



*The*  
REFRACTIVE  
THINKER

VOLUME XII

CYBERSECURITY

in an Increasingly Insecure World



Foreword by **Bill Bonney, Gary Hayslip, and Matt Stamper**

Authors of *CISO Desk Reference Guide: A Practical Guide for CISOs*



# THE REFRACTIVE THINKER®

AN ANTHOLOGY OF  
DOCTORAL WRITERS

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VOLUME XII

## Cybersecurity

In an Increasingly Insecure World

Edited by Dr. Cheryl A. Lentz



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*The important thing is not to stop questioning. Curiosity has its own reason for existing. One cannot help but be in awe when he / she contemplates the mysteries of eternity, of life, of the marvelous structure of reality. It is enough if one tries merely to comprehend a little of this mystery every day. Never lose a holy curiosity.*

—ALBERT EINSTEIN



# Foreword

The headlines have been screaming for several years about cyber-attacks that hit every aspect of our daily lives. What once was solely the province of credit card fraud has now extended to phishing for personal details. Infections bring malicious code that does everything from destroy your hard disk to steal your personal information to encrypt your files and hold them for ransom to turn your PC or cell phone, or even TV, into a mindless drone in a massive bot army ready to wreak havoc in your digital name. Where does it stop? We can no longer trust the news now that bots push fake news to drive up clicks, we worry about the lights going off because power plants are under siege, and now we wonder if we can trust our elections.

One of the key factors that drove us to write the *CISO Desk Reference Guide* was the realization that we're outmanned and outgunned. Outmanned in that we need thousands more cybersecurity specialists than are available today, and many firms are hiring their first Chief Information Security Officer (CISO). Outgunned in that the tools of the past, that aimed to deploy a firewall to protect a well-defined and completely self-contained enterprise network, are no longer even a meager deterrent for a mildly determined cybercriminal. We can no longer even draw the distinction between cybercrime and nation-state activity, as recent reports

acknowledge that the criminals are almost as well equipped as the spies.

What is critically important is that we bring all the soft power and all the hard power we can muster against this threat. We envision a world that is safe from threats and to get there, society must become educated, we must act in unison, and we must become more informed consumers and a more informed electorate. As we engage more on how to make our world safer, we must recognize each person's role and resist the temptation to assume our government or big industry bears sole responsibility. We didn't eradicate most infectious disease in the developed world by leaving it to just the doctors, and we're not going to rid the world of cyber-crime and cyber terrorism by leaving it to the experts alone.

It is with this backdrop that Dr. Cheryl Lentz continues her award-winning *The Refractive Thinker*® series by bringing forth doctoral theses on cybersecurity in a new volume XII: *Cybersecurity in an Increasingly Insecure World*. In this pivotal work, her scholars are approaching the cybersecurity issue from all the right angles. Dr. Tracy Celaya and Dr. Adam Pierce look at the challenges of cybersecurity in human resources and getting talent right in *Cybersecurity in Human Resources on Multiple Fronts* and *Hiring Outsourced Cybersecurity Professionals for Government Contracts*, respectively. Several authors address cybersecurity issues in the realm of higher education, where profound changes must be made to bring critical skills to those who are preparing to enter the cyber workforce. These works include addressing integrity and ethics, as well as raising awareness of cybersecurity in the higher education domain, because yes, our schools are under attack as well.

These acclaimed authors bring critical thinking to many of the topics so important to the cybersecurity discussion.

From setting policy as discussed by Dr. Loyce Chitambo, to using cryptocurrencies as put forth by Dr. Ivan Salaberrios, to understanding the effect of cybersecurity risks on business continuity and organizational performance as explored by Dr. Joe Hage, these topics are timely and the need for scholarly treatment has never been greater.

As you read the pages ahead, we ask you to ask yourself: “What should I be doing to make a safer cyber world?” This is critically important if we’re to reap the benefits promised in this new digital age.

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## About the Authors . . .

**Bill Bonney, Matt Stamper, and Gary Hayslip** met in the summer of 2014 as members of the very inclusive and collaborative cybersecurity community of San Diego, California. Besides being the eighth largest city in the U.S. and a very welcoming community, San Diego is home to several pockets of technological innovation. These include very successful biotechnology, life sciences, and mobile technology industries; a plethora of defense contractors and aerospace research companies; a blossoming startup community in the Internet of Things (IoT) and Cybersecurity; and a thriving academic environment. San Diego is also home to the fewest number of *Fortune 500* company headquarters, per capita, in the United States.

Each of the authors has enjoyed over 30 years of success in the Information Technology (IT) field, but they have very different backgrounds. It became obvious as they got to know each other by participating on panels and speaking at industry events that these different backgrounds brought diverse and complementary perspectives to the problems the cybersecurity community currently faces. What started as a panel discussion on the role of the modern CISO sparked such a lively audience discussion that the authors began to consider turning it into a book for new CISOs and CISOs at mid-size firms in particular. The result is the *CISO Desk Reference Guide, a Practical Guide for CISOs*.

<http://www.cisodrg.com>

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## About the Authors . . .



**Bill Bonney, CISA**, is a Principal Consulting Analyst at TechVision Research with specialties in information security, Internet of Things (IoT) security and identity management. Prior to joining TechVision Research, he held numerous senior information security roles in various industries, including financial services, software and manufacturing.

Bill is a member of the Board of Advisors for CyberTECH, a San Diego incubator, and in on the board of directors for the San Diego CISO Round Table, a professional group focused on building relationships and fostering collaboration in information security management. Bill is a highly regarded speaker and panelist addressing technology and security concerns. He holds a Bachelor of Science degree in Computer Science and Applied Mathematics from Albany University.

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**Matt Stamper, CISA, CIPP-US**, brings a multi-disciplinary understanding to cybersecurity. His diverse domain knowledge spans IT service management (ITSM), cloud services, control design and assessment (Sarbanes-Oxley, HIPAA/HITECH), privacy, governance, enterprise risk management (ERM), as well as international experience in both Latin America and China. His executive-level experience with managed services, cybersecurity, data centers, networks services, and ITSM provides a unique perspective on the fast-changing world of enterprise IT, IoT, and cloud services.

Matt received a Bachelor of Arts from the University of California at San Diego, where he graduated Cum Laude and with Honors and Distinction in Political Science. His graduate studies include a Master of Arts in Pacific International Affairs from the University of California at San Diego and a Master of Science degree in Telecommunications sponsored by AT&T.

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customer information entrusted to Webroot. Gary is a proven cybersecurity professional, his previous information security roles include multiple CISO, Deputy Director of IT and Senior Network Architect roles for the City of San Diego, the U.S. Navy (Active Duty) and as a U.S. Federal Government employee.

Gary is involved in the cybersecurity and technology start-up communities in San Diego where he is the Co-Chairman for Cybertech, the parent organization that houses the Cyber incubator Cyberhive and the Internet of Things incubator iHive. He also serves as a member of the EvoNexus Selection Committee where he is instrumental in reviewing and mentoring Cybersecurity and Internet of Things startups. Gary holds numerous professional certifications including: CISSP, CISA, and CRISC, and holds a Bachelor of Science in Information Systems Management from University of Maryland University College & Masters in Business Administration from San Diego State University.

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# Preface

Welcome to the award winning Refractive Thinker® Doctoral Anthology Series. We are thrilled to have you join us for the 14th volume in the series (Vol II was published 3 times.), *Vol. XII: Cybersecurity in an Increasingly Insecure World*. Join us as we continue to celebrate the accomplishments of doctoral scholars from around the globe.

Our mission continues to be to get research off the coffee table, out of the Ivory Tower of academia, and into the hands of people who cannot only use, but also benefit from the many insights and wisdom found from doctoral research results. The goal is to continue to bridge the gap from the halls of academia into the halls of the business world. *The Refractive Thinker®* series continues to offer a resource by the many contributing doctoral scholars as they offer their chapter summaries of doctoral research well beyond the boundaries of a traditional textbook. Instead, the goal for this series is to use refractive thinking strategies to push the boundaries beyond conventional wisdom and to explore the paths not yet traveled particularly in this evolving digital age of technology.

As we begin a new year of 2017, this peer-reviewed

publication offers readers insights and solutions to various challenges regarding *Cybersecurity*, such as issues within human resources, risks on business continuity and organizational performance, outsourcing cybersecurity professionals for DoD contracts, and using cryptocurrencies to fund small businesses; our hope is that you will find answers regarding effective strategies regarding cybersecurity to help guide your efforts in the boardroom, as well as the work space as part of this special edition Vol XII: *Cybersecurity: In an Increasingly Insecure World* that have come from the research and pens of professional academicians and scholars around the world. The premise is to think not only *outside the box*, but also *beyond the box*, to create new solutions, to ask new questions, to proceed forward on new roads not yet explored or traveled. Our premise is to review academic research in a simple to digest executive summary format to offer new ways for business leaders to think about effective practices for strategies in their business based on what new research has to offer specifically moving forward in an insecure world.

With this volume, we add a new dimension to the series where Dr. Cheryl Lentz, *The Academic Entrepreneur* will conclude each chapter from a business point of view to link this doctoral research to applications for your business.

Remember, not only does *The Refractive Thinker*® series offer a physical book, we offer eBooks (Kindle, Nook, and Adobe eReader), and eChapters (individual chapters by author) that highlight the writings of your favorite Refractive Thinker® scholars, available through our website: [www.RefractiveThinker.com](http://www.RefractiveThinker.com), as well as [www.Amazon.com](http://www.Amazon.com). Be sure to also visit our social media to include our Facebook page, Twitter, our YouTube Channel, and our groups on

LinkedIn® for further discussions regarding the many ideas presented here.

We look forward to your continued support and interest of the more than 130 scholars within *The Refractive Thinker*® doctoral community who contributed to this multi award winning anthology series from around the globe. Our mission that began with Volume 1 many years ago is to bring research out of academia for application in the world of business to provide answers to the many questions asked.



# Acknowledgments

The foundation of scholarly research embraces the art of asking questions—to validate and affirm, what we do, and why. Through asking the right questions, the right answers are found. Leaders often challenge the status quo, to offer alternatives and new directions, to dare to try something bold and audacious, to try something that has never been tried before. This 14th publication of our beloved 15 time award-winning *The Refractive Thinker*<sup>®</sup> series required the continued belief in this new publishing model, of a peer-reviewed doctoral anthology, by those willing to continue forward on this voyage.

We are grateful for the help of many who made this collaboration possible. First, let me offer a special thank you to our **Peer Review Board**, to include Dr. Jamie Klein, Dr. Ron Jones, Dr. Judy Fisher-Blando, Dr. Elmer Hall, and myself; and our **Board of Advisors** to include: Brian Jud, Dr. Les Paul, and Dr. Jody Sandwisch.

My gratitude extends with a well-deserved thank you to our production team: Gary Rosenberg, production specialist, and Joey Root, designer of the original Refractive Thinker<sup>®</sup> logo.

Thank you—we appreciate everyone’s contributions to this scholarly collaboration.

Job well done! My best to our continued success!

Dr. Cheryl Lentz

*Managing Editor and Chief Refractive Thinker®*

## CHAPTER 1

# Cybersecurity in Human Resources on Multiple Fronts

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*Dr. Tracy A. Celaya*

**H**uman Resources (HR), as a critical business component, is responsible for cyber, information, and data security on multiple fronts including hiring the right people, training and testing security awareness, and partnering with information technology (IT) to preserve the security of data and applications (van Zadelhoff, 2016). HR is often responsible for a broad undertaking of creating and maintaining training for ensuring awareness among employees and contractors and behavior demonstration of a security-minded organizational culture. External and internal cyber-attacks occur more frequently and pose a serious organizational threat while security in the cloud is a serious concern for HR leaders required to manage big data, putting HR at the center of a perfect storm. Although an unconventional approach, HR stands to reinforce cybersecurity through the refractive thinking practices examined in this chapter.

In this chapter, the purpose is to identify how HR professionals can transform technology and cybersecurity for HR on multiple fronts, and provide a review of best practices for moving HR into the cloud and understanding the importance of information security for the second largest source of organizational data, human resources. Finally, a review of

the areas of responsibility and vulnerability of cybersecurity within human resources as a strategic business unit and how HR leaders are the forefront of cybersecurity with skill set, experience, and technology knowledge.

## **Cybersecurity and Information Security for Human Resources**

Cybersecurity is a broad term often used subjectively however important to understand how cybersecurity fits in relation to HR. The National Institute of Standards and Technology (NIST) described cybersecurity as the ability to protect and defend the use of cyberspace from cyber-attacks (Kissel, 2013). To distinguish between data security and information security, consider data as a raw subset of electronic information transmitted or received, while information gives meaning to data as a representation of facts, opinions, or other intelligence (Kissel, 2013). According to Kissel (2013) of NIST, information security is, “the protection of information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction in order to provide confidentiality, integrity, and availability” (p. 94). Kissel’s definition continues stating information security is,

Protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction to provide:

1. Integrity, which means guarding against improper information modification or destruction, and includes ensuring information nonrepudiation and authenticity;
2. Confidentiality, which means preserving authorized restrictions on access and disclosure, including means for

protecting personal privacy and proprietary information;  
and

3. Availability, which means ensuring timely and reliable access to and use of information (p. 94).

However, Craigen, Diakun-Thibault, and Purse (2014) identified five dominant themes of cybersecurity: a) technological solutions; b) events; c) strategies, processes, and methods; d) human engagement; and d) referent objects (of security). Craigen et al. created a more inclusive definition with these themes. “Cybersecurity is the organization and collection of resources, processes, and structures used to protect cyberspace and cyberspace-enabled systems from occurrences that misalign de jure from de facto property rights” (Craigen et al., 2014, p. 17). Given the latter definition, cybersecurity for HR incorporates using secure hiring practices, hiring the right people for all positions including information security, security awareness training, and assessment, compliance with data security regulations, and protecting information and employees with secure systems/technology specifically, cloud technologies.

## **Moving HR into the Cloud**

Technology continues to evolve faster than business units and organizations can keep up, including the HR function, requiring collaboration between HR and IT to improve HR practices (Stryve Advisors & The RBL Group, 2011). Data security in the cloud drives cloud adoption for large enterprises (Krause, 2016; Staley & Gandi, 2016), while small to large organizations still cite cost as reason to delay moving to cloud solutions and shirk cybersecurity, but still must

improve how data and networks are safeguarded. Anti-virus software and firewalls are not nearly enough for consideration as exclusive lines of security in today's virtual ecosystem. Although enterprises are well into maturity on the adoption curve of cloud technologies and services, Cloud-Based Computing adoption continues to slowly increase for other organizations (Celaya, 2015; Computerworld, 2017; Staley & Gandi, 2016). Many companies face technological obsolescence with globalization and high competition (Birasnav, Rangnekar, & Dalpati, 2011), making scalability a desirable organizational goal, and HR leaders indicate a desire for scalability and mobility for global access to data and applications, as leading drivers for modernizing current technology. However, organizations may not be technologically prepared to scale or include mobility as a scalable technology strategy if cyber and information security concerns are not considered and proper security measures incorporated into the solution.

A survey by Stephan, Uzawa, Volini, Walsh, and Yoshida (2016) of Deloitte, found 68% of participants consider HR technology an important to urgent trend. Yet, results from the Sierra-Cedar HR Systems Survey by Harris and Spencer (2016) indicated 42% of surveyed domestic, and more global, organizations have core HR systems located on-site with SaaS solutions consisting of 58%, and Laurano (2014) reported 48% of organizations still manually handle data. Cloud technology is a paradigm shift for distributed applications, platforms, and infrastructures globally accessible through any mobile device with Internet access (Chen et al., 2011). Cloud service providers offer advantages to organizations such as increased collaboration, cost savings, mobility, and scalability (Aljabre, 2012; Carcary, Conway, & Doherty, 2014). Upgrading technology to cloud and mobile

can provide HR leaders the opportunity to create a competitive advantage, while addressing security concerns with more network security services offered in the cloud (Krause, 2016).

As cloud technologies are slowly realized, mobile technologies are fast becoming an HR issue (Card & Sivak, 2015) with few organizations currently providing mobile applications for employees. However, mobility with bring-your-own-device (BYOD) and mobile applications is on the rise with accessibility, availability, and mobility of applications and data as leading reasons for implementing Cloud-Based Computing (Celaya, 2015). In Kopochinski's (2016) article, chief information officer, Steve Monaghan stated, data can live anywhere with cloud technologies, making storing, moving, and regulating data far more complex (Kopochinski, 2016). As a result, information security is an increasing focal point for 47% of enterprises (Celaya, 2015; Computerworld, 2017; Sierra-Cedar, 2015; Stephan et al., 2016). More responsibility resides with cloud service providers for offering overall data and cybersecurity for clients whose information resides with them, which may alleviate some HR leader's; however, not at the expense of ignoring the potential risks.

Data privacy is among the leading risks for transferring information through cloud computing (Shilpa & Gopal, 2011). In addition, inconsistent data protection laws, migration issues when changing service providers, nonexistent disaster recovery by user organizations, insufficient employee training, unauthorized access (Card & Sivak, 2015; Sierra-Cedar, 2015), and lack of control over availability (Aleem & Sprott, 2013) are prominent security risks. Dai, Yang, and Xing (2015) stated security issues, network-transmission problems, and a lack of knowledgeable developers contribute

to impediments of cloud technology use with data privacy as an ongoing concern and impediment to cloud adoption (Shilpa & Gopal, 2011).

Celaya (2015) conducted a study of HR professionals regarding the adoption of Cloud-Based Computing in HR. The study used a qualitative research methodology with modified Delphi approach to collect data from HR professional participants to leverage the exploratory technique of subjectivity (Hall, 2009; Skulmoski, Hartman, & Krahn, 2007) using iterative rounds of online surveys. Participants of the study indicated data security and a lack of leadership support among the leading reasons for the slow adoption of cloud technologies. Additionally, Celaya found possible correlations between fear and close-mindedness, other priorities ranking higher, and a lack of technology subject knowledge, potentially indicating avoidance of cloud technologies and data security by some HR leaders. Another interesting correlation occurred between scalability and addressing data concerns when implementing cloud technology. The correlation may indicate a decrease in scalability when data security is left an unresolved concern, and be an indicator of an organization's ability to successfully implement cloud technology, particularly when growing. In the study, HR professionals implementing Cloud-Based Computing identified primarily addressing security needs and concerns, including data access, accuracy, and disaster recovery, as among top best practices for successful implementation and adoption (Celaya, 2015). Finally, a correlation emerged between data security, leaders understanding the technology available, and selecting a technology vendor, or cloud solution, with all-in-one integration. The organization remains responsible for ensuring providers offer security in alignment with organizational goals and policies despite more cloud service providers

taking on more responsibility for data security, cybersecurity, and secure integration under the information security umbrella. However, secure technology is only part of the issue (Sierra-Cedar, 2016).

The roles and functions of HR continue to change in addition to the use of cloud and mobile technology for HR. Responsibility for human resources as a strategic business unit exists on multiple fronts with data security, training, compliance, and hiring strategy. The migration of HR into the cloud poses challenges for identifying what skillsets HR professionals need (Crane, 2016). Lack of knowledge with the technology available and lack of resources with the right technology skill sets are among the highest challenges to organizations implementing cloud (Celaya, 2015; Staley & Gandi, 2016). Cloud computing may solve many problems companies experience however a talent attainment shortage halts the issues (Drobney, 2013).

## **Cybersecurity in Hiring**

Employees are an organization's biggest asset and its largest threat with information security (Drobny, 2013; Kopochinski, 2016; van Zadelhoff, 2016). On average, only 8% of HR teams have a very good understanding of cybersecurity (Mazor, Schaefer, Tsuchida, Volini, & Walsh, 2016) and are mostly unaware of the security needed for data or the network. IBM's 2015–2016 Cybersecurity Index (IBM Security, 2016) reported people outside of the organization carried out 40% of attacks in 2015 while malicious insiders and inadvertent actors carried out 60% of attacks, putting HR in a key position of responsibility for an organization's information security strategy through the employee lifecycle. Leaders must include security as a point of focus

in talent acquisition efforts (van Zadelhoff, 2016). Hiring strategy considerations may include the technology used, recruitment channels, candidate screening providers, and security training for HR professionals.

Drobney (2013) argued cybersecurity is not a technology problem, but a people issue, and an organization's inability to acquire and leverage talent along with the lack of knowledgeable internal resources (Celaya, 2015). The cybersecurity talent gap increases along with the complexity and frequency of cyber threats and reaches deep into all levels of education and generational gaps in the workforce, while some young workers with exceptional potential remain unaware of the information security industry and need for skilled people.

The importance of security must be communicated across business units to place the people, systems, and processes that detect potential threats. Organizational leaders need every employee and contractor with the company to be aware and involved given the ubiquity of technology throughout any organization, large or small, and the complexity of an ever-changing technological landscape (Creese & Upton, 2014). Creese and Upton (2014) suggested adopting a robust internal security policy, raising employee awareness of threat types, critically assessing a candidate's honesty and ethical compass, defining rigorous sub-contracting policies, and monitoring employee technology use. An experienced staff with the skill sets needed for effective cybersecurity is essential and challenging with the shortage of talent. However, closing the talent gap between the cybersecurity workforce and HR professionals aware of digital security, starts with ensuring cybersecurity is an ongoing, enforced, and monitored learning and development directive.

## **Cybersecurity and Employee Training**

Most organizations' security awareness programs are ineffective often enforced annually for compliance or performance management purposes. However, making security awareness a permeating part of organizational culture requires multiple methods of delivery to ensure the message is understood and behavior changed (Dilla, Gal, Raschke, & Steinbart, 2016; Newcombe, 2016). Human error accounted for 95% of security fails consisting of "system misconfiguration, poor patch management, use of default user names and passwords or easy-to-guess passwords, lost laptops or mobile devices, and disclosure of regulation information via use of incorrect email address," according to IBM (2014, p. 3). Human error and malicious conduct can lead to heavy financial and data losses, and become a deterrent for implementing effective technologies for any organization. In a study conducted by Celaya (2015), participants indicated lack of technology awareness and subject knowledge as leading factors impeding organizations from implementing cloud technology, where lack of technology awareness hinders cloud implementation for 36% of HR professionals, directly inhibiting data security.

Organizational leaders must be educated about technology enough to understand the technology available and potential risks in order to make successful business decisions (Kopochinski, 2016). Organizational leaders are among the highest targeted employees of cyber-attacks and must be prepared to consistently practice security awareness and reinforce an information security culture through their actions with support of awareness programs. Awareness programs must educate all employees and contractors on preventative measures from attacks including social engineering.

Social engineering is also known as *human hacking* and is a tactic for gaining access to an employee or consumer's credentials to further obtain access to networks, accounts, and other personally identifiable information (PII) (Conteh & Schmick, 2016). Social engineering attacks consist of phishing, baiting, pretexting, and other tactics (Conteh & Schmick, 2016). Organizational leaders are targeted employees for social hackers attempting to breach an organization's security measures, and must be prepared to consistently practice security awareness and reinforce an information security culture through their actions and support of awareness programs. As such, organizations should promote a culture of security awareness to ensure the safety of systems and data is built-in to organizational culture (IBM Security, 2016). Executive support leads to more widely practiced employee awareness training with emphasis on its importance in cybersecurity strategy.

## **Implications for Research and Practice**

Previous studies by influential research organizations such as Deloitte, Sierra-Cedar, and IBM demonstrated that data security is a challenge and top priority for enterprises, while small to large organizations are slowly realizing security is a top issue. Additional research could prove beneficial investigating security concerns for small to large organizations. Celaya (2015) reported interesting potential correlations with limited statistical significance however significant enough to note and explore further with future research. A final logical direction for future research includes revisiting Celaya's study using a quantitative methodology and a higher number of participants to further validate findings or identify new outcomes from an ever-changing technology landscape.

## **Conclusion**

Organizational leaders expect security to be the biggest leadership challenge between 2016 and 2019 (IDG Enterprise 2017; Hulme, 2015). HR professionals and leaders must understand the complexity of data privacy and security (Mazor, Schaefer, Tsuchida, Volini, & Walsh, 2016). Data concerns include privacy, data integrity and accessibility, internal employee access, lack of disaster recovery measures and service availability (Aleem & Sprott, 2013; Card & Sivak, 2014).

HR and IT develop the infrastructure for technology change and security with people and system resources while influencing readiness and adoption within an organization, making HR leaders core influencers of technology. Top investment drivers included cloud computing and security/risk management by 28% and 23% of IT leaders, respectively (IDG Enterprise, 2017). However, IT Security consists of only 4% to 10% of budgets with competing operational resources dominating the overall budget (Krause, 2016).

Cyber, data, and information security are cross-functional efforts requiring the involvement of everyone from the C-Suite to frontline employees. HR cultivates an organizational culture of information security on multiple fronts; an unconventional tactic, as examined in this chapter. Using a refractive thinking approach, the responsibilities from HR include fortifying an organization's information security strategy with talent acquisition, security awareness campaigns and training, and partnering with IT to ensure the security of data and applications, especially with cloud and mobile technologies.

## THOUGHTS FROM THE ACADEMIC ENTREPRENEUR

### *The problem:*

- Identifying how HR reinforces cyber, data, and information security within an organization.

### *The goals:*

- Understanding HR's responsibilities for cyber, data, and information security on multiple fronts.

### *The questions to ask:*

- How is HR currently involved in cyber, data, and information security for the organization?
- What factors must be considered when moving HR systems to the cloud?
- What security features do vendors provide which align with business objectives?
- How do these factors impede the organization's ability to use cloud technologies and ensure a solid information security strategy?
- How prepared is HR to effectively hire cybersecurity staff?
- How technologically inclined are HR professionals to ensure the security of people, systems, and processes?
- Are employees and contractors provided effective security awareness training to encourage behavior change and mitigate the human error factor during cyber-attacks?

### *Today's Business Application:*

- Cyber, data, and information security are among the top concerns for organizational leaders.

- HR leaders who collaborate with IT and senior executives are better equipped to successfully implement cloud and mobile technologies and support the organization's information security strategy.
- Senior executives who support IT and HR in creating an organizational culture of information security are more likely to mitigate cyber-attacks and protect systems, data, and people.
- Security awareness training and campaign effectiveness increases when delivered via multiple channels and supported by senior leaders.

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## About the Author . . .



Dr. Tracy A. Celaya hails from Phoenix, Arizona. Dr. Tracy is a U.S. Air Force veteran and holds several accredited degrees; a Bachelor of Science in Information Technology (BSIT), a Master of Business Administration (MBA), and a Doctorate of Management and Organizational Leadership (DM). Additionally, she holds certifications as a Professional Project Manager (PMP) and Certified ScrumMaster (CSM). She is affiliated with the Information Systems Security Association (ISSA), Information Systems Audit and Control Association (ISACA), and the Society of Human Resource Management (SHRM).

Dr. Tracy is a Sr. IT Security Project Manager for American Airlines involved in avionics, network, and cybersecurity initiatives. She is President and Principal of Go Consulting International and Chief Operations Officer for a human resources SaaS startup. She also serves on the Fresh Start Women's Auxiliary Board in Arizona.

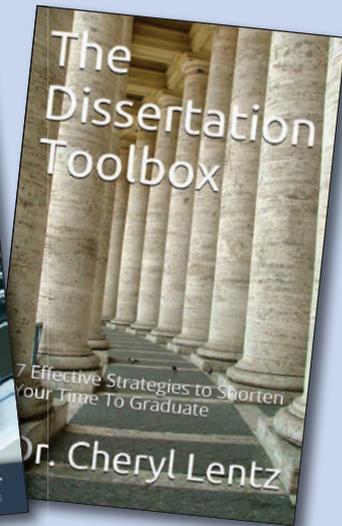
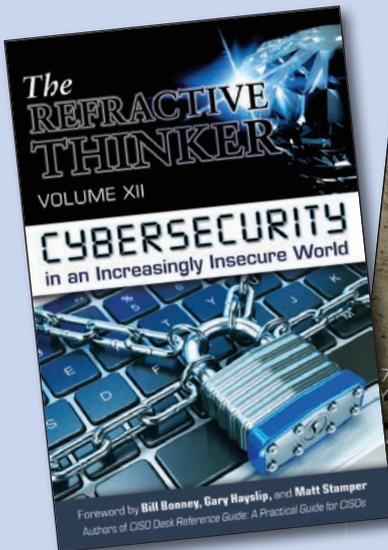
Her doctoral study, *Cloud-Based Computing and Human Resource Management Performance: A Delphi Study*, included examination of the slow adoption of cloud technology in HR, uncovered best practices for successful implementation, and investigated characteristics of innovative HR leaders successfully deploying Cloud-Based Computing.

To reach Dr. Tracy A. Celaya for information on consulting or doctoral coaching, please e-mail: [tracy@startwithgo.com](mailto:tracy@startwithgo.com)

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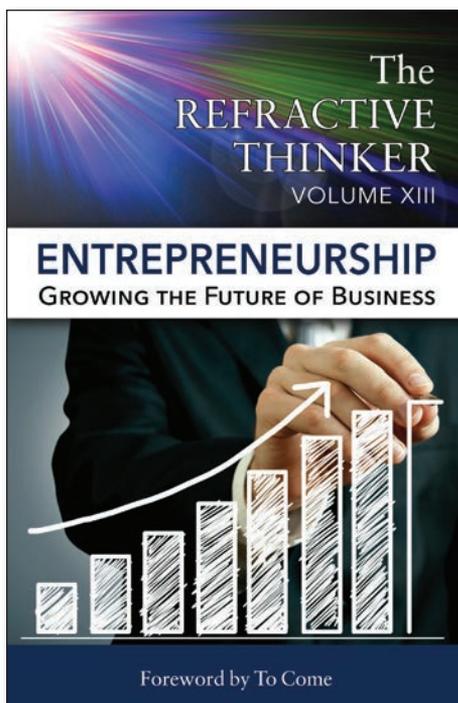
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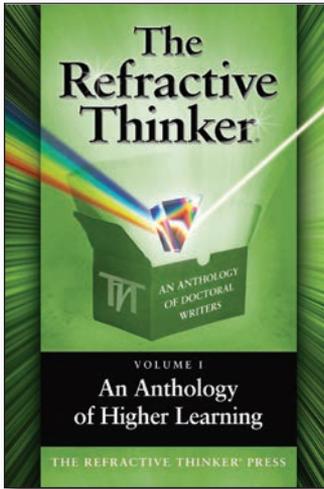
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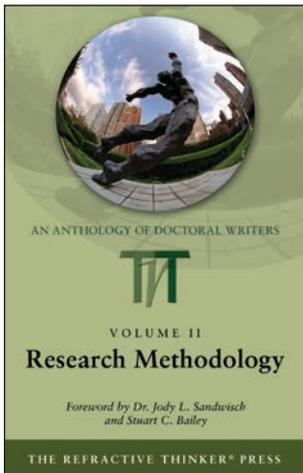
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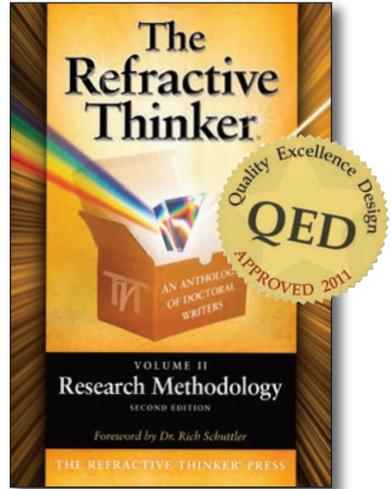
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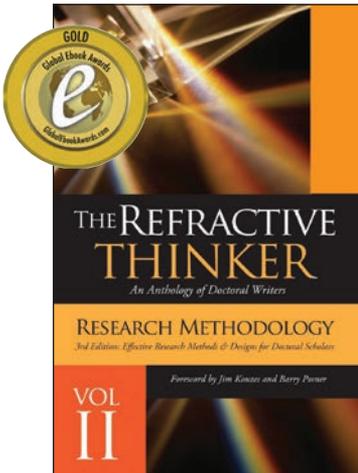


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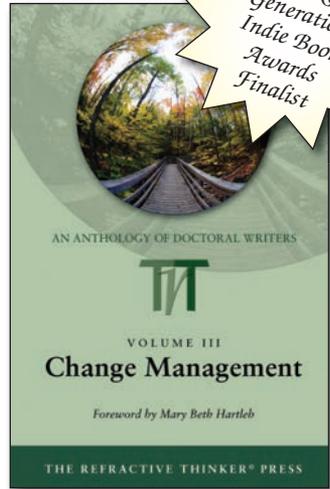


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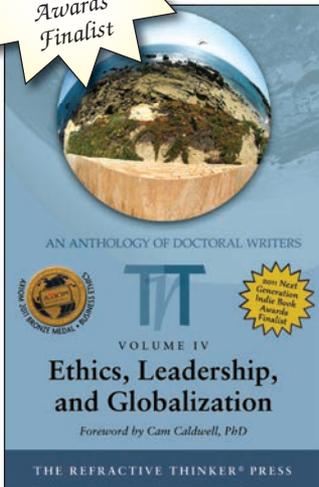
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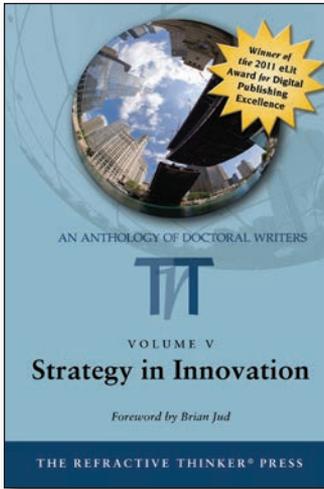


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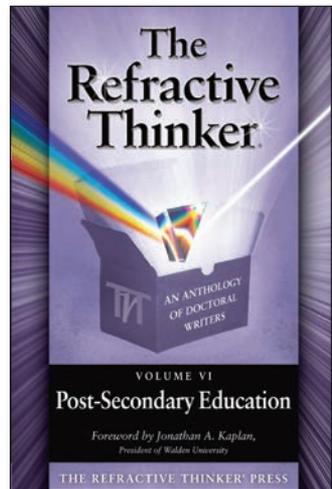
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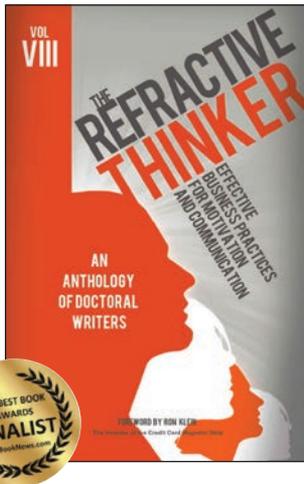
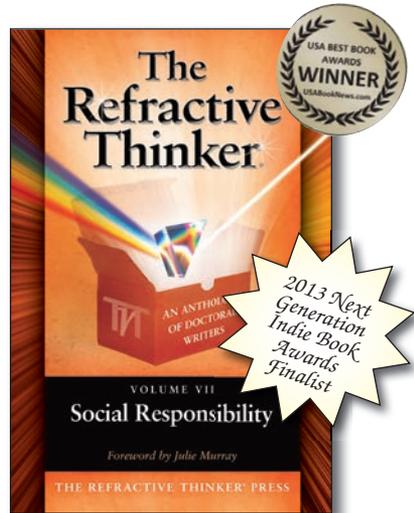
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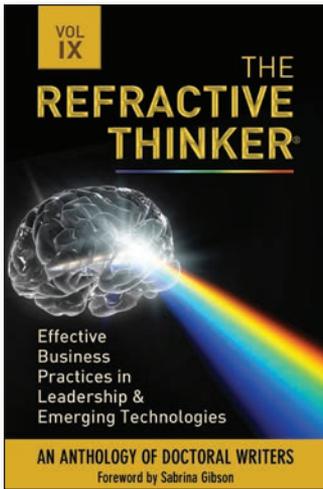
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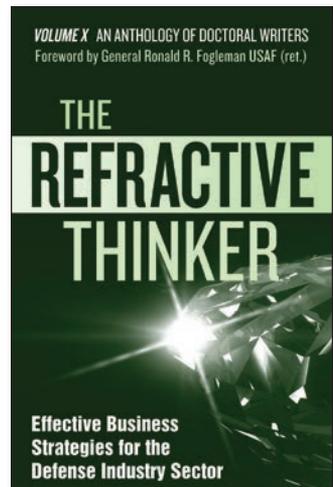
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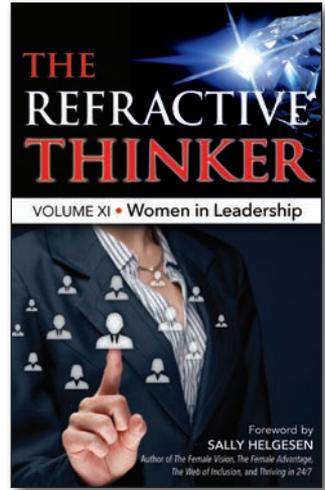
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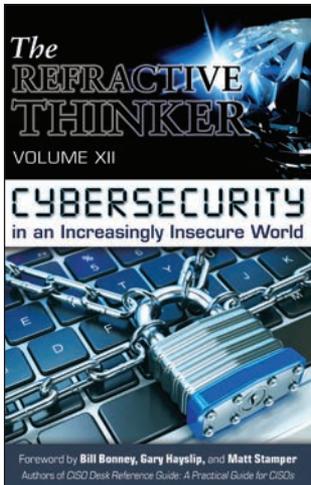
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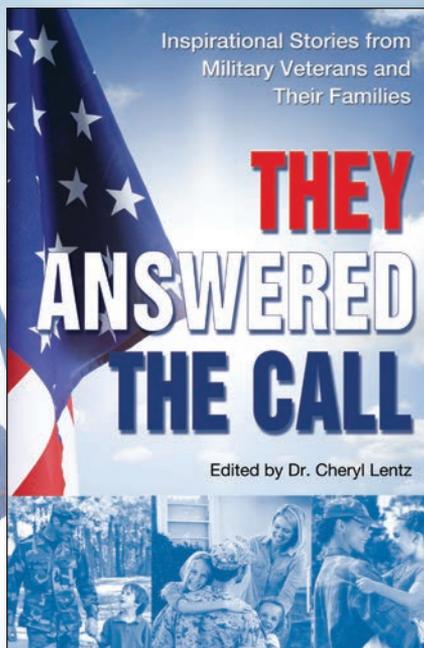


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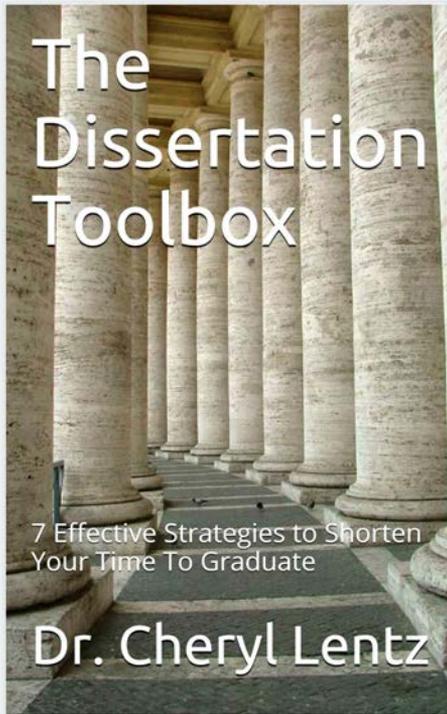


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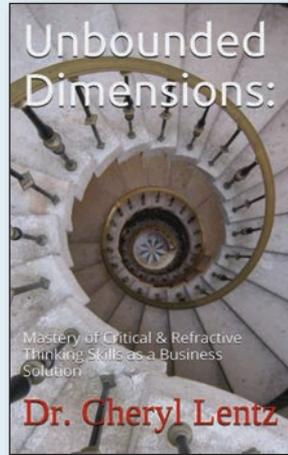
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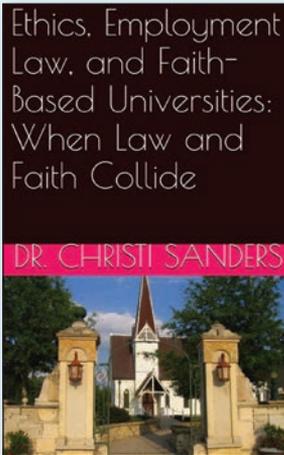
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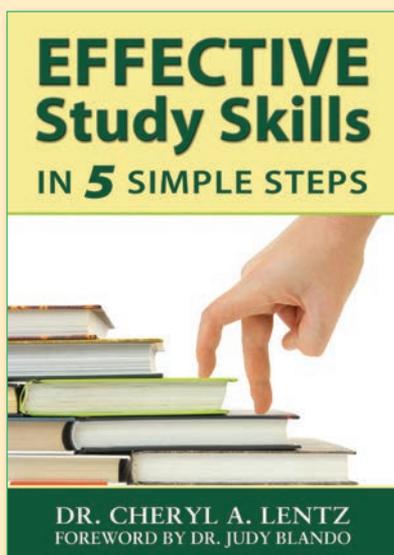
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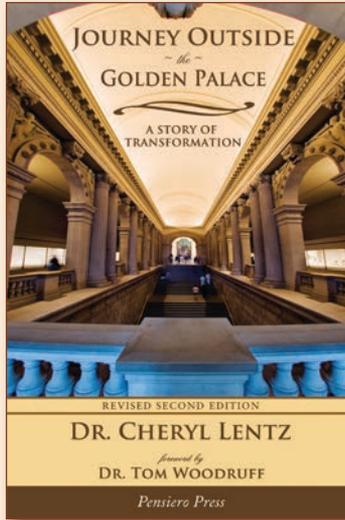
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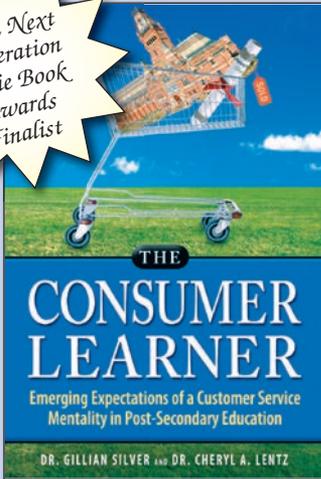
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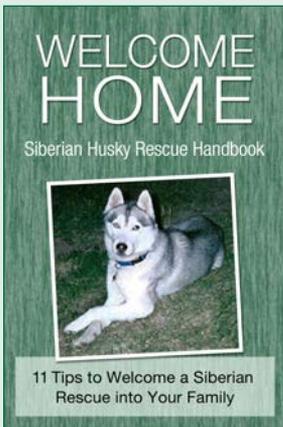
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