

# Understanding Information Security Policy Compliance: A Media Synchronicity View



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*Employee failure to comply with Information security policies (ISP) have resulted in unintended disclosure of sensitive information resulting in major losses for organizations. ISP are usually communicated using media such as email, documents, face to face interactions and video conferencing. While previous studies using media richness theory have explained media choice, our research focuses on media capability guided by the conveyance and convergence concept espoused by Media Synchronicity theory. We propose a laboratory experiment to understand how transmission velocity, parallelism, information transmission and information processing can impact employee intentions to comply with ISP.*

## 1. Introduction

Even after several efforts at information system policy compliance (ISPC), organizations are still falling prey to unintended disclosure of sensitive information. In an incident at Sony Pictures Entertainment, an employee likely opened a targeted email and clicked on a malicious link resulting in humiliating data dumps released over several agonizing months (Richards, 2015) which included four unreleased movies posted on pirate web sites (Seal, 2015). Closer to home, 63% of Indian businesses were concerned about being exposed to cyber criminals due to employee error, while 68% were concerned about employees conducting malicious activities (Sangani, 2019). In a disconcerting incident at the Kudankulam Nuclear Power plant, it was found that a malware attack that breached India's largest nuclear power facility's administrative network was caused by an employee who connected a malware infected personal computer to the administrative network (Madhavan, 2019). Indians still prefer to use pirated software. Hackers exploit vulnerabilities in the software and without the frequent patches the developers send (pirated software user will not get it), the computer will be a sitting duck.

There have been many theoretical angles that have discussed the issue of information security compliance including social bond theory (Safa et al., 2016), protection-motivation theory (PMT) and deterrence theory (Herath and Rao, 2009; Vance et al., 2012). The unified model of information security policy compliance (UMISPC) (Moody et al., 2018), an amalgamation of 11 theories such as the theory of reasoned action (Fishbein and Ajzen, 1975), health belief model (Becker, 1974) and the theory of self-regulation (Bagozzi, 1992) goes to show that ISPC has been researched using diverse theories and various factors.

It stands to reason that theories that stress communication capabilities play an important role in the transmission of ISP to employees in an organization. Media richness theory (Daft and Lengel, 1986; Sun and Cheng, 2007) explains how different levels of media richness differently affect receivers' understanding, as the capacity of the media to transmit information varies. Media richness as an objective property of media indicates the extent to which a medium can facilitate shared understanding within a time interval (Sun & Cheng, 2007). Using MRT as a theoretical lens, Alamki et al. (2019) found that the instructionally designed videos created a correlation between positive emotions, a stronger participation intention, and better recall of content. In effect, richer media affected the behavioral intention positively. Based on MRT, Richards et al. (2019) show that data mining or artificial intelligence algorithms might serve the purpose of reducing ambiguity in place of or in concert with media-rich channels of communication. In the case of ISPC research it was found that lean media was helpful in improving secure behaviors (Shaw et al. 2009; Jenkins et al. 2012).

However, criticisms of the MRT included its inability to explain why one communication system should be selected over another. In other words, media was selected not for its original intent of being the most effective for the given situation but merely was a matter of choice for instance, in the hands of managers (Daft and Lengel, 1986; Dennis and Kinney, 1998). For instance, individuals in higher level positions were found to be more likely to use e-mail for their equivocal tasks, even strategy (Markus 1994; Lee 1994).

Thus, given the issues with MRT, Dennis et al. (2008) proposed the media synchronicity theory (MST) because the media richness theory was insufficient to explain why one communication system should be selected over another. The main thrust of MST is to understand media capability with regards to conveyance and convergence of information. Certain media such as email, documents are capable of conveying quite a substantial amount of information while media such as face to face interaction and video conferencing provide the ability for individuals to converge on the meaning of the information provided. Thus, guided by MST, this paper endeavours to answer the following research question"

What media capabilities lead to ISPC convergence among employees in an organization?

## 2. Theory

Synchronous activity is that which moves at the same rate and exactly together. Media synchronicity (Dennis and Valacich, 1999) is the extent to which individuals work together on the same activity at the same time; i.e., have a shared focus. All tasks are composed of two fundamental communication processes, conveyance and convergence. Dennis et al. (2008) define conveyance as the exchange of information, followed by deliberation on its meaning. It can be divergent, in that not all participants need to focus on the same information at the same time, nor must they must agree on its meaning. In general, low media synchronicity is preferred for conveyance. Convergence is the development of shared meaning for information. By definition, it is convergent, in that participants strive to agree on the meaning of information and agree that they have agreed. This means that participants must understand each other's views. In general, high synchronicity is preferred for convergence. According to MST, media exhibit capabilities such as Transmission Velocity, Parallelism, Symbol Sets, Rehears ability, Reprocess ability, Information Transmission and Information Processing. Conveyance and convergence are influenced to varying degrees by these capabilities espoused by MST.

Transmission velocity is the speed at which a medium can deliver a message to the intended recipient, generally referred to as immediate or rapid feedback. For instance, Face to face communication can provide high transmission velocity while email and documents have a low to medium transmission velocity. Parallelism derived from Shannon and Weaver's number of frequencies, is the number of simultaneous transmissions that can effectively take place. Parallelism is the extent to which signals from multiple senders can be transmitted over the medium simultaneously. While E-mail has high parallelism, Voice mail is low on this capability. Symbol sets, derived from Shannon and Weaver's types of symbols, are the number of ways in which a medium allows information to be encoded for communication. For instance, emails do not possess as high a symbol set as a video message. Rehears ability is the extent to which the media enables the sender to rehearse or fine-tune a message during encoding, before sending. Email is high on rehears ability whereas face-to-face provides very low capability to rehearse the message. Reprocess ability is the extent to which the medium enables a message to be re-examined or processed again, during decoding; either within the context of the communication event or after the event has passed. Email message provides high ability for the user to reprocess the information whereas face-to-face provides limited ability for reprocessing. Information transmission process consists of preparation of information for transmission, transmitting it through a medium and receiving information from a medium. Information processing is understanding the meaning of information and integrating it into a mental model. The focus is among individuals for information transmission and within individuals for information processing. Conveyance and convergence require both information transmission and information processing, but often in different proportions (Dennis et al., 2008).

High synchronicity (S) is achieved through the process of convergence. Media that are high (H) in transmission velocity (TV) and information transmission (IT), while being medium (M) in parallelism (P) and low (L) in rehears ability (Re) and reprocess ability (Rp) achieve this as shown in Table 1. For instance, face-to-face (F2F), and video conferencing (VC) have the ability to provide high synchronicity. Conveyance results in low synchronicity. Media that are high in parallelism, rehears ability, reprocess ability and information processing (IP) achieve this. For example, E-mail is highly capable at conveying information. Symbol sets (SS) remains fairly consistent across all media types.

**Table 1** Capabilities of Select Media used for this Study (Adapted from Dennis et al. 2008)

Media	TV	P	SS	Re	Rp	IT	IP	S
F2F	H	M	F-M	L	L	F	L	H
VC	H	M	F-M	L	L	F	L	H
Email	L-M	H	F-M	H	H	S	H	L
Docs	L	H	F-M	H	H	S	H	L

## 3. Proposition

In the context of IS compliance, employees who are trained either through face-to-face or video conferencing, have the ability to ask questions and get feedback about their concerns on IS issues. Consumers engaged in reciprocal communication with sales representatives can effectively obtain information pertaining to their decision making process (Jiang et al., 2010). Face-to-face and video conferencing helps in fast and multiple exchange of small content of information and have suitable symbol sets that facilitates the need for lower information processing by the employee. Even though the sender can send transfer the information quickly and has lower capability to rehearse the message, the reprocess ability required of the recipient is also low, being that there is the need to process a small amount of information in every exchange. This could lead to employees achieving a better comprehension and convergence with the gravity and seriousness associated with the need to comply with IS policies.

When employees receive emails or voice mail messages, they have diminished capability to understand the message due to the lack of feedback and symbol sets. Even though reprocess ability (the ability to re-read or re-hear) is high in emails and voice mail for the sender, fewer symbol sets and slower transmission velocity could result in the inability to completely understand the serious issues enumerated in the IS policy. Also, feedback may be deferred due to the delay in acknowledging email or voice mail message that are seeking clarifications. Furthermore, receivers can take longer to review and deliberate on

previously received messages. Thus, the importance and urgency to comply with the IS policy may not be clearly understood leading to confusion and lower intention to comply. This leads to the proposition that:

**P1** – Mediums that support high synchronicity capability will have greater influence on an employee's intent to comply with ISP than mediums that have low synchronicity capability.

#### 4. Hypotheses

Face to face and Video Conferencing have the capability for high transmission velocity. Recipients have the ability to ask questions and evaluate feedback on a real time basis. This compared to email or word documents, will result in deferred answers and further delayed analysis of the feedback. With the ability for Face to Face and Video Conferencing to clear their concerns regarding ISPC, employees would have a clearer understanding of the policy content and also the potential negative ramification if they don't comply with ISP. Thus we hypothesize that:

**H1** – Media that provide high Transmission Velocity will lead to higher ISPC.

The speed at which the information is transmitted is an important component of synchronicity. In the case of media such as face to face and video conferencing, there is the capability for rapid, back and forth information transmission capability. This leads to higher synchronicity. Individuals can get immediate responses to their concerns which helps them shape their mental models sooner. Thus we hypothesize that:

**H2** – Media that provide high Information transmission will lead to higher ISPC.

Parallelism is the extent to which signals from multiple senders can be transmitted over the medium simultaneously. In traditional media such as the telephone, fewer transmissions can effectively take place over the medium at the same time, limiting the quantity of information transmitted per time period. In the case of email or Face to Face conversation, one person can start a discussion, while the second person can start another conversation. Thus focus on a particular topic is lost leading to lowered focus and thus lowered synchronicity. For instance, a phone conversation provides for low parallelism leading to higher synchronicity between the participants. Thus we hypothesize that:

**H3** – Media that provide low parallelism will lead to higher ISPC.

In cases where convergence is required, there is less need for information processing capabilities since the focus is on minor adjustments to the existing mental models. If individuals agree on the interpretation of some or many elements of ISPC, those elements do not need much information processing. Media such as face to face and video conferencing are low in information processing capabilities. Thus we hypothesize that:

**H4** – Media that provide low Information processing capabilities will lead to higher ISPC.

#### 5. Methodology

An experimental design is proposed to test out the hypotheses. Participants would be randomly assigned to one of the five groups namely, control, email, face to face, telephone, video conferencing or document group. The participants in the control group would be requested to answer a psychometrically established questionnaire about their intentions to comply with the ISP. Participants in the email group would receive a notification about ISP via email and after reading the same, would be requested to answer the same questionnaire given to the control group about their intention to comply with the ISP. For the participants in the face to face group, a security expert would read out the same message send to the email group. Participants in the face to face group would have an opportunity to ask questions and get any doubts cleared with the expert or amongst themselves. These participants would fill out the same questionnaire given to the control group regarding their intention to comply with ISP. A similar process would be followed for the telephone, video conferencing and document group where following the communication/interaction the participants would be requested to fill out the questionnaire given to the control group. To examine whether there is a significant difference between the groups, a t-test would be conducted on the data collected from the five treatment conditions.

#### 6. Conclusions

There is an ever-growing need for ensuring that employees comply with ISP. Communications of ISP play a vital part in this process. Thus the assortment of media available to provide the communication need to be analysed and understood for their ability to increase ISP compliance amongst employees. Based on MST, convergence results in increased shared understanding and thus this paper proposes an empirical analysis to understand which media is most capable of providing high synchronicity thus leading to better compliance with ISP. This research proposes to test media capabilities such as parallelism, information transmission, information processing, transmission velocity to validate whether media with high synchronicity capabilities lead to better ISPC amongst employees.

#### 7. References

1. Alamäki, A., Pesonen, J., &Dirin, A. (2019). Triggering effects of mobile video marketing in nature tourism: Media richness perspective. *Information Processing & Management*, 56(3), 756-770.

2. Becker, M. H. (ed.) (1974) The Health Belief Model and personal health behavior (special issue). *Health Education Monograph*, 2(4).
3. Bagozzi, R. P. (1992). The self-regulation of attitudes, intentions, and behavior. *Social psychology quarterly*.
4. Fishbein, M., & Ajzen, I. (1975). *Intention and Behavior: An introduction to theory and research*.
5. Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements, media richness and structural design. *Management science*, 32(5), 554-571.
6. Dennis, A. R., & Kinney, S. T. (1998). Testing media richness theory in the new media: The effects of cues, feedback, and task equivocality. *Information systems research*, 9(3), 256-274.
7. Dennis, A. R., Fuller, R. M., & Valacich, J. S. (2008). Media, tasks, and communication processes: A theory of media synchronicity. *MIS quarterly*, 32(3), 575-600.
8. Dennis, A. R., & Valacich, J. S. (1999, January). Rethinking media richness: Towards a theory of media synchronicity. In *Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences*. 1999. HICSS-32. Abstracts and CD-ROM of Full Papers (pp. 10-pp). IEEE.
9. Herath, T., & Rao, H. R. (2009). Encouraging information security behaviors in organizations: Role of penalties, pressures and perceived effectiveness. *Decision Support Systems*, 47(2), 154-165.
10. Jenkins, J. L., Durcikova, A., & Burns, M. B. (2012, January). Forget the fluff: Examining how media richness influences the impact of information security training on secure behavior. In *System Science (HICSS), 2012 45th Hawaii International Conference on* (pp. 3288-3296). IEEE.
11. Jiang, Z., Chan, J., Tan, B. C., & Chua, W. S. (2010). Effects of interactivity on website involvement and purchase intention. *Journal of the Association for Information Systems*, 11(1), 1
12. Lee, A. S. (1994). Electronic mail as a medium for rich communication: An empirical investigation using hermeneutic interpretation. *MIS quarterly*, 143-157.
13. Madhavan, N. (2015). Is India cyber security ready? Retrieved from <https://www.thehindubusinessline.com/opinion/columns/is-india-cyber-security-ready/article29911679.ece#>
14. Mark Richards, G., Yeoh, W., Chong, A. Y. L., & Popovič, A. (2019). Business intelligence effectiveness and corporate performance management: an empirical analysis. *Journal of Computer Information Systems*, 59(2), 188-196.
15. Markus, M. L. (1994). Electronic mail as the medium of managerial choice. *Organization science*, 5(4), 502-527.
16. Moody, G. D., Siponen, M., & Pahlila, S. (2018). Toward a unified model of information security policy compliance. *MIS Quarterly*, 42(1).
17. Richards, K. (2015). Lack of cybersecurity awareness linked to CIOs. Retrieved from <https://searchsecurity.techtarget.com/opinion/Lack-of-cybersecurity-awareness-linked-to-CIOs>
18. R. S. Shaw, C. C. Chen, A. L. Harris and H. J. Huang, "The Impact of Information Richness on Information Security Awareness Training Effectiveness", *Computers & Education*, 52 (2009), pp. 92-100.
19. Safa, N. S., Von Solms, R., & Furnell, S. (2016). Information security policy compliance model in organizations. *computers & security*, 56, 70-82.
20. Seal M. (2015). An Exclusive Look at Sony's Hacking Saga. Retrieved from <https://www.vanityfair.com/hollywood/2015/02/sony-hacking-seth-rogen-evan-goldberg>
21. Shaw, R. S., Chen, C. C., Harris, A. L., & Huang, H. J. (2009). The impact of information richness on information security awareness training effectiveness. *Computers & Education*, 52(1), 92-100.
22. Sun, P. C., & Cheng, H. K. (2007). The design of instructional multimedia in e-Learning: A Media Richness Theory-based approach. *Computers & education*, 49(3), 662-676.
23. Vance, A., Siponen, M., & Pahlila, S. (2012). Motivating IS security compliance: insights from habit and protection motivation theory. *Information & Management*, 49(3-4), 190-198.