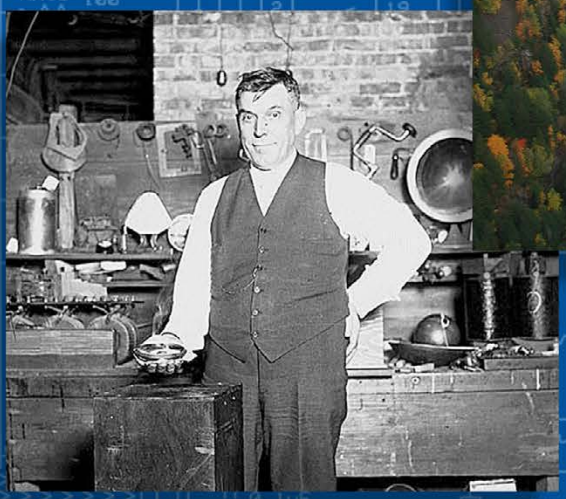
Seattle City Light

TECHNOLOGY VISION 2020



2014-2020

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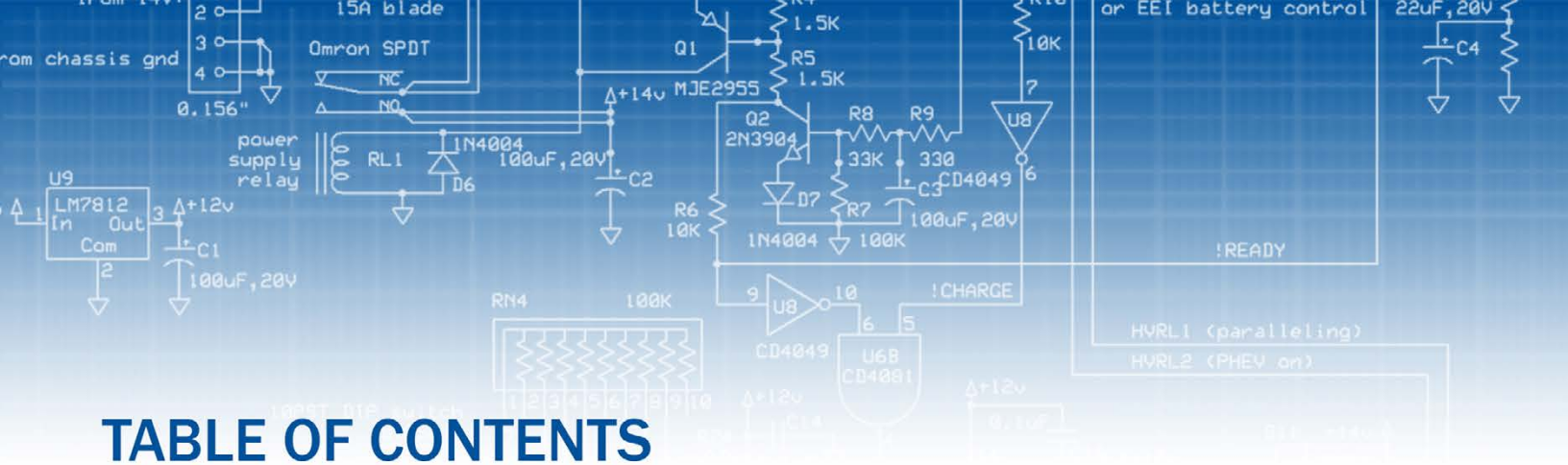

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LETTER FROM THE CIO

"Ideals are like the stars: we never reach them, but like the mariners of the sea, we chart our course by them."
— Carl Schurz, secretary of the interior under President Rutherford Hayes (1871-1877)

In March 1902, voters approved a bond to construct a municipal power plant on the Cedar River. Businessman J.D. Ross took immediate action. He walked into the office of City Engineer Reginald Thompson and asked to design and build the new plant. Two weeks later Ross returned to Thomson's office with blueprints. The rest is history.
In May 2012, Seattle City Light published its six-year strategic plan addressing crucial challenges such as an increasing customer demand for efficiency and conservation, an aging infrastructure, growing security and compliance regulations, as well as a wave of knowledge loss through retirement.

This is where the two stories merge and basic principles of good engineering bridge a 110-year span. To cope with the technological challenges of the new millennium, City Light needs a blueprint that allows the stepwise construction of an interlocking technology architecture – connecting employees and customers.

Starting in the 1960s with payroll and billing applications, information systems, computers, and communication have now reached all aspects of City Light. Almost every employee touches a keyboard daily. Many can not do their work if "the computer goes down." Technology now shares this wide reach with Finance and Human Resources, which are an integral support function for every major business process in the utility.

With the projects and initiatives from the 2013-2018 Strategic Plan to mitigate these challenges well underway, the need for a solid technology blueprint that integrates systems and data becomes a critical success factor. The large majority of strategic projects have a technology component. While in previous decades technology could be managed in an insular, self-contained fashion, the permeation of computers, micro-processors, controls, internet, and communication networks has fused standalone systems into a connected technology landscape.

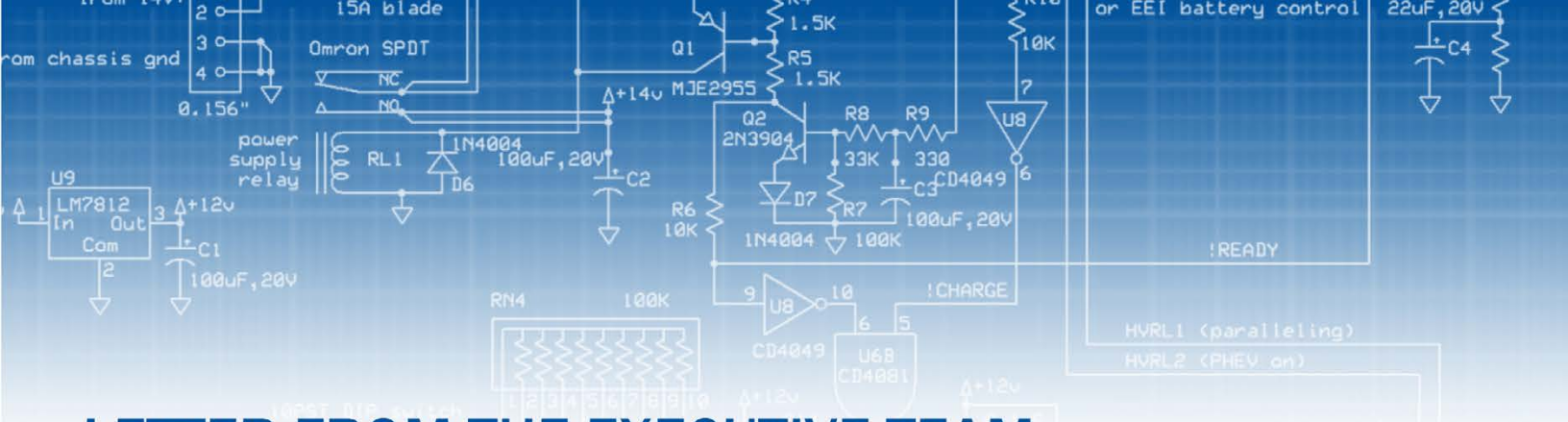
At the core of this Vision 2020 document is the technology blueprint and the strategic initiative projects it integrates. This blueprint is designed to provide the successful foundation for the new solutions we already envision, while keeping the door open to innovative technologies yet to come.

We have looked to the past, not just for engineering inspiration, but also to understand how to create technological success in the culture of City Light. We hope that you can find an avenue to contribute to the success of City Light through the implementation of a well coordinated blueprint.

Sincerely,

Dirk Mahling

Dirk Mahling, Ph.D.
Chief Information Officer



LETTER FROM THE EXECUTIVE TEAM

In 2012 Seattle City Light published its first strategic plan, covering the years 2013 through 2018. The first year into this plan has seen a host of activity and led to our first update – now extending into 2020. With this extension and many strategic initiative projects underway, a solid technological foundation is both timely and critical. Technology Vision 2020 provides this foundation for City Light. It accommodates many different technological needs and also ensures that they work well together. The framework is also scaleable, allowing us to make tactical optimizations as we progress along our path.

Every officer at City Light owns projects and initiatives as part of the strategic plan that contain elements of information technology, network communications systems, data storage, or microprocessor-based controls. Knowing that these technology needs are well integrated and that technology projects are successfully delivered gives us the confidence to make needed investments and concentrate on the business goals and processes of City Light. This helps every one of our customers and employees obtain the information they need and facilitates "anytime/anywhere" access to the tools that deliver it (e.g., OMS, WAMS, GIS).

Seattle City light is entering an exciting future securing its position as the greenest utility in the country, winning customer service awards, and leading the way in the use of innovative technologies for our customers and the environment. We also face crucial challenges on the road ahead. They demand that we efficiently and effectively coordinate information-based technologies across business operations as enterprise-wide enablers. Technology Vision 2020 has been specifically crafted to address this demand and contribute to the overall success with our strategic plan — all the way to 2020 and beyond!

Sincerely,

Jorge Carrasco
General Manager &
Chief Executive Officer

James Baggs
Internal Compliance Officer

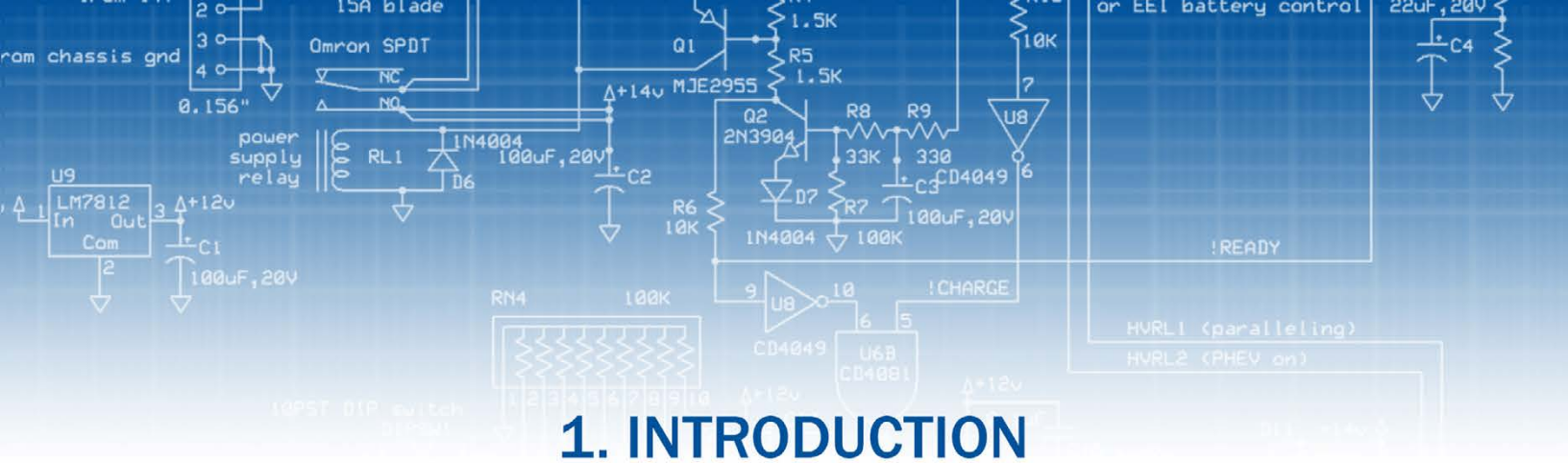
Jeffrey Bishop
Chief Financial Officer

Sephir Hamilton
Chief of Staff

DaVonna Johnson
Human Resources Officer

Michael Jones
Power Supply &
Environmental Affairs Officer

Philip West
Customer Service &
Energy Delivery Officer



1. INTRODUCTION

Technology must perform as an enterprise-wide enabler.

Aligned with its mission, Seattle City Light's 2013-2018 Strategic Plan centers on meeting and exceeding customers' expectations into the next decade and for many years ahead. It addresses crucial challenges, including: increasing customer demands for efficient and cost-effective service; an aging infrastructure that no longer meets current needs; rising power, debt service, and compliance related costs; and approximately half of its skilled, experienced workforce eligible for retirement within the next five years.

MISSION

Seattle City Light (SCL) is a publicly owned utility dedicated to exceeding our customers' expectations in producing and delivering environmentally responsible, safe, low-cost, and reliable power.

Seattle City Light's (SCL) Strategic Plan points to the need for strategic investments that are critical to City Light's future success. These systemic concerns demand urgent attention to support increasing customer demands around rate
predictability, paying bills, conserving energy, and access to "anytime/anywhere" service.

Every organizational area within the utility plays an important role in serving SCL's mission and implementing the directives articulated in its Strategic Plan. Fiscal and human resources, power generation, transmission, and distribution management efforts must respond holistically to this strategic call to action. Similarly, technology — which supports attendant information needs and serves as a conduit of that information for internal and external customers — must perform as an enterprise-wide enabler to streamline service, improve workflow, and enhance integration across all lines of business operations.

Akin to SCL's core utility infrastructure that is approaching obsolescence, approximately 80% of City Light's business software systems must be replaced within the next six years, and deferred investments in enterprise resource planning (ERP) and operational systems must also be addressed within this same time frame. Historically, information technology (IT) products and practices were insular and proprietary, targeted as specific solutions to disparate business needs. Those days are over. A sea change has occurred, and legacy-based IT "islands of information" now touch one another across the enterprise. Operational technology (OT) has also grown and evolved, forging an IT-OT convergence that no longer treats a variety of related technologies separately (e.g., communications, controls, microprocessors).

This document presents a business-driven approach to guiding the deployment of computing resources at SCL into the next decade and beyond. It offers a vital technology blueprint that is fundamental to supporting SCL's strategic imperatives.

Technology Vision 2020 charts a clear course that:

- Aligns all process and systems
- Connects strategic initiatives projects with existing systems
- Ensures compatibility and supports convergence of IT and OT solutions
- Ensures data integrity and efficiency
- Addresses cyber security demands
- Guides future system purchases, offering protection from siloed investments
- Reduces costs and risk

2. LESSONS LEARNED

Technology Vision 2020 must address the lessons learned from prior technology planning initiatives.

To be truly successful, Technology Vision 2020 must address the lessons learned from prior technology planning initiatives. As the American philosopher George Santayana noted: "Those who cannot remember the past are condemned to repeat it." Accordingly, this chapter reviews the outcomes of City Light's 2000 and 2008 strategic information technology plans, as well as a series of interviews conducted with selected internal SCL business partners regarding their impressions of those previous plans.

While these two prior planning efforts yielded some very tangible improvements – including the implementation of enhanced automation for customer service (CCSS), outage management (OMS), and work management (WAMS) functions – a large number of critical projects were only partially deployed or never implemented at all. Many of these initiatives also tend to resurface from one planning cycle to the next (e.g., disaster recovery, security, field automation, and document management), signifying long-term trends that remain unaddressed or take longer than one planning cycle to implement.

Some of the causal factors surrounding this situation are beyond the grasp of technology's reach alone. These issues include changes in SCL leadership and strategic direction, nationwide economic downturns with attendant fiscal constraints, and resistance to change that is endemic to many organizational cultures.

However, several other factors clearly can and must be addressed by Technology Vision 2020. Ineffective technology governance and inadequate stakeholder communication surfaced as key barriers in the majority of interviews conducted. Historically, governance has focused on technology at a project-specific basis – lacking a cohesive, programmatic approach that cuts across business units, enhances cross-functional workflow, and facilitates information access. SCL also has lacked a disciplined approach to project management, characterized by insufficient role clarity among technical and business representatives, inadequate funding for operations and maintenance (O&M), scope creep, limited quantifiable benefits realization assessment, and insufficient attention to change management.

The following page presents a summary of outcomes correlated to SCL's two, prior technology planning efforts. It highlights specific projects that have been implemented, partially implemented, or never implemented. It also notes the key strategies that drove each plan, as well as the critical issues that each plan sought to address. It may be worth noting that the year 2000 plan only cited IT issues, in contrast to SCL strategic business issues outlined in the 2008 plan. This suggests that City Light's view of technology has matured over the years – evolving from a tactically-focused "cost of doing business" role to one that business operations increasingly rely upon for strategically supporting and transforming business operations. The final column on the following table summarizes major barriers to successful implementation – which, tellingly, cut across the planning horizons of both previous technology plans.

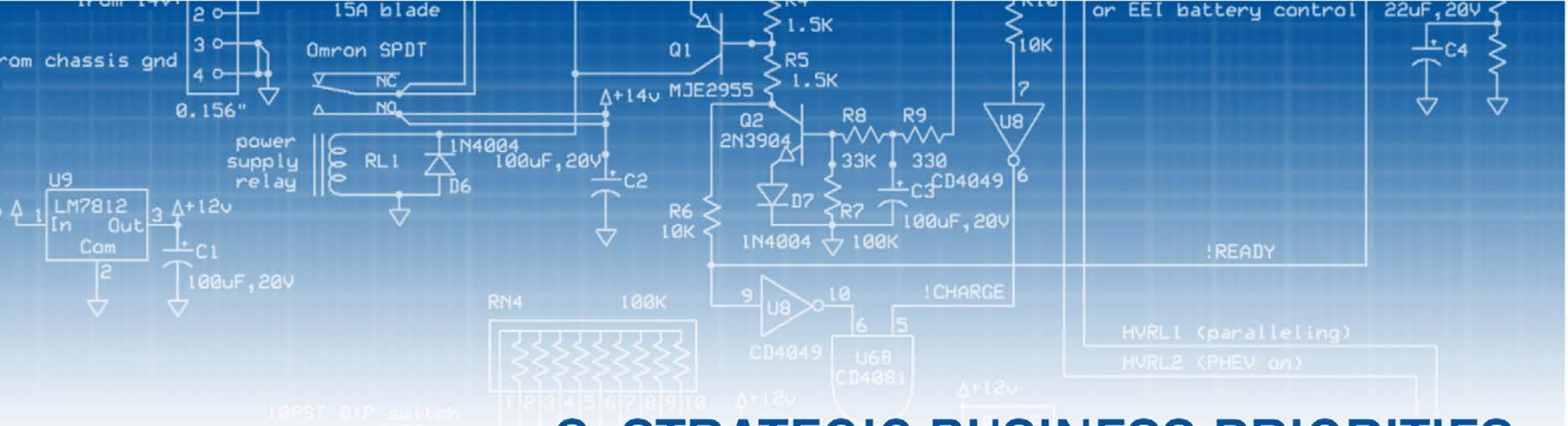
First computers used at SCL (1954). No longer limited to the back office, this technology has since evolved to support the frontlines of power distribution and customer service.

Figure 1. Prior SCL Technology Plan Outcomes

	2000 - 2003	2008 - 2012
Implemented	• CCSS • Power Sales • Complex Billing • Sundry Sales • Remote Access	• OMS • Asset/Work Management (WAMS) • GroupWise to Exchange • Business Intelligence • Strategic Partnership (ETRM)
Partially Implemented	• IT Governance • Web Strategy • PMO	• Financial Planning • Green IT
Not Implemented	• WAMS • Key Customer Management	• AMI • Mobile Workforce • Smart Grid Technologies (EMS) • Content Management • Disaster Recovery • Infrastructure Security • Customer Care/Complex Billing • Conservation Virtual Power Plant
Key Strategies	• Consider total costs (capital and O&M) when evaluating IT investments • Maintain a standardized, reliable base technical architecture • Establish an integrated application architecture • Partner with business units to ensure best practices in process design and technology • Improve access to and availability of timely and accurate information throughout the organization • Work cooperatively with other City departments to take advantage of information technology opportunities that benefit City Light customers • Measure performance to improve the Utility's accountability for investments	• Consolidate and Modernize Information Technology Solutions • Enable Real-time Information Across the Utility • Drive Enterprise Mobile Business Solutions • Anticipate and Integrate Smart Grid Technologies • Promote Ubiquitous, Enterprise-wide Information Technology Security
Major Issues	NOTE: the 2000 plan identified only IT issues vs. 2008 plan's business issues	• Utility marketplace changing from stable/predictable to dynamic/volatile • Increasing demands to develop new business capabilities, improve energy efficiency, and manage energy risk • Rising customer expectations/demand for clean, reliable, low-cost power • Concern over carbon emissions and the rising cost of fuel • New federal regulations governing cyber security compounding complexities
Major Barriers	• Resistance to Change • Economic Downturn • Change in Leadership/Direction • Ineffective Governance/Communication • Data Flow Restricted to Siloes • Ad Hoc Project Management/Program Management • Lack of an Integrated and Architected Approach	

When viewed in the aggregate, the most significant barriers to prior technology planning efforts surround *the lack of an integrated, architected approach to supporting customer needs across the enterprise coupled with an ineffective governance model.* **City Light can no longer simply look at projects and associated technologies in isolation. It demands a cogent reference architecture for properly fitting into place the entire portfolio of SCL's technology projects, information, communications, and related solutions through a more viable and holistic approach to technology governance.**

The remaining chapters highlight the strategies that frame this architecture, present a set of related blueprints and associated projects, outline requisite governance and service support approaches, and conclude with critical success factors for moving forward.



3. STRATEGIC BUSINESS PRIORITIES AND OBJECTIVES

City Light's Strategic Plan centers on tangibly enhancing reliability, customer service, environmental stewardship and critical infrastructure.

Seattle City Light developed its 2013-2018 Strategic Plan (currently being updated for 2014-2020) to address customers' needs for environmentally responsible, available, affordable, and reliable energy. This rolling six-year plan is results-focused, reflecting enterprise-wide imperatives that center on tangibly enhancing reliability, customer service, environmental stewardship and critical infrastructure. The following table summarizes the priorities and objectives that drove the development of that plan.

Figure 2. Seattle City Light's Priorities and Objectives

Priority	Objectives
Customer Value	• Provide more rate stability and predictability • Anticipate and exceed customer service expectations • Promote environmental stewardship
Workforce Investments	• Ensure a safe work environment • Attract, train, and retain a high-performance workforce
Asset Preservation	• Provide reliable, safe, cost-effective electric service to our customers • Maintain stable, cost-effective, environmentally responsible power supply portfolio • Incorporate technology to meet future customers
Municipal Enterprise Excellence	• Improve communication about City Light's strategic priorities • Enhance cost competitiveness and accountability in procurement of all services • Implement best practices in business processes and technology across the enterprise • Ensure fiscal strength

The Strategic Plan assessed both the strengths and challenges faced by City Light. In response, the plan calls for the following key strategic investments in the 2013-2018 period, organized around four key objectives:

Objective 1	Objective 2	Objective 3	Objective 4
Improve customer experience and rate predictability	Increase workforce performance and safety practices	Enhance organizational performance	Continue conservation and environmental leadership

Figure 3. Strategic Investments Summary

Strategic Initiatives	Additional Funding[2] (Proposed 6-yr total, millions)		Objectives
	Operating ($)[3]	Capital ($)	
Budget/rate alignment	0.3		◆
Net wholesale revenue practices	126.3		◆
Ratepayer advocacy initiative			◆
Cost of service & rate design policies			◆
Customer-focused website/services	0.7	1.4	◆
Customer Service Center improvements			◆
Enhanced environmental leadership	0.1		◆ ●
Environmental liability reductions	1.4	9.1	◆ ●
Safety culture promotion/practices	(4.6)		▲
Skilled workforce attraction & retention	27.2	6.2	▲
IT security upgrades	1.2	4.2	◆ ■
Reliability and cybersecurity standards compliance	3.5	0.8	◆ ■
Enterprise GIS	4.1	6.4	◆
North downtown substation	1.5	117.4	◆
Transmission system improvement		18.2	◆
Underground cable replacement	1.2	5.3	◆
Streetlight planning, design, construction		29.9	◆
Mobile workforce implementation	0.8	0.8	◆ ■
Hydro performance & generator availability	1.4		◆
Regional power & transmission leadership	(10.2)		◆ ■
Advanced metering infrastructure	(6.4)	80.5	◆ ■
Electric vehicle infrastructure & rates			◆ ■ ●
Engineering and operations standards	3.0		◆ ■
Climate research	1.3		●
Conservation enhancement program			◆ ●
Communications and engagement			■
Performance benchmarking & efficiencies	1.7		■
IT roadmap	5.7	12.5	■
Performance-based reporting	5.4	3.1	■
Internal management review unit	4.1		■
Project management quality improvement	2.8		■
Service agreements/performance metrics	0.8		■
External service contract procurement			■
Efficiencies initiatives	(55.9)	(37.5)	◆ ■
Financial policies initiative 3.0	3.0		■

◆ Improve customer experience and rate predictability
▲ Increase workforce performance and safety practices
● Continue conservation and environmental stewardship
■ Enhance organizational performance

1 Gradual reduction in net wholesale revenue target over six years.
2 In constant 2012 dollars (without inflation).
3 Reflects increased and decreased O&M but not revenue enhancements.

4. TECHNOLOGY VISION, STRATEGIES AND GUIDING PRINCIPLES

Business-technology alignment is central to success.

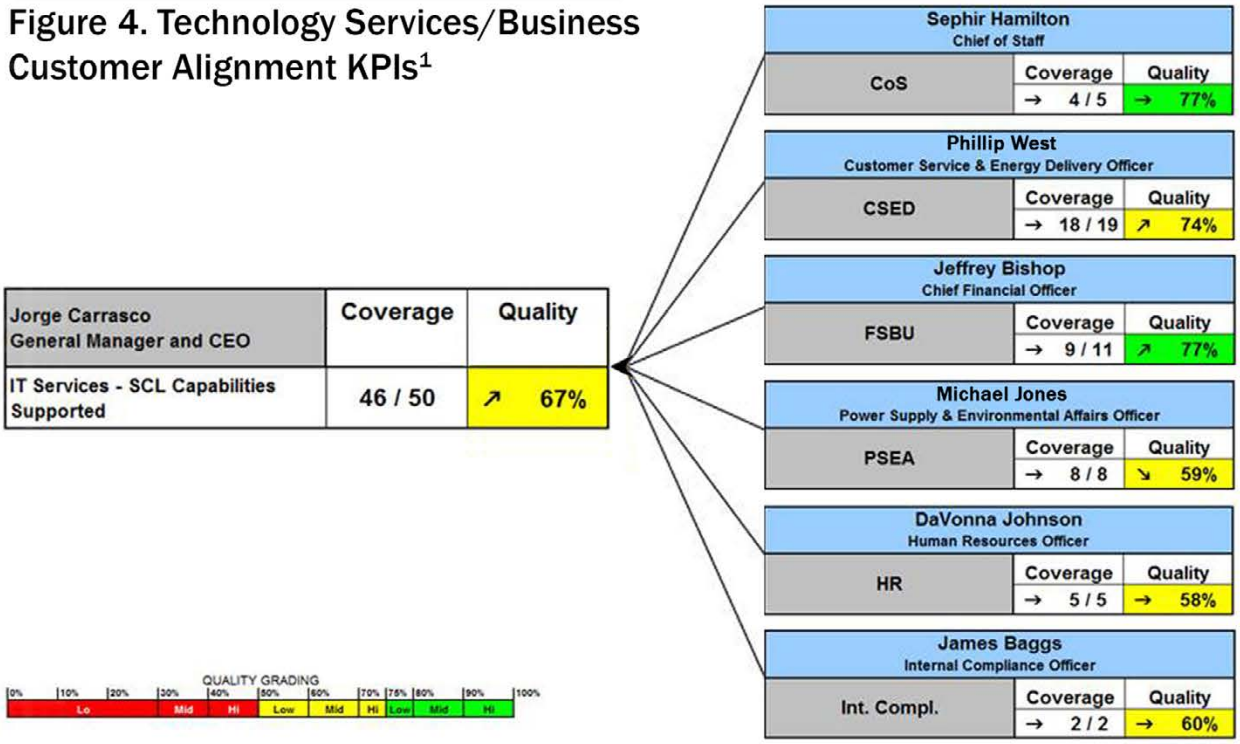
Aligned with SCL's strategic business priorities and objectives, Technology Vision 2020 provides a strategic roadmap for supporting those directives over the next six years — and beyond. The following presents the vision, strategies, and guiding principles that frame this call to action.

Technology Vision	*A simple, integrated and scalable technology platform for information and systems that supports the utility of the future*
Technology Strategies	*Modern • Real-Time • Integrated • Mobile • Secure*
Technology Guiding Principles	• SCL technology and business personnel will work in partnership to optimize operations across the utility • SCL will take a holistic, enterprise approach to all aspects of information and operational technology driven by shared business need and a common architecture • SCL will favor vended, pre-integrated solutions • SCL's technology infrastructure must: ✔ Be as homogeneous as possible ✔ Be cost-effective ✔ Be maintainable ✔ Be scalable, extensible, and interoperable ✔ Address security needs ✔ Address business continuity needs

The vision, strategies, and guiding principles promote a viable path for addressing current strategic projects — and also serve as a launch pad for the next wave of technology innovation that inevitably will occur over the next planning horizon (i.e., 2020 to 2030). It may also be worth noting that Technology Vision 2020 recapitulates the strategies articulated in the 2008 technology plan. This is as an acknowledgment of the need for strategic continuity, as well as the long-term technology trends that endure and will continue to evolve over time (e.g., cyber security, the cloud, emerging customer-centric web-based solutions). Technology Vision 2020 also adds the core set of guiding principles outlined above to govern the "rules of the road" for assessing, investing in, and deploying technology during the years ahead. In addition, these strategic directives move City Light toward "agile" development methodologies that respond to customer needs more rapidly, flexibly, and adaptively than historic "waterfall" (i.e., sequential design) processes. This iterative, incremental agile approach employs demonstrable prototypes that quickly validate proof-of-concept and support continuous improvement.

Above all, business-technology alignment is central to success. With this focus in mind, Technology Vision 2020 also includes a targeted set of key performance indicators (KPIs) to monitor progress made toward tangibly achieving that alignment. The following exhibit provides a summarized view of the KPIs.

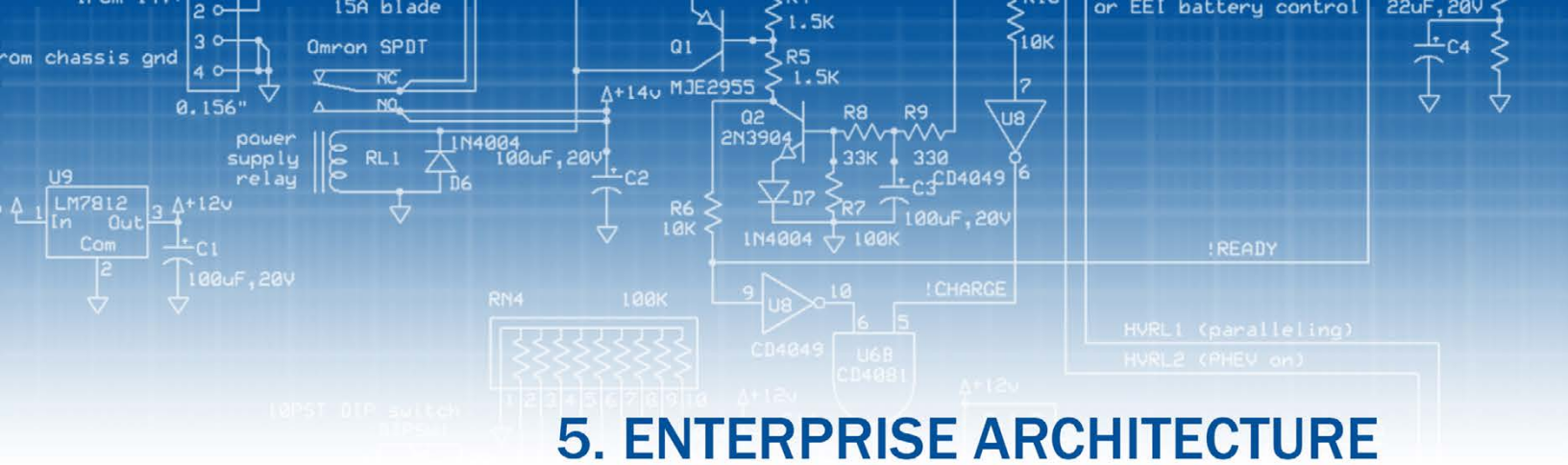
Figure 4. Technology Services/Business Customer Alignment KPIs[1]



These and other related key performance alignment indicators are presented at the SCL managers' meeting on a monthly basis. For each SCL director, and also aggregated for City Light's CEO, the table identifies:

- **Coverage**: the number of major business functions supported by ITSD as a percentage of the total number of major business functions identified for ITSD support
- **Quality**: The perceived level of customer satisfaction as identified by ITSD business liaisons via ongoing discussion with directors and/or designated business unit representatives

[1] as of Fall, 2013



5. ENTERPRISE ARCHITECTURE

What is Enterprise Architecture?

Enterprise architecture supports changing business requirements and integrates new technologies, aligned with best practices.

Enterprise architecture (EA) provides a proven methodology for aligning technology investments with the business direction of an organization. The field of enterprise architecture originated in 1987, with the publication in the IBM Systems Journal of an article titled "A Framework for Information Systems Architecture," by J.A. Zachman. In that paper, Zachman laid out both the challenge and the vision of enterprise architectures that would guide the field for the next 25 years. The challenge was to manage the complexity of increasingly distributed systems. As Zachman said:

"The cost involved and the success of the business depending increasingly on its information systems require a disciplined approach to the management of those systems.[2]"

The field of enterprise architecture emerged to address two critical problems:

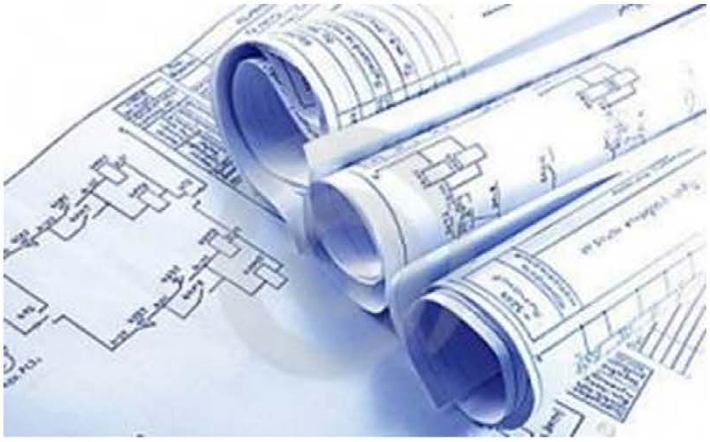
- **System complexity** — Organizations were spending more and more money building complex, distributed technology systems; and
- **Poor business alignment** — Organizations were finding it more and more difficult to keep those increasingly expensive systems aligned with business need.[3]

Enterprise architecture provides a practical set of principles, strategies, policies, standards, and practices – derived from business needs and priorities — that guide technology decision-making and the engineering of an organization's information systems and technical infrastructure.

Unlike a project, with defined start and end dates, enterprise architecture is an ongoing effort. Enterprise architecture evolves to support changing business requirements and priorities, and to integrate new technologies and best practices. It looks comprehensively at the complex relationships among environmental trends and business drivers, an organization's mission and operations, and technology best practices to both define and deliver technical blueprints that support the short- and long-term objectives of the business.

[2] Zachman, J.A. "A Framework for Information Systems Architecture." IBM Systems Journal, Volume 26, Number 3 (1987).
[3] Sessions, Roger. "A Comparison of the Top Four Enterprise-Architecture Methodologies." Microsoft Developer Network Library (2007)

SCL Enterprise Architecture Blueprints



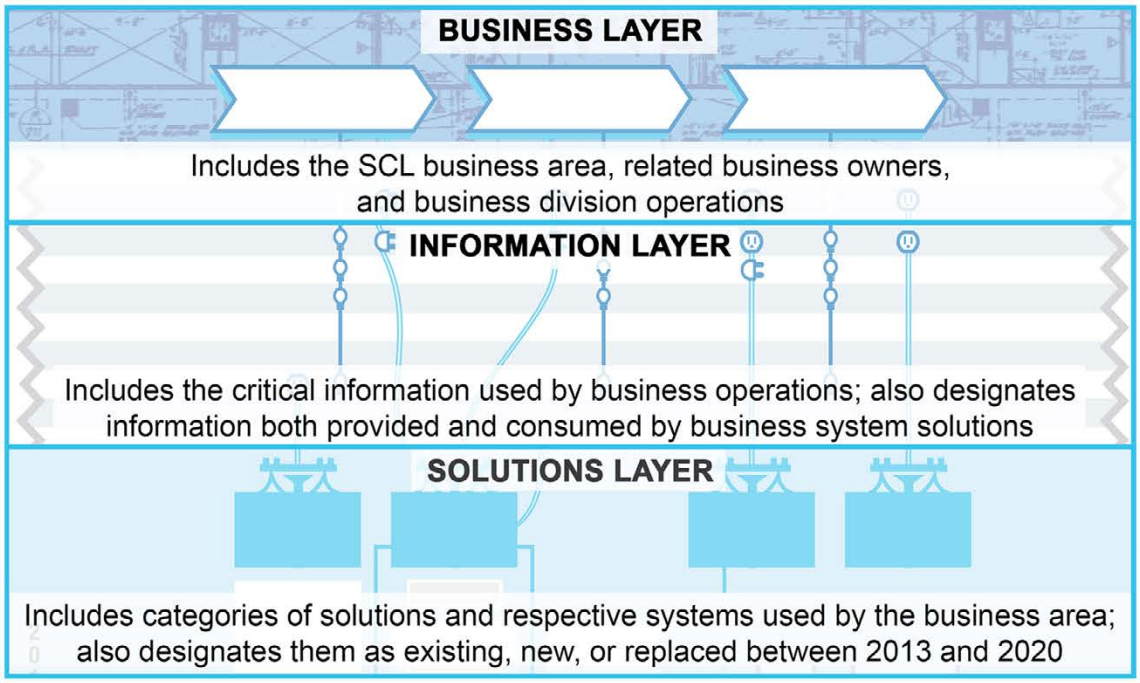
At its core, Technology Vision 2020 centers on five enterprise architecture blueprints panels presented within this chapter, one for each of SCL's business units (FSBU, CSED, PSEA, HR, and Compliance). Aligned with City Light's defined business priorities and objectives, these EA blueprints offer a series of significant related benefits — as outlined in the table that follows.

Figure 5. Enterprise Architecture Alignment with SCL Business Priorities

Customer Value	A coherent software platform significantly reduces the myriad integration points that exist today and enables SCL to more expediently anticipate and exceed customer service expectations.
Workforce Investments	Aligned with best practices, the enterprise architecture framework offers a proven, professional approach to technology management across the utility — fostering a positive environment for attracting, developing, and retaining a high-performance technology workforce.
Asset Preservation	Enterprise Architecture (EA) promotes information sharing across traditional organizational boundaries. It establishes structured approaches to capture, classify, categorize, store, and retrieve information about the utility's assets — and addresses the lack of an encompassing data and systems architecture across the utility. As a result, policy makers and operational staff can make timelier, well-informed decisions about SCL's assets, better analyze service trends, maintain a more cost-effective asset portfolio, and anticipate future service demands.
Municipal Enterprise Excellence	In support of SCL's strategic objectives surrounding enhanced business processes and fiscal strength, EA constructively challenges costly "best-of-breed" system deployments, where up to 60% of functionality is never used and disparate solutions impede efficient workflows. Technology Vision 2020 promotes investment in pre-integrated solutions that yield more cost-effective, expedient deployment, single-vendor accountability, and increased reliability.

As the diagram below illustrates, the EA blueprints consist of three basic layers that relate to SCL's business, information, and system solutions.

Figure 6. SCL Enterprise Architecture Blueprints – Schematic Overview



Business Layer

Technology must meet SCL business needs at the process level — not at a systems level or business-goal level. Accordingly, the top of each diagram leads with a business layer related to each major business unit at the utility:

- Customer Service and Energy Delivery
- Power Supply and Environmental Affairs
- Internal Compliance and Security & Emergency Management
- Financial Services
- Human Resources

The business layer outlines the core business processes (e.g., asset management, customer care) in each business area. In addition, it identifies the primary business process owners within each of the business units. The aim is to allow business process owners to concentrate upwards on customers and business goals — secure and confident that technology will take care of the rest.

Information Layer

Information is the lifeblood of SCL's business. The information layer depicts critical bands of information (e.g., customer data, employee data) used by City Light business processes. As the jagged edges on the borders of the layer indicate, this data cuts through the silos that exist today. For example, all business areas create budgets and employ people.

This layer also defines how the information is employed, characterized by the following icons:

- The light-bulb icon connotes information used by a business process
- The socket icon connotes information that is consumed by a business system solution
- The plug icon connotes information that is provided to a business system solution
- The cloud icon connotes information provided via software as a service, a software delivery model in which software and associated data are hosted by a cloud-computing vendor — external to SCL

Please refer to the glossary at the conclusion of this document for brief definitions of each information band presented.

Solutions Layer

System solutions provide an integrated conduit for processing the information needs of the business. This layer outlines major solution areas and the respective computing systems used by the business units, characterized by the following icons:

- This icon connotes a solution area which encompasses a subset of related systems (e.g., Work and Asset Management is a solution area that includes systems such as WAMS and Cascade).
- This icon connotes an **existing** SCL computing system (e.g., WAMS)
- This icon connotes a **new** SCL computing system (e.g., Cascade)
- This icon connotes an SCL computing system **slated for replacement** (e.g., CCSS)

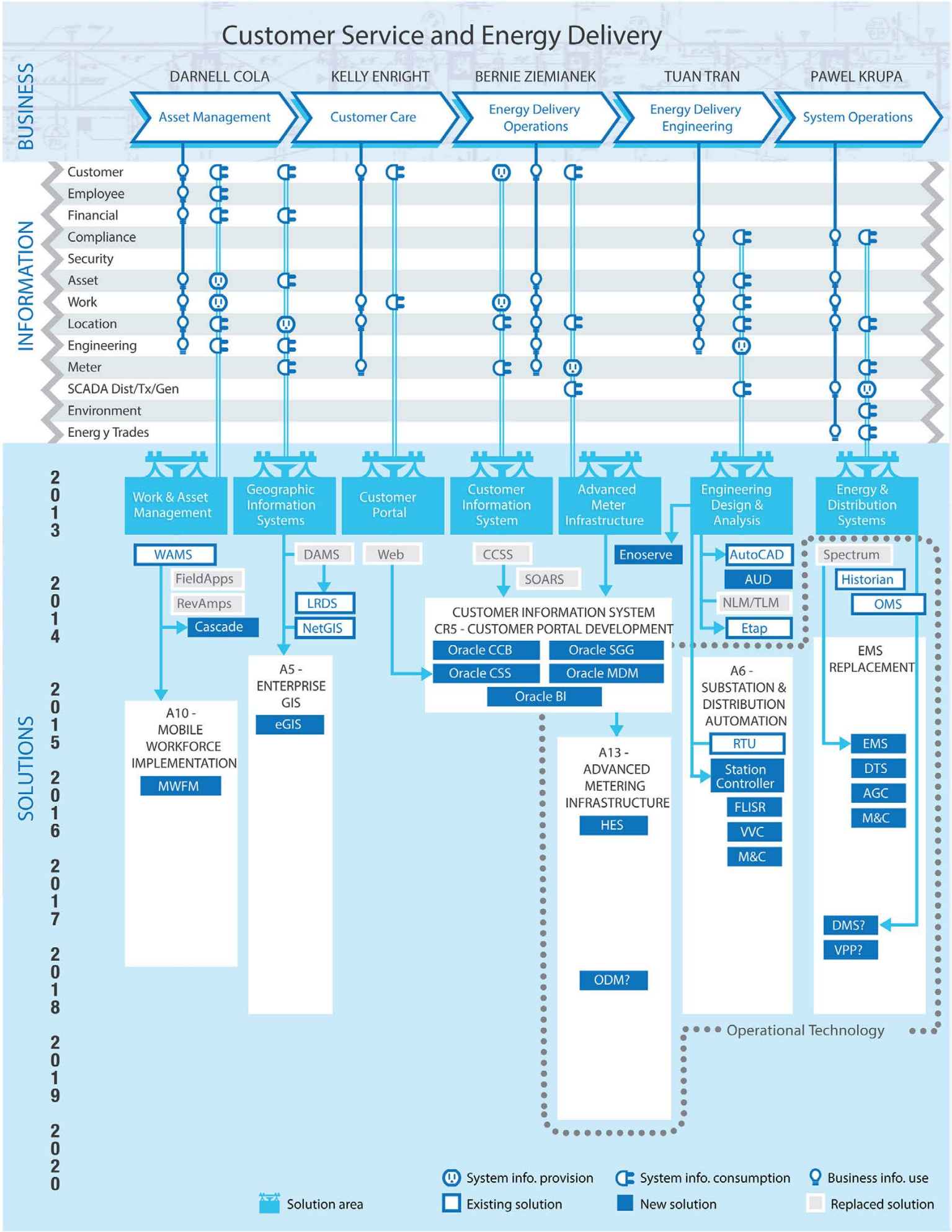
The solution layer also incorporates a timeline on the left margin (i.e., from 2013 through 2020) so that projects can be temporally aligned and coordinated accordingly. In addition, it aligns related projects with defined strategic plan initiatives.

However, completing these projects represents only one part of Technology Vision 2020. To be truly successful, this plan must also consider the convergence of informational technology (IT) and operational technology (OT) as one. This includes IT-OT information, security, and the use of related data across all lines of business — both today and in the future. Accordingly, the EA blueprints address this convergence (represented by dotted lines that surround OT-related solutions), cutting across the three IT-OT silos that currently exist within Customer Service and Energy Delivery, Power Supply and Environmental Affairs, and IT.

Once again, please refer to the glossary at the conclusion of this document for definitions of all the systems acronyms employed.

The following five pages present the enterprise architecture blueprints as of Fall, 2013. **These schematics represent a "point-in-time" snapshot of the architecture, and will continue to evolve in support of SCL's business needs.**

Please refer to http://sclweb/it/blueprints for the most current iteration of these diagrams.


Customer Service and Energy Delivery
BUSINESS
DARNELL COLA
KELLY ENRIGHT
BERNIE ZIEMIANEK
TUAN TRAN
PAWEL KRUPA
Asset Management
Customer Care
Energy Delivery Operations
Energy Delivery Engineering
System Operations
INFORMATION
Customer
Employee
Financial
Compliance
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Work
Location
Engineering
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SCADA Dist/Tx/Gen
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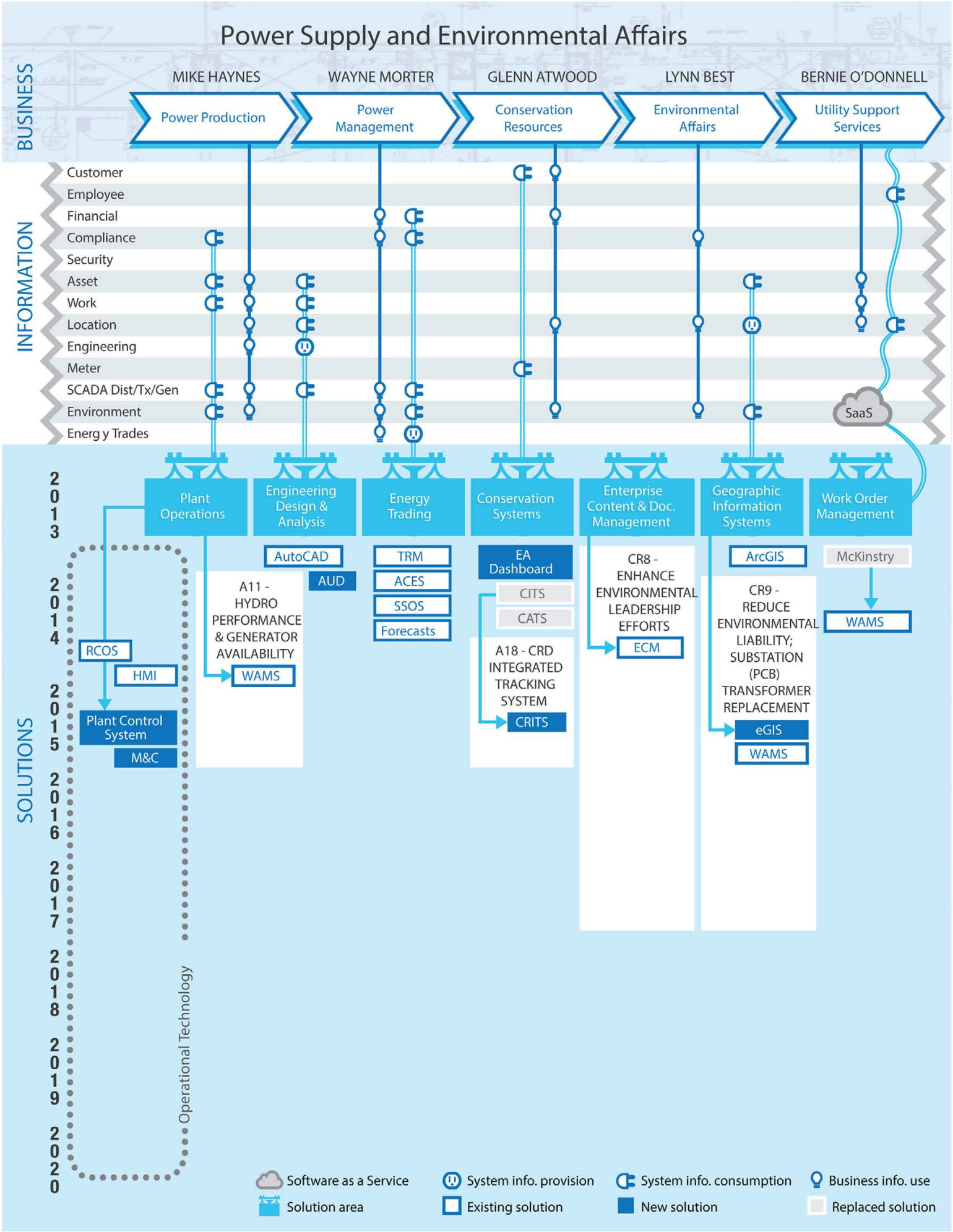
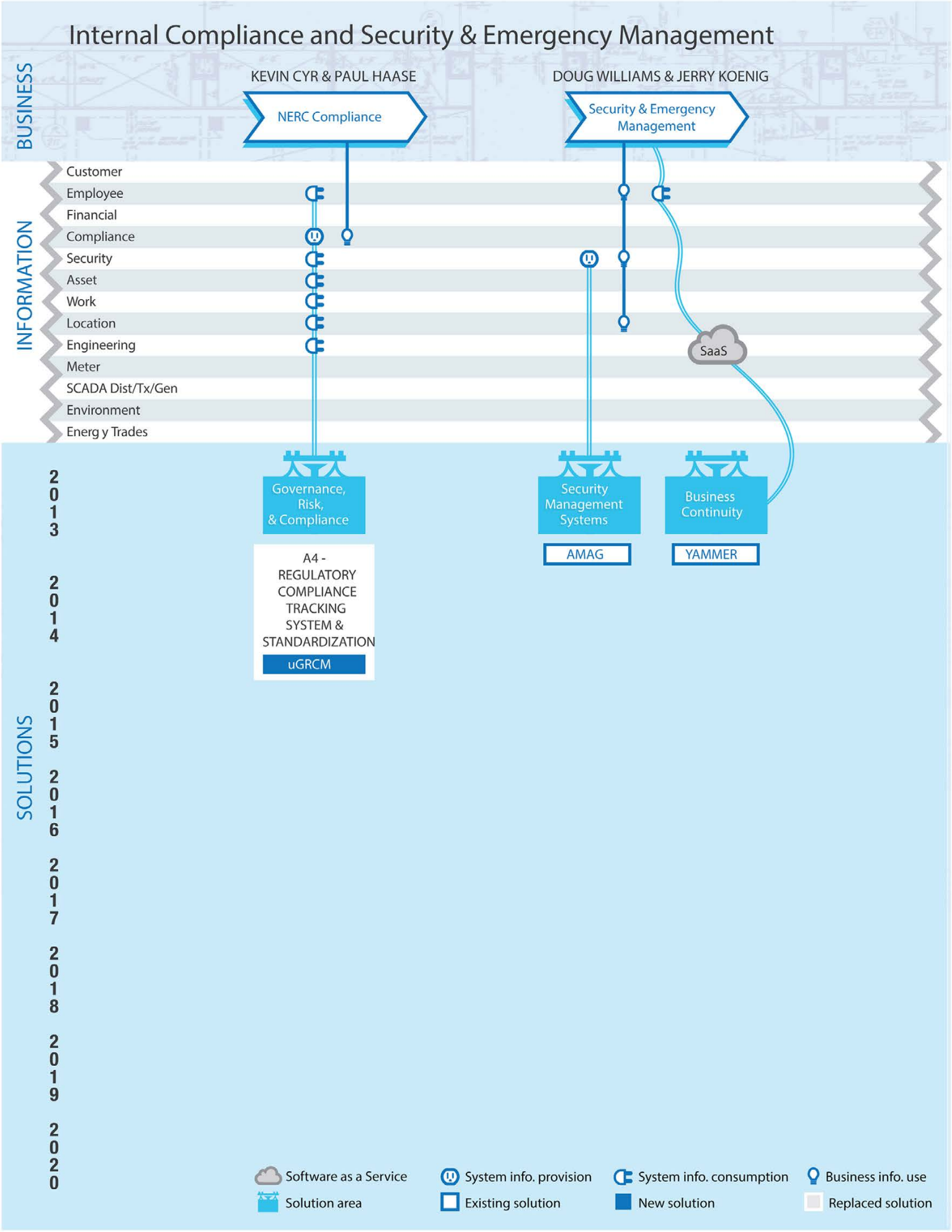
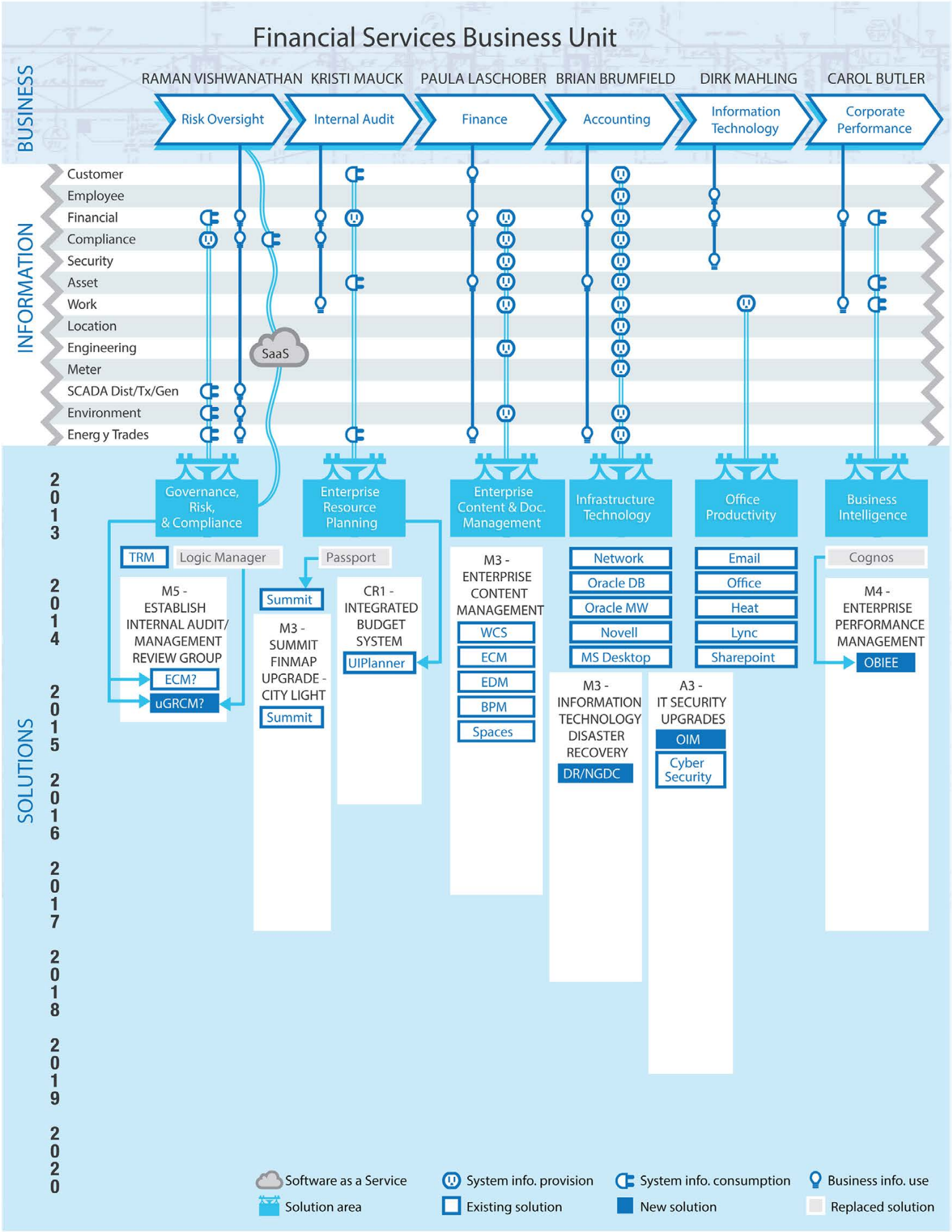
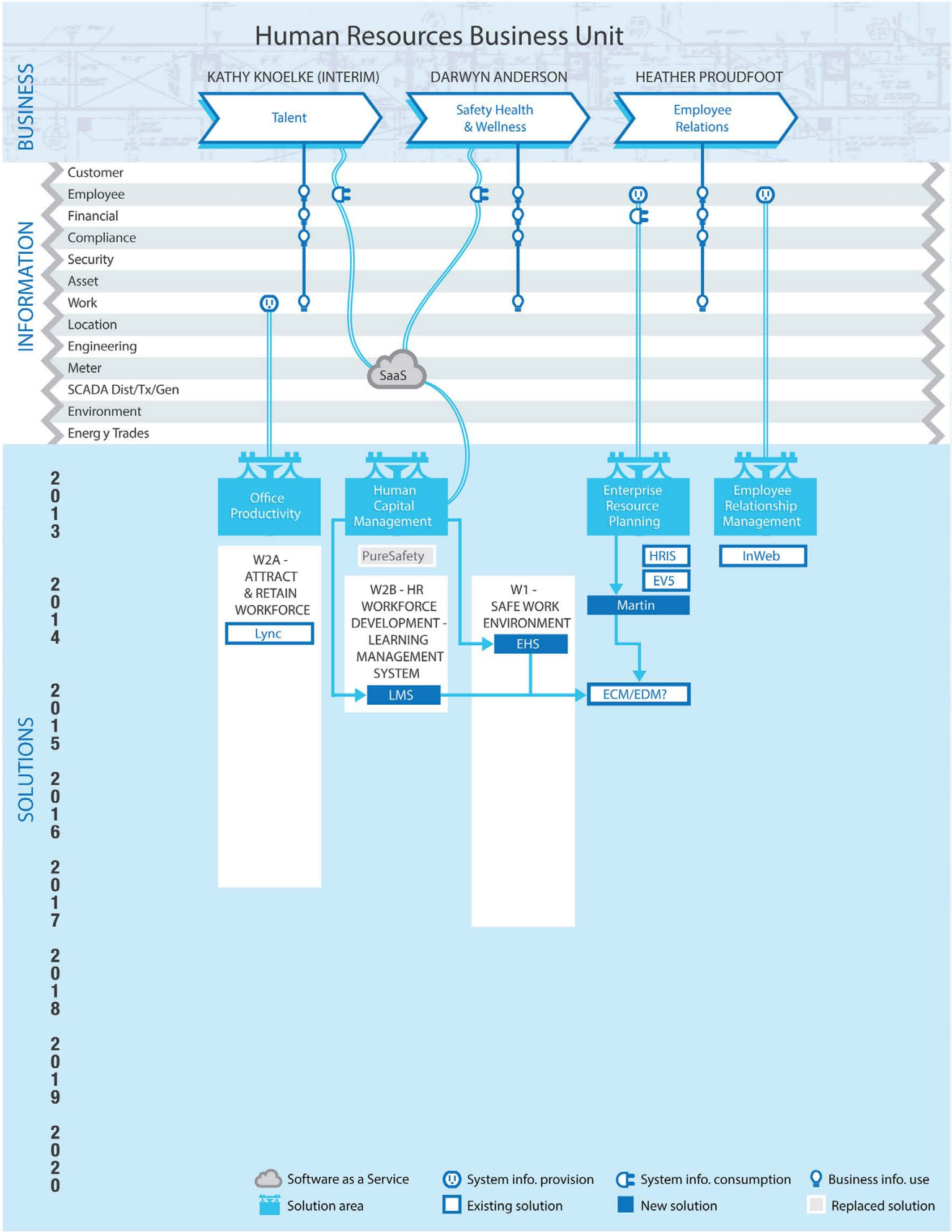
Work & Asset Management
Geographic Information Systems
Customer Portal
Customer Information System
Advanced Meter Infrastructure
Engineering Design & Analysis
Energy & Distribution Systems
WAMS
FieldApps
RevAmps
Cascade
DAMS
LRDS
NetGIS
Web
CCSS
SOARS
Enoserve
AutoCAD
AUD
NLM/TLM
Etap
Spectrum
Historian
OMS
CUSTOMER INFORMATION SYSTEM
CR5 - CUSTOMER PORTAL DEVELOPMENT
Oracle CCB
Oracle SGG
Oracle CSS
Oracle MDM
Oracle BI
A10 - MOBILE WORKFORCE IMPLEMENTATION
MWFM
A5 - ENTERPRISE GIS
eGIS
A13 - ADVANCED METERING INFRASTRUCTURE
HES
ODM?
A6 - SUBSTATION & DISTRIBUTION AUTOMATION
RTU
Station Controller
FLISR
VVC
M&C
EMS REPLACEMENT
EMS
DTS
AGC
M&C
DMS?
VPP?
Operational Technology
System info. provision
System info. consumption
Business info. use
Solution area
Existing solution
New solution
Replaced solution


Power Supply and Environmental Affairs
BUSINESS
MIKE HAYNES
WAYNE MORTER
GLENN ATWOOD
LYNN BEST
BERNIE O'DONNELL
Power Production
Power Management
Conservation Resources
Environmental Affairs
Utility Support Services
INFORMATION
Customer
Employee
Financial
Compliance
Security
Asset
Work
Location
Engineering
Meter
SCADA Dist/Tx/Gen
Environment
Energ y Trades
SaaS
SOLUTIONS
2013
2014
2015
2016
2017
2018
2019
2020
Plant Operations
Engineering Design & Analysis
Energy Trading
Conservation Systems
Enterprise Content & Doc. Management
Geographic Information Systems
Work Order Management
AutoCAD
AUD
TRM
ACES
SSOS
Forecasts
EA Dashboard
CITS
CATS
ArcGIS
McKinstry
WAMS
RCOS
HMI
Plant Control System
M&C
A11 - HYDRO PERFORMANCE & GENERATOR AVAILABILITY
WAMS
A18 - CRD INTEGRATED TRACKING SYSTEM
CRITS
CR8 - ENHANCE ENVIRONMENTAL LEADERSHIP EFFORTS
ECM
CR9 - REDUCE ENVIRONMENTAL LIABILITY; SUBSTATION (PCB) TRANSFORMER REPLACEMENT
eGIS
WAMS
Operational Technology
Software as a Service
Solution area
System info. provision
Existing solution
System info. consumption
New solution
Business info. use
Replaced solution


Internal Compliance and Security & Emergency Management
BUSINESS
KEVIN CYR & PAUL HAASE
NERC Compliance
DOUG WILLIAMS & JERRY KOENIG
Security & Emergency Management
INFORMATION
Customer
Employee
Financial
Compliance
Security
Asset
Work
Location
Engineering
Meter
SCADA Dist/Tx/Gen
Environment
Energ y Trades
SaaS
SOLUTIONS
2013
2014
2015
2016
2017
2018
2019
2020
Governance, Risk, & Compliance
A4 - REGULATORY COMPLIANCE TRACKING SYSTEM & STANDARDIZATION
uGRCM
Security Management Systems
AMAG
Business Continuity
YAMMER
Software as a Service
Solution area
System info. provision
Existing solution
System info. consumption
New solution
Business info. use
Replaced solution


Financial Services Business Unit
BUSINESS
RAMAN VISHWANATHAN
KRISTI MAUCK
PAULA LASCHOBER
BRIAN BRUMFIELD
DIRK MAHLING
CAROL BUTLER
Risk Oversight
Internal Audit
Finance
Accounting
Information Technology
Corporate Performance
INFORMATION
Customer
Employee
Financial
Compliance
Security
Asset
Work
Location
Engineering
Meter
SCADA Dist/Tx/Gen
Environment
Energ y Trades
SaaS
SOLUTIONS
2013
2014
2015
2016
2017
2018
2019
2020
Governance, Risk, & Compliance
Enterprise Resource Planning
Enterprise Content & Doc. Management
Infrastructure Technology
Office Productivity
Business Intelligence
TRM
Logic Manager
M5 - ESTABLISH INTERNAL AUDIT/ MANAGEMENT REVIEW GROUP
ECM?
uGRCM?
Passport
Summit
M3 - SUMMIT FINMAP UPGRADE - CITY LIGHT
Summit
CR1 - INTEGRATED BUDGET SYSTEM
UIPlanner
M3 - ENTERPRISE CONTENT MANAGEMENT
WCS
ECM
EDM
BPM
Spaces
Network
Oracle DB
Oracle MW
Novell
MS Desktop
M3 - INFORMATION TECHNOLOGY DISASTER RECOVERY
DR/NGDC
Email
Office
Heat
Lync
Sharepoint
A3 - IT SECURITY UPGRADES
OIM
Cyber Security
Cognos
M4 - ENTERPRISE PERFORMANCE MANAGEMENT
OBIEE
Software as a Service
Solution area
System info. provision
Existing solution
System info. consumption
New solution
Business info. use
Replaced solution


Human Resources Business Unit
BUSINESS
KATHY KNOELKE (INTERIM)
DARWYN ANDERSON
HEATHER PROUDFOOT
Talent
Safety Health & Wellness
Employee Relations
INFORMATION
Customer
Employee
Financial
Compliance
Security
Asset
Work
Location
Engineering
Meter
SCADA Dist/Tx/Gen
Environment
Energ y Trades
SaaS
SOLUTIONS
2013
2014
2015
2016
2017
2018
2019
2020
Office Productivity
Human Capital Management
Enterprise Resource Planning
Employee Relationship Management
W2A - ATTRACT & RETAIN WORKFORCE
Lync
PureSafety
W2B - HR WORKFORCE DEVELOPMENT - LEARNING MANAGEMENT SYSTEM
LMS
W1 - SAFE WORK ENVIRONMENT
EHS
HRIS
EV5
Martin
ECM/EDM?
InWeb
Software as a Service
Solution area
System info. provision
Existing solution
System info. consumption
New solution
Business info. use
Replaced solution

Enterprise Architecture Characteristics

A variety of characteristics permeate every aspect of the preceding EA blueprints — impacting all of the business processes, information needs, and specific solutions outlined within these schematics. They are intrinsic to SCL's overall enterprise architecture.

This section of Technology Vision 2020 offers a brief description of these EA characteristics, as follows:

- Cyber security
- Business continuity
- Networked communications
- IT-OT convergence
- Mobile/BYOD
- Compliance
- Consumer technology and energy technology
- Emerging technologies

Cyber Security

Cyber security surrounds the protection of information, services, and assets from all facets of unintended or unauthorized access, revision, or destruction. It extends beyond the boundaries of IT alone, encompassing a business-based focus on safeguarding of every SCL asset — tangible as well as intangible (e.g., SCL brand, intellectual property, bank account information). Unlike many other aspects of Technology Vision 2020, cyber security is not a strategic differentiator. Very real threats exist; they simply must be addressed.

No organization or individual can ever be 100% secure. From this perspective, the question is not: will SCL's technology-related security be threatened? The more salient inquiries are: when will these threats occur; how severe will the attacks be; and how can we best detect and quarantine attempted intrusions so they do not adversely impact SCL operations?

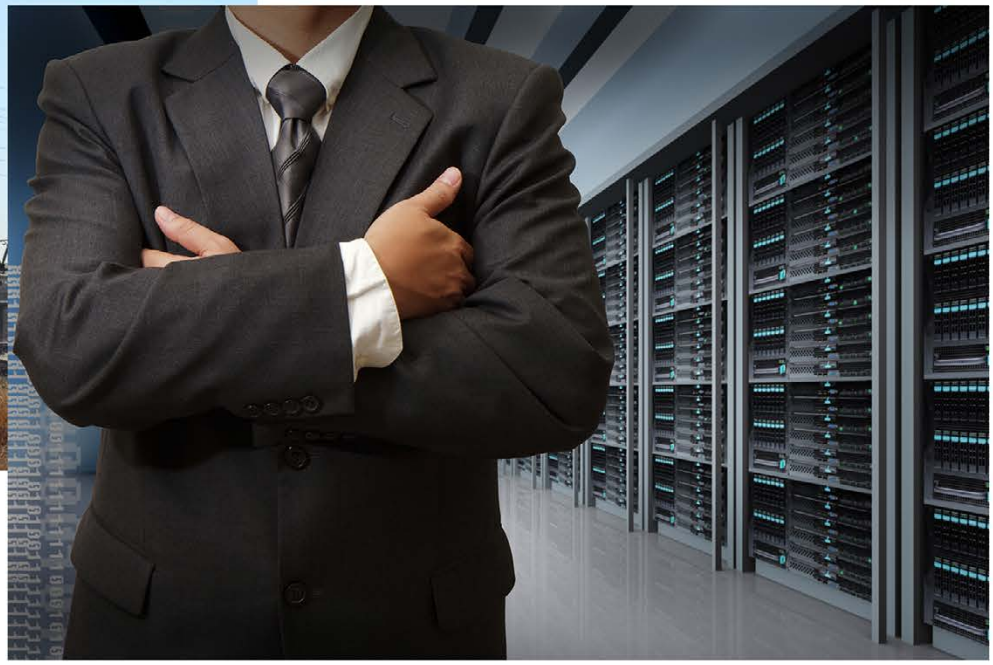
With the above in mind, City Light must tackle cyber security from a business viewpoint — rather than a technology centric, one-size-fits-all orientation centered on a toolkit of firewalls and standard devices. To be truly effective, SCL's enterprise architecture needs to embrace and support enterprise risk management — enumerating the full range of business security risks (e.g., from password access to bio-terrorism) across the organization — and by creating rankings of risk probability based on potential impacts to operations.

Like a swimming pool that targets specific temperatures and pH levels to safeguard the water, these risk profiles must be infused within every single line of the EA blueprints to effectively protect business operations. SCL needs to be on latest security update patch, appropriately blacklist/whitelist users, and enforce security accordingly. More importantly, however, cyber security cannot and should not be addressed in an after-the-fact manner. It must be architected and managed from the very core of City Light's enterprise architecture.

Business Continuity

Business continuity centers on ensuring that SCL's customers, staff, vendors and other entities have requisite access to City Light's critical business functions. Readers of this document may recall the BusB incident that occurred in 2012, when a power conduit became overloaded. This placed SCL's server room in jeopardy and significantly impeded City Light's ability to print bills. That incident serves as a cautionary tale and real-world reminder of business continuity's paramount importance.

How prepared is City Light to effectively recover in the face of an emergency or catastrophic event (e.g., earthquakes, terrorist attacks)? In the midst of such disasters, the prioritization of needs becomes apparent in very material ways. Computers must keep running; standby control centers need to be in place. SCL must also acknowledge that not all applications are created equal (e.g., financial forecasting vs. power tracking systems), and effectively prioritize recovery requirements for each technology solution within its portfolio. This will require working across all business areas to identify, understand, and address a wide variety of business continuity related scenarios.



Communication Networks

Expedient, cost-effective movement of information serves as an essential, animating force of any modern utility. Communication networks provide that crucial conduit.

SCL's communication networks have evolved organically since the 1970s. As a result, an incompatible collection of technologies (e.g., fiber, copper, microwave, leased lines) and related protocols exist today — as well as a diverse set of related roles and responsibilities serving SCL's engineering, generation, and IT functions. These current methods are inefficient, unsecure, outdated, expensive to maintain, and in need of a major overhaul.

City Light's communication networks can no longer be viewed from a siloed perspective. Technology Vision 2020's enterprise architecture calls for a unified, simplified, secure, and recoverable approach for transmitting information that is vital to both external and internal customers. Aligned with the business continuity imperatives outlined above, it must also offer sufficient redundancy for safely and expediently resuming business operations.

State of the art operations center (ISO-NE)

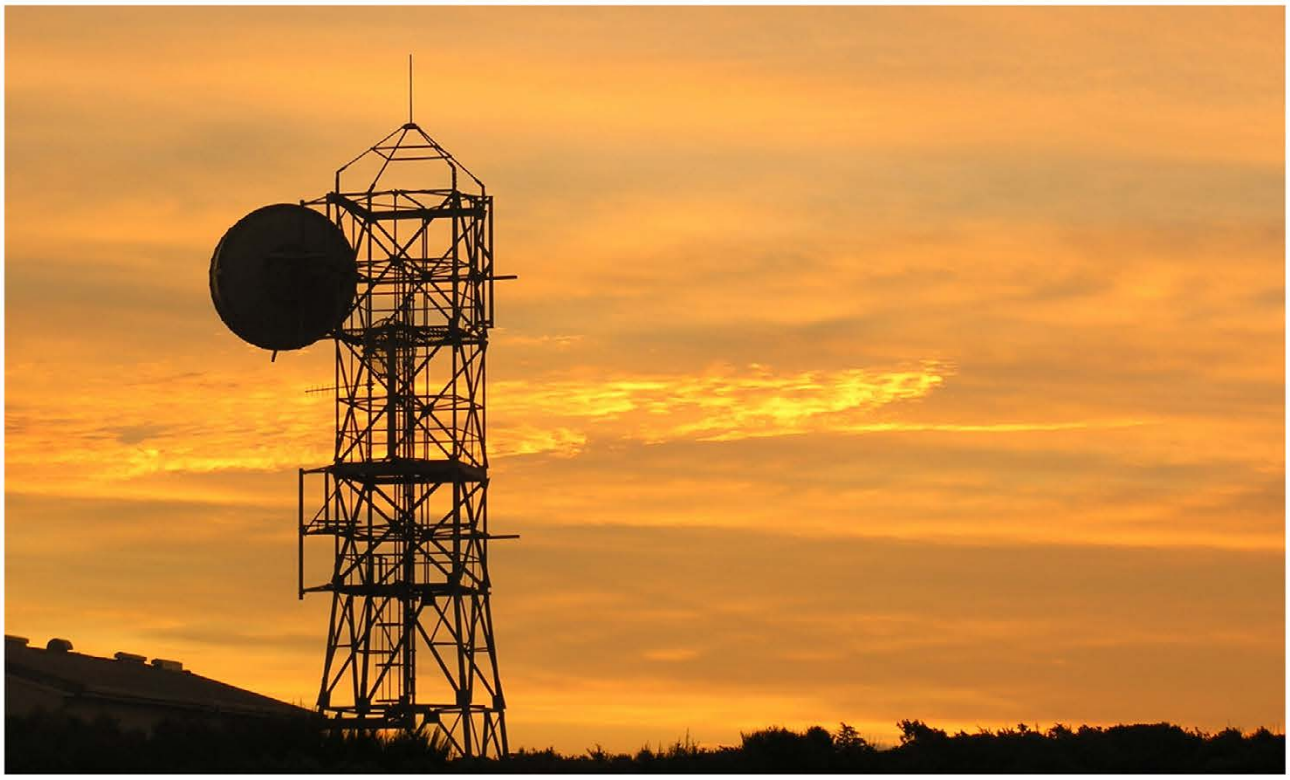
IT-OT Convergence

During the preceding decade, the operational technologies (OT) landscape has witnessed a seismic shift. This transition surrounds both a conversion from analog to digital solutions, as well an ongoing evolution from proprietary to more open alternatives. Although microprocessors were “hidden” within related products in the past, information technology (IT) now touches a wide variety of operational mechanisms, including: governors, substations, breaker systems, transformer monitoring, and SCADA systems.

From this point forward, SCL must embrace the convergence of IT and OT holistically (e.g., encompassing technology platforms, software, cyber security, and use of information across all lines of business) — rather than continuing to seek and employ disparate, business unit-specific solutions. Leading industry analysts, such as Gartner, point to a wide array of benefits that accrue from effective IT and OT convergence management, including: optimized business processes, enhanced information for better decisions, fewer outages, reduced costs, lower risks and shortened project timelines. Kristian Steenstrup, research vice president and Gartner fellow, expands upon this concept further by noting: "The relationship between the IT and OT groups needs to be managed better, but more importantly, the nature of the OT systems is changing, so that the underlying technology — such as platforms, software, security, and communications — is becoming more like IT systems. This gives a stronger justification for IT groups to contribute to OT software management, creating an IT and OT alignment that could be in the form of standards, enterprise architecture (EA), support and security models, software configuration practices, and information and process integration."[4]

Enterprise architecture lays a viable foundation for addressing this convergence. It serves as a launching pad for integrated communication and technology into the year 2020 and beyond, turning the page toward City Light’s next chapter of enhanced customer service and value.

[4] Steenstrup, Kristian. "IT and Operational Technology: Convergence, Alignment and Integration." Special Report on IT and Operational Technology Alignment (2011)



Mobile/BYOD

Mobile and bring-your-own-device (BYOD) technology offers the power to transform how SCL services are delivered to customers — providing "anytime, anywhere" access to City Light information and transactions.

In support of SCL's Mobile Workforce initiative, Technology Vision 2020 focuses on supplying both field crews and knowledge workers the solutions they need to move the business forward — regardless of device — supported by high-quality communication networks that enable improved collaboration. It also embraces a professional approach to mobile device management (MDM) that effectively secures, monitors, manages, and supports mobile devices deployed across the enterprise.

Compliance

In alignment with City Light's strategic imperatives to ensure reliable power in a manner that complies with attendant laws and regulations, all technology devices and connections must meet the North American Electric Reliability Corporation (NERC) / Critical Infrastructure Protection (CIP) standards and compliance rules. This demand is exacerbated further by the anticipated extensions of NERC CIP which will continue to move the reach of NERC/CIP for EMS-related, peripheral solutions out into SCL's substations – no longer physically fenced in. As some substation networking specialists have observed, "NERC mandates are a major disruptive event in the history of substation networking. There will never be a time like the present to position substation networks to serve the rapidly evolving needs of the intelligent-and compliant-utility."[5]

To address these needs, Technology Vision 2020 centers on working in partnership with SCL's Internal Compliance business unit — and in collaboration with selected business representatives from across the utility — to develop actionable checklists that identify salient NERC/CIP compliance mandates, map them to SCL's technology deployment architectures in alignment with best practices, and ensure the effective management of and adherence to compliance requirements on an ongoing basis.

[5] GarrettCom Inc. "NERC/CIP Compliance: Headache or Opportunity?" Utility Automation & Engineering T&D (2007)

Consumer Technology and Energy Technology

The accelerating march toward converged technologies impacts both internal and external SCL customers. Internally, the three IT-OT silos within Customer Service and Energy Delivery, Power Supply and Environmental Affairs, and IT clearly need to work toward enhanced cooperation and integration. Externally, convergence will also affect SCL's consumers. Just as IT is merging with OT, customer technology (CT) — which includes home area networks (HANs) and smart thermostats, is now also converging with energy technology (ET) — which includes microgrids (i.e., small-scale versions of the centralized electricity system) and distributed generation. Within this context, SCL demands a cohesive platform that external customers can "plug into" for both information and energy.

Emerging Technologies

A viable path toward supporting the utility of the future must not paint SCL into a technological corner. The cloud, personal-use devices, and vended solutions (e.g., Oracle products) will continue to evolve over the years ahead. From an operational perspective, emerging technologies such as microgrids, neighborhood energy storage, home area networks, demand response, and self-healing networks also may offer new, innovative ways of doing business that City Light may choose to pursue.

Within this context, it is important to avoid hyper-optimizing for today's technologies, consequently impeding the deployment of tomorrow's enhanced offerings. The EA blueprints presented earlier in this chapter provide the framework necessary for expediently implementing emerging and new technologies well into the year 2020 and beyond. The conclusion of the following chapter — Strategic Technology Projects — further expands upon this point.

A 3 MWh battery array at the Prosperity site by PNM in Albuquerque, NM (photo by Dirk Mahling)

6. STRATEGIC TECHNOLOGY PROJECTS

Technology Vision 2020's enterprise architecture can accommodate a wide variety of future strategic technology initiatives.

Technology Vision 2020 takes the perspective that the majority of initiatives presented within this chapter are business projects first, several of which happen to contain significant technology components. From that view, the following provides brief descriptions for each technology initiative and an attendant timeline for the projects, aligned with City Light's defined strategic objectives and associated 2013-2018/2020 Strategic Plan initiatives. More specifically, the exhibit on pages 29 and 30, also identifies the designated business division owner, a projected timeline over the planning horizon, and the related capital improvement project (CIP) and operations & maintenance (O&M) City Light budget identifiers for each technology intitiative.

Project Descriptions

Objective 1: Improve customer experience and rate predictability

Customer Portal Development (CSS)	Develop a customer portal to facilitate self-service options for City Light's customers by providing easy access to online tools, forms, and relevant information.
Integrated Budget System	Replace existing City Light budget systems and provide automated support for the City's central budget process, including development of Budget Issue Papers and submittals for the City's REM budgeting system.
Outage Management System Upgrade	Upgrade OMS to v1.11, implement Oracle Business Intelligence for Utilities, and rebuild the OSI PI Adapter.
Regulatory Compliance Tracking System	Provide an online system that manages workflows and tracks compliance with North American Electric Reliability Corporation (NERC) standards and requirements.
Customer Information System (CC&B)	Replace the existing Consolidated Customer Service System (CCSS) application with a more current and viable technology solution. Provide Customer Information System (CIS) processing and support for Seattle City Light, Seattle Public Utilities, the City's Utility Call Center, and other customer service staff.
Denny Substation - Network	Provide network system design and construction, engineering design at the substation network interface, and underground conversion of the streetlight, traffic signals, and telecom and fiber-optic systems.
Denny Substation Development	Design and build a 200 MVA substation on Denny Avenue to provide capacity to meet load growth, operational flexibility to operate the electrical system to serve new development and existing load and support development of an underground network.
Enterprise Geographic Information System (eGIS)	Integrate and modernize City Light's GIS systems to enable fully functional enterprise level access to geospatial and asset data.
IT Security Upgrades	Update or replace information security systems that are at high risk of failure to enhance vulnerability and intrusion detection as well as response capabilities and procedures.
Denny Substation - Transmission Lines	Design and construction of transmission lines to support the new Denny Substation and also provides for undergrounding the transmission lines.
Distribution Automation	Automate radial distribution feeders, which includes installation of equipment to provide remote control of operations of switches on power lines and gather real time data on conditions in distribution power lines.
Substation Automation	Replace and upgrade substation automation systems, including Remote Terminal Units (RTU) and annunciators in each of City Light's 14 substations, and upgrade equipment at two substations annually.
Streetlight Infrastructure Replacement	Replace 1,603, or 33 percent, of the highest priority streetlights and related underground infrastructure identified in the Streetlight Six-year Horizon Plan. Emphasis on standardization of fixtures, construction materials, and construction methods.
Mobile Workforce Implementation	Provide mobile communication and computing equipment for Seattle City Light workers to use in the field to improve operational efficiency by permitting more efficient scheduling of crews and rapid revision of crew schedules during emergencies, and reducing transit time between job sites.
Advanced Metering Infrastructure	Replace approximately 400,000 existing meters, residential or commercial, with Smart Meters allowing two-way communication between Seattle City Light and its customers. The project deploys a fundamental component of Smart Grid technology.

Objective 2: Increase workforce performance and safety practices

Case Management Deployment	Implement a data tracking and document management system for Employee Relations unit.
Document Scanning and Storage	Copy and transfer employee personnel paper-based files to an electronic environment.
HR Workforce Development - Utility Training and Development	Implement an automated, web-based Learning Management System to allow for the creation of individual training and development plans, and support online performance assessment and management, and succession planning.
SPAF Workflow Mapping and Process Tracking	Develop an automated Salary Placement Authorization Form (SPAF).
Video Conferencing Facilities	Provide Video Conferencing Facilities (Microsoft Lync) for City Light staff.
InWeb Redesign	Redesign the Seattle City Light InWeb to provide relevant and more accessible information to employees and to make the InWeb useful, effective, and faster.
Technical Training Center Development	Develop a dedicated, state-of-art Technical Training Center that provides educational needs for classroom instruction and field experience training opportunities for entry-level as well as seasoned Utility service workers of SCL.
Attract, Retain & Promote Efficiencies	Fund compensation and incentive programs that are competitive with other utilities to attract experienced and new electric utility workers.
Safe Work Environment - Safety Management System	Implement a Safety Management System to help reduce injury frequency and severity rates to a level that is in the top quartile while ensuring compliance with all federal, state, and local worker safety regulations.

Objective 3: Enhance organizational performance

AutoCAD Utility Design Implementation	Deploy the AutoCAD Utility Design tool to improve the efficiency of Network and Distribution Engineering. This will streamline and standardize many engineering drawings, calculations, and material selection.
Looped Radial Distribution System (LRDS)	Replace the obsolete Distribution Automated Mapping System hardware and software with modern, configurable, vendor supported Consumer Off-The-Shelf (COTS) software and a server to host the software to provide stability, availability, and reliability, lacking in the current software and hardware.
Transformer and Network Load Management (TLM/NLM)	Replace and upgrade the Transformer and Network Load Management systems and Load Flow software to reduce the possibility of costly unplanned outages due to the inability to perform effective design, reduce the possible duration of those outages, and provides the load data required to perform necessary system analysis and planning.
City of Seattle/ Department of IT Data Center Migration	Replacement of current data centers for city department usage.
Network Geographic Information System (NetGIS)	Develop a Graphical Information System to better manage our Network distribution system.
Passport Inventory Replacement	Implement a modern Supply Chain Management System software package to replace current system that manages inventory, logs receipts, issues materials, carries unit cost for valuation, tracks quantities and availability, and forecasts usage of supplies.
Summit FinMap Upgrade	Provide City Light participation in the evaluation, selection, implementation and training within City Light as the City of Seattle upgrades from the current version of PeopleSoft.

Objective 3: Enhance organizational performance — continued

Energy Management System Replacement	Replace the existing Energy Management System (EMS), which includes (but is not limited to) replacing portions of the EMS map board and all of the front-end processors, implementing a hot EMS off-site backup (Backup Control System) with live cutover testing and hot cutover without loss of historic data, and supporting design criteria of a no single point of failure and quality assurance testing on a dedicated quality assurance system.
Enterprise Content Management System (includes Electronic Document Management)	Plan, build, deploy, and provide ongoing management of an enterprise document management and workflow system that effectively and efficiently captures, secures, shares, and distributes digital and paper based documents and reports.
Enterprise Performance Management (BI)	Implement a business intelligence system for City Light by providing software tools and consultant support to identify and track performance metrics for each of the Departments programs, aligning organizational strategy to goal setting, planning and performance monitoring, and providing a single comprehensive system for measuring the Utility's financial and corporate health.
Establish Internal Audit/ Management Review Group	Establish an internal review group to perform audits and reviews to support productivity improvements, achieve cost savings, and reduce or eliminate fraud and abuse.
IT Business Continuity (formerly IT Disaster Recovery)	Establish a formal disaster recovery program for City Light by placing a recovery version of IT assets in geographically diverse locations.
Project Management Quality Improvement	Build a consistent enterprise project management capability to ensure proper project development, oversight, management, and accountability.
IT Infrastructure	Replacement and improvement of the Utility's information technology infrastructure.

Objective 4: Continue conservation and environmental leadership

Conservation Resources Integrated Tracking System	Implement an Integrated Tracking System that will track improvements at SCL facilities to reduce energy consumption to include generation sites, service centers, and substations.

Beyond 2020: Future Strategic Technology Initiatives

The EA blueprints and related projects outlined above lay the groundwork for future technology initiatives just over the horizon. Through effective governance and inter-disciplinary stakeholder input, SCL's business leaders must direct, prioritize, and decide whether or not to pursue emerging and new technologies that add customer value, increase operational efficiency and cost-effectiveness, and ensure energy reliability well beyond the year 2020.

Although not funded or authorized at this time, Technology Vision 2020's enterprise architecture can accommodate a wide variety of ideas for future strategic technology initiatives along these lines, such as: microgrids, cyber security and business continuity projects, enterprise trading and risk management (ETRM) automation, a new distribution management system, home area networks, automation of reports and consolidation orders, demand response, virtual workforce, and knowledge management projects. Predicated on the outcome of a thorough business case analysis, other technology initiatives may also include new automated solutions for human resources and financial management as well, aligned with an integrated Oracle-based strategy. As City Light continues to update its Strategic Plan via an ongoing refinement cycle, Technology Vision 2020 will address emerging needs with a parallel evergreening process that actively partners with the business units.

Figure 7. Strategic Investments Summary

Strategic Initiatives	Division Owner	Technology Initiatives
Objective 1: Improve customer experience and rate predictability		
Customer-Focused website/services (CR5)	**Customer Care**	Customer Portal Development
Budget/ rate alignment (CR1)	**Finance**	Integrated Budget System
Performance of Customer Care Center (CR7)	**Customer Care**	Outage Management System (
Reliability & cybersecurity standards compliance (A4)	**Internal Comp**	Regulatory Compliance Tracki
Customer-Focused website/services (CR5)	**Customer Care**	Customer Information System
North downtown substation (A6)	**Energy Delivery**	Denny Substation - Network
North downtown substation (A6)	**Energy Delivery**	Denny Substation Developmer
Enterprise GIS (A5)	**Asset Mgmt**	Enterprise Geographic Informa
Implement IT security upgrades (A3)	**IT Services**	IT Security Upgrades [3]
North downtown substation (A6)	**Energy Delivery**	Denny Substation Transmissio
North downtown substation (A6)	**Energy Delivery**	Distribution Automation
North downtown substation (A6)	**Energy Delivery**	Substation Automation
Streetlight planning, design, construction (A9)	**Energy Delivery**	Streetlight Infrastructure Repla
Mobile work Implementation (A10)	**Customer Care**	Mobile Workforce Implementat
Advanced metering infrastructure - AMI (A13)	**Customer Care**	Advanced Metering Infrastruct
Objective 2: Increase workforce performance and safety practices		
Attract, Retain & Promote Efficiencies (W2A)	**Employee Relations**	Case Management Deploymer
Attract, Retain & Promote Efficiencies (W2A)	**Employee Services**	Document Scanning & Storage
Workforce development - Utility Training & Devmt (W2B)	**Talent Acquisition**	HR Workforce Development -
Attract, Retain & Promote Efficiencies (W2A)	**Employee Services**	SPAF Workflow Mapping and
Attract, Retain & Promote Efficiencies (W2A)	**Talent Acquisition**	Video Conferencing Facilities[1]
Attract, Retain & Promote Efficiencies (W2A)	**Employee Services**	InWeb Redesign[1]
Technical training center (W2)	**Talent Acquisition**	Technical Training Center Dev
Attract, Retain & Promote Efficiencies (W2A)	**Employee Services**	Attract, Retain and Promote Ef
Safety culture promotion/practices (W1)	**Safety, Health, Wellness**	Safe Work Environment - Safe
Objective 3: Enhance organizational performance		
Efficiencies (M9)	**Energy Delivery**	AutoCAD Utility Design Implem
Efficiencies (M9)	**Energy Delivery**	Looped Radial Distribution Sys
Efficiencies (M9)	**Asset Mgmt**	Transformer and Network Load
IT roadmap (M3)	**CoS/DoIT**	City of Seattle / Department o
Efficiencies (M9)	**Asset Mgmt**	Network Geographic Informati
IT roadmap (M3)	**Accounting**	Passport Inventory Replaceme
IT roadmap (M3)	**IT Services**	Summit FinMap Upgrade
IT roadmap (M3)	**System Ops**	Energy Management System F
IT roadmap (M3)	**IT Services**	Enterprise Content Manageme
Performance-based reporting (M4)	**Corp Perf**	Enterprise Performance Mana
Establish Internal Audit/Management Review Group (M5)	**Internal Audit**	Establish Internal Audit/Manag
IT roadmap (M3)	**IT Services**	IT Business Continuity (formerl
Project management quality improvement (M6)	**Asset Mgmt**	Project Management Quality In
IT roadmap (M3)	**IT Services**	IT Infrastructure
Objective 4: Continue conservation and environmental leadership		
Conservation enhancement program (A18)	**Conservation**	Conservation Resources Integ

[1]Although not officially a Strategic Initiative Technology project, this effort supports the Strategic Initiative
[2]This is a City of Seattle project led by DoIT
[3]Strategic Initiative aligns with both Objective 1 and Objective 3
[4]Strategic Initiative aligns with both Objective 1 and Objective 4

	2014	2015	2016	2017	2018	2019	2020	CIP/O&M/ BIP
(CSS)								CIP 9944
								CIP 9955
OMS) Upgrade[1]								O&M 1156
g System								CIP 9963
CC&B)[1]								CIP 9937
								CIP 8404
t								CIP 7757
tion System (eGIS)								CIP 9957
								CIP 9960
n Lines								CIP 7125
								CIP 8425
								CIP 8424
cement								CIP 8460
ion [3]								CIP 8429
ure [3]								CIP 8426
t (MARTIN)[1]								O&M 1752
[1]								TBD
Utility Training & Development								O&M 1249
Process Tracking[1]								TBD
								TBD
								TBD
elopment								CIP 9230
ficiencies								O&M 1259
y Mgmt System								O&M 1239
entation[1, 3]								CIP 9950
tem (LRDS)[1, 3]								CIP 9958
l Mgmt (TLM/NLM)[1, 3]								CIP 9952
IT Data Center Migration [2]								DoIT
on Systems (NetGIS)[1, 3]								CIP 9943
nt[1]								CIP 9959
								CIP 9961
eplacement[1]								CIP 9956
nt (incl Electronic Document Mgmt)								CIP 9962, O&M 1169
gement (BI)								CIP 9933, O&M 1349
ement Review Group								O&M 1329
y IT Disaster Recovery)								CIP 9964, O&M 1159
nprovement								O&M 1359
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ated Tracking System [4]								CIP 9320

7. TECHNOLOGY SUPPORT

Technology Vision 2020 centers on delivering courteous, prompt, cost-effective service.

Technology Vision 2020 centers on delivering courteous, prompt, cost-effective service that supports SCL's business needs. This chapter offers a brief overview of the primary ways in which SCL's internal customers receive their technology support. More specifically, this includes:

- Technical assistance in conducting daily work
- Management and implementation of large technology projects

Client Services

The newly formed Client Services group combines desktop support, the service desk, Microsoft Exchange and SharePoint help, and voice/data support for a unified approach to customer-facing services. It provides a single, professionally managed access point into City Light's technical support organization to addresses all non-project oriented customer needs.

Client Services employs a three-tiered approach to support:

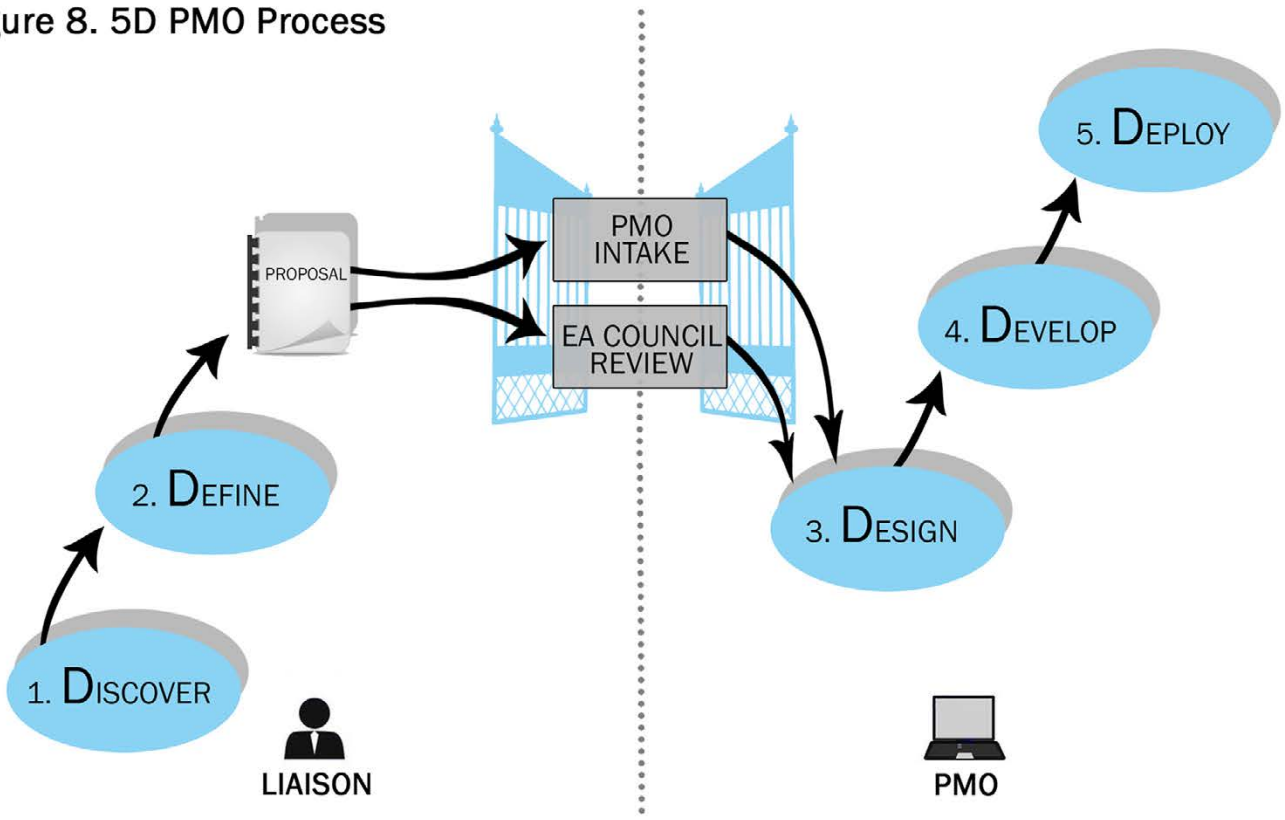
- **Tier 1**: Provides initial, first-line support for resolving customer concerns over the phone. Aligned with best practices, Technology Vision 2020 aims to resolve 70%-80% of customer inquiries before finding it necessary to escalate the concern to the next tier.
- **Tier 2**: Provides more extensive, in-depth analysis and support. This may include research, diagnostic testing, and the use of remote management tools to troubleshoot and resolve problems.
- **Tier 3**: Provides the highest level of support for addressing complex technical issues. This may include support to resolve concerns surrounding solution design or configuration flaws.

Project Management

In the past, customers initiated technology projects simply by properly completing SCL's related request forms. Technology Vision 2020 promotes a significant enhancement to that service orientation by assisting customers in a much more consultative fashion, employing a "5D" project management office (PMO) process outlined and illustrated as follows:

- **D**iscover: Every director at SCL has a designated technology liaison to help assess business needs and explore technologies (both current and emerging) to best address them
- **D**efine: Working in partnership the liaison, a project's scope, goals, and technology requirements are clearly delineated — before it enters the PMO
- **D**esign: Once well defined, the PMO helps develop the requisite project plan, budget, and architectures necessary to support and optimize business processes
- **D**evelop: During this phase, the solution is built, configured, and tested
- **D**eploy: The solution is rolled out, incorporating change management practices that foster stakeholder adoption and yield the intended value of the investment

Figure 8. 5D PMO Process



The enterprise architecture defined in this document must be infused with a clear understanding of business needs and frequent customer communication. While the business liaison concept is not new to City Light, Technology Vision 2020 recreates and places a renewed focus on the role of the liaison – as well as the need for technology personnel to work in interdisciplinary teams with appropriate business subject matter experts.

As the diagram on the preceding page suggests, the ITSD liaison will do everything in her power to support the business customer through the Discover and Define stages. This includes: providing analysis and assistance in developing a concise project proposal; facilitating the PMO intake process; and ensuring alignment with City Light's enterprise architecture (EA) blueprints to foster a successful review by the EA Council. Working in partnership the customer, this approach promotes a clearly articulated project for the PMO's subsequent Design, Develop, and Deploy phases.

It is also worth noting that ITSD's PMO runs over 100 projects that involve some aspect of technology at any given time. City Light has to effectively manage the attendant resources necessary to deliver these projects on-time and within budget. Similar to a consulting company, it must find the right resources, at the right time, at the right cost to fit within a defined and balanced enterprise architecture.

All of these projects need to demonstrate visible progress to build confidence in SCL's ability to deliver. Accordingly, City Light's approach to project management must focus on small, incremental deliverables. Related communication also must be straightforward and clear. Overall, drawing upon an acronym familiar to many, SCL's project management approach must be SMART: specific, measurable, attainable, relevant, and time-bound.

Finally, although most customers experience technology as a either a project or a problem, it is also important to acknowledge the efforts of SCL's technology infrastructure personnel. Like the utility itself, these are the people who "keep the lights on" behind the scenes on the daily basis – supporting the servers, networks, databases, middleware, and related back-end technologies that facilitate the efficient flow of information and communications.

8. TECHNOLOGY GOVERNANCE AND POLICIES

City Light can no longer afford to manage its "islands of information" in a best-of-breed, business-unit specific fashion.

Technology governance provides the requisite framework for managing, evaluating, directing and monitoring the use of SCL's information, computing, controls, and communications technologies. As the preceding chapters illustrated, City Light can no longer afford to manage its "islands of information" in a best-of-breed, business-unit specific fashion. SCL must recognize the enterprise-wide nature of these technologies to function efficiently and cost-effectively in service to its customers.

Since technology is so ubiquitous throughout the utility, Technology Vision 2020 constructively challenges City Light to rethink governance in a manner that brings all the pieces of its technology puzzle together. Accordingly, several key governance bodies must work in partnership toward this end, including:

- **Technology Strategy Council**[6]: provides long term, strategic guidance for the use of information, computation, controls, and communication technology in all its forms to support SCL's business imperatives — employing a programmatic approach that cuts across organizational boundaries and focuses on obtaining the greatest value from technology-related investments
- **Enterprise Architecture Council**: takes direction from the Technology Strategy Council and then translates those directives as necessary — providing architectural guidelines and related EA blueprints that serve as the foundation for work performed by the project steering committees
- **Project Steering Committees**: makes the directives from these governance councils actionable for the utility's major systems (e.g., WAMS, OMS, GIS, Customer Care, Web, Finance, HR) — selecting and building systems in accordance with the EA blueprints, guiding principles and related standards

[6] Representation includes the Chief Financial Officer (CFO), the Customer Service and Energy Delivery Officer, the Power Supply and Environmental Affairs Officer, the Human Resources Officer, the Internal Compliance Officer, and the Chief Information Officer (CIO). The Council will be led by the CIO. Adjunct members or guests will be invited on an "as needed" basis. Meetings will be held quarterly.

Given the convergence of technologies previously described, industry observers (e.g., Gartner) see successful, forward-thinking utilities increasingly recognize a necessity for technology officers' authority to merge and follow. Progressive utilities, such as SCE, SDGE, or ECOVA on the IOU side — or Austin Energy, JEA, SMUD, and Clark on the Large Public Power Council side, have chosen to include a technology officer on the executive team, recognizing the growing importance of planning for and coordinating the next generation of operational technologies alongside traditional information management systems. Regionally in the Puget Sound area, the same trend takes hold with the recent appointment of a CTO at TPU in addition to the CIO/Assistant GM at SnoPUD and the CIO at PSE.

Rather than maintaining an exclusive focus on leading the backroom information services of yesterday, emerging best practices encourage a new way of thinking about the CIO or CTO role, resulting in a technology officer for the whole organization. Those utilities include technology thinking at the highest level to help optimize business processes, enhance information access, and improve communications among all the related technologies across the enterprise — whether delivered, supported, or managed by the IT organization or elsewhere.

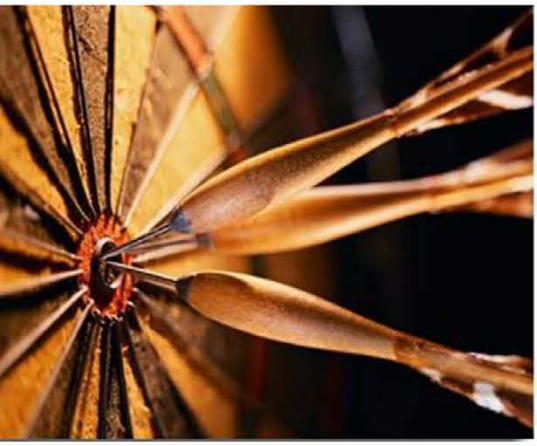
Good governance also needs to be attentive to effectively communicating and managing the change associated with this document's call to action. Accordingly, Technology Vision 2020 will be supported by a structured communications/change management plan that embraces a continuous conversation with customers across the utility.

9. CRITICAL SUCCESS FACTORS

Technology must serve and support the entire organization.

Technology Vision 2020 calls for significant investments in software systems and technology infrastructure. The reason for this is clear: technology has moved out of the back seat and now drives service quality, operational efficiency, and innovation throughout the organization. It also requires a new way of thinking about technology itself. Like transmission and distribution equipment, technology is a critical City Light asset. Similar to financial management and human resource functions, technology also must serve and support the entire organization. From this perspective, and aligned with the course chartered in City Light's 2013-2018 Strategic Plan, SCL must plan for, maintain, regularly upgrade, and replace software systems and technology infrastructure with a strategic, enterprise-wide perspective.

Clearly, this Technology Vision 2020 demands much more than a one-time financial investment for a defined list of projects. To realize the vision, and effectively address lessons learned from prior technology planning initiatives, City Light must also consider these critical success factors:



- **Sustained link to business priorities**. The primary purpose of enterprise architecture is to ensure business-technology alignment. Technology Vision 2020 must be regularly updated to maintain traceability from SCL's strategic priorities and business objectives to the EA blueprints and supporting investments in applications and platforms.
- **Effective technology governance and communication**. An enhanced governance model must foster and facilitate the leadership, stakeholder engagement, and information sharing necessary for ensuring that SCL's technology investments support City Light's business imperatives. Embracing a common enterprise technology vision, an expanded governance role for the CIO that cuts across operational boundaries, and a proactive approach to change management will be fundamental to Technology Vision 2020's success.
- **A programmatic approach to technology planning and project management**. Achieving a common enterprise architecture and improved access to integrated information requires interdisciplinary effort and coordinated technology planning across all of SCL's business areas, guided by structured project management methodologies.
- **Performance management**. Well-communicated performance management updates will be required to measure and demonstrate progress made toward the target enterprise architecture.
- **Cultural change**. A cultural shift will be needed throughout the organization to work beyond historical siloes and infuse an enterprise perspective into every level of technology planning, procurement, deployment and support at City Light.

10. GLOSSARY

ENTERPRISE ARCHITECTURE BLUEPRINTS: INFORMATION LAYER DEFINITIONS

CUSTOMER – A person or organization that receives services from Seattle City Light.
Customer data: identifying information, accounts, agreements, services, premises, contact channels, billing address, energy usage, billing history, service requests

EMPLOYEE – A person employed by Seattle City Light.
Employee data: identifying information, work history, training history, skills, degrees, certifications, job classification, roles, responsibilities, organizational unit, reporting structure

FINANCIAL – Records of money and assets managed by Seattle City Light.
Financial data: budgets, capital funds, financial transactions, market data, rates, financial forecasts, bonds, inventory, contracts

COMPLIANCE – Records of operating procedures and resources that are subject to conformance with regulatory standards.
Compliance data: laws, regulations, standards, critical assets, critical cyber assets

SECURITY – Records of identity, authentication, and authorization used to secure access to Seattle City Light digital assets.

SECURITY DATA – personally identifiable information, credentials, privileges, access rights, roles, application servers, database instances.

ASSET – Records of equipment and other items of value to Seattle City Light.
Asset data: equipment, facilities, maintenance records, specifications, cost, age, manufacturer

WORK – Records of activities and processes for Seattle City Light.
Work data: schedules, activities, processes, projects, initiatives

LOCATION – A place, position, or coordinate that describes where a thing is.
Location data: maps, coordinate, address, place name, distance, area

ENGINEERING – Records of the technical description, design, and functions of systems at Seattle City Light.
Engineering data: standards, specifications, drawings, diagrams, test results, inspections

METER – Records of the measurement of energy usage.
Meter data: metered usage (kWh), peak demand, voltage, scalar read, interval read

SCADA Dist/Tx/Gen – Measurements and control signals on distribution, transmission, and generation events and operational parameters.
SCADA data: tags, points, digital status, analog values, time

ENVIRONMENT – Records of natural resources and events.
Environment data: weather, land, water, air, climate, habitat, animal, chemical, pollution, emissions, temperature

ENERGY TRADES – Records of financial transactions and schedules in Seattle City Lights power markets.
Energy trades data: price, position, value, forecast, load, generation, trades

ENTERPRISE ARCHITECTURE BLUEPRINTS: SOLUTION LAYER DEFINITIONS

ACES	ACES – trade settlement system
AGC	Automated Generator Control
ArcGIS	ArcGIS desktop geographic information system
AUD	AutoCAD Utility Design – electrical engineering design tool extension to AutoCAD
AutoCAD	Computer aided drawing
BI	Business Intelligence
Cascade	Utility asset management and testing
CATS	Conservation Acquisition Tracking System
CCB	Customer Care & Billing
CCSS	Consolidated Customer Service System (legacy)
CITS	Commercial/Industrial Tracking System
CRITS	Conservation Resources Integrated Tracking System
DAMS	Distribution Automated Mapping System
DMS	Distribution Management System
DTS	Dispatcher Training Simulator
ECM	Enterprise Content Management
eGIS	Enterprise geographic information system
EMS	Energy Management System
Enoserve	Enoserve – field device testing and reporting
Etap	Electrical engineering analysis package
FieldApps	Field Applications – collection of applications including Xfmr, FEDS, and FMS (legacy)
FLISR	Fault location isolation and service restoration
Forecasts	Forecasts – energy trading forecasts
HES	AMI Head End System
Historian	Historian database for real time events
HMI	Human Machine Interface
LRDS	Looped Radial Distribution System – geographic information system replacing DAMS
M&C	Monitoring and Control
McKinstry	Facilities service order tracking
MDM	Meter Data Management
MWFM	Mobile Workforce Management
NetGIS	Network distribution geographic information system
NLM/TLM	Network Load Management/Transformer Load Management – electrical engineering load analysis programs
ODM	Operational Device Management
OMS	Outage Management System
RCOS	RCOS – semi-autonomous plant control system
RevAmps	Work order management (legacy)
RTU	Remote Terminal Unit
SGG	Smart Grid Gateway
SOARS	Service Order Analysis Retrieval System (legacy)
Spectrum	Spectrum – Siemens Energy Management System
SSOS	SCL Slice Optimizer Solution
Station Controller	Substation server system
TRM	Trading and Risk Managment
uGRCM	Governance, Risk, and Compliance Management
VPP	Virtual Power Plant
WAMS	Work and Asset Management System
Web	Public facing web customer interface (legacy)
Yammer	Enterprise social network

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