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E-ISAC Long-Term Strategic Plan

April 24, 2017

Executive Summary

The Electricity Information Sharing and Analysis Center (E-ISAC), operated by the North American Electric Reliability Corporation (NERC), executed a significant improvement initiative over the past two years based on findings and recommendations developed by the Electricity Subsector Coordinating Council (ESCC) in 2015. Looking forward, the electricity industry would like the E-ISAC to become an indispensable resource for security information sharing and analysis, and to be the centerpiece for building a highly engaged community of security professionals.

To carry forth this vision, the E-ISAC must undergo continuous improvement and evolution that reflects the changing threat landscape, changing technologies and business processes inside the industry, and changing customer expectations for a highly reliable and security electricity infrastructure that is increasingly more integrated with insecure infrastructures such as the public Internet. This will require additional resources for people, technology, and facilities above what has been budgeted in previous years.

This strategic plan builds on the ESCC's earlier recommendations and discusses improvements needed in 2017 to address current threats, a look at the mid-term range of 2018-2022 to address emerging threats, and what the E-ISAC might look like beyond 2023 if the forecasted issues continue to develop.

The plan was developed with guidance from the ESCC and from NERC leadership. It recognizes the need for sound fiscal planning, recognizes the growing threats to the grid from human and cyber actors, and highlights the need for a more robust security information sharing and analysis capability within NERC.

At a recent planning session with C-level executives, one utility CEO said he wanted to "transform the E-ISAC into an intelligence collecting and analytical capability that industry literally cannot do without," which resonated strongly among the other executives. To achieve this goal we must get the E-ISAC to a maturity level where industry completely trusts it to gather, hold, analyze, and distribute highly sensitive security information.

Specific financial projections, technology requirements, staffing, and facility improvements are being developed and will be incorporated in the NERC strategic plan and the NERC business plan and budget.



Background

The Electricity Information Sharing and Analysis Center (E-ISAC) is operated by the North American Electric Reliability Corporation (NERC).¹ It was established by NERC at the request of the U.S. Department of Energy in 1999 to serve as a focal point for voluntary information sharing within the electricity subsector. By 2006, the ISAC was widely used in the subsector for collecting, analyzing, and distributing voluntarily-shared security information and was a key component of NERC's overall electric reliability mission. NERC's Board of Trustees oversees the budget and activities of the E-ISAC in the same manner as other NERC divisions.

NERC assumed the role of the Electric Reliability Organization (ERO) in 2006 and began a multi-year effort to develop enforceable reliability and security standards for the electricity subsector. As the standards were completed and compliance monitoring began, the ISAC remained the place where security incidents were reported, but the voluntary nature of reporting from electricity entities shifted towards mandatory reporting from entities required to be compliant with NERC's Critical Infrastructure Protection (CIP) standards. By 2014, voluntary sharing with the E-ISAC had greatly diminished in favor of mandatory reporting, but the desire for voluntary sharing within the subsector remained strong. The following year a perceived problem of internal NERC cross-sharing of security information was addressed when NERC implemented the employee code of conduct that bars voluntarily shared security information from being forwarded to NERC's compliance and enforcement teams. Also in 2015 the E-ISAC finished a separation project that includes physical and electronic barriers to protect the information voluntarily shared by industry members.

In late 2014, the Electricity Subsector Coordinating Council (ESCC) initiated a strategic review of the E-ISAC. In June 2015, the ESCC published its key findings and recommendations, which fell into four major areas of improvement for the E-ISAC:

1. Strengthen the governance structure and processes to increase effectiveness and responsiveness
2. Improve the quality and value of the products by identifying member needs and expectations
3. Advance the analysis capabilities by continuing to upgrade operational and staff capabilities
4. Advance the information collection capabilities through enhanced member engagement, better tools or sensors, and an improved portal

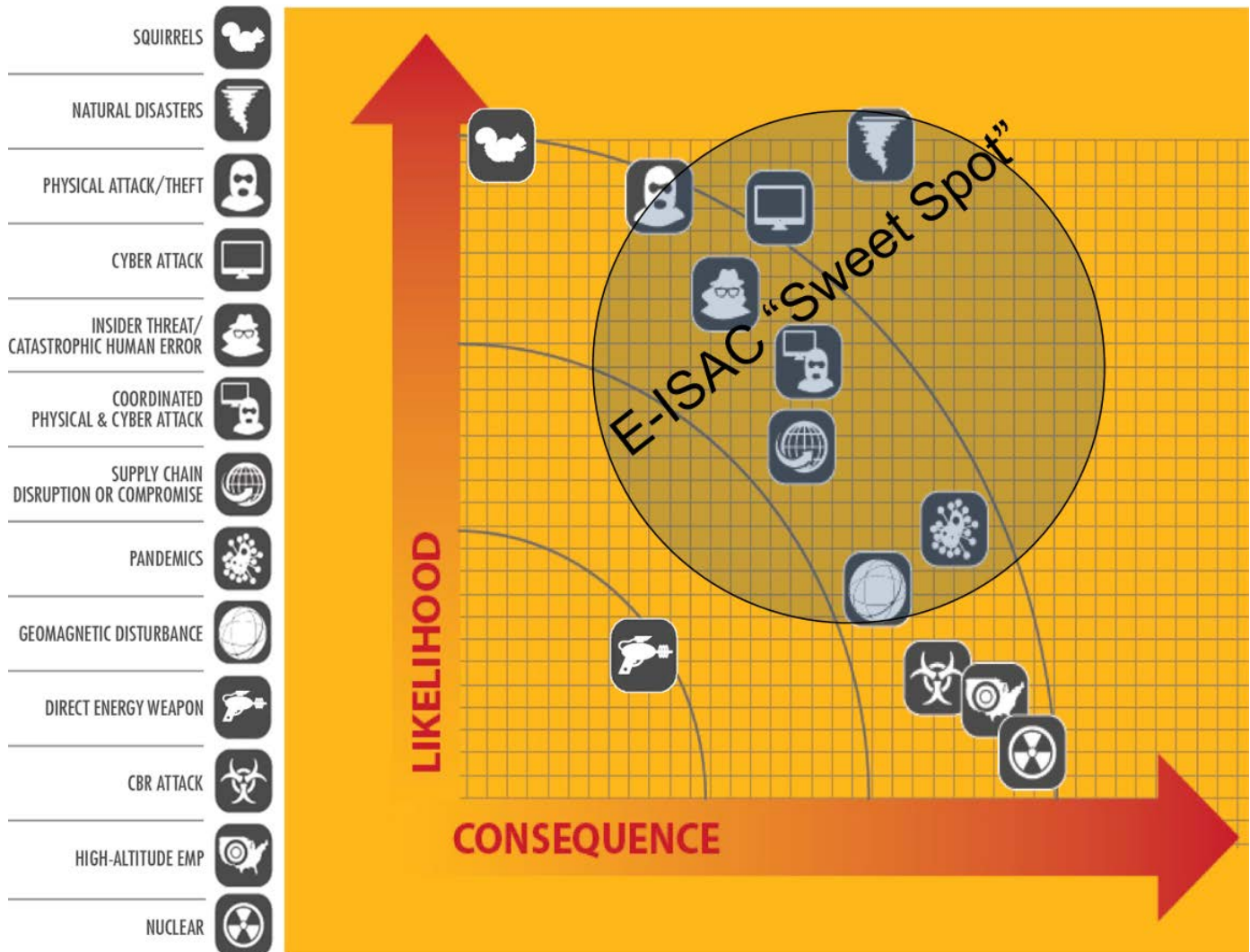
A C-level advisory team from the ESCC (the Member Executive Committee, or MEC) was established in 2015 to help enable the implementation of the ESCC's recommendations, which included a new vision for the E-ISAC to become the electricity industry's leading, trusted source for analysis and sharing of security information. As of April 2017, much progress has been made toward realizing this vision and now we look forward to the next five years and beyond while asking the question, "how do we transform the E-ISAC into an intelligence collecting and analytical capability industry cannot do without?" To begin this process, the following section looks back at known threats and ahead at the anticipated evolving nature of future threats targeting the electricity industry.

¹ Initially called the Electricity Sector Information Sharing and Analysis Center (ES-ISAC), the name was changed in September 2015 to the Electricity Information Sharing and Analysis Center (E-ISAC) as part of a rebranding and role-clarification initiative.



The Changing Threat Landscape

A study conducted for the ESCC by the Chertoff Group in 2014² found that a range of threats target the electric power grid. These threats can be approximately related to each other by using a likelihood versus consequence plotting. We feel that the E-ISAC's "sweet spot" is roughly along the 45-degree line as depicted in the graphic below.



Industry by itself cannot protect the grid from all hazards, and likewise neither can the government. A strong partnership between industry and government for security is required, and in fact has been in place for many years. At the center of this partnership is the ESCC, which serves as a bridge between the public and

² "Addressing Dynamic Threats to the Electric Power Grid Through Resilience" <https://www.chertoffgroup.com/files/docs/Addressing-Dynamic-Threats.compressed.pdf>



private sectors for strategic security policy coordination and to develop unity of messaging during a crisis. In addition, timely and actionable information sharing, collaboration, and analysis are the cornerstones of good security practices within the electricity industry. The E-ISAC's role is to facilitate voluntary sharing and collaboration, and to provide unique insights into emerging security issues that are affecting the sector. In January 2017 the E-ISAC and the MEC met in person to discuss the future of the E-ISAC relative to changing threats, changing industry dynamics, and a changing environment. While physical threats resulting in theft, vandalism, disruption, or destruction will always be present, the group recognized that cyber threats and other types of threats are evolving and will require adaptive change throughout industry and especially with respect to the E-ISAC. The group agreed that future threats industry needed to monitor and mitigate included:

- Near-term (0-2 years)
 - Nation state threats, advanced persistent threats, the Internet of Things (IoT), Distributed Denial of Service (DDoS) attacks, and ransomware
 - Data breaches and intellectual property theft
 - Insiders, physical damage, coordinated attacks, and third-party risks
- Mid-term (3-5 years)
 - Increased reliance on gas generation
 - Distribution system vulnerabilities via networked control systems
 - Growth of demand response technologies with low security
 - Distributed energy resources
 - Reliability of communications networks
- Long-term (5-10 years)
 - Higher replacement rate of components and systems
 - Increased cost of operations due to higher security costs
 - Ability to run manually might be lost
 - Computers attacking computers

The remainder of this plan discusses improvements needed in 2017 to address current threats, a look at the mid-term range of 2018-2022 to address emerging threats, and what the E-ISAC might look like beyond 2023 if the forecasted issues continue to develop.

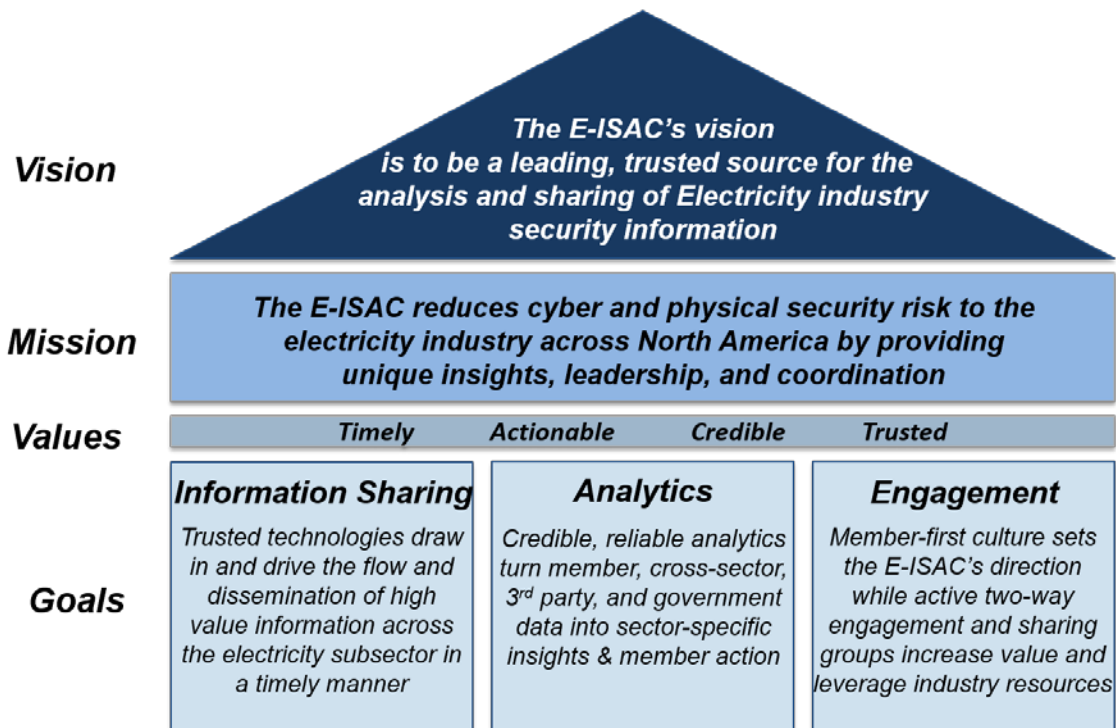


The Need for a Strategic Plan

Given that quite a bit of work was accomplished over the past two years to improve the E-ISAC, it is reasonable to ask why a long-term strategic plan is needed. Looking externally, there are three primary drivers:

1. Security threats continue to evolve and become more dangerous
 - a. Ukraine, IoT, and ransomware attacks are indicators
 - b. Geopolitical tensions and changing societal trends make North America a target
2. Customer expectations for highly reliable energy continue to increase
 - a. Electricity entities need to be more agile and responsive to real-time risks
 - b. Rapid technology changes also increase the risk landscape
3. More robust understanding and measurement of grid resiliency and security
 - a. Need new tools for collecting and analyzing grid security metrics data

Since the publication of the ESCC's strategic review in 2015, the E-ISAC has solidified vision, mission, values and goals statements as shown in the graphic below. The three "goals" columns represent parts of a rising spiral of membership engagements: bringing in more information improves the analytical process, which in turn drives more engagement, which then brings in more information, which improves analytics, and so forth.



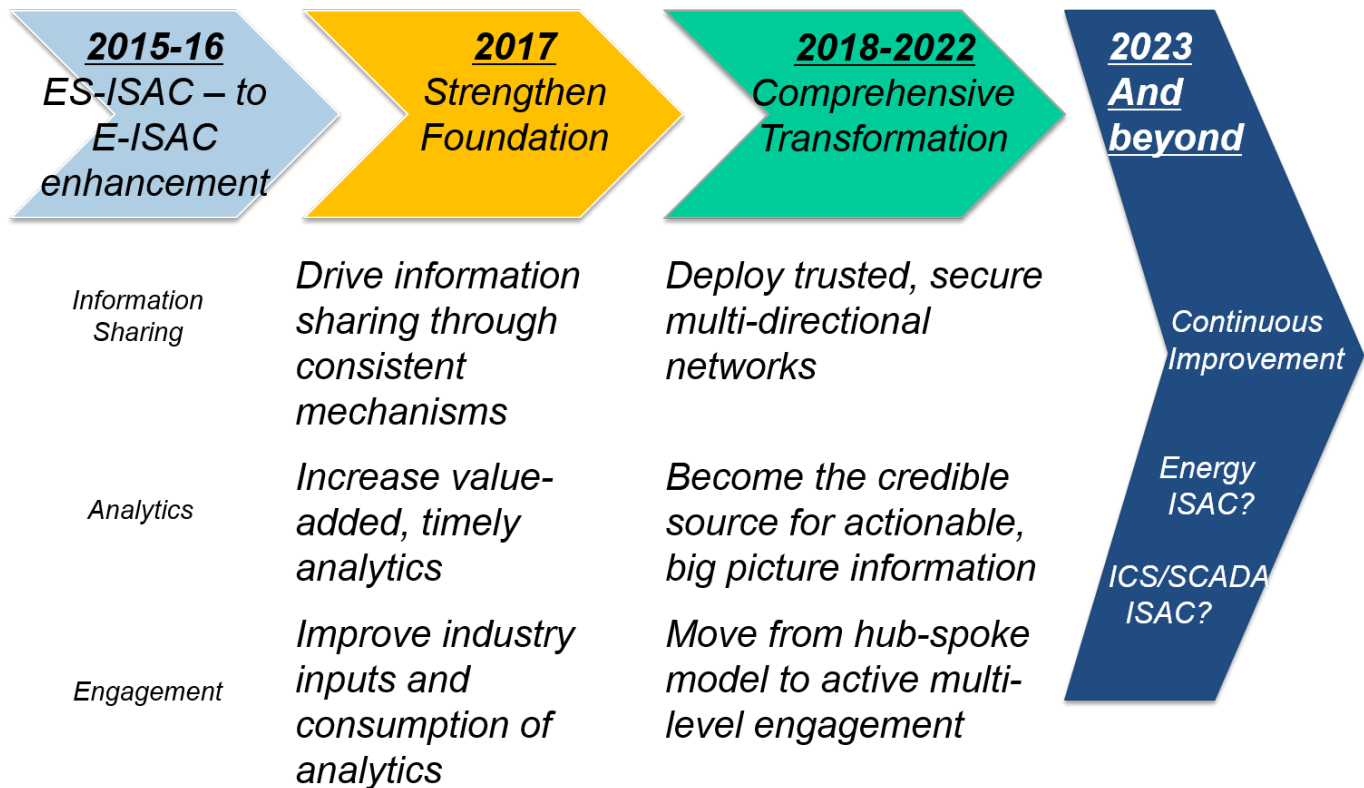


This process takes the E-ISAC to new levels as it gets better at information collection, analysis, and dissemination and represents the core capabilities of the E-ISAC. The MEC and the E-ISAC developed a related strategy for the improvement of the E-ISAC’s products and services that builds upon the pillars shown in the graphic above, and is working on a technology roadmap in partnership with NERC’s Information Technology team that also follows this method. Both of these more tactical plans support the goals and objectives of the E-ISAC’s long-term strategic plan.

Transforming the E-ISAC: 2017 and Beyond

In the coming years, NERC should build on the foundation of the 2015 ESCC recommendations, and position the E-ISAC to provide more robust security information for better understanding of security weaknesses and strengths across the ERO. By addressing the three primary drivers outlined above, NERC can transform the E-ISAC into a world-class intelligence collecting and analytical capability for the electricity industry. To accomplish this, the E-ISAC must achieve a maturity level where industry completely trusts it to gather, hold, analyze, and distribute highly sensitive security information, with no fear that information voluntarily submitted to the E-ISAC would ever be used for a compliance enforcement action or investigation.

As we strengthen the foundation built over the past two years, the E-ISAC should undertake a comprehensive multi-year transformation to build capabilities that include trusted, secure, multi-directional networks and a movement from a hub/spoke model to a very active multi-level engagement. The E-ISAC strives to be the industry’s most credible source for actionable, big picture information. This roadmap is illustrated in the graphic below.





2015 and 2016 were foundation-building years, set in motion by the ESCC strategic review and the publication of the findings and recommendations. In 2015, NERC implemented an employee code of conduct, completed a physical and logical separation of the E-ISAC from other parts of NERC, hired strategic leadership and key industry experts, and rebuilt the organization with new internal functional groups. Also that year, the name was changed from the ES-ISAC to the E-ISAC and new logos, color schemes, and branding were launched. In 2016, the old web portal was upgraded with the intention of setting in motion a completely new platform capability that will launch later in 2017. Over the past two years, membership engagement and information sharing grew rapidly, new products and services were launched, and the third Grid Security Exercise (GridEx III) was successfully administered by the E-ISAC. The impact of these initial changes on the E-ISAC's capability to respond to real-world incidents was validated by the Ukraine grid attacks in December 2015, denial of service attacks from Internet of Things (IoT) devices in October 2016, and the second Ukraine event along with the Grizzly Steppe incident at the end of December 2016.

As was pointed out frequently in the past two years, the "IS" and the "A" in "ISAC" define the two primary strategic themes that must be in place for the organization to be successful. In 2017, the E-ISAC is deploying new information sharing and analysis tools such as the Cyber Automated Information Sharing System (CAISS) and an Event Visualization Tool (EVT) to increase the speed and ease of sharing cyber threat information. While the Cybersecurity Risk Information Sharing Program (CRISP) has enhanced visibility and understanding of cyber threats for the electricity industry, processing classified information takes time. As information comes in from CRISP sensors and goes to the Pacific Northwest National Laboratory, the E-ISAC will leverage a new unclassified data storage and analytics capability inside the E-ISAC so that more actionable information can be sent to industry on a timelier basis. Later this year we anticipate that alerts and technical information will flow securely between CAISS and CRISP in our efforts to expand our data collection beyond the current participant pool and to achieve a more comprehensive picture of industry threats than we have today.

The major technical effort in 2017 is a planned replacement of the current web portal with a new "platform" that will enable automatic information sharing, the creation of private discussion groups, data visualization, and many other features that the E-ISAC's members requested. To support the new tools and the needs of the sector, additional analysts will be hired in 2017. In addition, new partnerships are envisioned with organizations like the Computer Emergency Response Team Coordination Center (CERT/CC), and at the end of 2017, the E-ISAC will host the GridEx IV. In mid-April 2017, the internal structure of the E-ISAC was modified to align the staff to better serve the industry. There are now two major groups—one focused on operations and analysis and the other on programs and member engagement. Some minor facility improvements are also planned for 2017.

Looking forward, the next five years (2018-2022) will focus on transforming the E-ISAC into a world-class intelligence collecting and analytical capability for the electricity industry. To achieve this goal, the E-ISAC should increase its capability to collect security intelligence; increase the number of specialized analysts; acquire additional data storage, management, and sharing technologies; and increase the E-ISAC's access to classified networks and facilities.



New Intelligence Collection – To Support Better Unclassified Information Sharing

Some new collection capabilities coming online in 2017 such as CAISS and the Department of Energy’s CYOTE project will bring additional intelligence, but the E-ISAC should also consider more active monitoring of public and private networks for new threats, perhaps collecting data from sensors in Operational Technology (OT) networks, and increasing the ability to monitor social media and other open sources. Some of that new collection could be done by others as a service that the E-ISAC would pay for.

Access to Classified Networks and Facilities – To Improve Sharing of Highly Sensitive Information

While the majority of the E-ISAC’s staff hold US government security clearances, the facility inside of NERC operates at the unclassified level. This requires E-ISAC staff to travel to government facilities in order to view and analyze classified data. On the industry side, very few entities have access to classified facilities and most do not have staff with appropriate clearances. To support the strategic goal of better information sharing, both the E-ISAC and industry members should have increased access to classified data and classified information sharing networks. Relationships with government partners need to be leveraged to make valuable classified data and analysis rapidly available to asset owners and operators.

More Analysts – To Improve the E-ISAC’s Analytical Capabilities

The E-ISAC should hire technical analysts with specializations in fields such as industrial control system security, end-point (host) security, network security, cloud security, and penetration testing. Over the next three to five years an estimated ten or more analysts should be hired at a rate of two or three per year so that the annual increase of NERC’s budget is minimized.

Acquisition of New Technologies – To Improve Industry Engagement

As more data is collected, the E-ISAC should acquire additional data storage, management, and sharing technologies. These technologies must be as secure as possible, given that the risk of a targeted data breach will increase as the E-ISAC improves its capability to give early warning to industry about threats and vulnerabilities discovered via data analysis. Specific technologies needed in the next five years include event visualization via the new platform, predictive analysis based on artificial intelligence, real-time threat feeds to members, a customized platform experience for each user, and federated information sharing.

Beyond 2023 security challenges will continue to expand, requiring additional resources and perhaps a different relationship across the energy industry. Due to commonality of threats across all energy companies, rapid growth of vulnerable control systems, and a convergence of lines of business within the industry, we must consider whether or not the E-ISAC should remain focused only on electricity, or if it should expand to include all energy owners/operators (electricity, gas, oil, and natural gas).

Other items to consider beyond 2023 include the size and location of the E-ISAC facility and potential partnerships with the research community. Due to limitations of the NERC budget, some of these new capabilities would need outside funding from the government or perhaps grants from large industry companies.



Other MEC Guidance

Several questions were presented to the MEC membership about the long-term future of the E-ISAC. Most of the questions were answered in the discussion paragraphs above. The remaining questions not previously discussed and the MEC's summarized responses are below.

Should the E-ISAC move to 24/7 operations?

Not immediately but the decision should be based on changing situations and activity levels. This response is driven by the reality of the cost for the additional staff, and by the reality that very little data is submitted to the E-ISAC for analysis outside of normal business hours. But, as the E-ISAC's capabilities and data collection grow, there will likely be a point in the next 3-5 years when it might be necessary to move to round-the-clock operations.

What is the E-ISAC's relationship with other ISACs?

There is concern that other ISACs (the Financial Services ISAC, or FS-ISAC, is a recent example) will attempt to recruit electric utilities to pay for special analytical services in order to cover expanding costs. The consensus view of the MEC is that the E-ISAC should not discourage members from taking advantage of services offered by other ISACs, and should try to learn about those new capabilities with an eye towards developing them organically within the E-ISAC when appropriate. Services offered by other ISACs should be viewed as additional intelligence sources. Additionally, the E-ISAC should develop stronger information sharing partnerships with other ISACs and increase the level of cross-sector engagement.

Should the E-ISAC have an international relationship?

The E-ISAC, as part of NERC, currently has members in Canada and Mexico. The MEC recommended that the E-ISAC consider establishing formal information sharing relationships with other countries such as Japan or the United Kingdom. Because no other countries are interconnected with the North American grid beyond the US, Canada, and Mexico, any future information sharing relationship with entities in other countries would be at a very high level and must preserve the privacy of North American entities that are voluntarily sharing with the E-ISAC.

Should the E-ISAC accept funding from sources beyond NERC assessments?

Government funding may be necessary to cover costs of the recommended expansions of technical capabilities, staff, and facilities. MEC members cautioned about any potential "attached strings" that come with government grants. Beyond 2018, some member companies have expressed interest in a model like CRISP where companies can pay for additional services, or perhaps moving to a tier-based pricing model.



Conclusion and Next Steps

The next several years present an opportunity to transform the E-ISAC into a world-class intelligence collecting and analytical capability for the electricity industry; and an opportunity to support NERC's overall initiatives to better understand the current security posture of the North American grid. As threats, technologies, and business process change, the E-ISAC, in order to be as valuable as it can to the industry, must evolve to a maturity level where industry completely trusts it to gather, hold, analyze, and distribute highly sensitive security information. Specific financial projections, technology requirements, staffing, and facility improvements are being developed and will be incorporated in the NERC strategic plan and the NERC business plan and budget.

Towards this transformation, for the near term (remainder of 2017 and all of 2018), the E-ISAC plans to:

- Hire additional analysts
- Increase the in-house data storage and analysis capabilities
- Grow the CRISP and CAISS programs
- Deliver a world-class information sharing platform well before GridEx IV
- Grow membership engagement via the new platform
- Increase engagement with other ISACs and information sharing partners
- Increase engagement with Canada and Mexico
- Provide higher quality grid security metrics data to support NERC's data collection initiatives