about 55% of the employees are satisfied with the organization, 45% dissatisfied, and 18% disgruntled. These simulation results are shown in Figure 11 and Figure 12 below. The simulated size of the organization is somewhat arbitrary, but in this execution is about 1,000 people.

Figure 11: Employee Satisfaction Levels[6]

Figure 12: Employee Classification Levels

Figure 13 shows the accumulation of insider threat incidents under the above conditions. The baseline run shows about 6 incidents occurring over a 20-year period. The major factor here, given our assumptions, is the variable ***percent disgruntled starting to attack***. This variable is set

[6] This behavior-over-time graph was generated using the Vensim modeling tool. The X-axis for the graphs is specified in months (240 months—twenty years—is the duration of this simulation). The legend below the graph shows each variable and the name of the simulation run graphed in the format "variable: simulation run". The variable simulation runs are distinguished with a number label (1 and 2 in Figure 13) and in color copies also specified in the legend below the graph.

at 0.2% per year. Put another way, every year *0.002 Disgruntled Insiders* are responsible for insider threat incidents. In equilibrium, there are about 150 disgruntled insiders, so this is about 1 incident every 3-1/3 years, accumulating to about 6 over 20 years.

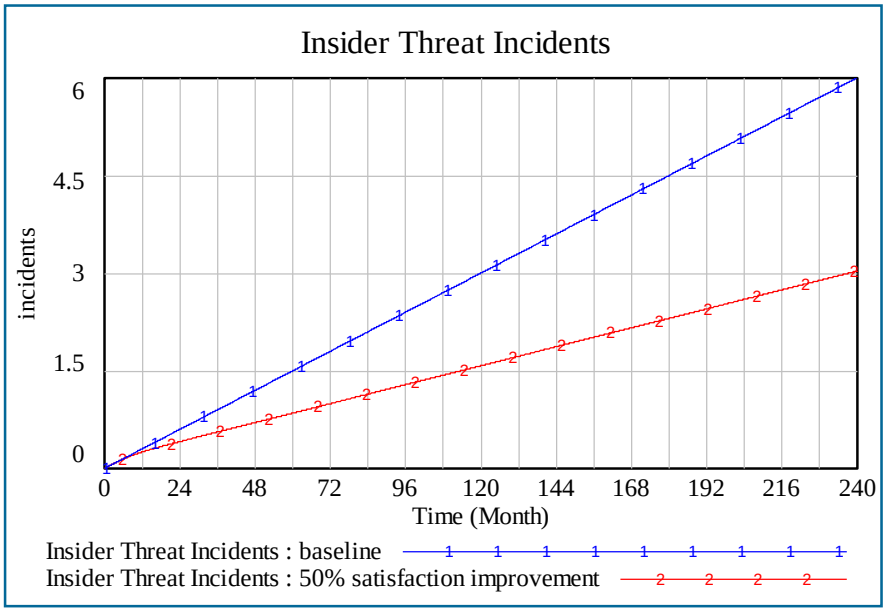

Figure 13: Individuals Responsible for Insider Threat Incidents

The simulation run named "50% satisfaction improvement" shows that the number of insider threat incidents drops in half over the twenty-year timeframe of the simulation when the rate of employees becoming dissatisfied drops by 50% and the rate of employees becoming satisfied increases by 50%.

This change, possibly due to workforce management practices to improve employee attitudes about their satisfaction with the organization, takes place in the simulation at month three, moving the accumulation of insider threat incidents off its baseline trajectory to fewer such incidents. Of course, the actual decline is very sensitive to both the percentage improvement as well the percentage of disgruntled employees starting to attack.

Figure 14 shows the potential decline in incidents for various values of these two variables as a three-dimensional surface.

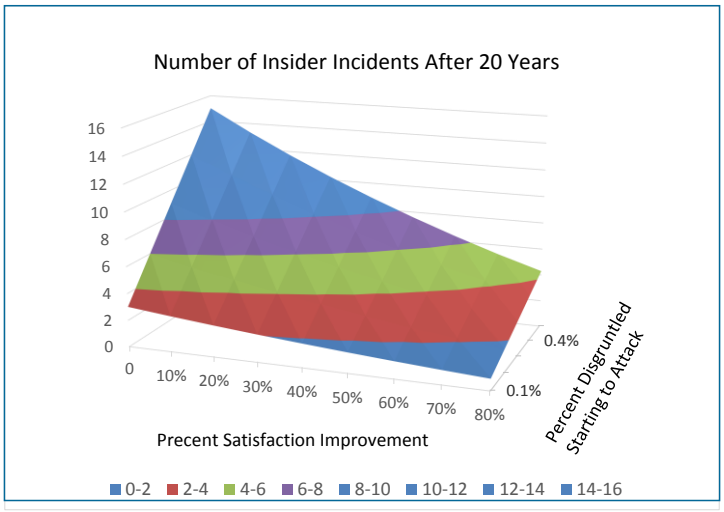

Figure 14: Sensitivity Simulation Results on Insider Threat Incidents

We can now extend the model to better understand the cost savings from efforts to improve employees' satisfaction with the organization. In the upper right corner of the model extension shown in Figure 15, we include model variables to estimate the number of counterproductive work behaviors of satisfied employees and a multiplier of that number of behaviors for dissatisfied employees. Costs are estimated both as a cost per counterproductive work behavior, in terms of lost productivity, and the costs associated with insider threat incidents.

The following values are assumed for these variables in our analysis:

- ***CWB per satisfied*** = 0.5 CWB/month
- ***multiplier CWB rate per dissatisfied*** = 4.0
- ***cost per CWB*** = $500
- ***cost per incident*** = $1M

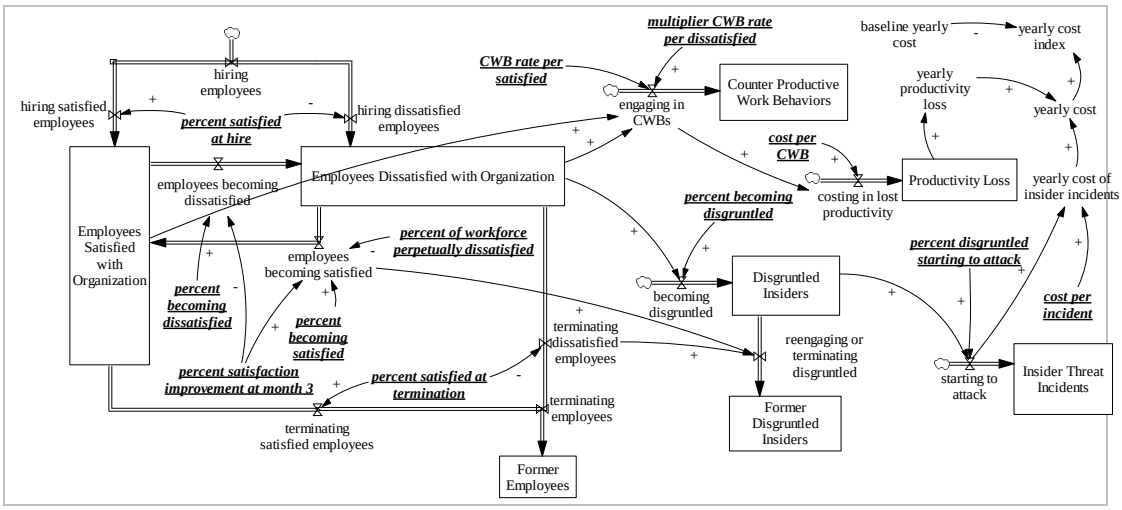

Figure 15: Model Extension to Estimate Potential Cost Savings

We calculate the yearly costs as the simple sum of the costs of productivity loss due to CWBs and the costs due to disgruntled insider threat incidents. We form a yearly cost index based on the costs associated with no satisfaction improvement (i.e., where ***percent satisfaction improvement at month 3*** is 0).

Figure 16 shows the decrease in relative cost from the baseline due to various levels of satisfaction improvement. For example, with the 505 satisfaction improvement that we analyzed previously, we get a 25% reduction in yearly costs associated with egregious insider threat incidents and other counterproductive work behaviors.

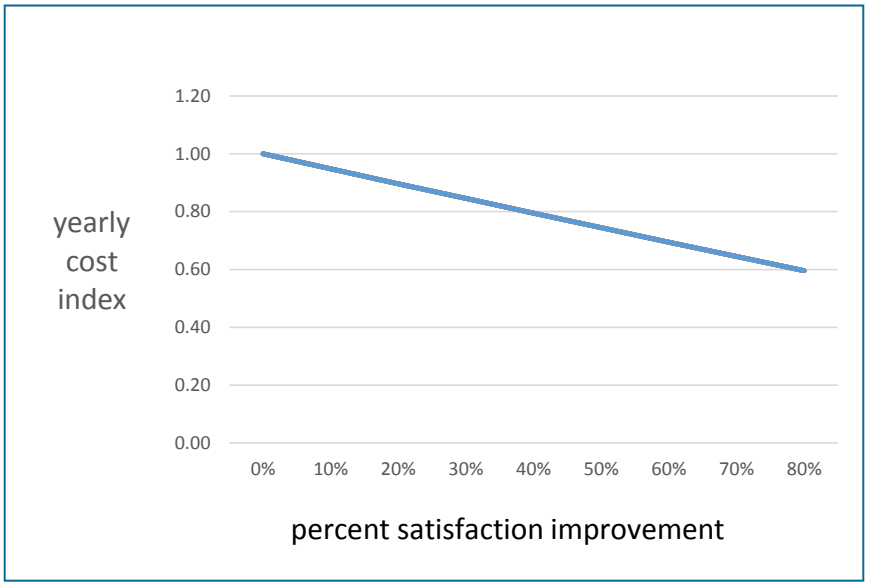

Figure 16: Decrease in Yearly Costs Due to Satisfaction Improvement

5 Positive Incentive-Based Principles and Practice Areas

We believe that continuing the research started in this report is critical to establishing and managing effective insider threat programs. Our vision is the extension of the traditional security approach shown in Figure 17. The right side of the figure depicts the traditional approach focused on negative incentives that restrict employees to prevent abuse and detects and punishes abuse when it occurs. This approach is based on a negative form of deterrence as promulgated in deterrence theory, which says that people obey rules because they fear getting caught and being punished. Restricting, detecting, and punishing employees reinforces the deterrence (negative) of abuse.

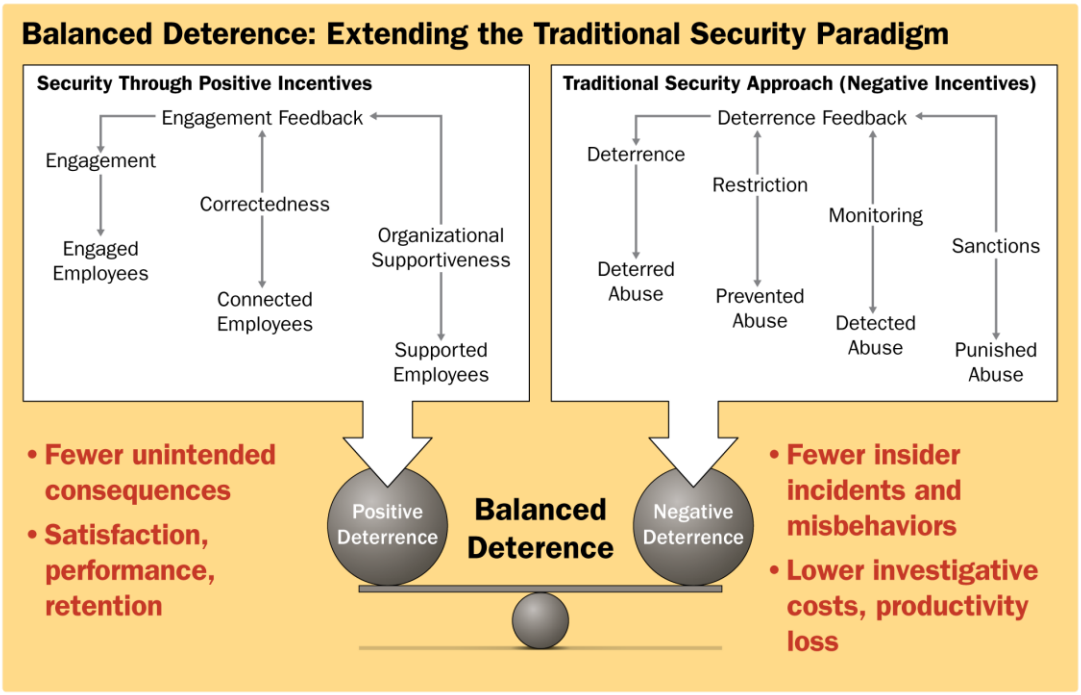

Figure 17: Extending the Traditional Information Security Paradigm

Our extension of security through positive incentives is shown on the left side of the figure. In its current form, as supported by our research, organizational support (including organization justice) is shown as the foundation of positive deterrence. With this foundation in place, connectedness with coworkers and job engagement serve to strengthen an employee's commitment to the organization. Organization support and connectedness also strengthen overall engagement in a feedback effect.

This form of positive deterrence complements the use of negative deterrence by reducing the baseline of insider threat in a way that can improve employees' satisfaction, performance, and commitment to the organization. As illustrated in our modeling effort, fewer incidents and counterproductive behaviors reduces costs through fewer investigations and greater staff productivity. Employing the right mix and ratio of positive and negative incentives in an insider threat program can create a net positive for the employee—moving an insider threat program from a

"big brother" program to a "good employer" program that actually improves employees' work life.

Figure 18 provides a breakdown of practice areas relevant to developing and retaining staff to achieve an organization's mission, with a particular focus on positive incentives. The first two branches off the root node at the left side of the figure involve workforce management practices, including hiring and retaining the appropriate staff with the right job responsibilities and ensuring that they are positively motivated to execute responsibilities that support achieving the organization's mission.

The third branch acknowledges the fact that employees can act counter to the organization mission even if they perform their job well in other respects. This branch, which traverses the red node in the figure, makes this partitioning particularly appropriate for guiding the development and refinement of insider threat programs. The second and third branches, in combination, show that practices can benefit the organization in terms of employee satisfaction, performance, and retention as well as reducing the insider threat.

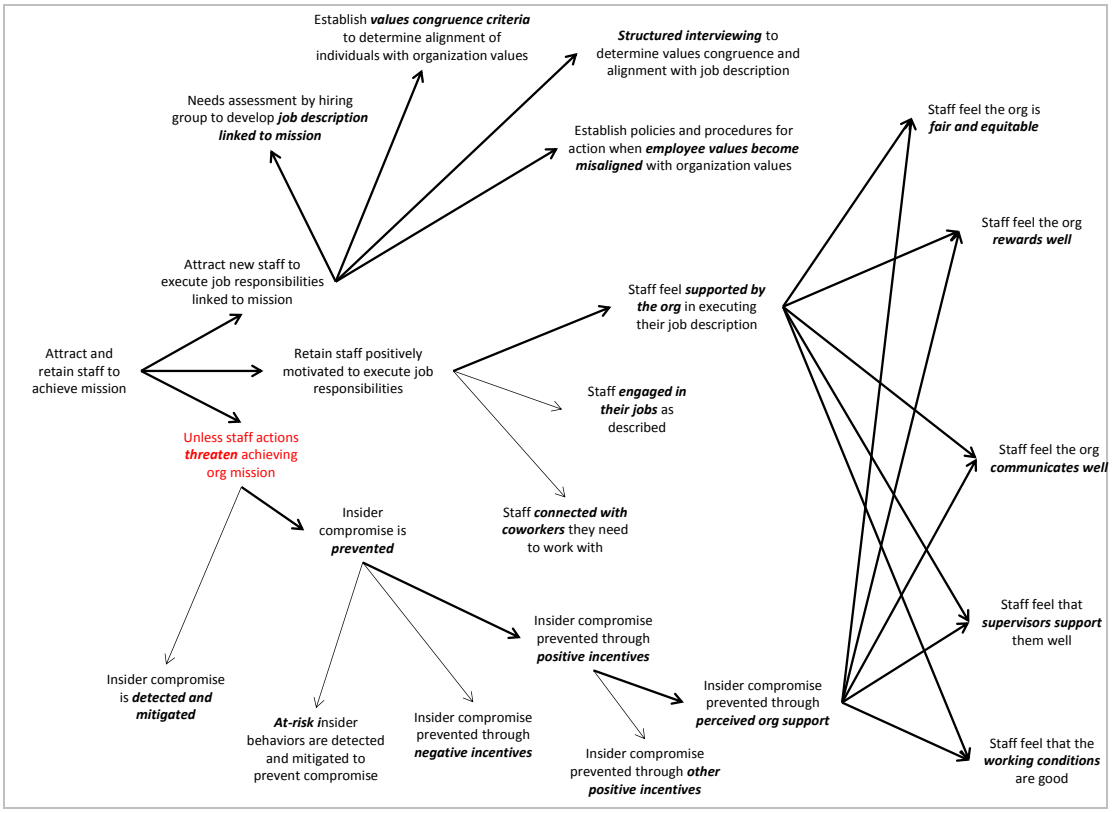

Figure 18: Taxonomy of Positive Incentive Workforce Management Practice Areas

This section describes practice areas that can positively incentivize employees in their job and work with their employer. The first part of this section elaborates the first branch of Figure 18 that has bold arrows that represent attracting the right staff.

The second part of this section elaborates the second and the third branches of Figure 18 that terminate with the fundamental practice areas associated with perceived organization support on the right side of the figure.

We finish this section with a discussion of organizational culture. (Appendix C provides a graphic of all the practice areas integrated together.) This discussion focuses on practice areas that promote perceived organizational support because, as we previously described, we believe that achieving this perception to be the foundation for other positive incentives an organization can employ. Without that perception, all else can be undermined. As a context for our discussion, Figure 18 also shows other factors that insider threat program managers should consider when designing their programs.

5.1 Hiring the Right Staff

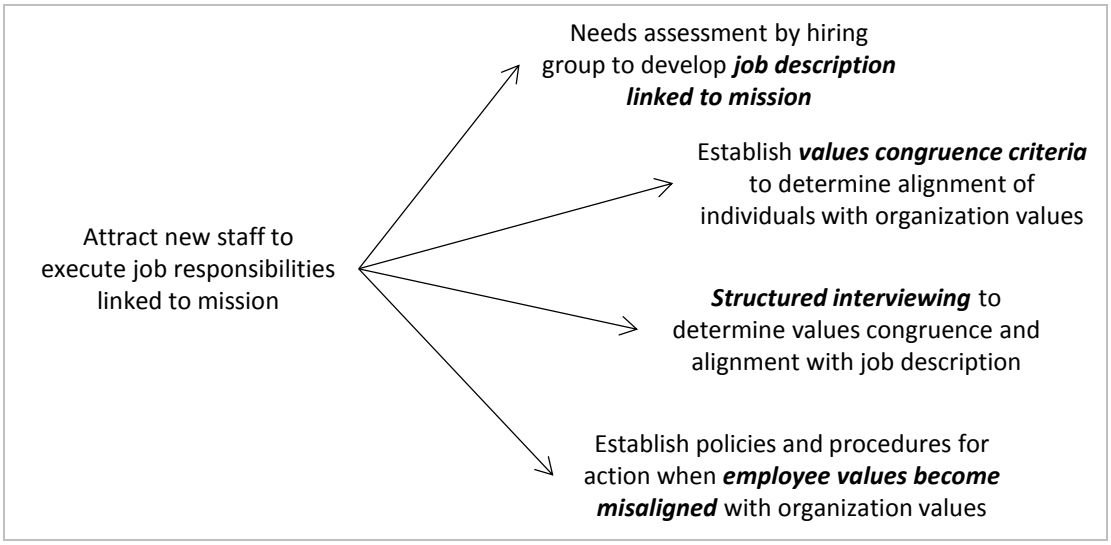

Figure 19: Factors Involved in Hiring the Right Staff

Establishing and maintaining the right workforce is a precondition of getting positive incentive-based practices to work well. Congruence of values between employees and the organization inherently promotes perceptions of organizational support [Eisenberger 2011, page 87]. While background checks and reference checks are common practices, some organizations may decide to conduct psychometric, personality, or background tests as a condition of employment if the sector in which the organization operates permits it. For federal government organizations, government-sponsored labs, and contractors, the ability to obtain a security clearance involving extensive background checks may be a condition of employment.

The hiring process usually starts with a needs assessment conducted with the hiring group, possibly facilitated by the HR department. A job description is the likely work product used in structured interviews of job candidates. Competency-based interviewing can be a good way to solicit and verify the candidate's qualifications, including both social skills and technical capabilities. (See the Loominger competencies [Jantti 2012].) If the job description reflects the skills and capabilities needed and its contribution to the organization's mission, then a good employee match with the job description should ensure the person's ability to fulfil the job responsibilities.

There are usually more options available other than termination in the case of an employee who becomes dissatisfied with their job (e.g., adjusting their responsibilities and/or moving to another

team within the organization). However, if an employee's values become misaligned with the organization's values, lack of resolution may require the person to be respectfully but expeditiously ushered out of the organization.

5.2 Perceived Organizational Support

Perceived organizational support (POS) involves the extent to which employees believe their organization values their contributions, cares about their well-being, supports their socio-emotional needs, and treats them fairly. A foundation of POS is social exchange theory—a theory in which individuals interact with others and invest in relationships in a way that maximally benefits themselves.

A key concept is the norm of reciprocity, which has both a positive and negative form. Positive reciprocity involves the actions of employees in the interests of the organization as a form of repayment (or obligation created) for favorable treatment by the organization. Negative reciprocity involves misbehaviors of employees performed because of perceived mistreatment.

With these basic concepts, it is not difficult to see how perceptions of organizational support could influence insider-threat-related behaviors. How can an organization promote these perceptions? As identified in Figure 18 and elaborated below, POS can be encouraged through organizational justice, adequate rewards and recognition, effective communication, supportive management, and effective working conditions [Eisenberger 2011].

Organizational Justice

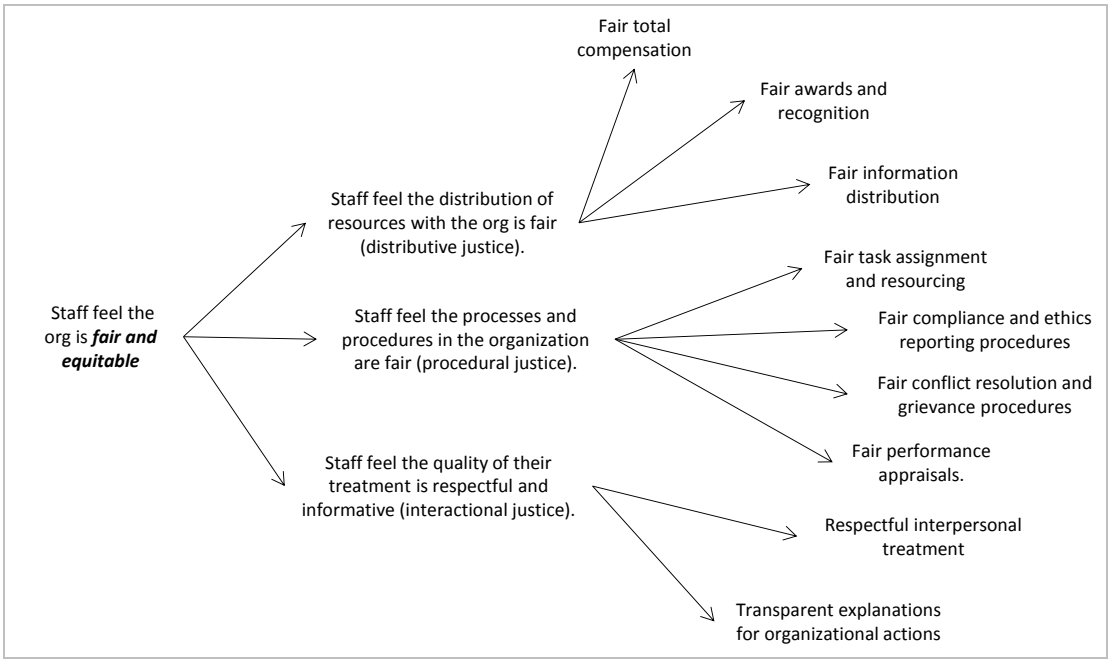

Figure 20: Factors Involved in Organizational Justice

Past research shows that employees' sense of fair treatment by the organization is the strongest determinant of POS [Eisenberger 2011]. Organizational justice involves three types of justice:

- *Distributive justice* involves fairness of the distribution of resources within the organization, either tangible forms, such as payment and rewards, or intangible forms, such as praise and recognition. For example, aligning salaries and benefits to comparable industry benchmarks can help facilitate perceptions of fairness.
- *Procedural justice* involves fairness of the processes and procedures in the organization that involve outcomes important to employees. Employees' sense of organization support comes from the consistency and fairness of procedures involving performance appraisals, for example.
- *Interactional justice* involves the quality of treatment employees receive as the organization makes decisions that affect them, such as interpersonal explanation of decisions in a respectful and informative way (sometimes called interpersonal justice and informational justice, respectively). For example, perceptions of interactional justice may depend on a compassionate and flexible response to an employee's request for time off to deal with an ailing parent or child.

While feelings that an employer's actions are fair and equitable may come over many years of an employee's experience, involving the employee's perception of the organization's treatment of their coworkers and self, these three types of justice allow us, in our research, to identify specific practices that can bolster the employee's overall sense of fairness. Threads associated with these justice types appear in the following sections.

Adequate Rewards and Recognition

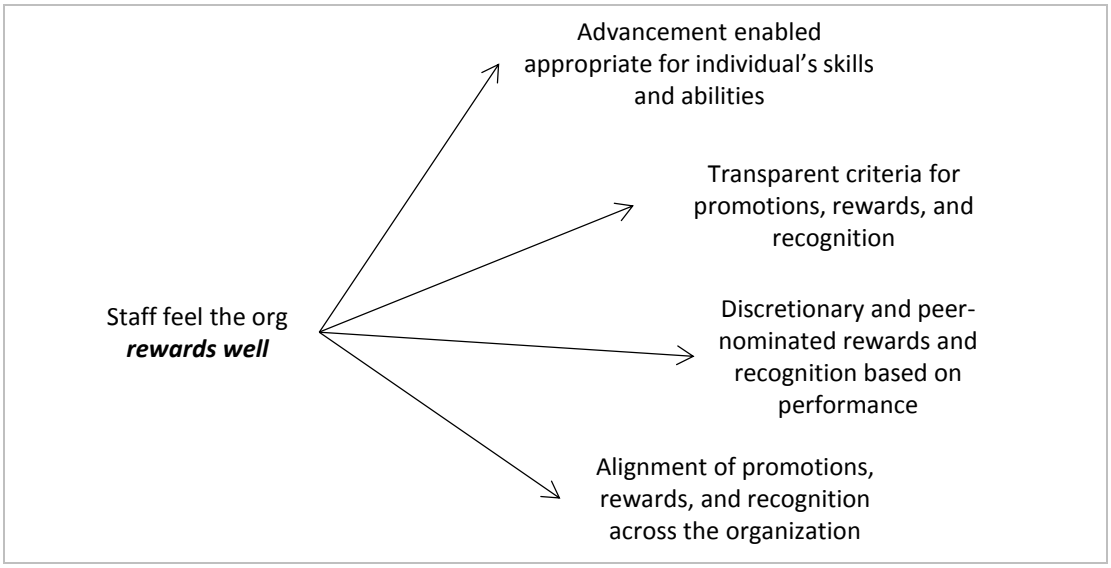

Figure 21: Factors Involved in Adequate Rewards and Recognition

Some prominent research has found that extrinsic incentives, such as pay raises and rewards, can reduce an individual's intrinsic sense of satisfaction and fulfillment. However, in general, that research only weakly links the incentive with performance. Beyond distributive justice, rewards and recognition that are strongly linked to performance can boost an employee's sense of competence and mastery, which as a result, increases perceptions of organizational support. Organizational rewards and recognition, which are discretionary by management or peers, have a much greater effect on feelings of organizational support than across-the-board recognition. In addition, aligning salaries and benefits to comparable industry benchmarks can help facilitate perceptions of fairness.

Making sure employees know about the total remuneration, including benefits, may be important especially where organizations are restricted in the salary levels that can be offered. Promotions should also be aligned across the organization with the level of employee responsibility and performance.

Problems can occur in organizations where the primary means of advancement is into management positions different from the technical positions into which employees are hired. Management skills are a discipline of their own; there is no guarantee that technical people have such skills. Creating a technical track of advancement separate from the management track can help ameliorate these problems.

Effective Communication

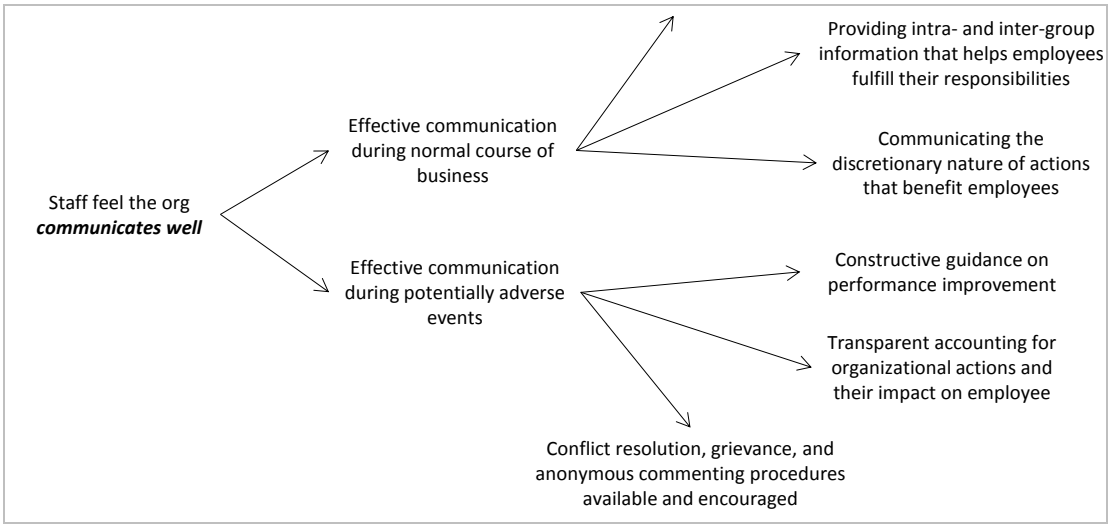

Figure 22:Factors Involved in Effective Communication

Management's effective communication with employees starts from day one of an employee's tenure with new-employee orientation and mentoring to help establish the new employee's position in the organization. Effective communication supports an employee's feelings of organizational support during both good and bad times. The greatest gains in perception of organizational support come when management voluntarily acts in favorable ways to employees, rather than, for example, as a result of contractual agreements or regulations. However, management needs to communicate the discretionary nature of their actions and the benefit to the employees. Managers

should facilitate information sharing among and within groups, especially because it helps employees' work performance.

Reduction in POS due to unfavorable treatment may be lessened through effective communication. For example, the organization may justify the treatment as outside the organization's control, diplomatically explain the legitimacy of the treatment, or, in some cases, simply apologize for admitted poor treatment and rectify the matter in the future. Transparently accounting for management actions and conditions may be the best way to ensure employees feel fairly treated. Up-front, explicit expectation setting may also help to prevent employees from forming unrealistic expectations that will ultimately fail to be fulfilled.

Employees' sense of organization support also comes from consistency and fairness of the procedures involving performance appraisals, which rely on managers' effective communication. Of course, performance improvement plans may be necessary, but should be conducted constructively with a focus on the positive aspects of employee performance, rather than dwelling on the negative aspects.

Fair grievance and conflict resolution procedures should be in place to address issues as they come up. For individuals reluctant to express their concerns, anonymous commenting procedures may serve a useful purpose. Managers need to both effectively communicate to and facilitate communication from employees.

Supportive Management

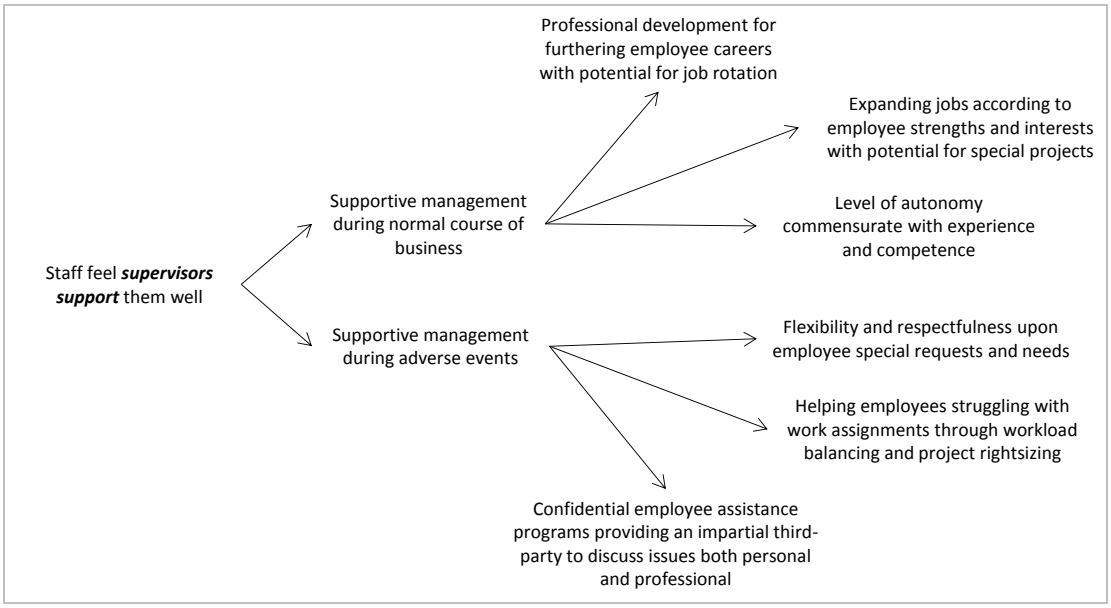

Figure 23:Factors Involved in Supportive Management

For the purposes of this report, *supportive management* deals mostly with interactional justice associated with the treatment employees receive from their direct supervisors. Supervisors need to know their direct reports well to make informed decisions regarding their work assignments and daily work execution. Making sure employees have the resources needed to execute task demands is essential. Providing these resources and opportunities for professional development chosen by

the employee facilitates the employees' feelings of mastery of their domain of interest, job engagement, and support by the organization in furthering their careers.

Employees that perform well can be given opportunities to identify and/or participate in special projects, as long as those opportunities are available to all employees. Supportive supervisors can grant an employee a level of autonomy commensurate with that employee's experience and competence. Employees interested in the work of other teams can be given the opportunity to work on joint projects or rotate to other teams in the organization in which they have an interest.

Supportive management also pertains to times when the employee is experiencing difficulties. As mentioned, perceptions of interactional justice may depend on a supervisor's compassionate and flexible response, for example, to an employee's request for time off to deal with medical issues. When problems arise with an employee's performance, appreciative inquiry can be a way to focus and build on what is going well—a much more self-affirming and effective approach than focusing on what is going wrong [Whitney 2010].

Workload balancing may be necessary in cases where high performers are executing more than their fair share of the work across employees of comparable levels. Another problem arises when employees are split across so many projects that the overhead associated with context switching degrades performance or just makes the job miserable. Rightsizing the number of projects per person can improve employees' feelings of organizational support. The organization should provide and managers should encourage employee assistance programs to help with difficulties both personal and professional.

Effective Working Conditions

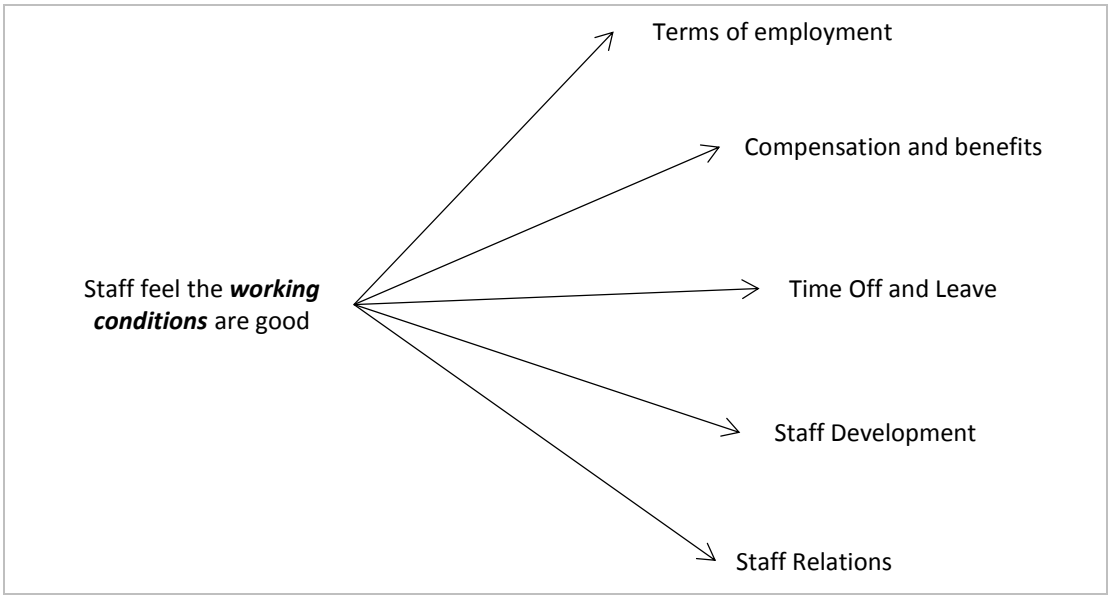

Figure 24: Factors Involved in Effective Working Conditions

Issues dealt with previously, such as management supportiveness and organizational communication, certainly influence the quality of the overall work environment. However, many working

conditions are so ingrained in an organization's way of doing things that they may be barely noticeable to management. These conditions may actually be part of the culture of the organization, which the next section discusses in detail.

Effective working conditions deal with issues that may receive little attention. However, unless they are explicitly acknowledged, they may leave some employees feeling unsupported. These implicit working conditions vary greatly by organization, but may include bigger issues, such as terms of employment, work-hour or location flexibility, and work-family policies, or smaller issues such as acceptable office temperature. Some of these issues may be flexibly addressed by lower level managers. However, if they are ingrained in culture and policy, they may present bigger obstacles to employees. Organizations need to consider the many potential issues involving working conditions in creating an environment that is supportive to employees.

5.3 Sociocultural Considerations

Sociocultural considerations at the individual, group, and organizational levels are also pertinent to the successful adoption of positive incentives that reduce the insider threat. This importance is due, in part, to the diverse cultural backgrounds of the individuals employed by organizations as well as the culture and subcultures of the organization and its subunits.

Today, the workforce employed by organizations in the United States commonly includes individuals who were born and reared outside the city, state, and region of the organization's location as well as outside the United States. According to the Bureau of Labor and Statistics, in 2014, 16.6% of those employed (16 years old and over) were foreign born.[7] The majority, 30.7%, of the foreign-born were employed in the fields of management, professional, and related occupations.

The cultural diversity of the workforce has created organizations that can be described as being culturally heterogeneous. This cultural heterogeneity may require organizations to consider the cultural composition of the workforce and the culturally relevant motivators that encourage employees to act consistent with their interest. For example, cultural variations in communication, concepts of time, and degree of individualism and collectivism adopted from their birth countries may directly impact how individuals and groups consume and interpret workforce management practices.

When communicating, meaning and context cannot be decoupled, and it is important for management to examine meaning and context together. The high-low context continuum created by Hall in 1976 considers both meaning and context, and places cultures along a dimension spanning from high context to low context [Hall 1976]. This continuum provides insights for understanding culturally significant differences between cultures and communication.

In high-context cultures, cultural knowledge is implicit, and contextually bound non-verbal aspects of communication are as important as is the silence that accompanies the explicit verbal code (i.e., the words themselves). The focus of the high-context culture is people and relationships and, through these relationships, an understanding of the non-verbal aspects of communication find meaning. In a low-context culture, knowledge is explicit and communication in both written

[7] http://www.bls.gov/news.release/forbrn.t04.htm

and spoken form is explicit and based on direct statements. In low-context cultures, the listener understands the message as it was intended [Hall 1976].

How people perceive and organize time and space is a sociocultural construct that influences our daily lives—how we interact with others and how we perceive our past and future. Based on ethnographic research, Hall proposed two variant solutions of how time and space are culturally organized—monochromic and polychromic time. Cultures with polychromic tendencies view time as something that is fluid, flexible, and adjustable to fit the needs of the individual or group. In monochromic cultures, time is viewed as something that is structured and can be compartmentalized and wasted [Hall 1976]. Tardiness to meetings, pre-meeting conversation, or interruptions are acceptable in polychromic cultures, while it is considered unacceptable in monochromic cultures.

Broad generalizations about the sociocultural construct of a country can be found in Hofstede's dimensions of individuals and collectivism. Individualism and collectivism each represent a set of distinguishing values; a position on the dimension reflects a focus of either "I" (the individual) or "we" (the collective group). On a scale of 0 to 100, the most collectivistic countries are closest to 0, and those with high individualistic traits are closer to 100.

Interpersonal relationships and trust are important to all aspects of life in high-context and collectivistic societies. Behavior in collectivistic societies is governed by in-group norms with a focus toward the good of the collective group versus the good of the individual. Collectivistic cultures value a sense of self-respect and having the acceptance and approval of one's peers, supervisors, and family members. Conflict can arise from the violation of boundaries, norms of group loyalty and commitment, reciprocal obligations, and trust. When dealing with conflicts or problems, high-context, collectivistic societies focus on the social aspects and implications of a problem [Guess 2004]. According to Guess, members of these societies value security (of the group), are more risk-avoiding, and follow passive, collaborative, and avoidance strategies.

In summary, when organizations design and deploy positive incentives, they should consider the sociocultural composition of the workforce. This consideration ensures their practices provide motivators for individuals and groups with high-context, polychromic collectivistic tendencies and low-context, monochromic, and individualistic tendencies. For example, individuals with high-context, polychromic, and collectivistic tendencies might respond best to practices that illustrate the positive benefits to the group and the long-term impacts. Individuals with low-context, monochromic, and individualistic tendencies might respond best to practices that illustrate the positive to the individual and include short- and long-term impacts.

6 Conclusions and Future Work

Traditional insider threat management involves practices that constrain users, monitor their behavior, and detect and punish misbehavior. Such negative incentives attempt to force employees to act in the interests of the organization and, when relied on excessively, can result in negative unintended consequences that exacerbate the threat.

Positive incentives that attempt to attract employees to act in the interests of the organization can complement negative incentives. We identified and analyzed three avenues for aligning the interests of the employee and the organization: job engagement, perceived organizational support, and connectedness with coworkers. This report describes research that provides evidence that a particular set of positive incentives focused on increasing organizational support to employees can reduce the insider threat.

In summary, this report describes our research progress in several areas:

- *Analyzing several high-profile insider incidents for the levels of job engagement, coworker connectedness, and perceived organization support evident during the incident timeline.* Perceived organizational support was found to be extremely negative, while job engagement and coworker connectedness were found to be low, but not necessarily in the extreme. These incident case studies suggested focusing on organizational support in our survey research.
- *Conducting a survey of individuals responsible for establishing insider threat programs in organizations.* Supporting and extending previous research, we found a negative correlation between perceived organizational support and intentional (primarily malicious) counterproductive work behaviors. A somewhat weaker negative correlation was also found between organizational justice and these behaviors. The relationships were found to be statistically significant at the 95% confidence level. However, the exploratory nature of our initial analysis does not permit us to generalize this relationship to the larger population of organizations.
- *Developing a simulation model that illustrates the value of positive incentives.* We developed a system dynamics model based on published data and simple (but arguable) assumptions showing how positive, intrinsic incentives can increase a program's operational efficiency with reduced investigative costs and fewer incidents involving disgruntled or exploitive insiders. Our incident analysis and survey work provided validation of the simulation model structure (i.e., the stock and flow structure of the system dynamics model). We will continue to calibrate our model based on future research and expect to demonstrate similar benefits as our work progresses.

Our research raises many questions about how an insider threat program can or should incorporate positive incentives that improve employees' perceptions of support by the organization. We elaborate important principles and practice areas, but this is just a first step. Our future work will focus on what we believe to be the key to a successful insider threat program: identifying the mix of positive and negative incentives that creates a net positive for employees.

The challenge is that people respond to negative incentives differently depending on the culture of the organization, the nature of their job, and their personality. Fortunately, existing theory provides insight into these differences and can illuminate a means for building a general transition

process to take an organization from its current state to one that has a balance of positive and negative incentives that promotes employee satisfaction, performance, and retention while also being *more* effective at reducing the insider threat.

Appendix A Scales Used in Incident Coding

Perceived Organizational Support Scale [Eisenberger 1986]

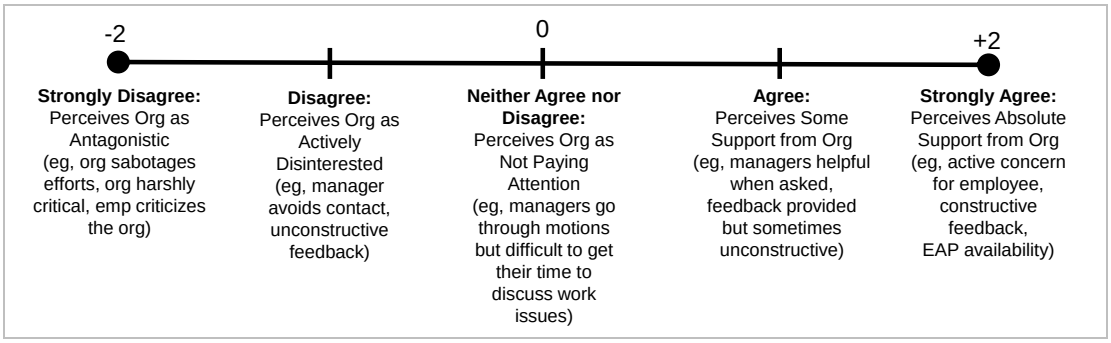

Figure 25: Perceived Organizational Support Scale

To what extent would the subject of the incident agree or disagree with the following statements about the victim organization?

1. The organization values my contribution to its well-being.
2. The organization appreciates the extra effort I give.
3. The organization would respond to complaints I might have.
4. The organization really cares about my well-being.
5. The organization would notice if and when I do exceptional work.
6. The organization cares about my general satisfaction at work.
7. The organization shows concern for me.
8. The organization takes pride in my accomplishments at work.

Job Engagement Scale [Schaufeli 2006]

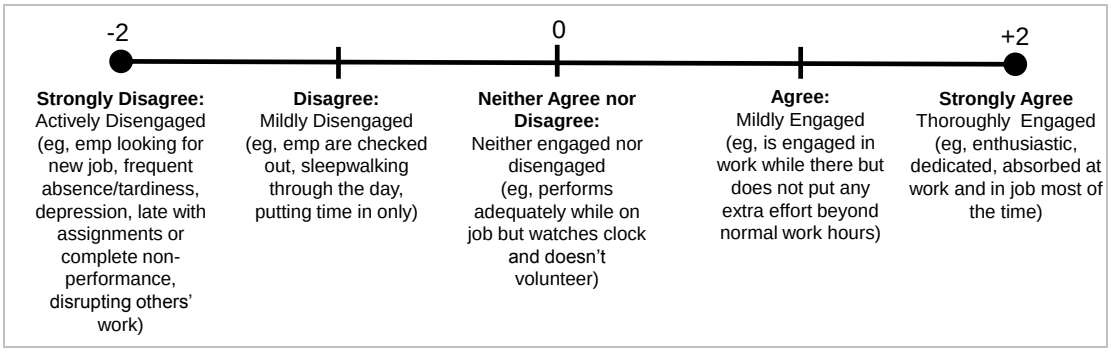

Figure 26: Job Engagement Scale

For the incident in question, to what extent do you agree or disagree with the following statements about the subject's job in the victim organization? (Note: questions 1-3 are about the employee's vigor in their job; questions 4-6 are about the employee's dedication to their job; and questions 7-9 are about the employee's absorption in their job.)

1. At work, I feel bursting with energy.
2. At my job, I feel strong and vigorous.
3. When I get up in the morning, I feel like going to work.
4. I am enthusiastic about my job.
5. My job inspires me.
6. I am proud of the work that I do.
7. I feel happy when I am working intensely.
8. I am immersed in my work.
9. I get carried away when working.

Connectedness with Coworkers Scale [Brien 2012, Malone 2012]

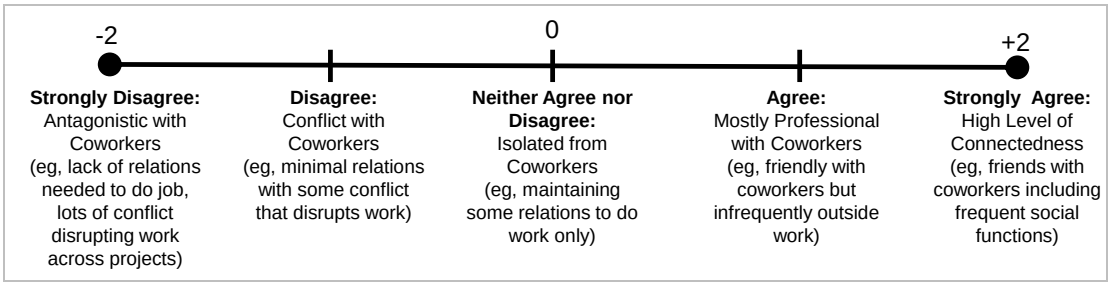

Figure 27: Connectedness with Coworkers Scale

For the incident in question, to what extent do you agree or disagree with the following statements about the subject's connection with coworkers in the victim organization?

1. When I'm with the people from my work environment, I feel understood.
2. When I'm with the people from my work environment, I feel heard.
3. When I'm with the people from my work environment, I feel as though I can trust them.
4. When I'm with the people from my work environment, I feel I am a friend to them.
5. When I'm with the people from my work environment, I feel included.
6. I have close bonds with the people from my work environment.
7. I feel accepted by the people from my work environment.
8. I have a sense of belonging in my work environment.
9. I have a place at the table with others in my work environment.
10. I feel connected with others in my work environment.

Appendix B Survey Components

Organizational Justice [Moorman 1991]

Items
Distributive justice
My work schedule is fair.
I think that my level of pay is fair.
I consider my work load to be quite fair.
Overall, the rewards I receive here are quite fair.
I feel that my job responsibilities are fair.
Formal procedures
Job decisions are made by the general manager in an unbiased manner.
My general manager makes sure that all employee concerns are heard before job decisions are made.
To make job decisions, my general manager collects accurate and complete information.
My general manager clarifies decisions and provides additional information when requested by employees.
All job decisions are applied consistently across all affected employees.
Employees are allowed to challenge or appeal job decisions made by the general manager.
Interactional justice
When decisions are made about my job, the general manager treats me with kindness and consideration.
When decisions are made about my job, the general manager treats me with respect and dignity.
When decisions are made about my job, the general manager is sensitive to my personal needs.
When decisions are made about my job, the general manager deals with me in a truthful manner.
When decisions are made about my job, the general manager shows concern for my rights as an employee.
Concerning decisions made about my job, the general manager discusses the implications of the decisions with me.
The general manager offers adequate justification for decisions made about my job.
When making decisions about my job, the general manager offers explanations that make sense to me.
My general manager explains very clearly any decision made about my job.

Survey of Perceived Organizational Support (SPOS) [Eisenberger 1986]

1.[a] The organization values my contribution to its well-being.
2.[a] If the organization could hire someone to replace me at a lower salary it would do so. (R)
3.[a] The organization fails to appreciate any extra effort from me. (R)
4.[a] The organization strongly considers my goals and values.
5. The organization would understand a long absence due to my illness.
6.[a] The organization would ignore any complaint from me. (R)
7.[a] The organization disregards my best interests when it makes decisions that affect me. (R)
8.[a] Help is available from the organization when I have a problem.
9.[a] The organization really cares about my well-being.
10. The organization is willing to extend itself in order to help me perform my job to the best of my ability.
11. The organization would fail to understand my absence due to a personal problem. (R)
12. If the organization found a more efficient way to get my job done they would replace me. (R)
13. The organization would forgive an honest mistake on my part.
14. It would take only a small decrease in my performance for the organization to want to replace me. (R)
15. The organization feels there is little to be gained by employing me for the rest of my career. (R)
16. The organization provides me little opportunity to move up the ranks. (R)
17.[a] Even if I did the best job possible, the organization would fail to notice. (R)
18. The organization would grant a reasonable request for a change in my working conditions.
19. If I were laid off, the organization would prefer to hire someone new rather than take me back. (R)
20.[a] The organization is willing to help me when I need a special favor.
21.[a] The organization cares about my general satisfaction at work.
22.[a] If given the opportunity, the organization would take advantage of me. (R)
23.[a] The organization shows very little concern for me. (R)
24. If I decided to quit, the organization would try to persuade me to stay.
25.[a] The organization cares about my opinions.
26. The organization feels that hiring me was a definite mistake. (R)
27.[a] The organization takes pride in my accomplishments at work.
28. The organization cares more about making a profit than about me. (R)
29. The organization would understand if I were unable to finish a task on time.
30. If the organization earned a greater profit, it would consider increasing my salary.
31. The organization feels that anyone could perform my job as well as I do. (R)
32. The organization is unconcerned about paying me what I deserve. (R)
33. The organization wishes to give me the best possible job for which I am qualified.
34. If my job were eliminated, the organization would prefer to lay me off rather than transfer me to a new job. (R)
35.[a] The organization tries to make my job as interesting as possible.
36. My supervisors are proud that I am a part of this organization.

Note. (R) indicates the item is reverse scored.
[a] These items were retained for the short version of the survey.

CY-CWB

On average, how frequently does each non-accidental employee behavior occur at your organization? Please estimate if you cannot remember.

Occasionally = at least once a year
Sometimes = at least once every other month
Often = at least once a week
All the time = at least once daily *

	In your opinion, how often does this employee behavior typically occur at your organization?
Purposely damaging a piece of equipment that the organization owns. *	-- Please Select --
Purposely vandalizing a company website. *	-- Please Select --
Purposely took a non-trivial item(s) valued over $25 without permission. *	-- Please Select --
Purposely reading sensitive documents not authorized to read. *	-- Please Select --
Purposely damaging someone's work product (reports, repository, blogs, etc.). *	-- Please Select --
Purposely inhibiting a coworker's progress. *	-- Please Select --
Purposely logging into an assigned work computer during business hours to appear as if working but not actually working. *	-- Please Select --
Purposely producing work that was low quality when high quality work was easy and possible. *	-- Please Select --
Purposely installing software to harm organization. *	-- Please Select --
Purposely sending an email to harm another person's computer. *	-- Please Select --
Purposely providing coworkers with sensitive information for which they were not authorized. *	-- Please Select --
Purposely and inappropriately transmitting employer's proprietary information internally. *	-- Please Select --
Purposely taking physical or electronic copies of employer's proprietary information upon resignation. *	-- Please Select --
Purposely mislabeling the sensitivity of emails and/or documents. *	-- Please Select --
Purposely violating an acceptable-use policy for tools and technology. *	-- Please Select --
Purposely violating a known security policy. *	-- Please Select --
Purposely accessing the organization's network remotely in an unauthorized way. *	-- Please Select --
Purposely transmitting organizational proprietary information externally without authorization. *	-- Please Select --
Purposely committed an unauthorized wiretap on their organization's conversations. (wiretap = intercepting telephone and internet communications in an unauthorized manner) *	-- Please Select --
Purposely disabled security controls without authorization. *	-- Please Select --
Purposely plagiarizing a co-worker's efforts. *	-- Please Select --
Purposely posting disgruntled feelings towards their organization to the external world (email, social media, texts, etc.). *	-- Please Select --

Appendix C Positive Incentive-Based Principles and Practice Areas

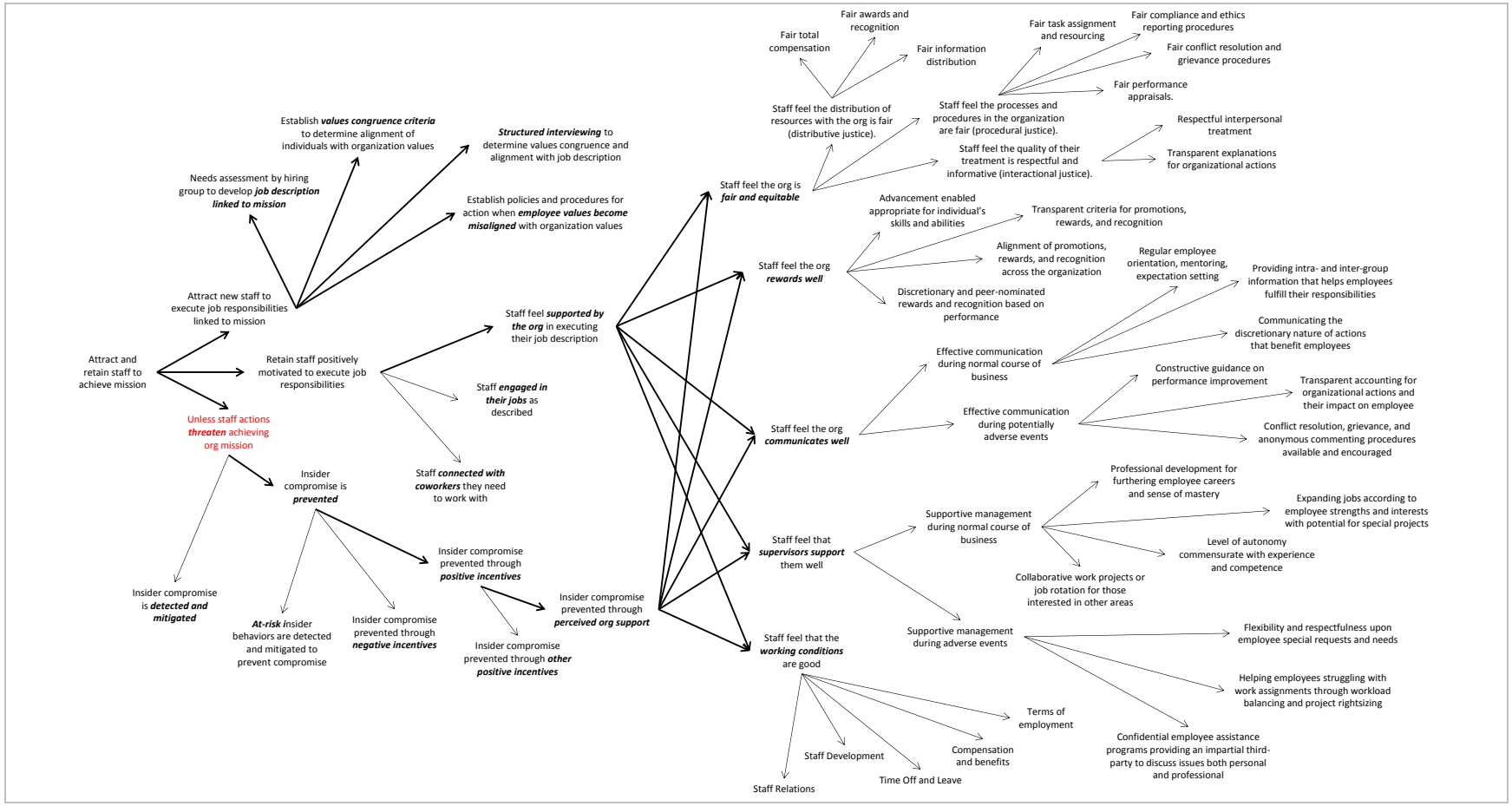

Figure 28: Taxonomy of Positive Incentive Workforce Management

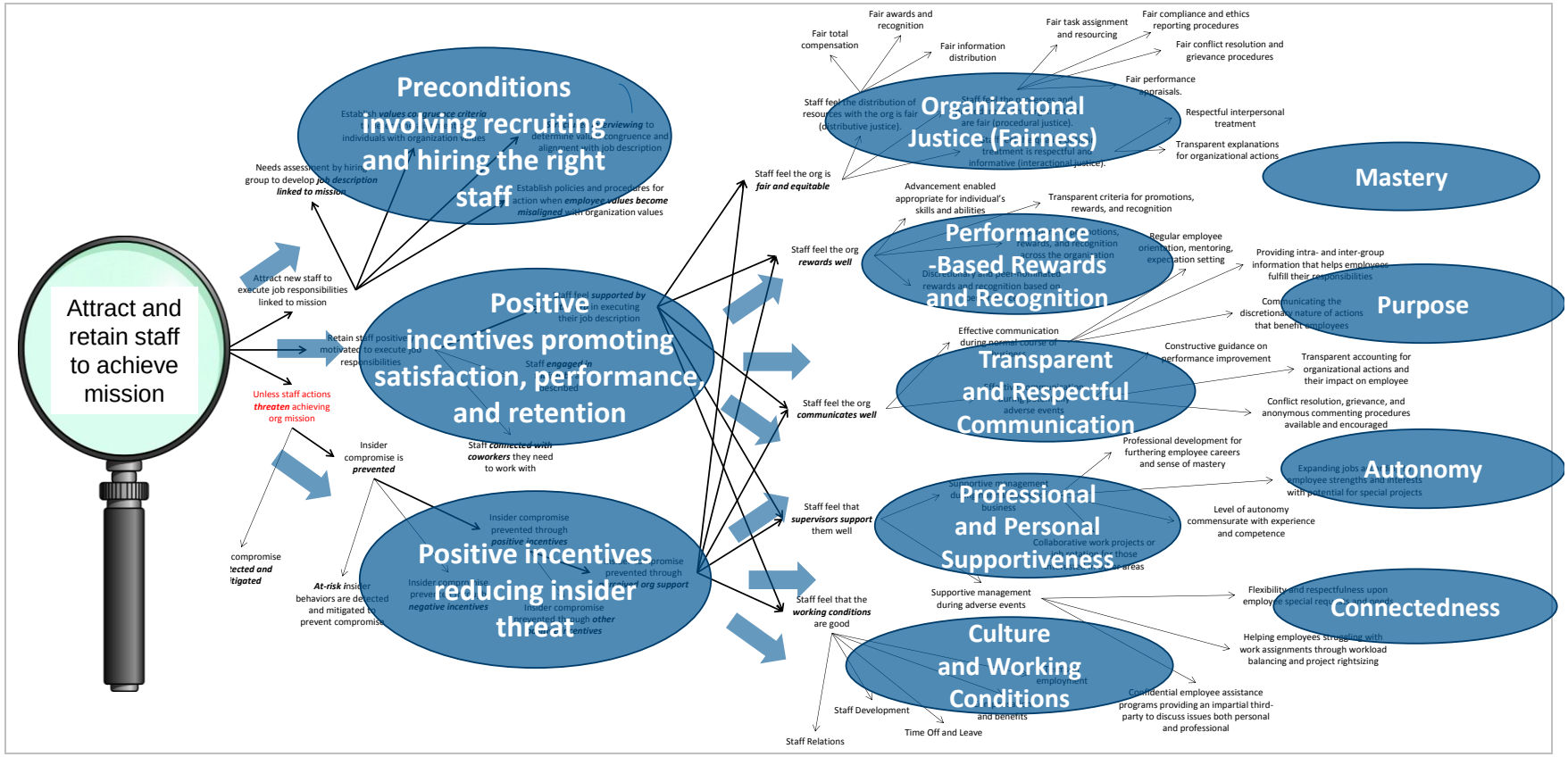

Figure 29: Positive Incentive-Based Practice Areas

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