The Characteristics of Influencers and Opinion Leaders of Science Gateways and Cyberinfrastructure

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ABSTRACT

As the field of Science Gateways (SG) and cyberinfrastructure (CI) advance further, outreach and workforce development have become increasingly necessary to sustain their growth. Opinion leaders, or SG/*CI influencers*, play a fundamental role in accelerating the adoption and diffusion of SG/CI and broadening its workforce.

Based on thematic analysis of 132 interviews with SG/CI practitioners, including domain scientists, computational technologists, and supercomputing center administrators, among others, we identified three key aspects of SG/CI influencers: *who* they are, *what* qualities they possess, and *how* they communicate. From these insights, we explain *why* they are successful at influencing others to adopt SG/CI, and we offer a prescriptive model for better SG/CI communication, message design, and influencer development in a crucial time for accelerating user adoption and diffusion of SG/CI.

First, addressing *who* influencers are, we find that influencers exist across different roles (i.e., SG/CI users, developers, administrators, and outreach educators). Influencers tend to facilitate growth within SG/CI at two levels: (a) They play a mentoring role (e.g., professors, advisors) to help individuals grow, and (b) they are active and visible in a particular academic or professional field to help the community grow. Fundamentally, they are influencers because they introduce SG/CI to others and pass along essential knowledge.

Second, we categorized *what* set of qualities influencers possess into two main types: boundary spanning [1] and reputational [2]. Within the SG/CI community, individuals with boundary-spanning qualities cross organizational or cultural boundaries to facilitate interactions and the exchange of knowledge between groups and possess qualities such as being visionaries, innovative, and cross-disciplinary. Reputational qualities of influencers include being respected, trusted, and regarded as distinguished or prolific in the field. Thus, influencers are opinion leaders because, as diffusion of innovations suggests, they can lead people's opinions by their reputations (e.g., village elders, religious leaders, etc., in other social studies) [2].

Finally, understanding *how* influencers are successful at persuading others to adopt SG/CI can provide a foundation for better communication practices and SG/CI promotional message design. We find that there are three dimensions to influencer communication, including the skills of (a) articulating and explaining what SG/CI is; (b) expressing why SG/CI is important for science; and (c) projecting passion and excitement for SG/CI.

Thus, SG/CI messengers will be most effective if they possess (a) mentoring roles and (b) are active and visible members of an academic or professional community. Influencers in these roles facilitate growth within SG/CI at the individual and community levels. In summary, SG/CI messengers need to possess the boundary-spanning and reputational qualities described previously, combined with message design that includes three main elements: (a) effectively conveying what SG/CI is; (b) expressing why SG/CI is important; and (c) expressing emotion, passion, and excitement for SG/CI. To overcome the sometimes unavoidable "spray and pray" approach to SG/CI promotion, we suggest that a successful diffusion strategy would target users who are "ready to grow" with SG/CI.

Keywords—cyberinfrastructure; diffusion of innovations; influencers; opinion leaders; science gateways; technology adoption

REFERENCES

[1] Burt, R. S. (1992). *Structural Holes*. Harvard University Press.

[2] Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.). New York: Free Press.