GridWise Architecture Council Constitution:

Summary of Constitution Interview Process and Feedback

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DISCLAIMER

Executive Summary of Constitution Interview Process and Feedback on the Interoperability Constitution

The GridWise Architecture Council's (GWAC) mission is to establish broad industry consensus in support of the technical principles that enable the vast scale interoperability necessary to transform electric power operations into a system that integrates markets and technology to enhance our socio-economic well-being and security. As a vehicle to establish consensus surrounding fundamental interoperability principles relevant to all operations of the electric system, including end use, distribution, transmission, and generation, the GWAC drafted a set of fundamental, strategic statements of principle. These initial statements of principle were then reviewed and refined through a rigorous and broad set of stakeholder interviews to establish the Interoperability Constitution [1], signed by delegates at the Constitutional Convention [2]. This report describes the interview process and summarizes results that were at the basis of the Constitution.

Over 100 stakeholders representing each sector relevant to GridWise took part in the interview process, contributing to increasingly refined and increasingly consensual statements. In the final iteration, about one third of the interviewees voted in agreement or strong agreement to 90% or more of the statements, as summarized in Figure 1. About 80% of the interviewees were in agreement or strong agreement with 80% or more of the statements; this would indicate very strong consensus in support of these principles.
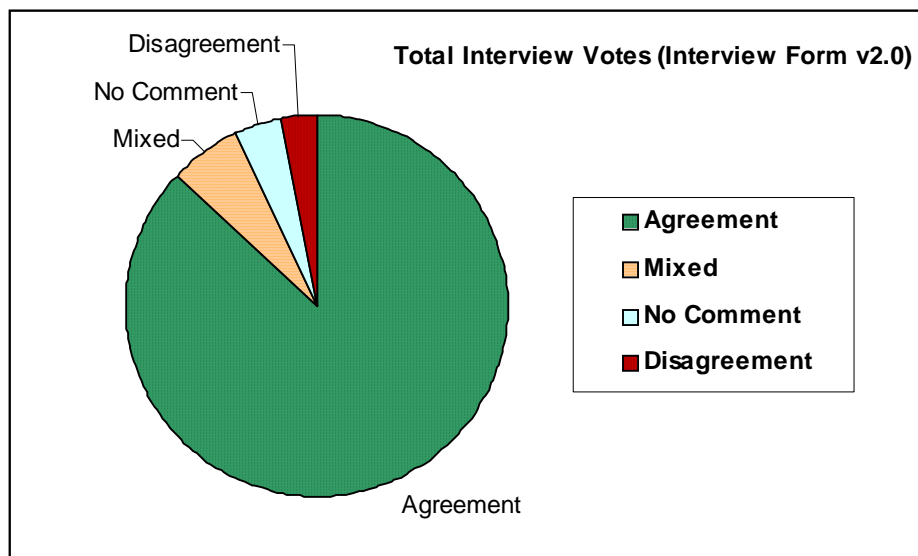

Figure 1 - Clear Majority of Agreement with Constitution Principles

The Constitution is designed to be a living, evolving document; neither perfect, nor finalized. The Constitution Statements presented and signed at the Constitutional Convention are reproduced below.

GRIDWISE

Constitution Statements of Principle

B - Business Principles

Context: Subject to the regulatory environment in which they operate, organizations are free to structure themselves in the manner they see fit to best deliver goods and services and compete with other businesses. They interact with other organizations through contracts of their own choosing in as open a marketplace as possible. Enterprises can be categorized into wholesale and retail segments; however, the path from producer to consumer may pass through a variety of businesses each providing their unique value added contribution. There is no standard process of running a business.

B01- Subject to regulatory monitoring requirements, interoperability approaches should focus on the information exchange and the interaction at the boundary between transacting parties while respecting the privacy of the internal aspects of their business (technology choice and processes).

B02- Interoperability approaches must support the ability to roll out changes to contracts or market rules while preserving stable operation of the overall electric system.

B03- Interoperability approaches must address the common types of marketplace transactions among parties along the path between producers and consumers appropriate to the level of service provided.

B04- Interoperability approaches must consider implementation costs/benefits and impacts to the parties involved in the transaction.

B05- Interoperability approaches must support verification and auditability of transaction completion and be able to validate that contract terms have been met.

U - Usability Principles

Context: Electricity users have a wide range of needs and energy management capabilities, as well as varying degrees of willingness to pay for any given energy product. The new frontier in a transformed energy system is the participation of new parties in overall system operations, including end use, distribution, transmission, and generation.

U01- Interoperability approaches should address the technical capabilities needed to support the emergence of markets for consumers to choose the appropriate electricity service program they desire.

U02- In the event of a communications failure between interacting parties, the parties must assume operating positions that best preserve stable operation of the overall electric system.

U03- Interoperability strategies should be communicated in appropriate ways that can be understood and adopted by all stakeholders in the electric system.

I - Information Technology Principles

Context: Advances in information technology empower electronic business and intelligent machine connectivity. Large sectors of the economy rely on information technology to enable greater levels of productivity, efficiency, and reliability of service. This provides a vast marketplace for the application of information technology and reduces the need for industry specific information technology approaches. Information technology is characterized by a high rate of innovation with impacts to large scale systems of systems that must cope with the deployment of new solutions as legacy approaches continue to operate in tandem.

I01- A broadly held interoperability strategy can help organize and advance the large scale integration of automated equipment, business processes, and human interactions.

I02- Strategies for interoperability shall adopt the broadly applicable best practices of information science to improve end to end performance of both business and the electric system's operation and managerial processes.

I03- An interoperability framework shall address a strategy for the identification of system entities beyond organizational boundaries to ensure unambiguous interactions, and shall support the naming of groups or collections of system entities.

I04- An interoperability framework shall incorporate information modeling approaches that define the shared meaning and relationships of entities and concepts applicable to interactions in an area of industry or commerce.

I05- Interoperability strategies shall address time synchronization, sequence of events, time tagging, and other requirements related to time as appropriate to the service provided.

I06- Interoperability strategies shall address the ability to set up (i.e., discover and configure) system components so they can join, modify (e.g., upgrade), and terminate their positions in the system.

I07- An interoperability framework must address information system security and privacy concerns, balance them appropriate to the service provided, and support adaptation to future risks.

I08- As appropriate to each interaction, an interoperability framework should address strategies for e-business transactions that may include creation of a transaction, negotiation, scheduling, operations, settlement, billing and financial transfers.

I09- An interoperability framework must be practical and achievable:
- Meets performance requirements.
- Is reliable.
- Is scalable.
- Has sufficient breadth to meet the range of business needs.

I10- An interoperability strategy must accommodate the coexistence of and evolvement through several generations of IT standards and technologies that will reside at any point in time on the Grid.

R - Regulatory Principles

Context: Business is conducted under a formal set of rules or laws meant to follow policy guidelines. The rules are set, maintained, and enforced by various local, state, and federal agencies in accordance with their jurisdictions. Business interactions associated with the electric industry are reviewed and monitored by those regulatory bodies whose role is to ensure a viable electric system environment that supports our economy and balances issues of social equity.

R01- Interoperability strategies and issues must be communicated in a form to be understood by regulators and policy makers.

R02- Interoperability approaches among organizations must allow regulators the ability to verify that business is conducted within established rules and that all relevant transactions are auditable.

G - Governance Principles

Context: This Constitution is a living, evolving document that influences the long-term future of the electric power system. Though the Statements of Principle are meant to be long lived, the ability to correct, update, and clarify this Constitution is recognized.

G01- An interoperability framework must consider the needs and views of the full range of stakeholders in an integrated view of the electric system.

G02- Governance processes should measure successes and shortcomings of the interoperability framework, and drive improvement.

G03- The governance of this Constitution must be independent of any particular standards organization and preserve the technical neutrality of these principles.

G04- With regard to encouraging standards and standards development, the governance of this Constitution:

- Will encourage development of standards where appropriate to Constitution objectives, and work with existing groups to guide standards development toward better achieving interoperability;
- Will endorse and/or recommend standards where appropriate to Constitution objectives;
- Will proactively encourage collaboration, merging, and rationalization of standards where appropriate to Constitution objectives.
- Does not develop detailed specifications for standards.

G05- These long lived Statements of Principle and the strategic approaches that derive from them must be able to change through time in a prudent, controlled manner.

Acknowledgements

The GWAC was led through this consensus building process by GWAC Chair, Rik Drummond (the Drummond Group, Inc.), who sowed the initial ideas, which matured into the Constitution process. The GWAC along with guest contributors worked together to develop the initial statements of principle; and each GWAC member, along with outside helpers, led interviews with stakeholders. The Pacific Northwest National Laboratory (PNNL) provides support to the GridWise Architecture Council. Special thanks goes out to each of these key

GWAC Members, Support Team, and Eric Lightner with 'Benjamin Franklin' after the Constitution Signing

contributors: GWAC members and members emeritus, Ron Ambrosio (IBM Research); Jay Britton (AREVA T&D); David Cohen (Infotility); Rik Drummond; Albert Esser (Emerson Network Power); Erich Gunther (EnerNex); Stephanie Hamilton (Southern California Edison); Larsh Johnson (eMeter); Lynne Kiesling (IFREE); Jack McGowan (Energy Control); Vito Stagliano (Calpine); Wade Troxell (Colorado State University); Don Watkins (Bonneville Power Administration); Eric Wong (Cummins); GWAC administrator, Steve Widergren (PNNL) and support, Mia Paget (PNNL); and additional initial contributors and interviewers, Geoff James (CSIRO); Eric Lightner (U.S. Department of Energy); Brad Nacke (Emerson Network Power); Rob Pratt (PNNL); and Paul Wang (Concurrent Technologies Corporation).

The GridWise Architecture Council members would particularly like to thank all of the numerous stakeholders that accepted to be interviewed for this effort (a listing of participants is included in the Appendix). The Constitution is a vehicle to establish consensus surrounding fundamental principles and amass buy-in from a broad base of stakeholders in the application of information exchange to the effective operation of the future electric power system. This process would be of little value without the insightful collaboration of such a wide range and high level of stakeholders: Thank you.

Thanks also to key industry supporters of smart grid initiatives and GridWise, including all of the delegates to the Constitutional Convention and the convention organizers.

Key Supporters of Smart Grid Initiatives.
From left, James Crane (GridApp); Don Von Dollen (EPRI IntelliGrid); Jesse Berst (Smart Grid News); Steve Hauser (GridWise Alliance); Bob Saint (NRECA); Eric Lightner (U.S. DOE); seated, Rik Drummond (GWAC Chair); 'Ben Franklin'.

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Introduction: Report on the Constitution Interview Process

The GridWise Architecture Council's (GWAC) mission is to establish broad industry consensus in support of the technical principles that enable the vast scale interoperability necessary to transform electric power operations into a system that integrates markets and technology to enhance our socio-economic well-being and security. As a vehicle to establish consensus surrounding fundamental interoperability principles relevant to all operations of the electric system, including end use, distribution, transmission, and generation, the GWAC drafted a set of fundamental, strategic statements of principle. These initial statements of principle were then reviewed and refined through a rigorous and broad set of stakeholder interviews to establish the Interoperability Constitution [1], signed by delegates at the Constitutional Convention [2].

This report describes the interview process and summarizes results that were at the basis of the Constitution.

What is the Constitution?

The Interoperability Constitution establishes Statements of Principle that represent a consensus view across all stakeholders in the electric system community, and form a foundation from which to derive or revise design requirements. Its goal is to facilitate reliable integration and interoperability of all components in the electric power system.

The Interoperability Constitution is intended to establish a stable guiding framework against which to measure requirements and subsequent architecture designs, in a similar fashion to how the Constitution of the United States (a country made up of federated states) provides a framework and benchmark for the creation of laws that codify the original vision of the country. Further, this framework must be stable, yet not immutable, to allow for judicious evolution over time as business, regulatory, and technology models change.

The GridWise™ Architecture Council Interoperability Constitution Whitepaper [1] provides further background on the context, objectives and scope of the Constitution.

An Effort led by the GridWise Architecture Council

The GridWise Architecture Council's (GWAC) mission is to establish broad industry consensus in support of the technical principles that enable the vast scale interoperability necessary to transform electric power operations into a system that integrates markets and technology to enhance our socio-economic well-being and security. The GWAC is sponsored by the United States Department of Energy.

Key paths the GWAC is following to achieve this mission include framing the debate on interoperability, involving industry sectors and policy makers for buy-in/ownership, and identifying and addressing priorities for advancement (standards, regulatory issues, message communication, community forums). Along these lines, the Constitution is a

vehicle to establish consensus surrounding fundamental principles and amass buy-in from a broad base of stakeholders in the application of information exchange to the effective physical and economic operation of the future electric power system. Figure 2 highlights the consensus building and forward momentum that can be gained by engaging proactive, positive stakeholders with the constitution process. The process of creating the Constitution is as important as the resulting statements themselves.
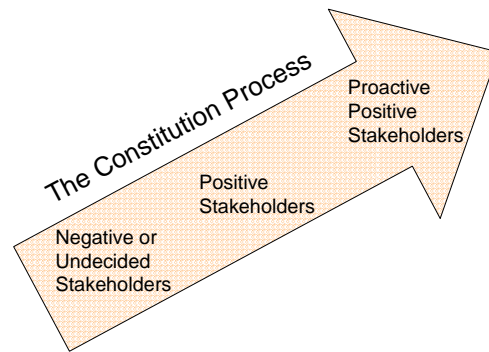

Figure 2 - The Constitution Process for Building Consensus and Forward Momentum

The Constitution Interview Process

The process of developing the Constitution was several cyclical steps – each focusing on getting consensus, increasing clarity of the direction, and achieving wide scale buy-in across stakeholders in the North American electric power system.

> Step 1: Define a series of short statements that describe the key principles that drive a transformation of electric system operations consistent with the architecture vision statements. They are meant to engage stakeholder participation and ownership.

> Step 2: Review and socialize the vision and the Statements of Principle with the broad spectrum of stakeholders gathering their concerns, suggestions and modifications to the statements.

> Step 3: Analyze feedback from several reviews; consolidate and discuss results with interviewed stakeholders attempting consensus.

> Step 4: Create a new series of short statements that reflect the concerns, suggestions, and modifications from those in Step 2. (Repeat Steps 2-4 as needed to improve clarity and consensus and reach an ever broader set of stakeholders.)

The concept of an Interoperability Constitution was initially conceived in the fourth quarter of 2004. After initial Statements of Principle were developed, discussed and revised, the interview process was established to engage stakeholder participation and ownership. Trial interviews were used to refine the interview methodology and further prepare the statements of principle during the second quarter of 2005.

An initial broad phase of stakeholder interviewing was conducted in the third quarter of 2005, culminating in a "Summary of Intermediate Feedback" distributed to GWAC members and interview participants. This initial summary of feedback proposed clarifications to the statements based on stakeholder comments, which were integrated into a revised version (referred to as version 2.0) of the Constitution Interview forms. An additional phase of interviewing was conducted in the fourth quarter of 2005. Results

from this final phase indicated very strong consensus in support of the principles and led to sharing the concepts with a larger audience of stakeholders at the Constitutional Convention.

Constitution Interview Results

Over 100 stakeholders representing each sector relevant to GridWise took part in the interview process, contributing to increasingly refined and increasingly consensual statements.

The interviewed stakeholders represent a relatively balanced mix of the various sectors related to GridWise: energy/electricity generation, transmission, distribution; commercial & residential buildings; information technology and telecommunications; industrial systems control; and markets, trading, economics & the regulatory environment, as summarized in Figure 3. They also represent a spread of levels of knowledge and expertise, from CEOs and CTOs to chief architects, project managers, and energy managers to policy experts and commissioners.
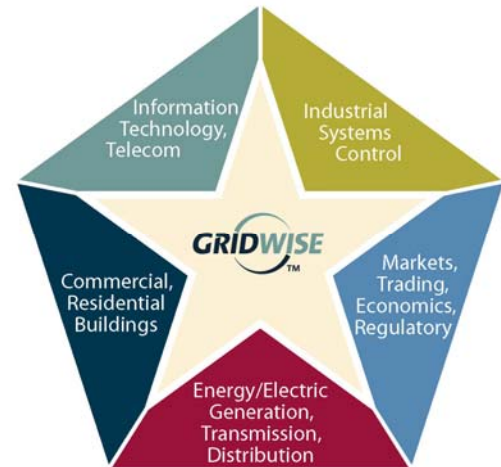
Figure 3--Industry Stakeholder Sectors

A list of stakeholders that participated in developing the Constitution Principles and in Constitution Interviews and further discussion on the representative breadth of the participants is included in the Appendix.

Interviews were led by GWAC members and supporting staff. Each interviewee indicated their degree of agreement or disagreement with each statement and was also given the opportunity to comment on each principle and provide more general comments. A predefined, standard interview form was used for each stakeholder interview. The interview form allowed interviewees to express their degree of agreement or disagreement with the Statements of Principle through a color-based voting scheme and to provide additional comments. Further details describing the interview methodology and the interpretation of results are provided in the Appendix.

In the final iteration, about one third of the interviewees voted in agreement or strong agreement to 90% or more of the statements, as summarized in Figure 4. About 80% of the interviewees were in agreement or strong agreement with 80% or more of the statements: this would indicate very strong consensus in support of these principles.

This process of voting by color provided intermediate results in ordered matrices, as illustrated in Figure 5 below. This matrix and other similar compilations of results allow a quick visualization of the degree of agreement and disagreement with statements and of areas receiving general consensus or receiving divergent responses.
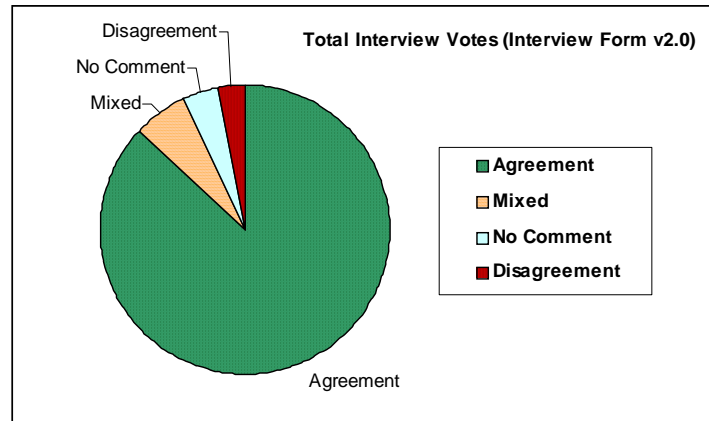
Figure 4--Clear Majority of Agreement with Constitution Principles

In addition to gathering stakeholder reactions to the Constitution Principles, their general comments were also recorded during the interviews and compiled in a database of results. A sample of these comments is presented in the Appendix.
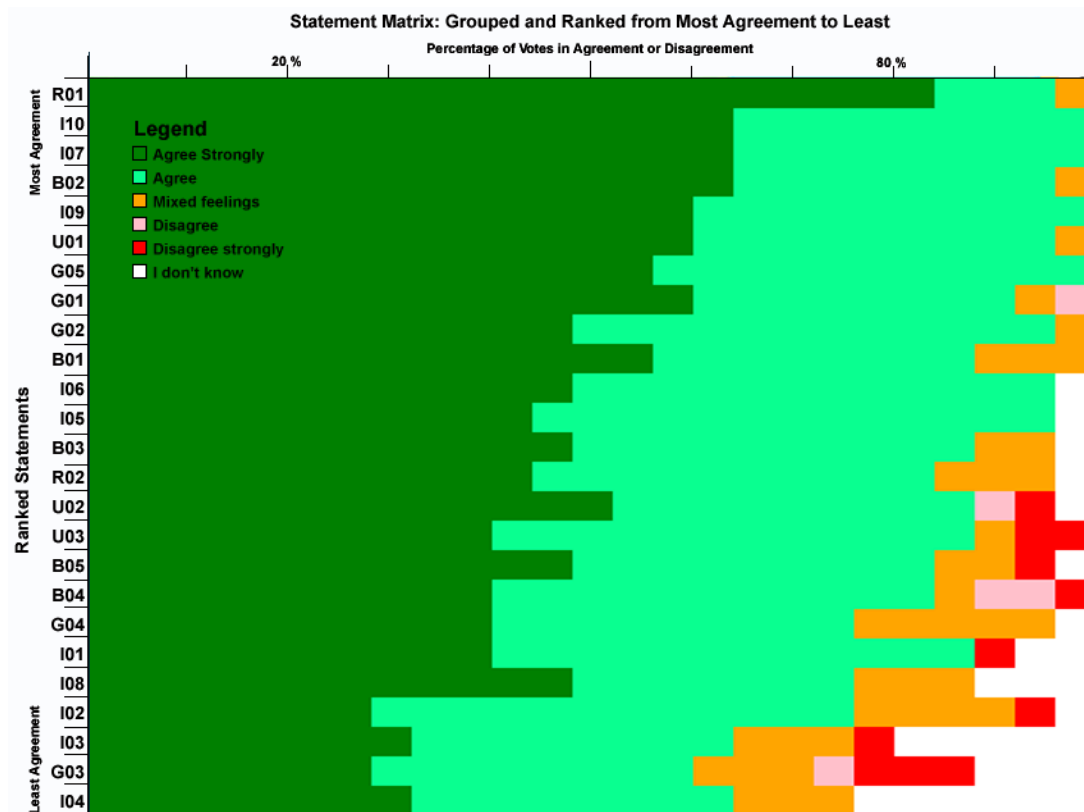
Figure 5--Example of Color-Coded Matrix of Interview Results

Outcome of the Constitution Interviews

Through approximately 100 stakeholder interviews, the process that led to the Interoperability Constitution proved to be fruitful on many levels. Some general observations of the GWAC resulting from the process are:

- While some segments have strong visions, the North American grid industry as a whole does not have a common vision

- Seamless, effective interoperability is not being widely worked across industry segments

- Many segments do not know what other segments are doing and are thus not aligning for interoperability.

The iterative refinements of the initial Statements of Principle resulted in a set of principles, the Interoperability Constitution, which, although not perfect, was deemed mature enough to engage a wider audience at the Constitutional Convention [3]. Quoting Benjamin Franklin (speaking of the United States Constitution), "In these sentiments, Sir, I agree to this Constitution with all its faults…"[4]. Following this principle, delegates to the Constitutional Convention shared in a symbolic signing of the Constitution, pledging to promote and improve the statements and the objectives they serve.

The comments provided by each interviewee provide an abundance of insight into issues facing power system modernization. As a starting point in mining and leveraging this wealth of insight, four key areas were addressed by breakout sessions at the Constitutional Convention and are expected to be areas of ongoing progress for Constitutional Convention breakout group participants and the GWAC [5].

Because the Constitution strives for long-term (30 year) longevity, it will remain a work in progress. Next steps building upon this basis will include:

- addressing Constitution management and continued use of this basis for building and broadening consensus

- addressing immediate actions identified during the Constitutional Convention breakout sessions in the areas of Technologies, Public Policies, Constitution Governance, Business and Industry Models

- progress toward next community building events.

References

1. GridWise™ Architecture Council, "GridWise Architecture Council Interoperability Constitution Whitepaper," October 2005. (http://www.gridwiseac.org).

2. GridWise™ Constitutional Convention, "GridWise Architecture Council Concludes Successful Constitutional Convention with Wide Cross-Industry Support," December 2005. (http://www.gridwise.com/downloads/2005-1214_Post_Event.pdf).

3. Rik Drummond, "GridWise Constitutional Convention Opening Session Presentation," December 6, 2005. (http://www.gridwise.com/Downloads/RikDrummond.pdf).

4. James Madison, "The Debates in the Federal Convention of 1787," September 17, 1787. (http://www.constitution.org/dfc/dfc_0917.htm).

5. GridWise™ Constitutional Convention, "GridWise Constitutional Convention Proceedings," February 2006. (http://www.gridwise.com/downloads/).

Appendix

Interviewee List and Representation Chart

We have aimed at interviewing key stakeholders representing a balance of sectors and expertise. A qualitative estimate of the mix of expertise of each interviewee in each of six general areas is summarized in the radar diagram below in Figure 6. The target line provides a simple, general reference where each area aside from Power has equal representation. The power area target is twice that of the other areas.

The interviews cover experts in each of the six areas, Power (energy/electric, generation, transmission, distribution); Markets (market, trading, economics); Buildings (home, residential, commercial, buildings); Industrial Systems (industrial controls, processes); IT—Telecom (information technology, telecommunications); and Regulatory (regulatory, policy). As targeted, the area with the most representation is Power, with strong representation in the IT, Regulatory, and Markets sides. There was slightly less expertise in Industrial Systems Control area among interviewees.
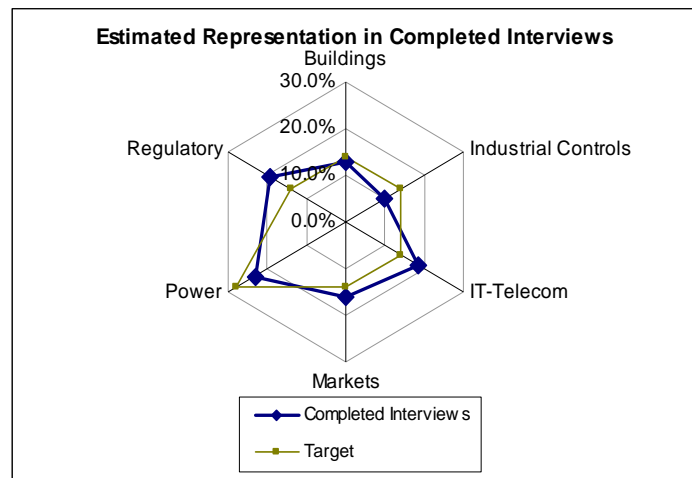
Figure 6 - Stakeholder Industry Sector Representation

This provides us with a qualitative confirmation that the interviews in this phase have reached a relatively broad and balanced set of stakeholders. Other factors have also been considered in determining which stakeholders to interview, including representation from key industry groups (utilities, Independent System Operators and Regional Transmission Operators, standards developing groups, trade groups…) and including representation from a variety of technical/leadership levels (from software engineers to Chief Information Officers to Chief Executive Officers…).

The list of interviewees as of January 2006 is provided below. All interviewees were asked whether their names could be cited as participants in this process (stakeholder names are excluded from this list where express permission was not clearly stated). Stakeholder reactions represent their individual opinions as experienced professionals, and do not necessarily represent the points of view of the organizations for which they work.

Stakeholders Interviewed[1]

Brian	Adkins	Legislative Director - Telecom	National Association of Regulatory Utility Commissioners (NARUC)
Ron	Ambrosio	Manager, Internet-scale Control Systems	IBM T.J. Watson Research Center
Ray	Bell	Chief Technology Office	Silver Spring Networks
Jack	Bernhardsen	Director	Pacific Northwest Security Coordinator
Jesse	Berst	President	Center for Smart Energy
Gilbert	Bindewald	Program Manager, GridWorks	Department of Energy
John	Boot	Director of Standards	Current Technologies
Jay	Britton	Principal Architect	AREVA-Transmission and Distribution
Dick	Brooks	Chief Architect	ISO New England
Anto	Budiardjo	CEO	Clasma, Inc
Ralph	Cavanagh	Energy Program Co-Director	National Resources Defense Council (NRDC)
Sunil	Cherian	President	Spirae
Francis	Cleveland	Vice President	Utility Consulting International (UCI)
David	Cohen	Acting CEO and Chief Technical Officer	Infotility
Carrie	CullenHitt	Vice President of Government and Regulatory affairs	Constellation New Energy
Suresh	Damodaran	Senior Software Architect	Sterling Commerce
Joyce	Dasch	Power Marketing Manager	Emerson Process Management, Power & Water Solutions
Paul	de Martini	Manager	Southern California Edison (SCE)
Arnold	de Vos	Director and Principal Consultant	Langdale Consultants
Dick	DeBlasio	Principle Program Manager	National Renewable Energy Laboratory (NREL)
Dan	Delurey	Co-Chair DRAM, President	Wedgemere Group
Joe	Desmond	Chairman	California Energy Commission (CEC)
Jim	Detmers	Chief Operating Officer	California ISO (CAISO)
Rik	Drummond	CEO and Chief Scientist	Drummond Group
Ross	Dueber	VP, Strategic Planning & Platforms	Emerson Electric
Michael	Dworkin	Chairman of Transition Cases for VPSC	Vermont Public Service Commission
Paul	Ehrlich	President	Building Intelligence Group
Fred	Elmendorf	Manager Specialist for PQ in TPS	Tennessee Valley Authority (TVA)
Albert	Esser	Chief Technology Officer	Emerson Network Power
Mike	Florio	Senior Attorney	The Utility Reform Network
Hal	Gentry	President & CEO	GridLogix
John	Gillerman	Project Manager	Systems Integration Specialists Company (SISCO)
Greg	Goldasich	Manager	Southern California Edison (SCE)
Ed	Gray	Director, Energy Infrastructure	National Electrical Manufacturers Association (NEMA)
Dian	Grueneich	Commissioner	California Public Utilities Commission
Erich	Gunther	Chief Technology Officer	EnerNeX
Randolph	Haines	Energy Manager	Thomas Jefferson University
Stephanie	Hamilton	Distributed Energy Resources Manager	Southern California Edison
Steve	Hauser	Executive Director (Alliance) / Director (SAIC)	GridWise Alliance and Science Applications International Corporation (SAIC)

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[1] Note that this list only includes participants that provided their permission to publish their names as participants. Additional stakeholders were interviewed and participated in Constitution briefings. Architecture Council members are included in this list as stakeholders involved in the overall process, although interview results for the members are not included in the voting data.

Stakeholders Interviewed[1]

Mike	Henderson	Director, System Planning	ISO New England
Kevin	Heslin	Editor	Energy & Power Management
Dave	Hoffman	Managing Director	CSE Ventures
Susan	Horgan	President	Distributed Utility Associates (DUIT)
Russ	Housley	Security Area Director for the IETF, Owner Vigil Security	Internet Engineering Task Force (IETF), Vigil Security
Joe	Hughes	Senior Project Manager	Electric Power Research Institute (EPRI)
Geoff	James	Principal Research Scientist, CSIRO ICT Centre	Commonwealth Scientific and Industrial Research Organisation (CSIRO, AU)
Jim	Jimison	General Counsel/Exec Director	U.S. Combined Heat and Power Association (USCHPA)
Brad	Johnson	President	A Energy Ventures
Larsh	Johnson	CTO	eMeter Corporation
Bill	Keese	former chair	California Energy Commission (CEC)
Lynne	Kiesling	Director, Center for Applied Energy Research & Senior Lecturer	International Foundation for Research in Experimental Economics (IFREE) & Northwestern Univ.
Kalvin	Kobayashi	Energy Coordinator	County of Maui, Department of Management
Jim	Lee	CEO	Cimetrics
Eugene	Litvinov	Director Business Architecture & Technology	ISO New England
Jim	Luth	Technical Director of the OPC Foundation	ICONICS
Joel	Malina	Executive Director (& Managing Director)	COMPETE (& Wexler & Walker Public Policy Associates)
Ross	Malme	CEO	RETX Energy Services
Anthony	Mazy	Utilities Engineer	California Public Utilities Commission
Dr. Mike	McCoy	VP Research	Becker Capital Mangement
Jack	McGowan	President	Energy Control Inc
Gary	McNaughton	MultiSpeak Leader	National Rural Electric Cooperative Association (NRECA), Cornice Engineering
Nora	Mead Brownell	FERC Commissioner	Federal Energy Regulatory Commission (FERC)
Gerry	Meade	Executive Director	Canadian Construction Innovation Council
Molly	Melhuish	Energy Analyst and Sustainability Specialist	Wellington
Dave	Meyers	Policy	DOE Office of Energy Efficiency and Renewable Energy
Mark	Miller	Head of System Operations Planning and Performance	National Electricity Market Management Company (NEMMCO) Australia
Terry	Mohn	IT Strategic Architect	San Diego Gas and Electric
Mike	Montoya	Director of Engineering Advancemen	Southern California Edison (SCE)
Bill	Muxton	Manager of Research and Development	TXU Energy
Brad	Nacke	Gov Bus Mgr	Liebert
Aaron	Nahale	CEO	SetPoint Systems
Bernie	Neenan	Vice President	Neenan Associates/A UtiliPoint Company
Scott	Neumann	CTO	Utility Integration Solutions (UISol)
Nicholaus	Noecker	World Wide Industry Architecture, IBM Software Group	IBM
Terry	Oliver	Chief Technology Innovation Officer	Bonneville Power Administration (BPA)
Dick	O'Neill	Chief Economic Advisor	Federal Energy Regulatory Commission (FERC)
Lars Ola	Osterlund	System Engineer	ABB

Stakeholders Interviewed[1]

Phil	Overholt	DOE Transmission and Distribution Program	DOE
Joe	Paladino	Business Area Coordinator	DOE
Mark	Palmer	Project Manager	National Institute of Standards and Technology
John	Petze	CEO and Director Business Development and Energy	Tridium, Inc.
Walt	Pfuntner	Manager - Enterprise Architecture and Technology Innovation	New York ISO
Mike	Pinter	BPI/IT Executive	Southern California Edison (SCE)
Ed	Riley	Director of Regional Coordination	California ISO
Jeff	Robbins	President and CEO	LiveData
Bob	Saint	Principal Engineer, Technical Services	National Rural Electric Cooperative Association (NRECA)
Rich	Scheer	VP	Energetics
Richard	Schomberg	VP Research & New Technologies, Chairman Int'l Electrotechnical Commission Technical Committee 8 (IEC TC8)	Electricite de France
Eric	Schubert	Senior Market Economist	Public Utility Commission of Texas
Rob	Seliger	Chair, HIMMS Integration and Interoperability Subcommittee	Sentillion
Mike	Sheehan	Vice President Technical Sales	Microplanet
Alison	Silverstein	Consultant	Alison Silverstein Consulting
Ken	Sinclair	Editor	AutomatedBuildings.com
Marsha	Smith	Commissioner	Idaho Public Utility Commission and National Association of Regulatory Utility Commissioners
David	Sun	Chief Scientist	AREVA Transmission and Distribution
Roger	Sutton	Chief Executive Officer	Orion New Zealand
Brian H.	Tolley	Director	Brian Tolley Corporation
Wade	Troxell	Associate Professor and Associate Department Head	Colorado State University
Vickie	VanZandt	Sr. VP Transmission Business Line	Bonneville Power Administration
Ken	Wacks	President	Kenneth Wacks Home and Building Systems
Dan	Walsh	General Manager of IT Application Services for T&D	Southern California Edison
Don	Watkins	Manager, Operating and Scheduling Practices	Bonneville Power Administration
Andrew	Watson	Architecture Board Chair	Object Management Group
Peggy	Welsh	VP	Consumer Energy Council of America
Eric	Wong	Manager, Business Development and Government Relations	Cummins West Inc.
Thomas	Yeh	VP and Chief Technical Officer	Connected Energy

Interviewing Voting Method

A predefined, standard interview form was used for each stakeholder interview. Interviews were conducted face-to-face (or via telephone) using a uniformly defined procedure. The interview form served several functions:

- to provide a controlled, uniform format and structure for all interviews
- to provide uniform background information about the GridWise vision and about the GridWise Architecture Council
- to present the context, objectives and methods behind the GWAC Constitution
- to gather basic information characterizing each interviewee, their areas of expertise and sectors of work
- to allow each stakeholder to provide his or her general 'vote' of agreement or disagreement on each statement as well as comments when desired
- to provide room for more open-ended comments where desired.

After compiling the results of the initial phase of interviewing, the Statements of Principles were refined and edited to respond to feedback from the interviews. These edited Statements of Principle (as appear in the current Constitution) were integrated in the interview forms for the final phase of interviews.

Colored Voting Methodology

A color-based voting form was developed to gather stakeholder general feedback on Constitution statements. Similar color-based methods of polling to facilitate decision-making in groups have been widely used for at least two decades in international management consulting. This method relies on a preliminary list of priorities or themes (like the GWAC Constitution statements) first being assembled, with voters then scoring each along a multi-point 'traffic light' color array (Green = positive; red = negative; three shades in between). Results are entered into a database and presented as a detailed color chart recording each interviewee's opinion. This information is then processed to aggregate the colors on each issue (or statement) and to rank them on the basis of the amount of green or red recorded (those issues with the most green votes are ranked top). Results can be projected on screen in real time, thus facilitating discussion.

The 'votes' of each interviewee for each statement (indicating strong agreement, agreement, mixed feelings, disagreement, strong disagreement, or 'I don't know') were compiled in numerical format in a database. Descending numerical values are assigned to each type of vote, so the results could then be sorted in various ways for analysis.

Colored voting is said to appeal to a different side of the brain than number based voting schemes, being relatively intuitive; similar to the use of standard traffic signal colors to intuitively convey levels of security or danger. The color voting scheme used here is:
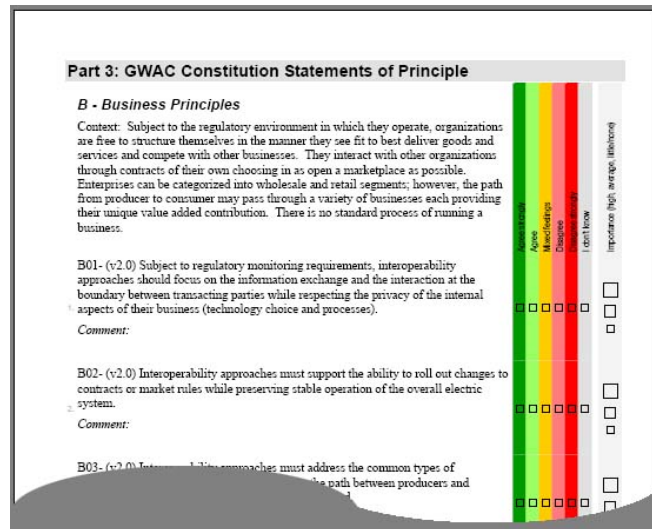
- Dark Green → Strong Agreement
- Light Green → Agreement
- Orange → Mixed Feelings
- Pink → Disagreement
- Red → Strong Disagreement
- White → 'I don't know'

This representation of the results gives a general visual impression of the amount of green (agreement) or red (disagreement)—qualitatively a first glance shows considerable agreement, with some dispersed disagreement or lack of understanding ('I don't know).

Ordering and grouping the results in various ways provides additional insight in the 'Stakeholder Matrix' and 'Statement Matrix' below.

Interviewees also indicated the relative importance of each statement (high, average, or little/none).

Figure 7 presents an extract from the interview form, showing how the colored voting was presented to interviewees.

Figure 7 - Example of Interview Form

Interview Results

Stakeholder Matrix

Each vertical column in Figures 8 and 9 below tallies the colored votes from each interviewee, organized from left to right with the interviewees showing the most agreement and understanding to the left and those showing the most disagreement and most "I don't know" votes to the right. Figure 8 tabulates the votes from the final phase of interviews, which was led after a few iterative sequences of interviewing, integrating feedback, and refining the Statements of Principle. Figure 9 assembles the results from all interviews, using both the final and intermediate versions of the Statements of Principle.[2]

Figure 8 – Ordered Matrix of Voting Results per Stakeholder Interviewed, Final Round of Interviews

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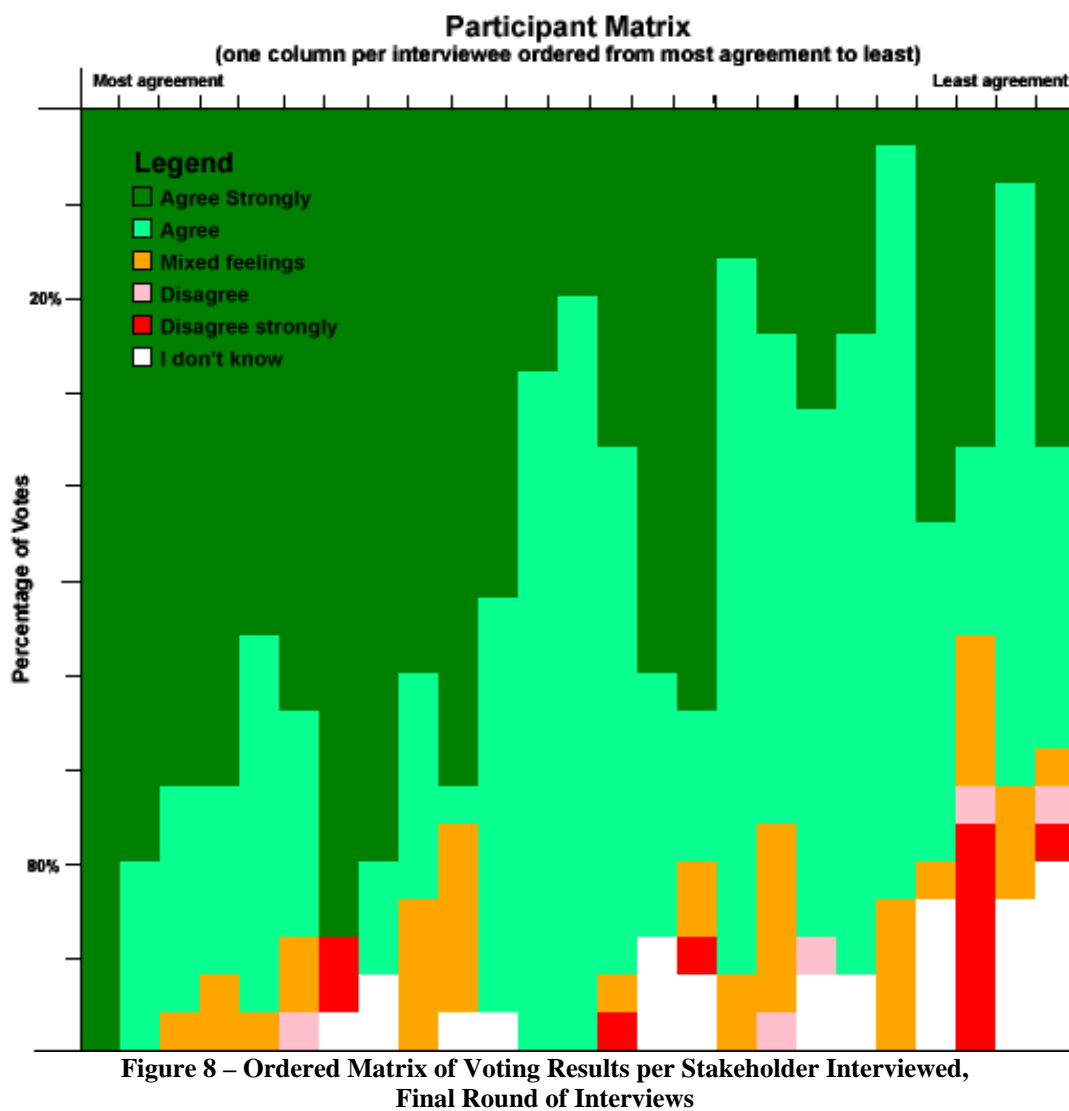
[2] Three interviews are excluded from these figures because the data was incomplete and could thus not be tabulated in this format.

Globally speaking, about one third of the interviewees voted in agreement or strong agreement to 90% or more of the statements in the. About 80% of the interviewees were in agreement or strong agreement with 80% or more of the statements; this would indicate very strong consensus in support of these principles.

All interviews gave strong or general agreement to the majority of the statements. One interviewee (at the far right in Figure 9), answered "I don't know" to close to half of the statements, but on average, there were relatively few "I don't know" responses.

Participant Matrix -- All Interviews
(one column per interviewee ordered from most agreement to least)
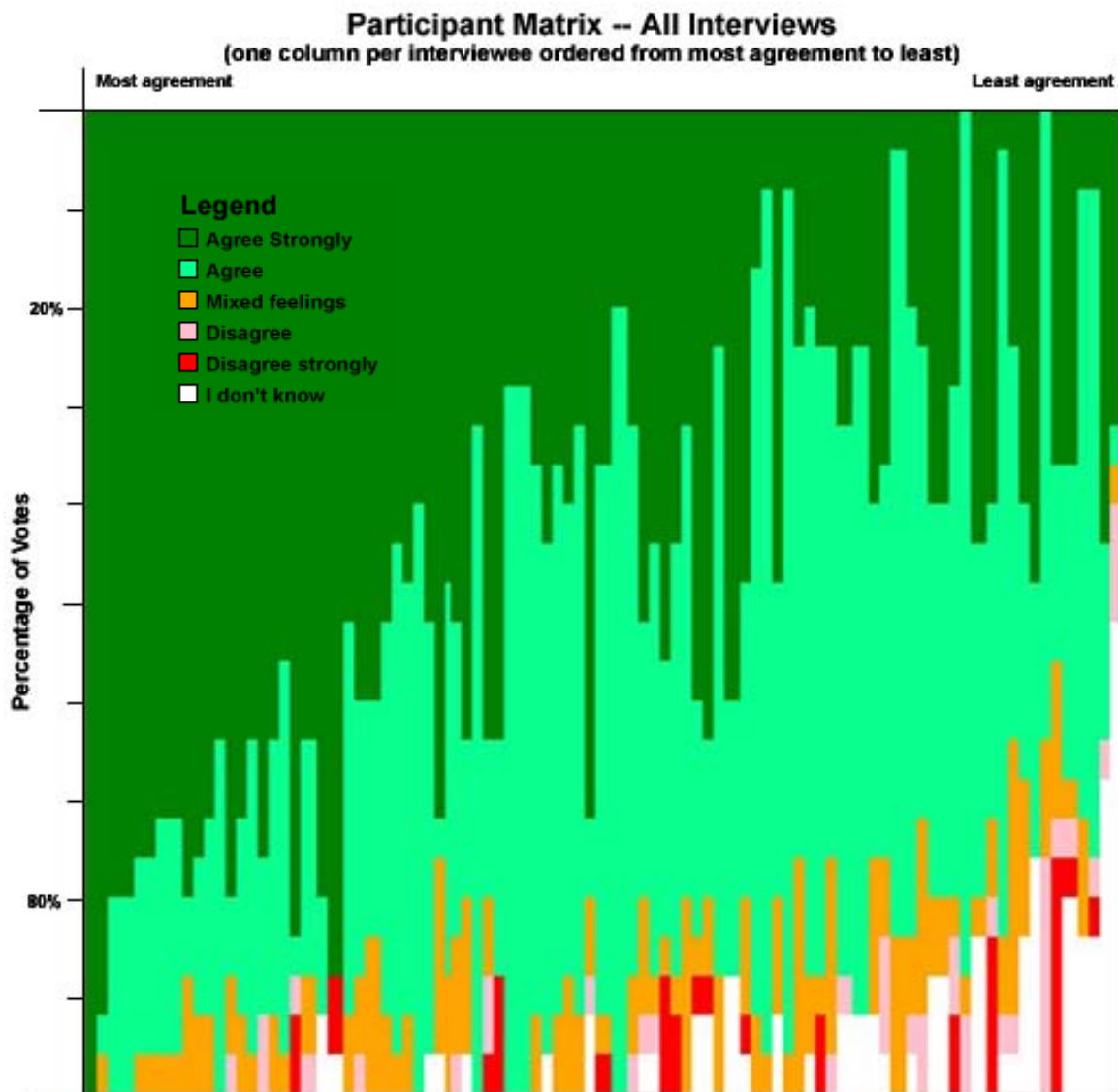
**Figure 9 – Ordered Matrix of Voting Results per Stakeholder Interviewed,
All Interviews**

Statement Matrix

The colored matrix in Figure 9 below compiles all of the votes on each Statement of Principle on each horizontal row and orders them from the statements receiving the most agreement (green and dark green) at the top to those receiving the most disagreement (pink or red) or lack of understanding (white) at the bottom. This chart tabulates the votes from the final phase of interviews, which was led after a few iterative sequences of interviewing, integrating feedback, and refining the statements. Most statements received a large majority of votes of agreement and strong agreement. A few solicited some mixed feeling or disagreement, with statement G03, "The governance of this Constitution must be independent of any particular standards organization and preserve the technical neutrality of these principles," drawing the most dissension (nevertheless two-thirds voted in agreement or strong agreement). Some statements, in particular I03 and I04 (information technology principles), solicited a number of "I don't know" responses, indicating that they may be out of the technical realm of a portion of the stakeholders interviewed.

Globally speaking, those with a relatively larger portion of orange, pink and red show more contention and may indicate issues that merit further discussion and clarification. Those with a relatively larger percentage of white votes are either unclear or represent subjects that some interviewees felt unqualified to address (such as the more technical information technology principles, which some participants felt were not within their domain of competence).

Statement Matrix: Grouped and Ranked from Most Agreement to Least

Percentage of Votes in Agreement or Disagreement

R01	Interoperability strategies and issues must be communicated in a form to be understood by regulators and policy makers.	
I10	A broadly held interoperability strategy can help organize and advance the large scale integration of automated equipment, business processes, and human interactions.	
I07	An interoperability framework must address information system security and privacy concerns, balance them appropriate to the service provided, and support adaptation to future risks.	
B02	Interoperability approaches must support the ability to roll out changes to contracts or market rules while preserving stable operation of the overall electric system.	
I09	An interoperability framework must be practical and achievable: Meets performance requirements; Is reliable; Is scalable; Has sufficient breadth to meet the range of business needs.	
U01	Interoperability approaches should address the technical capabilities needed to support the emergence of markets for consumers to choose the appropriate electricity service program they desire.	
G05	These long lived statements of principles and the strategic approaches that derive from them must be able to change through time in a prudent, controlled manner.	
G01	An interoperability framework must consider the needs and views of the full range of stakeholders in an integrated view of the electric system.	
G02	Governance processes should measure successes and shortcomings of the interoperability framework, and drive improvement.	
B01	Subject to regulatory monitoring requirements, interoperability approaches should focus on the information exchange and the interaction at the boundary between transacting parties while respecting the privacy of the internal aspects of their business…	
I06	Interoperability strategies shall address the ability to set up (i.e., discover and configure) system components so they can join, modify (e.g., upgrade), and terminate their positions in the system.	
I05	Interoperability strategies shall address time synchronization, sequence of events, time tagging, and other requirements related to time as appropriate to the service provided.	
B03	Interoperability approaches must address the common types of marketplace transactions among parties along the path between producers and consumers appropriate to the level of service provided among parties along the path between producers…	
R02	Interoperability approaches among organizations must allow regulators the ability to verify that business is conducted within established rules and that all relevant transactions are auditable among parties along the path between producers and consumers.	
U02	In the event of a communications failure between interacting parties, the parties must assume operating positions that best preserve stable operation of the overall electric system.	
U03	Interoperability strategies should be communicated in appropriate ways that can be understood and adopted by all stakeholders in the electric system.	
B05	Interoperability approaches must support verification and auditability of transaction completion and be able to validate that contract terms have been met.	
B04	Interoperability approaches must consider implementation costs/benefits and impacts to the parties involved in the transaction.	
G04	With regard to encouraging standards and standards development, the governance of this Constitution: Will encourage development of standards where appropriate to Constitution objectives and work with existing groups to guide standards development…	
I01	A broadly held interoperability strategy can help organize and advance the large scale integration of automated equipment, business processes, and human interactions.	
I08	As appropriate to each interaction, an interoperability framework should address strategies for e-business transactions that may include creation of a transaction, negotiation, scheduling, operations, settlement, billing and financial transfers.	
I02	Strategies for interoperability shall adopt the broadly applicable best practices of information science to improve end to end performance of both business and the electric system's operation and managerial processes.	
I03	An interoperability framework shall address a strategy for the identification of system entities beyond organizational boundaries to ensure unambiguous interactions, and shall support the naming of groups or collections of system entities.	
G03	The governance of this Constitution must be independent of any particular standards organization and preserve the technical neutrality of these principles.	
I04	An interoperability framework shall incorporate information modeling approaches that define the shared meaning and relationships of entities and concepts applicable to interactions in an area of industry or commerce.	

Figure 10 - Ordered Matrix of Voting Results per Statement of Principle

Stakeholder Comments on Statements and in Response to General Questions

Interviewees were encouraged to state any questions they had regarding the Constitution process and its purpose, and general remarks they made were noted. Throughout the interviews, stakeholders were invited to provide comments they had on any particular Statement of Principle.[3] Furthermore, four general questions were asked at the end of each interview:

- *How do you interact with the power system (if at all)?*
- *If we had to solve one problem to make the electric power system better, in your view, what would that be?*
- *Related to the context of this interview, what are your primary concerns or issues you contend with on a day-to-day basis?*
- *Related to the context of this interview, what are your long-term concerns (inhibitors, barriers…)?*

Comments regarding statements of principle were used to clarify and refine the statements. These comments along with the general comments were also used to help design the GridWise Constitutional Convention breakout sessions and to consider whether additional statements of principle were needed. Further insight could be gained through additional analysis of these comments; for example, by analyzing response patterns from different stakeholder groups or by analyzing the comments in light of the results from Constitutional Convention breakout groups.

Table A-1 below provides a sampling of responses to the general interview questions.

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[3] All comments are presented anonymously in this report and data spreadsheets. Please contact Architecture Council administrators to request permission to attribute any specific comment to its source (AC administrators can contact the interviewee in question to request permission to cite).

Table A-1—Sampling of Responses to General Interview Questions
How do you interact with the power system (if at all)? • "I represent the views of professionals working on convergence of buildings systems and IT and therefore by implication convergence of this technology, which represents 50% of electricity use in the U.S., with the grid." • "It's my job. Operations policy focus, including some tariff issues…Has reliability responsibilities for the California wholesale electric grid." • "Strictly from a policy perspective...I work with stakeholders such as legislative and regulatory on public policy issues from the consumer perspective. No new electric power policy will be enacted if consumer benefits are not carefully articulated." • "[I have] 30 years of experience in charge of power grid operations. [I have] been in charge of all substation operations. Now [I am] responsible for developing and deploying innovations to improve the electric grid and to make it safer, more reliable, and more cost-effective." • "As a supplier of distributed control systems for power generating plants, our interaction is related to providing operational availability, reliability, efficiency and performance to a power generating unit. In addition, our control systems interact with the power system by being the originator of real time power plant process and operational data that is fed to other systems in the enterprise for electricity dispatching, plant performance monitoring, predictive maintenance, etc." • "I regulate it, we now have responsibility for reliability. Looking at how to integrate demand side options, at some point." • "Representing the County of ___, I interact with the power system as a consumer, as a member of the electric utility's IRP Advisory Group, and as an intervener/participant in regulatory proceedings before the PUC." • "Run a distribution business, manage connections to transmission, work with 170,000 customers." • "I toast my bagel every morning, and I advise people on a regular basis on whether they are paying too much to toast."

Table A-1—Sampling of Responses to General Interview Questions

If we had to solve one problem to make the electric power system better, in your view, what would that be?

- "I believe that we've made great strides in individual technologies over the last decade or more. Our challenge now is to understand how to integrate and manage these technologies into a clean, affordable, reliable, secure and efficient system."

- "Enable better demand side responsiveness to power system conditions and prices. The system does not need to only respond to old fashioned price signals, but should be a lot more automatic and organic. Demand Response needs to be empowered to lighten dependence on supply side resources."

- "The system would have significantly more embedded dispersed intelligence so that anticipation of transients/system problems might be dealt with locally as well as centrally."

- "An active marketplace that treats demand reduction and generation on an equal footing."

- "Between entities in the electric power system, we don't know how we positively or negatively impact each other very well. For example, the ISO does not have responsibility to better integrate the overall system and to ensure adequacy of energy supply; in fact in California, no one has this authority or governance to ensure that the electric power system will meet requirements."

- "Address transmission congestion issues."

- "Development of a new platform for the EMS and Market systems that allows functional plug and play. Venders need to be specialists, not generalists."

- "…The root cause from US and world perspective, we need to reduce consumption. The key is to use this technology to reduce use and conserve resources for the long term. We also want to reduce the impact of the use on the environment, i.e., impacts of coal, nuclear, etc."

- "Put demand side on an equal footing with supply side, so that demand side can compete."

- "Create, at the demand side, full price transparency, visibility, and control. Stop looking at this as a one-way street; let's make demand fully interactive in the electric power market. That requires interoperability."

Table A-1—Sampling of Responses to General Interview Questions

Related to the context of this interview, what are your primary concerns or issues you contend with on a day-to-day basis?

- "I am afraid that this process will take too long and get too generic in an effort to please everyone. At some point it will need to take a stand on issues. Human tendency to be territorial will lead to conflicts."

- "With regard to governance, the constituency is very ignorant (not meant to be derogatory). We need re-education of all parties including employees, legislators—all parties. We need to open people's understanding. People believe things don't evolve. In fact, our world has changed and continues to."

- "Keeping critical infrastructure secure and protected are primary so that they are not vulnerable to physical or cyber attack."

- "Biggest concern: incentives are perverse. Utilities are adversely affected for customer side technologies."

- "My frustration is the regulatory process for electrical transmission and distribution is based upon who the stakeholders are in the electricity business (utilities and customers) and then entities acting as surrogates for the public (rate payer advocates) in a tug of war with each other over how much the utility will get… Manufacturers basically have no legal voice in these proceedings; they can only use 'remote control' to try to influence these processes. In the rule making context, comments can be made, but there is a lack of standing. Also hard to get manufacturers to react to policy proposals and ascertain consensus. The manufacturers, more so than utilities have down-sized, so there are not many staff experts to participate in these processes because they are busy in manufacturing details.

- "Continual lack of interoperability between products. Single one cost area repeated over and over. Everything from GIS to EMS to outage management to call centers. Similar utilities face the same problems. Built open many, many monolithic systems. Problem with advancing to newer technologies is immense cost--replacing one system involves replacing interfaces for every connected system. So they are stuck with technologies for years beyond their sustainable life. Sometimes a platform no longer even exists (e.g. SCADA systems supported by SmallTalk.) Applies to both vendor bought systems and in-house designed systems. (Software is usually operational cost; hardware can be seen as investment). Easily 200 applications running on mainframes, don't know when they can be migrated…e.g., example of merging mainframes in their merger (two companies) proved to be impractical, despite the CIS applications being developed by the same company (still not done 6 years later).

- "Business rules for markets and changes to markets are causing litigation turmoil (e.g., NICAP in New England). It would be nice if these could become like a common code of law for business agreements."

Table A-1—Sampling of Responses to General Interview Questions

Related to the context of this interview, what are your long-term concerns (inhibitors, barriers…)?

- "Money is an inhibitor. The business case, as important as this is, it is going to cost…"

- "There is a lack of knowledgeable human resources to design, modify, operate and maintain the grid. Distribution engineers don't have the tools, training or education to model the infrastructure they manage. The depth of expertise is just not there. These tools should be taught in schools."

- "Designing the market structure, interoperability structure, and regulations is, in my opinion, surprisingly analogous to writing tax code, because you have multiple parties with multiple goals, and so there needs to be a structure that I don't see in this document. That is the regulator needs to be more a party to this process rather than a person who is reported to. The regulator needs to be as integrally involved in what you are doing here as any of the other parties. I can't emphasize this strongly enough."

- "An increasing concern is that without an applicable set of standards-based specifications to reference as a minimum set of requirements, or to be used as a functionality checklist, both State and Federal regulators will authorize the deployment of networks and systems that are bound to become stranded due to obsolescence, lack of interoperability or unforeseen extensibility requirements"

- "My frustration is the regulatory process for electrical transmission and distribution is based upon who the stakeholders are in the electricity business (utilities and customers) and then entities acting as surrogates for the public (rate payer advocates) in a tug of war with each other over how much the utility will get, keeping lights on… Manufacturers basically have no legal voice in these proceedings, they can only use 'remote control' to try to influence these processes. In the rule making context, comments can be made, but there is a lack of standing. Also hard to get manufacturers to react to policy proposals and ascertain consensus. The manufacturers, more so than utilities have down-sized, so there are not many staff experts to participate in these processes because they are busy in manufacturing details."

- "Under the status quo, we can't deliver reliability with an old, tired grid. Under the new Energy Bill, if DOE implements the plan and FERC does mandatory reliability, things can improve. We will lose our competitive edge, if we do not follow GridWise-like principles."

Signed GridWise Interoperability Constitution

After each stage of stakeholder interviewing for the Constitution, the interview feedback was used to clarify and refine the statements of principle. The ultimate initial Constitution statements were presented at the Constitutional Convention and signed by delegates at the Convention.

This Constitution is presented as a living, evolving document—neither perfect, nor finalized, but sufficiently mature to engage a broader set of stakeholders and to serve as the basis for further progress on interoperability and consensus. Figure 10 presents the Constitution as signed at the GridWise Constitutional Convention in Philadelphia, PA on December 6, 2005.

Figure 11--The Signed GridWise Interoperability Constitution

Version	Date	Author	Comment
Cleared	28 Feb 2006	M. Paget	PNNL-15683
Final Feedback Summary Draft	18 Jan 2006	M. Paget	Compiled complete interview results.
Intermediate Feedback Summary	9 Aug 2005	M. Bosquet	Compiled results from first 65 interviews