Executive Summary:

NDSU plans to enhance research and academic collaborations with local and global partners by strengthening the institution’s CI resources based on existing and emerging needs by limiting as many technology impediments to these activities as possible and increasing its research and outreach mission by improving upon existing infrastructure and services offered.

Vision:

The elevation of NDSU to national and international prominence requires focused investment on its strengths. NDSU must develop a committed, focused and coordinated effort toward research and discovery excellence through faculty-inspired research activity accompanied by administrative support and resource allocation.

Background:

Celebrating its 125th year, NDSU is North Dakota’s Land-Grant University, created to serve the citizens of the state. Since its creation, NDSU has grown and now has research and outreach offices in nearly every county of the state. NDSU is the only institution in the state to be recognized as an RU/VH research university of the Carnegie Classification of Institutions of Higher Education and was similarly named in the National Science Foundation’s top 100 institution rankings.

Goals Accomplished:

Infrastructure Highlights:

- **Network Backbone**: NDSU completed a core network replacement in the fall of 2014, putting into place three Cisco Nexus 7000 core switches and two Cisco Nexus 6000 core Data Center switches that enabled a 40 Gbps backbone between cores and 10 Gbps uplinks for most buildings on the campus. The new core devices support In Service Software Upgrade (ISSU) so the software on the devices can be updated while maintaining network connectivity.
**IPv6:** NDSU’s network has had IPv6 enabled since 2008. IPv6 contains the necessary features to make it possible for higher education to continue to succeed as a research and economic engine for the community.

**Eduroam:** Since 2012, NDSU has been a part of Eduroam (education roaming), a global wireless Internet access service developed for the research and education community. Students, faculty and staff complete a one-time setup of their wireless devices and are then able to use secure wireless at all other participating Eduroam institutions. ([https://www.eduroam.org](https://www.eduroam.org))

**Network Management:** To monitor and enhance network performance, NDSU utilizes a suite of tools, including PerfSONAR, Cisco Prime Infrastructure, Zabbix, Nagios, FlowScan, and nfsen.

**Identity and Access Management (IAM):**
- InCommon, operated by Internet2, provides a secure and privacy-preserving trust fabric for research and higher education and their partners in the U.S. InCommon operates an identity management federation, a related assurance program, and offers certificate and multifactor authentication services. ([www.incommon.org](http://www.incommon.org))
- Central Authentication Service (CAS), provides centralized authentication for supported NDSU web applications, and it is the standard mechanism for allowing outside parties to authenticate against NDSU’s user accounts.

**Central File Services and Desktop Management:** Completed in March 2013, NDSU moved from the Novell Netware system to an Active Directory based file storage system to provide an easier way to share files across departments and divisions. Along with file storage, NDSU also implemented a standards-based desktop management solution aligned with Active Directory.

**Collaborative Framework:**

Clear, constant and open communication avenues between central and distributed IT and the campus community are vital in the optimal dissemination of information regarding technologies and tools that are available. Being aware of IT uses, needs and challenges - both current and anticipated - allows us to focus on providing the CI resources and training necessary for our students, faculty, researchers and staff to accomplish their work, as well as to continuously adjust our CI goals to incorporate new technologies and tools that will enhance and increase their ability to meet their present and future research and academic goals.

Examples of some of the existing communication avenues are:

- **IT Technical Professionals** [http://www.ndsu.edu/eci/ittechs/](http://www.ndsu.edu/eci/ittechs/)
- **IT Communication Liaisons** [http://www.ndsu.edu/its/campuswide/liaisons/](http://www.ndsu.edu/its/campuswide/liaisons/)
- **IT Expo** [http://www.ndsu.edu/vpit/tech_expo/](http://www.ndsu.edu/vpit/tech_expo/)

Initiated in 2013, this event is hosted by the IT Division and campus partners who provide and support IT services. Students, faculty and staff have opportunity to
explore IT services and resources that can benefit their learning, teaching, research and work.

- **Statistical Consulting Services** are jointly supported by IT Services and the Statistics Department. These services are available to all faculty, staff and students at N.D. University System institutions, typically at no charge. The full-time consultant statistician also serves as an adjunct faculty member, teaching Statistical SAS Programming and leading the Statistics Consulting/Presentation Practicum.

- **Research Data Management:** The NDSU Research Data Working Group was initiated in fall 2010 to address campus needs for data management planning for grant-funded research. The collaborative working group is sponsored by the Office of the Provost and is currently represented by NDSU Libraries and the IT Division. In 2013, the group’s efforts expanded beyond grant proposal assistance to provide general guidance to all students, faculty and staff on the best practices for managing academic, research and university business data.

### Integration with Statewide Infrastructure:

- **IPv6:** North Dakota’s Statewide Technology Access for Government and Education network (STAGEnet) continues working toward full deployment. The STAGEnet backbone fully supports IPv6, even though not all campuses have moved to IPv6. STAGEnet serves the higher education community, recognizing the important role that higher education occupies in research.

- **Identity and Access Management (IAM):** ConnectND is North Dakota’s implementation of Oracle/PeopleSoft financials, human resources and student administration applications across state government and the University System.

### Goals for the Next Five Years:

- Develop a model and appropriate technology to create 40 and 100 gigabytes per second deployments and port capacities of up to 10 gigabytes per second.
- Provide a segmented network for departments and divisions that need segmentation for research or business uses.
- Upgrade the existing wireless infrastructure to increase both capacity and coverage, as well as prepare for next generation Wi-Fi protocols (802.11ac).
- Enhance network management and security.
- Create a segmented computing environment for business critical applications.
- **InCommon Bronze Assurance** - provide reasonable assurance that a particular credential represents the same person each time it is used.
- Provide two-factor authorization to the NDSU students, faculty and staff.
- Maintain and improve communications between research, academic, business and support groups at NDSU.
- Overlay storage area network with Ethernet to achieve convergence.