



Balancing Organizational Incentives to Counter Insider Threat

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Website: <http://www.cert.org/insider-threat>

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This material is based upon work funded and supported by the Department of Defense under Contract No. FA8702-15-D-0002 with Carnegie Mellon University for the operation of the Software Engineering Institute, a federally funded research and development center.

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DM18-0691

Introduction

Insider threat behavioral analytics

- Typically involves analyzing data on the *behaviors of subject insiders* to identify indicators of increased risk

What about *organizational behaviors*? (i.e., non-security related practices)

- Can they be conducive to insider threat?
 - YES – historically known as situational factors
 - BUT - Little considered when forming insider threat programs
 - IMPLIES - Insider attacks are repeated as natural consequence

You can prevent, detect, respond to conducive organizational behaviors

- Just as with indicative insider behaviors

A CERT Research Project

Determine influence of workforce management practices on insider threat behaviors

Negative Incentives

Workforce management practices that attempt to *force* employees to act in the interests of the organization

**Employee Constraints,
Monitoring, Punishment**

Positive Incentives

Workforce management practices that attempt to *attract* employees to act in the interests of the organization

**Focus on Employee Strengths,
Fair & Respectful Treatment**

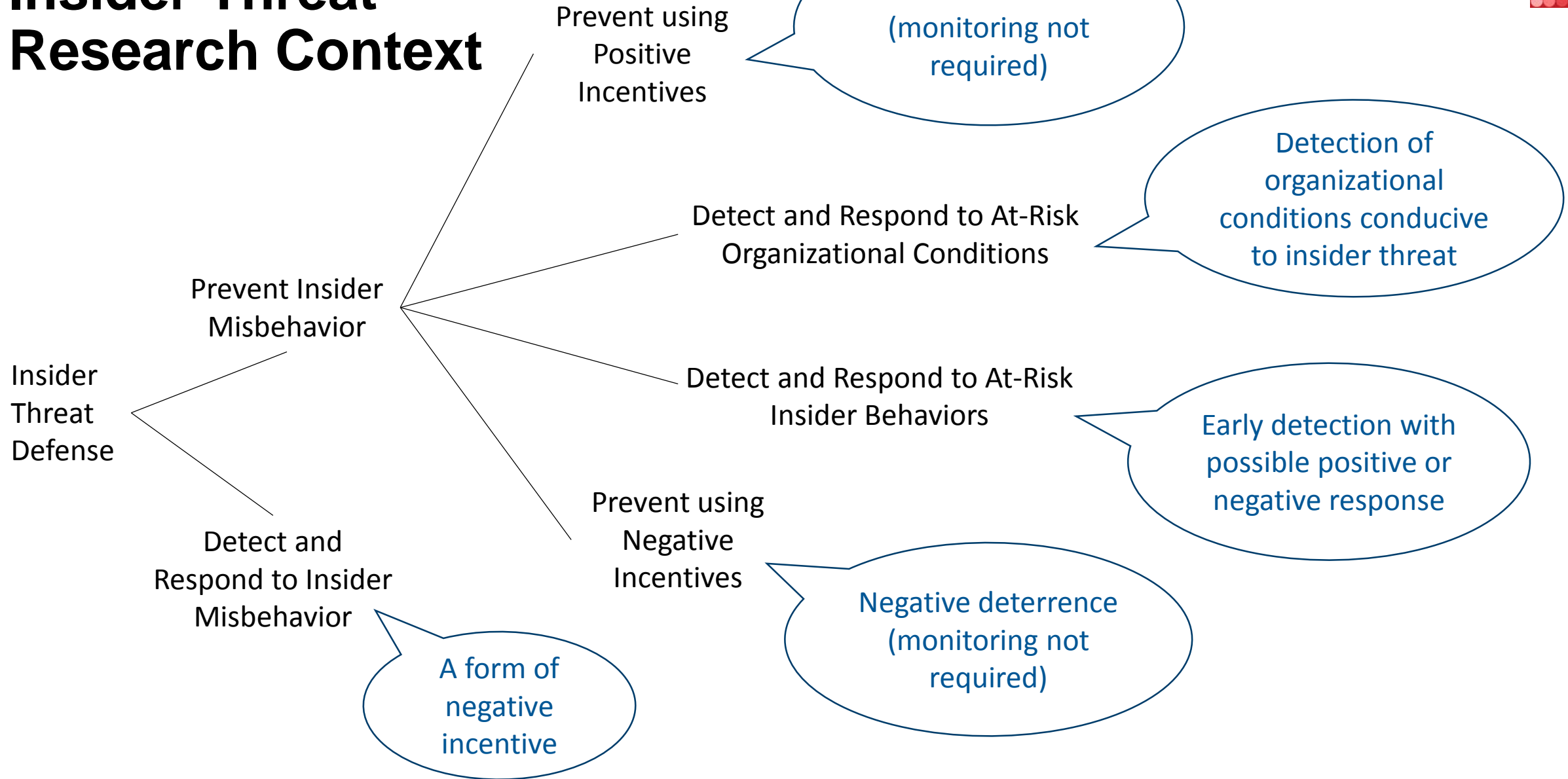
Negative incentives *alone* can *exacerbate* the threat they are intended to mitigate*

Basic Belief: Organizations should *explicitly* consider a *mix of positive and negative incentives* to build insider threat programs that are a net positive for employees

Initial Scope: Disgruntlement-spurred threat

* See “Effective Insider Threat Programs: Understanding and Avoiding Potential Pitfalls,” SEI Digital Library, March 2015.

Insider Threat Research Context



Three Broad Categories of Positive Incentives

People



Connected @ Work

Job



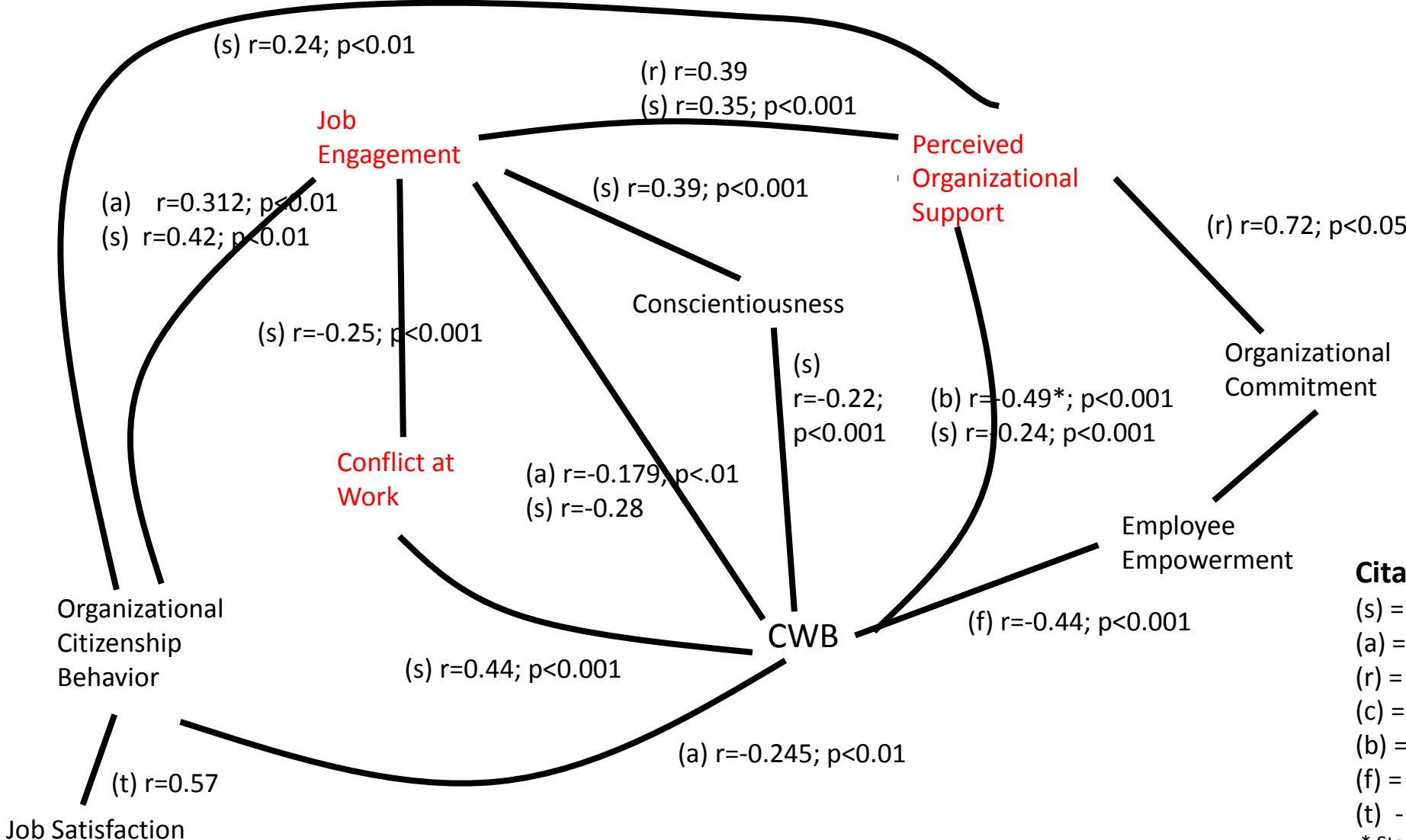
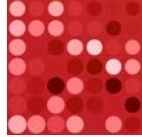
Job Engagement

Organization



Perceived Organizational Support

Previous Studies in the Organizational Behavior Literature: Counterproductive Work Behavior (CWB)



Citation Key:
 (s) = (Sulea et al., 2012)
 (a) = (Ariani, 2013)
 (r) = (Rhoades, Eisenberger, & Armeli, 2001)
 (c) = (Colbert, Mount et al. 2004)
 (b) = (Bordia, Restubog, & Tang, 2008)
 (f) = (Fatima et al., 2013)
 (t) - (Tang, Ibrahim 1998)
 * Stat for Psychological Contract Breach instead of POS

Two-Pronged Exploratory Research Approach*

1. *Insider Incident Case Study Analysis*

- How engaged, connected, and supported are insider threat actors?

2. *Organizational Survey*

- How much does organizational support influence insider cyber misbehavior?

Extension of previous work by focusing on

- Cyber-related insider threat behaviors
- Organizations actively establishing insider threat programs

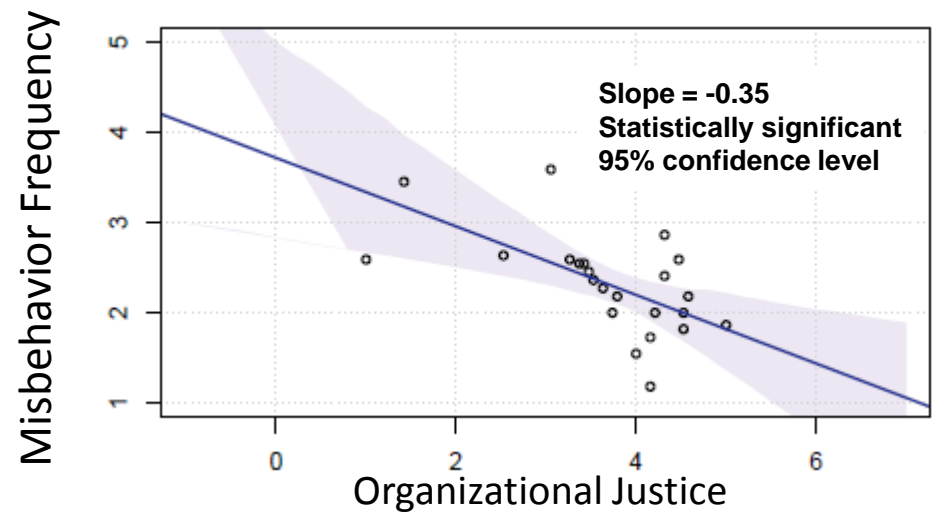
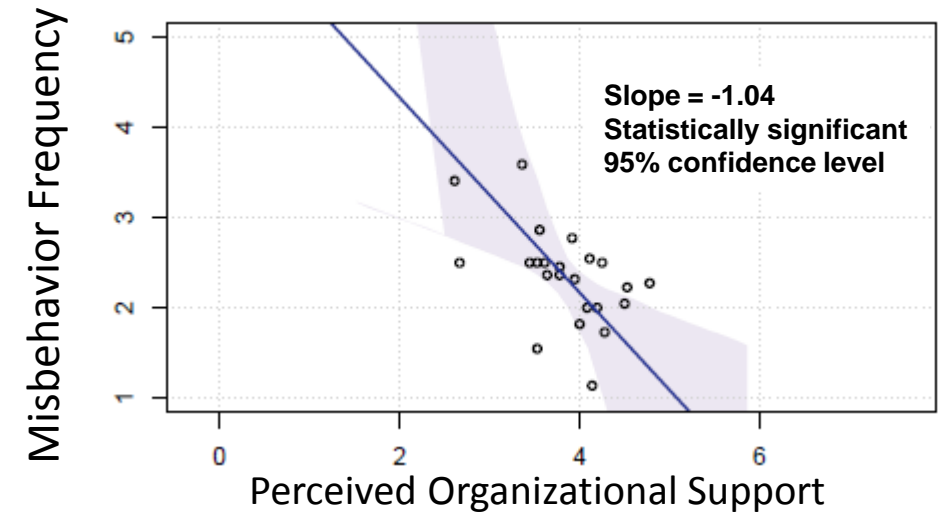
* For more details on this research see “The Critical Role of Positive Incentives in Reducing Insider Threat,” *SEI Technical Report CMU/SEI-2016-TR-014*, December 2016. http://resources.sei.cmu.edu/asset_files/TechnicalReport/2016_005_001_484929.pdf

Organizational Survey

How much does organizational support influence insider cyber misbehavior?

- **Challenge:** Hard-to-reach population suggests initial exploratory (non-random, small sample)
- **Method:** Survey Open Source Insider Threat (OSIT) Information Sharing Group
 - Independent variables on established 5-point scales
 - *Perceived organizational support* (36 questions)
 - *Organizational justice* (19 questions)
 - Dependent variable on 5-point frequency scale
 - *Cyber misbehavior* from case data (22 questions)
- **Response:**
 - 25 out of ~90 organizations responded

Results: 23 responses*



* Analysis used Deming Regression and Multiple Imputation by Chained Equations for missing values.

Surveyed Items on Insider Cyber Misbehaviors (Intentional)



Violating acceptable use

Taking proprietary information upon departure

Violating security policy

Stole significant items

Logged in to appear as if working

Inappropriately transmitting proprietary information internally

Purposely producing low quality work

Unauthorized remote access

Inhibiting coworker progress

Disabling security controls

Posting negative perceptions about organization

Sabotaging coworkers work

Purposely damaging organizational equipment

Plagiarizing work of coworkers

Sending threatening or harmful emails

Purposely installing harmful software

Vandalizing website

Limitations and Directions

Insider Threat Incident Analysis

- Analysis of three incidents does not permit drawing strong conclusions
- Used to narrow hypothesis for survey work

Organizational Survey

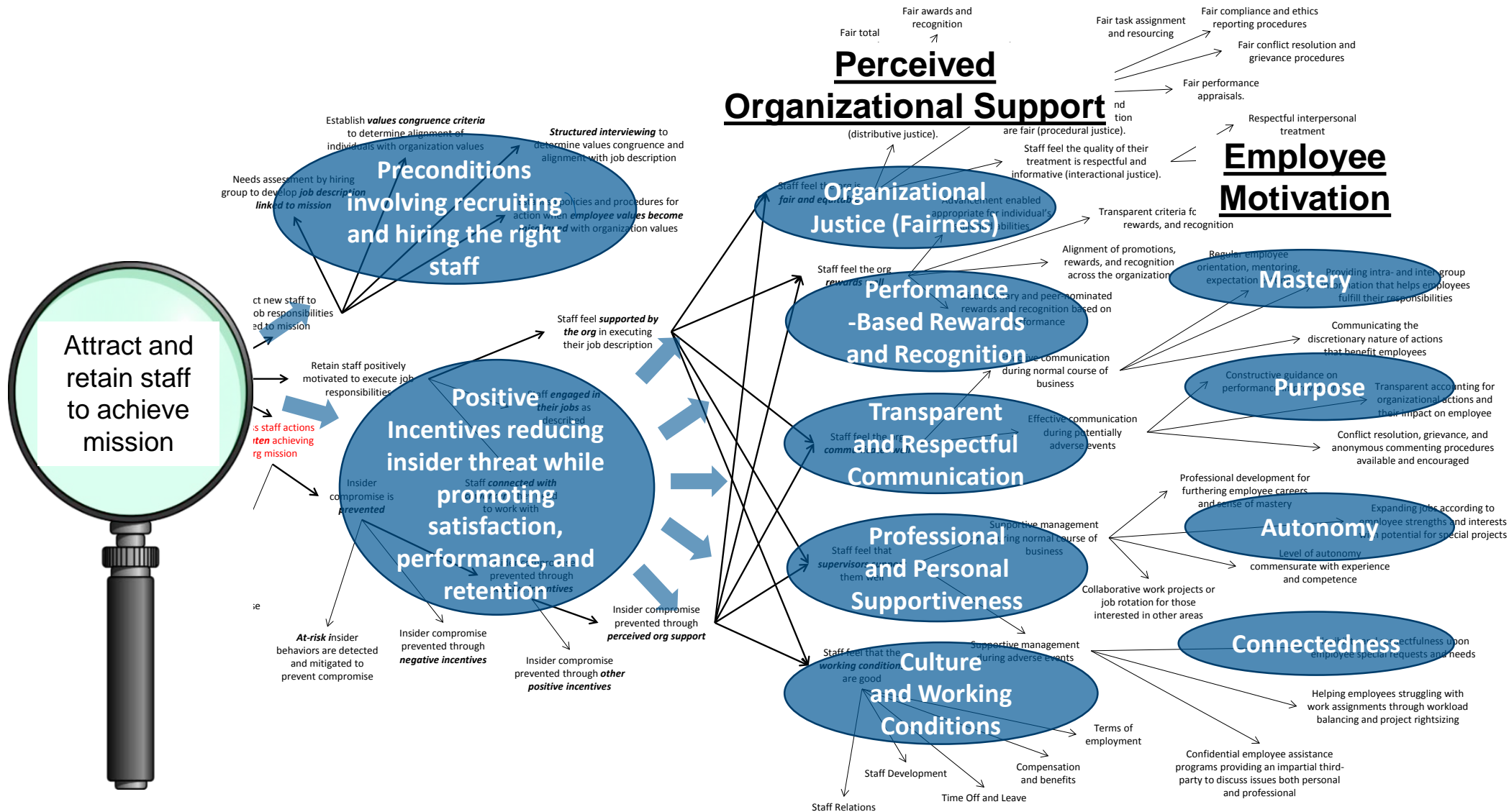
- Challenges reaching population suggested non-random sample of OSIT
- Vulnerable to the self-selection bias
- Data does not support causal analysis and results not generalizable

Our research just scratches the surface, BUT

- Justifies additional fundamental research in area (will discuss later)
- Combined with previous organizational behavior research, (arguably) justifies piloting of positive incentives (applied research)
 - Focus on practices associated with perceived organizational support



Organizational Supportiveness Principles and Practice Areas



Monitoring and Response (Examples)



Organizational Support Dimension	How to Reduce Incident Baseline (example)	What Organization Behavior to Monitor
Organizational Justice (Fairness)	Align compensation internally and externally	Consistency of compensation levels with organizational benchmarks
Performance-based Rewards and Recognition	Use performance-based criteria for promotions	Consistency of promotions with employee competency and performance track record
Transparent & Respectful Communication	Regular employee expectation setting	Level of employee complaints and grievances
Personal and Professional Supportiveness	Strengths-based professional development	Employee job engagement

Areas of Research

Theory Development

- Experiment-based determination of cause-effect relationship between perceived organizational support and insider threat

Technology Development

- Detection of
 - at-risk organizational conditions associated with organizational support
 - insider alienation through indicative changes in insiders' network of workplace relationships
- HR tools can facilitate positive incentives (e.g., performance management)
 - BUT, Employee Relationship Management tool development needed to support analysis of and diagnostics for one-on-one relationship between manager and direct reports

Adoption

- Determine how organizations can
 - determine an appropriate mix of positive and negative incentives
 - transition to that from their current state

Ways of Working With Organizations (Now)

Goal: Identify specific recommendations on positive incentive-based workforce management practices with the goal of reducing insider threat

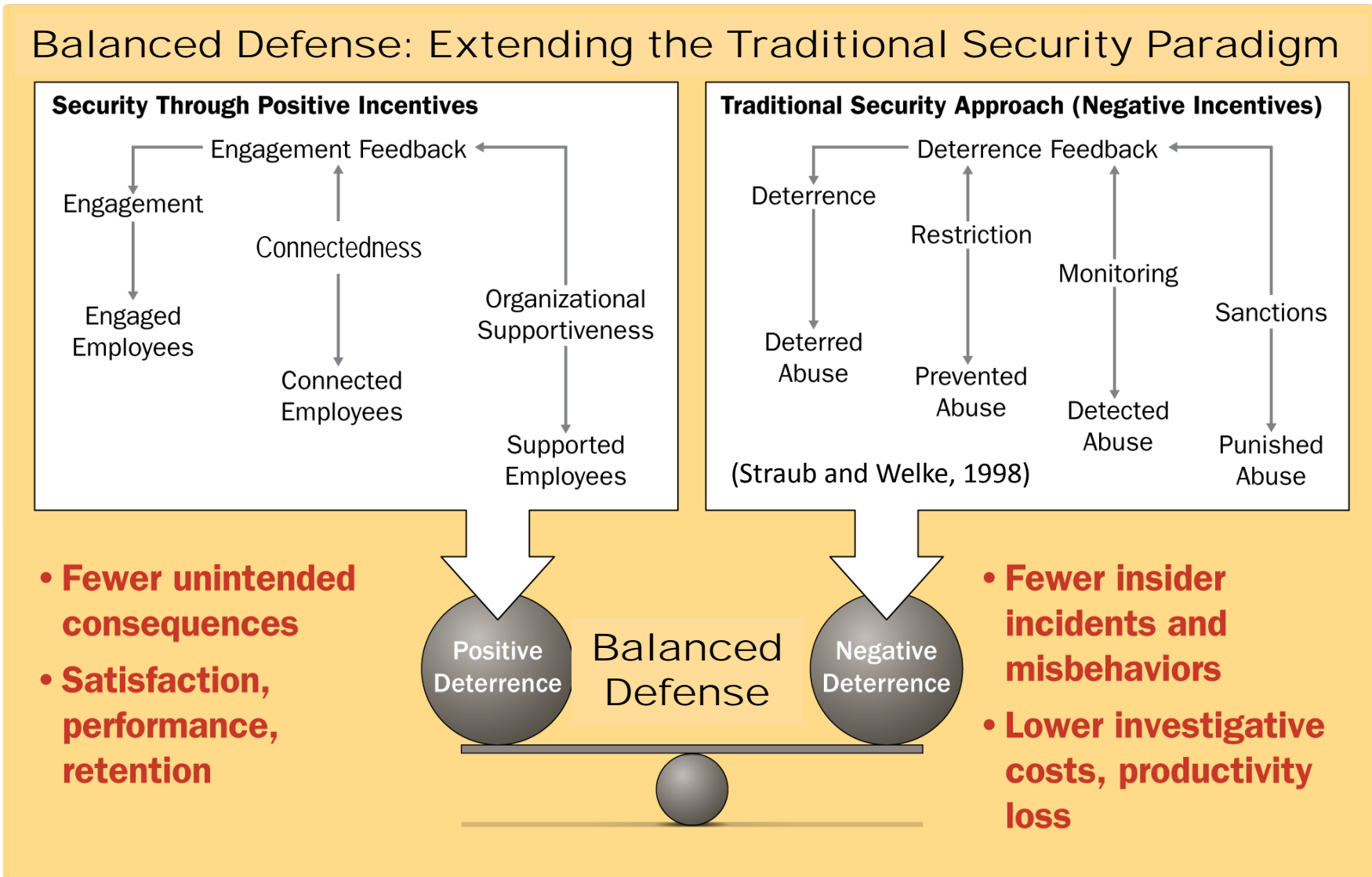
Options:

1. Analyze existing data, practices, and/or incidents
2. Conduct surveys, interviews, or focus groups to better understand employee attitudes and behaviors
3. Analyze tools that support employee relationship management
4. Conduct a multi-phase assessment, training, and coaching study to determine outcomes associated with specific practices

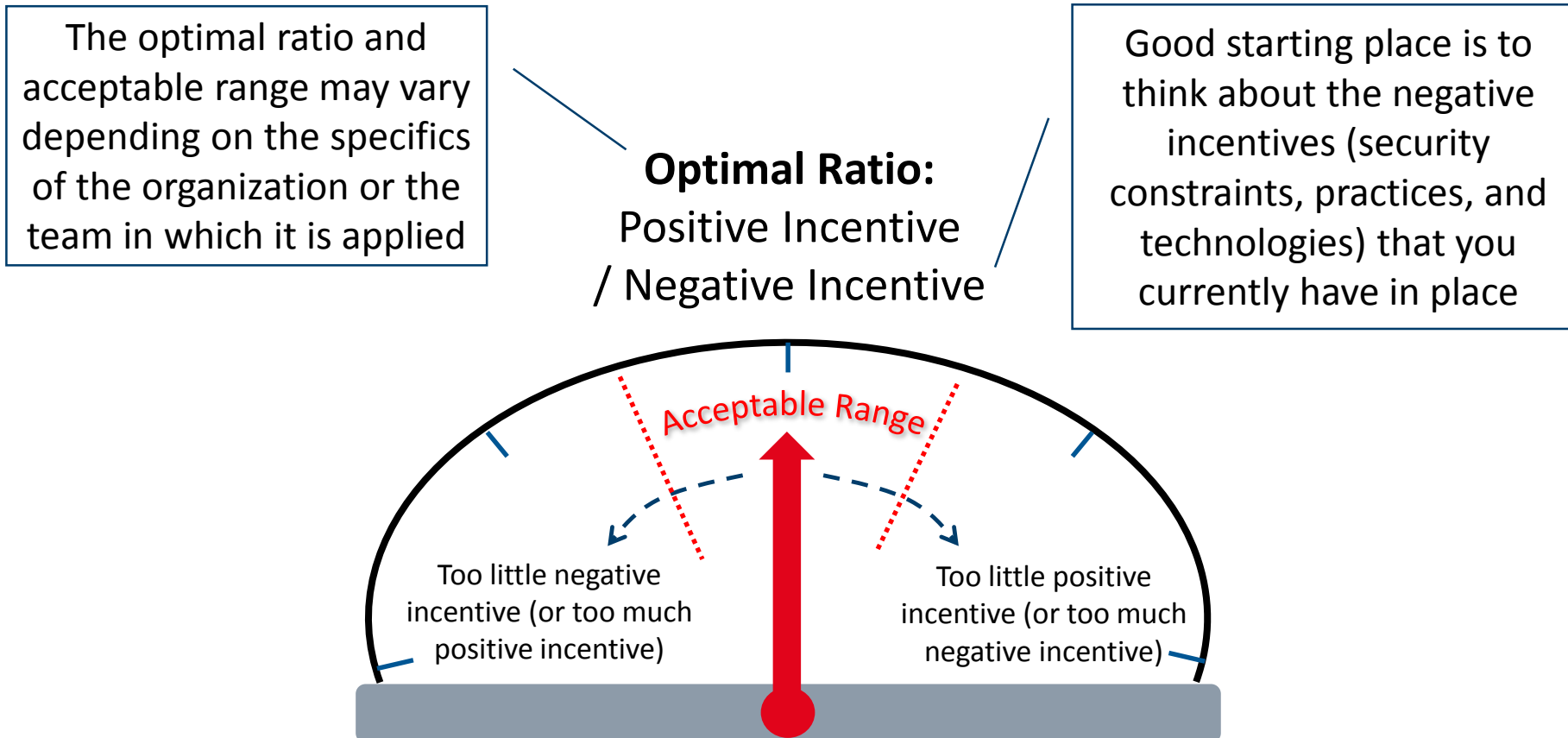
CMU Faculty Collaborator: Professor Denise Rousseau

- Carnegie Mellon University Organizational Psychologist
- Founder of the theory of *psychological contracts*

Vision for Integrating Positive and Negative Incentives



Conceptualizing a Metric for Balanced Defense



- Regulatory Focus Theory provides a basis for determining optimal ratio
- A basic principle is that more is not always better!

Key Take-Aways



Insider goodwill is important to both

- keeping intentional insider threat to a minimum
- AND ensuring organization success generally

Organizational practices that undermine insider goodwill exacerbate risk

- If not addressed, such practices allow attacks to recur as natural consequence
- Includes unintended consequences of existing cybersecurity practices

Positive incentive-based principles and practice areas can be used to

- Reduce the *baseline* insider incident frequency
- AND Target *user* and *organizational* behavior monitoring

Insider threat programs that balance positive and negative incentives can become an advocate for the workforce and a means to improve employee worklife

- a welcome message to employees threatened by a focus on discovering insider wrongdoing

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Special thanks to the Open Source Insider Threat (OSIT) Information Sharing Group for their responses to our survey.

* For more details on insider threat research see <http://www.cert.org/insider-threat>. For specifics of this research see "The Critical Role of Positive Incentives in Reducing Insider Threat," *SEI Technical Report CMU/SEI-2016-TR-014*, December 2016.

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