RUI: VOSS: COMPUTATIONAL TOOLS, VIRTUAL ORGANIZING, AND DYNAMIC INNOVATION DIFFUSION

PRELIMINARY FINDINGS FOR MEMBERS CHECK

Research Question #1

RQ1: In e-science, what communication activities constitute the iterative and co-occurring development and use of computational tools in virtual organizations?

Communication Activities at the Team Level:

- Creating a Common Project Understanding
    - Developers understand the scientific needs of the users
    - Users understand the technical capability/possibility of the developers
    - Users and developers maintain the same set of priorities (are 'on the same page')
    - Systematically documenting tool development and use

- Facilitating Constant Communication Cycles
    - Provide internal iterative feedback (from users to developers)
    - Update tool and instructions (from developers to users)
    - Agile software development (sprinting)

- Promoting Synergistic Collaborations
    - Coordinating division of labor/specializations
    - Synergizing multi-disciplinary expertise
    - Constant (virtual) communication
    - Inducing trust and minimizing conflicts

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Research Question #2

RQ2: What interactions (linking people-people, object-object, & people-object) mutually constitute the co-occurrence of tool implementation and virtual organizing in e-science?

- People-People Interactions
  - Establish leadership and credibility
  - Foster effective collaboration with existing (or new) contributors
  - Share/negotiate needs/motivations for the project
  - Communicate, coordinate, and collaborate in an established routine structure
  - Check progress regularly
  - Socialize to establish rapport and trust

- People-Object Interactions
  - Bring together dispersed users, developers, and tools through collaboratories
  - Prototype and test computational tools through visualizations, simulation, and modeling of big data using XSEDE resources
  - Augmented/Virtual Reality
  - Promote participation on a user feedback platform

- Object-Object Interactions
  - Connecting local computers, national supercomputers, software tools, visualization technologies, data repositories, through high-speed networks
  - Maintaining a tool repository (e.g., Galaxy Tool Shed, NanoHub, etc.).
  - Safeguard data through security systems/technologies
  - Employing middleware to link hardware and software
  - Coordinating jobs in queue through scheduling tools

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Research Question #3

RQ3: What macro conditions affect the attributes of a computational tool and the attributes of the inception virtual organization (VO), which, in turn, influence whether a tool successfully gets adopted and/or diffuses from one VO to another?

- Tool Attributes
  - Open source
  - Available for free
  - Community driven/Active user community
  - Well-documented
  - User-friendly interface
  - Easy to adopt
  - Problem-driven, Useful for meeting the original needs
  - Easily adapted across domains and/or meets other needs not originally thought of

- Virtual Organization's Attributes
  - Led by key players with credibility
  - Has a multidisciplinary team of experts
  - Develops a new common language
  - Maintains a collaborative environment (across locations, generations, etc.)
  - Focuses on a common goal
  - Generates strategic plans and establish routines
  - Create efficient and productive organizational structures & systems
  - Develop sufficient organizational capacity & resources
  - Maintains sustainable funding
  - Minimizes personnel turnover

- Macro Conditions
  - Economic: Funding Environment
  - Institutional/University Policies
  - Cultural Norms