



# The Digital Utilities **Inspire and Shape**

a digital world that  
reinvents power  
generation,  
transmission,  
distribution, and retail

**SAP**<sup>®</sup>

**Run Simple**

## HENRY'S POINT OF VIEW



**We envision the Digital Energy Network. It will reflect new structures of power generation, transmission, distribution, and retail and create new business models and processes in a competitive and collaborative digital economy.**

Henry Bailey  
Global Vice President  
Utilities Business Solutions  
SAP

Dear Customers and Partners,

Ten billion people – that's the global population projected by 2050. Some experts say the demand for electricity, natural gas, and water will double or triple as billions of people join the digital economy, and the use of energy and water will grow while vehicles and mass transit go electric. One thing is clear – the digital economy needs clean, dependable, and affordable electricity.

This should be a great outlook for power generators, distributors, and retailers, but decarbonization, deregulation, and decentralization are disrupting the century-old utilities hierarchy. We see a "Digital Energy Network" emerging that reflects new structures of power generation, transmission, distribution, and retail. It will foster new business models and processes and transform work in a competitive and collaborative digital economy.

The consequences are dramatic. Proven utilities business models based on trillions of dollars worth of plants and grids collapse. New market entrants, such as Google and Tesla, disrupt the value chain. Rapid technical and social innovation puts new capital investments at risk. Consumers, communities, and companies go "off the grid" with new wind, solar, and storage technology.

The industry is currently balancing the efficient operations of its existing infrastructure with the need to adapt to the volatile market environment. Leading utilities are re-evaluating their physical assets and customer relationships to:

- **Reimagine business models** to find new revenue and profit sources by offering innovative supply, load balancing, and smart home/business energy services
- **Reimagine business processes** and use digital technology to optimize business outcomes by converging information and operational technologies
- **Reimagine the role and structure of the workforce** to support future business by incorporating wearable technology, 3D printers, and geospatial technologies

"Reimagining" the utilities business will shape the Digital Energy Network that overlays and complements the power supply system. All participants – utilities, consumers, and new non-utility players – will use digital innovation to anticipate real-time demand and supply, operate self-healing grids, and innovate the customer experience.

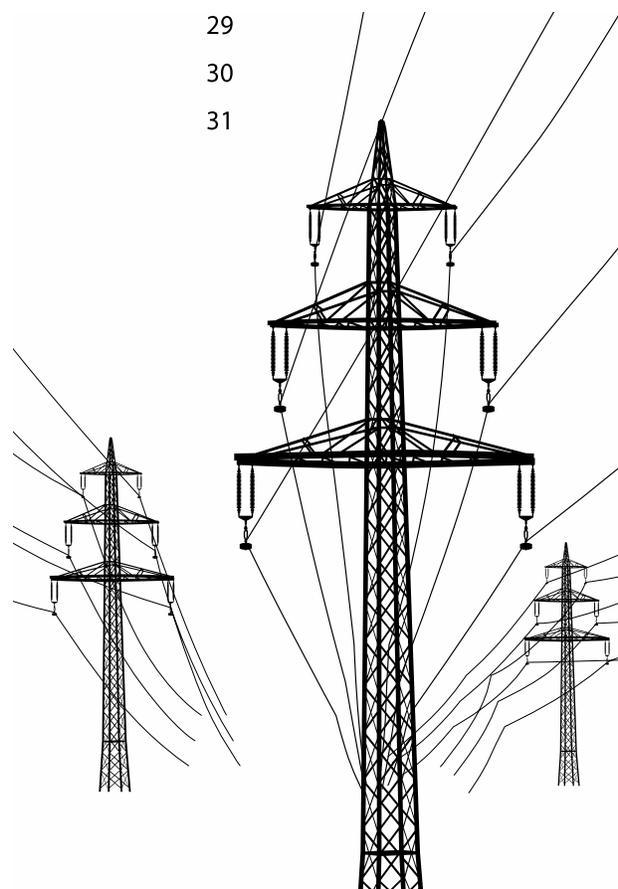
Our vision is to help the world use energy and natural resources responsibly today and tomorrow while providing reliable, sustainable, and affordable energy for all people. This requires access to the Digital Energy Network for all participants. We will offer the digital foundation and the digital gateways that integrate the core solutions of each market participant to the Digital Energy Network.

This document offers our perspective on where the industry will go and how SAP contributes to the evolution of the Digital Energy Network. Thank you for your interest, and I look forward to our journey together.

  
Henry Bailey  
Global Vice President  
Utilities Business Solutions  
SAP

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## EXECUTIVE SUMMARY

Big picture: The digital economy is real and will continue to transform utilities

### The Digital Economy

#### Technology trends

Five technology trends are shaping the digital economy – hyperconnectivity, super computing, cloud computing, a smarter world, and cyber security. Leading utilities prepare to use these technologies associated with these trends to find new answers to questions such as:

- What are profitable business models based on new technologies and trends like solar energy, smart home devices, flexibility services, and data science?
- How can we capitalize on the demand for reliable and sustainable power in a hyperconnected world?
- Which trends and technologies from adjacent industries are influencing the utilities market (e.g., consumer electronics and smart home devices)?

#### Leaders are emerging quickly from nowhere

The utilities industry boundaries are already blurred. Large players like Google, Samsung, or Tesla, and millions of private consumers engage in sustainable and smart energy generation and management. Start-ups promise a sustainable and reliable power supply at reasonable costs. Key questions include:

- How to sustain and grow customer relationships with new digital services?
- Which market spaces are the most attractive for new disruptive competitors?
- Who are potential partners in the Digital Energy Network?

#### Early adopters are winning

Companies that embrace the digital world and execute on their digital strategy are growing shareholder and stakeholder value faster than their peers. The nature of the Digital Energy Network forces participants to synchronize and collaborate to deliver stable, affordable, clean, convenient, and reliable electric energy. Key questions include:

- Which business segments allow market leadership and competitive differentiation?
- Which tasks are better allocated to a partner in the network?
- How do we develop and sustain the ability to adapt continuously to changing market conditions?

## TODAY, EVERY BUSINESS IS A TECHNOLOGY BUSINESS

#### Keys for utilities to win in the digital community:

- Lead reinventing and digitizing the business
- Digitize the engagement with customers
- Partner with other market participants to achieve economies of scale



Digital business models are disruptive. The rules have changed.

- **Tokyo Electricity Company (TEPCO)**, one of the worlds largest utilities companies, expects to deploy 27 million residential smart meters within its service territory by 2020<sup>1</sup>
- **CenterPoint Energy** implements an SAP HANA-based predictive maintenance solution that supports the strategy of integrating information technology (IT) with operational technology (OT)<sup>2</sup>
- **Google's Nest** is a line of programmable, self-learning, sensor-driven, Wi-Fi-enabled, connected smart products that promise energy efficiency, comfort, and security for people in their homes.<sup>3</sup>
- **Tesla** makes solar energy available in the night with its power walls made with advanced battery technology.<sup>4</sup>
- **Alliander**, the large Dutch power distribution company, uses SAP HANA to analyze 1.5 billion grid sensor measurements (expected to grow by two magnitudes) and forecast the required asset substitutions or maintenance at continuously reduced time cycles.<sup>5</sup>

# EXECUTIVE SUMMARY

## The future: The utilities industry transitions into a Digital Energy Network

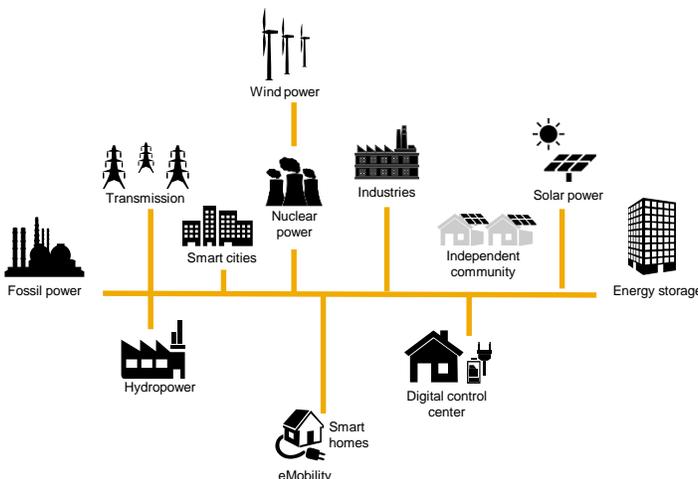
### The Digital Energy Network

The Digital Energy Network is the digital nerve system of the next-generation energy infrastructure. It consists of digital solutions from all market participants based on the market rules and the established standard information (exchange) model.

### Transformation drivers

The utilities industry value chain along generation, transmission, distribution, and retail is transforming at breakneck speed, driven by:

- **Decarbonization:** Invest into a low-carbon policy through improved fossil generation efficiency, applied carbon capture and storage (CCS) technology and substitution through CO<sup>2</sup>-free generation (renewables, nuclear)
- **Deregulation:** Market rules grant access to new players and change the game for incumbents
- **Decentralization:** Power supply has turned into two-way power flow within distributed networks of a mixed generation portfolio including renewables
- **Energy efficiency:** Investments in energy efficiency are effective to reduce the world's carbon footprint and enable profitable new business models.
- **Digitization:** Digital information within the Digital Energy Network leverages the Internet of Things (IoT) and ubiquitous connectivity



### New business models

The incumbent utilities companies and new players are reimagining business models, business processes, and job descriptions enabled by the transformation drivers:

- **Smarter customers** mean new business models for an efficient, collaborative consumer or prosumer – those consumers that produce their own energy
- **Advanced power storage** which will enable efficient load balancing, shifting of demand, and improved supply reliability
- **Digital controls** provide real-time information flow and are used to safely operate the supply system and enable self-healing grids

### Cyber security

The real-time Digital Energy Network is a potential target for cyber attacks. Securing this system is one of the top priorities.



**151% Increase**

in worldwide electricity demand according to Energy Technology Perspective 2010 in baseline scenario between 2007 and 2050<sup>6</sup>



**\$50 billion**

total world energy storage market by the year 2020<sup>7</sup>



**The top 3**

decision Imperatives are:

- New business models
  - IT for growth and innovation
  - Digital disruption and security
- according to a 2014 survey with utility CEOs<sup>8</sup>



**Wind**

power is currently the fastest growing source of electricity production in the world<sup>9</sup>



**67% of companies,**

including utilities, say they "have had at least one security compromise that led to the loss of confidential information or disruption of operations" in the past year<sup>10</sup>

## EXECUTIVE SUMMARY

### Road map to the Digital Energy Network: Steps to digitize your business

#### REIMAGINING

Do you have the right strategy? The starting point of the transformation journey is to reimagine your business with business outcomes and customers at the center.



##### REIMAGINE BUSINESS MODELS

Decarbonization, deregulation, decentralization, and digitization upend established business models without a clear road ahead. We see business models emerging along four main categories :

- Renewable generation at near-zero marginal cost
- Smart and efficient distribution
- Demand/supply balancing services
- Omnichannel retail to digital “prosumers”



##### REIMAGINE BUSINESS PROCESSES

Changing business models and digital technology drive business process efficiency and innovation that inspire new business approaches and lower TCO or accelerate breakthrough technology. We will see this in power generation and wholesale, storage and flexibility services, transmission, and distribution.



##### REIMAGINE WORK

The fundamental transformation from a power generation and distribution hierarchy to a Digital Energy Network profoundly changes what people do and how they learn, interact, engage, and grow. Many tasks will become automated, but people will be an even greater asset in shaping the customer experience as their roles change.

#### PLATFORM

Do you have the right platform?

Leaders are investing in digital capabilities that are congruent with their strategy. The Digital Energy Network will provide all participants the right platform to drive efficiency, accelerate energy innovation, and develop new business models.

We ensure solutions align to desired outcomes. The SAP Digital Business Framework is based on the five key pillars of a digital strategy:

1. **Customer experience** across all channels
2. **Supplier collaboration** across all spend categories (maintenance, repair, services, and expenses)
3. **Core business processes** (finance, procurement, supply chain, and work management)
4. **Workforce engagement**, including employees and contractors
5. **Assets and the Internet of Things** to drive real-time insights and new business models

**ROI drives this significant phase** of the transition to digital. It's not about any one of the above five pillars, but rather how they all interconnect to achieve business outcomes.

We apply **Design Thinking** as our key approach during the reimagining phase. Design Thinking can be described as a discipline that uses the designer's sensibility and methods to match business needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.

## EXECUTIVE SUMMARY

### Fundamental changes: Five technology trends changing everything

We are witnessing an unmatched era of true business innovation. Breakthrough technologies have matured and hit scale together, enabling five defining technology trends:

#### HYPERCONNECTIVITY

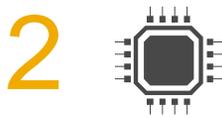
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Every person and every asset is connected, disrupting all the established rules around utility operations. Connectivity drives the Digital Energy Network with collaboration of consumer, supplier, information, assets, and the workforce.

#### SUPER COMPUTING

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The limits of 20<sup>th</sup> century computing power are gone. The Digital Energy Network, powered by real-time in-memory computing, creates infinite business opportunities for the utilities industry.

#### CLOUD COMPUTING

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Technology adoption and business innovation move faster than electrons in the power grid. Technology infrastructure lives on new cloud-based collaboration platforms, enabling Utilities to launch new business practices in a matter of days.

#### SMARTER WORLD

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Sensors, robotics, 3D printing, and artificial intelligence are the new normal. Utilities will monitor and repair assets remotely, critical components will be made in the field, predictive models will optimize the Digital Energy Network.

#### CYBER SECURITY

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The Digital Energy Network is a prime target for digital attacks and sabotage. Trust remains the ultimate business currency, making cyber security a top priority in the design and operation of the Digital Energy Network.



# REIMAGINING

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## THE DIGITAL ECONOMY OFFERS INFINITE NEW OPPORTUNITIES

In a connected world where every company is becoming a technology company, smarter products and services will refocus commerce on business outcomes and blur industry lines.

## DIGITAL INNOVATION IS REAL

Companies reimagine their entire business to become – or remain – successful players in the Digital Energy Economy. This page summarizes what is described in more detail on the following three pages.



### REIMAGINE BUSINESS MODELS

Examples of reimagined business models help to understand the scope of the transformation

- **Energy generation** leaders focus on efficient operation of large-scale power production that outperform decentralized, small-scale commercial and private producers
- **Smart and efficient distribution** capitalizes on the real-time nature of electrical energy and the need to permanently influence demand and supply in the network for a stable and balanced grid
- **Demand/supply balancing** absorbs and dispenses energy to support those who are in charge of matching demand and supply in real time, which is essential in an energy network with rapidly oscillating renewable energy
- **Omnichannel retail** to always-connected, always-on customers offers opportunities to deliver a broad range of innovative products and services



### REIMAGINE BUSINESS PROCESSES

Examples of reimagined and digitally empowered business processes across the future value chain

- **Smart asset operations and maintenance** for efficient power generation and wholesale
- **Storage and flexibility services** that operate like virtual power plants to balance power shortfalls or surplus
- **Sourcing and trading** to support grid stability through trans-regional/national energy exchange and to optimize revenue
- **Transmission:** Grid development and operations to build and run right-sized power grids
- **Supply-side coordination** to assist market participants, matching supply and demand consistently
- **Distribution management** to ensure reliable power delivery within each regional grid
- **Meter point operation** to digitally connect to the consumer and provide value-adding services
- **Omni-channel sales and service** to increase customer interaction and share of wallet
- **Service management** to diversify into business beyond the meter



### REIMAGINE WORK

Reimagined business models and processes need an adaptive workforce with new skills

- **Digital business processes** eliminate manual transaction steps and require “exception handling”
- **The ubiquity** of IoT-connected assets and mobile-connected customers allows simplified process execution down to a single step
- **The right information** at the right time on the right device improves decision quality, profitability, and productivity
- **Predictive and self-learning** software improves machine-to-machine collaboration and requires skilled workers to orchestrate complex systems
- **Interactive technologies** improve user experiences and deliver the right visual, text, and audio information on demand
- **Flexible business-to-people relationships** create adaptive businesses that value the specialists who build and run the digital enterprise of the future



## REIMAGINE BUSINESS MODELS

Decentralization, deregulation, decarbonization, and digitization disrupt established utilities industry business models but don't show a clear road to the future. We see utilities redefine their business model and restructure the value chain. New value will come from smart alignment along the four main business operations that reflect the volatile market situation.

### Energy generation excellence

At near-zero marginal cost for the generation of renewable energy, commissioning and efficient operations of renewable and conventional power generation assets are key to maximize margin.

- Top performers focus on efficient operation of large-scale power generation plants that outperform small-scale commercial and private producers
- Large-scale solar and wind farms are being built by utilities to help regions meet renewable mandates
- Generators integrate and process real-time sensor, market, and weather data to operate profitably
- Predictive analytics is a key enabler to maximize the use of centralized and decentralized assets

### Smart and efficient distribution

Decentralized renewable energy still needs powerful grids to deliver electricity. Whether transmission and distribution is paid by the energy (KWh) or load (KW), excellence in grid building, operations, and maintenance is key for profitability.

- Intermittent and decentralized power production requires the ability to predict and handle power in-feed with bi-directional power flow
- Evaluation of energy data helps to predict grid loads and anticipate bottlenecks that strain the grid. This allows for the optimization of grid investments
- Real-time processing of load data enables the integration with demand/supply balancing services to optimize grid utilization
- Similar to power plant operations, new capabilities in predictive maintenance and self-healing concepts help to further reduce operational costs

### Demand/supply balancing services

The intermittent character of renewable energy sources generates business opportunities around balancing services in the energy system – either by storing cheap and releasing expensive energy, or by influencing the demand side to shift consumption and save energy.

- Virtual power plants will connect and centrally manage decentralized energy production
- Requires real-time processing and predicting of generation and consumption data
- Includes power storage technologies such as pumped hydro, power-to-gas, batteries, thermal, flywheel, and compressed air

### Omnichannel retail to digitized prosumers

Consumers expect reliable and affordable energy supply with maximum convenience. The emergence of “prosumers” and increasing environmental and energy awareness broaden the scope of customer interactions and increase addressable consumer spend.

- Consumer information about personal preferences, lifestyle, location, sentiment, or consumption behavior gleaned from smart meters and consumer/owned devices create new business potential
- Customers are willing to invest in energy efficiency and in renewables generation that require new infrastructure and services
- E-mobility (e.g., electric cars) offers a broad range of business opportunities to engage customers that are today mostly captured by the vehicle manufacturers



### NEW GENERATION

Global renewable power generation is expected to grow from 5,000 TWh in 2013 to 7,000 TWh in 2019 (all fuels: 24,000 TWh)<sup>11</sup>



### BETTER FLEXIBILITY

Utilities can increase revenues by 15% or more by increasing the flexibility of their assets and offering new types of services.<sup>12</sup>



## REIMAGINE BUSINESS PROCESSES

The traditional energy value chain is transforming at breakneck speed, driven by massive structural changes, new technologies, highly interactive devices, and close to real-time processes enabled by the Digital Energy Network.

### Smart asset operations and maintenance for generation and wholesale distribution

Smart asset operations and maintenance are key drivers for cost efficient, compliant, and safe power generation, in particular in highly distributed environments. Predictive analytics with SAP S/4HANA based on sensor data enables smarter asset management with a fully digital allocation of spare parts, work, and logistics services delivered by the digital business networks.

### Storage and flexibility services

Sensors and meters attached to power consumption or generation devices and the industrial consumers' overall operations plan deliver input to calculate and offer demand increase/reduction capacity. This capacity can be managed automatically and is sold to grid operators who need to stabilize their grid.

### Sourcing and trading

Structured portfolios of aggregated, expected energy demand are optimally mapped to planned generation and standard energy wholesale products, sourced through own or cloud-based trading systems.

### Transmission

Significant investments have to be done to adapt the transmission network from the as-is fossil/nuclear-fueled plant locations to the new renewables plant locations. Simulation to predict load patterns, financial and technical modeling, and real-time control optimizes grid utilization and avoids building oversized transmission assets.

### Supply-side coordination

Distributed generation of volatile renewable energy requires a sophisticated digital supply side coordination that collects, analyzes, and distributes information in real time to the market participants for the sake of better decision making.

### Distribution

Renewable energy from wind parks and solar panels feeds back into the distribution grid that was designed for one-way operation. This strains the infrastructure and requires predictive maintenance to avoid outages.

### Meter point operation

Meter data is not just needed for billing purposes – it is analyzed in real time to forecast and balance load, optimize demand response, monitor and improve energy efficiency and reliability, and optimize energy portfolio profitability.

### Sales

Digital information about consumer behavior, preferences, and needs creates a new world of sales opportunities. Regardless of the business model, sales needs a digital, 360-degree view of the consumer and the market.

### Services

Innovative service offerings and processes can have a game-changing impact on customer relationships and the top and bottom line. All service processes will be digitally connected to the workforce, suppliers, customers, and assets for more efficiency and customer value.



National Grid realized \$80 million in savings, including mitigation strategies for 100 high-risk suppliers leveraging the business network.<sup>13</sup>



Convergent billing and invoicing unifies billing for any kind of commodities and services.<sup>14</sup>



## REIMAGINE WORK

The fundamental transformation from a power generation and distribution hierarchy to a Digital Energy Network profoundly changes what people do and how they learn, interact, and grow.

Every substantial business transformation automates manual tasks, enriches jobs, and drives efficiency.

**Digital business processes replace manual transaction work** in procurement, inventory management, invoicing, and payment processing. Digital processes have access to real-time analytics to support rule-based decision making.

**The right information at the right time on the right device:** Shop floor processes are supported or controlled by predictive and self-learning systems that interact with machines and business processes.

**Predictive and self-learning software** accelerates the delegation of business processes and decisions from people to machines. People who need the knowledge have digital access on demand and in real time, regardless if they are part of the core or the extended workforce.

**Interactive technologies** reflect the transition of people's roles from transaction workers to exception workers, who engage when the digital rulebook needs human creativity and ingenuity.

People continue to be key assets in the Digital Energy Network. Their roles will change, but their value to each segment in the network will grow.

**Flexible business-to-people relationships:** Utilities are high-tech companies that operate large-scale technical and digital assets. However, the transformation to the Digital Energy Network also creates hundreds of millions of new people interactions: between consumer and service teams, between the core and the extended workforce, and with the public over social and broadcasting networks. Real-time digital information on the right devices is critical to advance the business agenda through interaction between people.



BC Hydro forecasts a 200% ROI in the first year through cost avoidance and productivity improvements as a result of using the SAP SuccessFactors learning management system.<sup>15</sup>



Many utilities will lose half of their current workforce to retirement in the next five to ten years.<sup>16</sup>

## SAP HANA: THE GREAT SIMPLIFIER

Utilities today are under tremendous pressure as consumers are expecting omnichannel experiences and faster recovery from outages. Utilities like CenterPoint Energy, Alliant, and PSE&G are doing this today. This involves two key concepts: simplification and innovation.

**Simplification** is all about doing what we are already doing BETTER, FASTER, and CHEAPER

**Innovation** is all about reimagining utilities business models and customer engagement by leveraging the technology trends discussed earlier

The diagram below is at the heart of the Digital Energy Network. The idea is very simple, but it took years to make it a reality: Bringing together transactions and analytics on the same platform. CenterPoint Energy implemented a predictive maintenance solution that supports its strategy of integrating information technology (IT) with operational technology (OT).

In-memory computing is a concept brought to life by the breakthrough SAP HANA platform. While relatively young by commercial standards, the rapid adoption of SAP HANA across the utilities industry validates its massive potential for digital businesses. SAP HANA helps Alliant create new business models that it couldn't think of a year ago.

With in-memory computing, we can now finally:

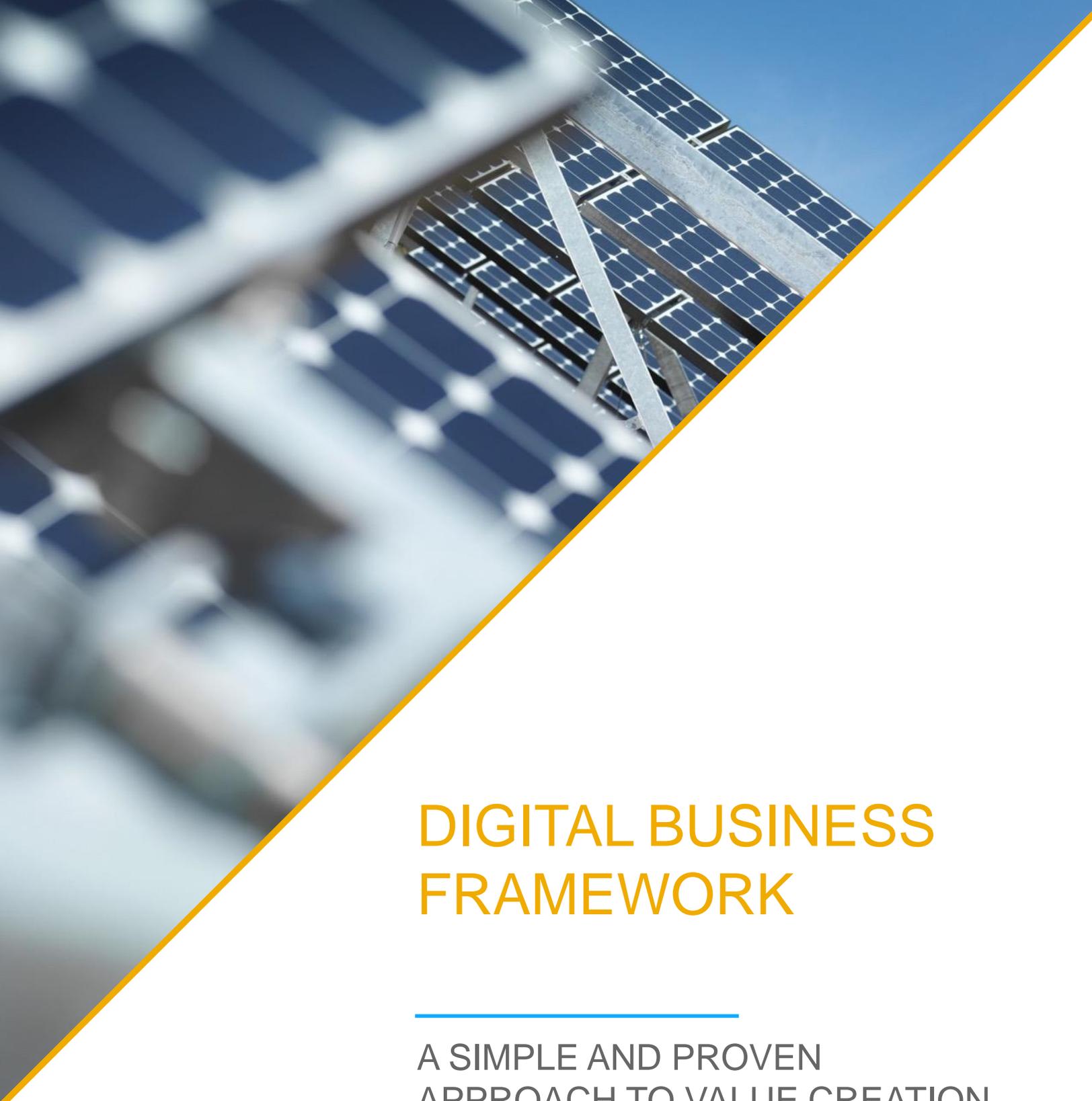
1. **Leverage Big Data** from meters, sensors, weather, social, and geospatial sources. Bringing all data signals together leads to optimal decision making, which can be instantly acted upon in transactional systems via human and machine-to-machine interfaces
2. **Extend the business process** to interoperate with business partners in near real time via advanced cloud-based business networks
3. **Modernize business processes** from finance to supply chain, enterprise asset management and meter-to-cash, running them in real time with no data replication and no batch programs

These capabilities open infinite new ways to optimize business, drive business digitization, simplify everything, reduce cost, and provide the agility required in a fast, changing world. PSE&G is determining the effective age of substation transformers to reduce outages through advanced analytics.

SAP constructed an innovation road map designed to bring in-memory computing together with cloud computing and mobility. This strategy has been embraced by early adopters who are leading the transition to digital.

## SMARTER DECISIONS + SMARTER TRANSACTIONS = SMARTER BUSINESS





# DIGITAL BUSINESS FRAMEWORK

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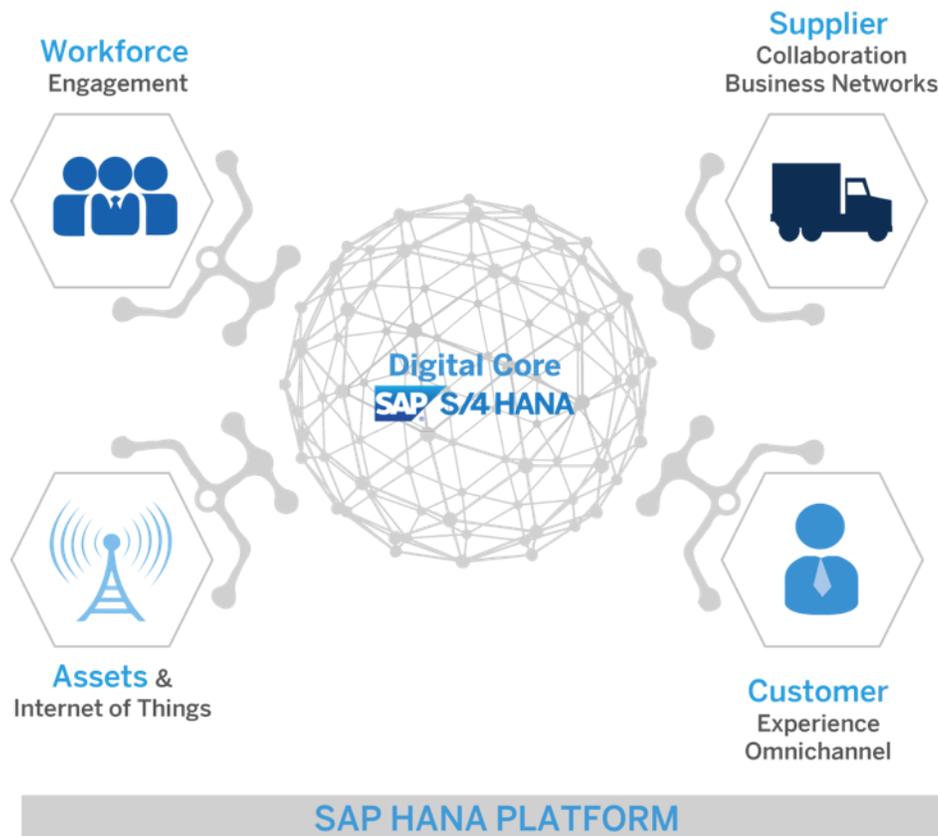
## A SIMPLE AND PROVEN APPROACH TO VALUE CREATION THROUGH DIGITIZATION

Every company across all industries requires a simple digital approach to build a pragmatic and executable vision of its digital strategy.

## DIGITAL BUSINESS FRAMEWORK

Every utility needs to think about the five pillars of a digital strategy

1. SAP understands the five pillars of digitization, and we also understand that the continuously changing requirements pose big challenges for businesses. The method of reimagining business models, business processes, and work helps develop the digitization road map.
  2. We have built the digital business framework to support utilities in developing and executing on their digital enterprise strategy to become digital transformers that fully leverage and contribute to the Digital Energy Network.
  3. Utilities must digitize to grow profits and reduce costs by simplifying their operations. The value of the digital economy is based on how to serve the consumer or prosumer. Value creation often comes from edge solutions which are based on and coordinated by the digital core solutions. It is the platform for innovation and business process optimization, connecting the workforce, the Internet of Things, the supply network, and the customers.
1. Outcome-based **customer** experience
  2. Re-platform **core business processes** and bring together transactions and analytics in real time to be smarter, faster, and simpler
  3. Smarter and engaged **workforce** across all employees and contractors
  4. **Supplier** collaboration to accelerate growth innovation
  5. Harness **assets** and the **Internet of Things** to drive real-time insights and new business models





## THE DIGITAL CORE FOR THE DIGITAL UTILITY

A NEW GENERATION OF ERP SOLUTION, RUNNING **IN REAL TIME, INTEGRATING PREDICTIVE, BIG DATA, AND MOBILE**, WILL CHANGE HOW UTILITIES WORK, HOW TO RUN THE BUSINESS, AND HOW INFORMATION IS CONSUMED: **THE FUTURE IS HERE.**

Advanced in-memory computing signals an end to running the business in batch mode and eliminates complex workarounds for generation, transmission, distribution, and retail. You can Run Simple and use the full power of the Digital Energy Network.

### Real time

Real-time optimization of business-based changes will have a massive implication for how we work, how we do business, and how we organize.

### Power of prediction and simulation

Every employee can gain real business insights with the help of simulation and predictive tools to drive smarter decisions, improve reliability, and reduce outages.

### Agility

The ability to rapidly enter new markets, acquire and onboard new utility business models, or reflect an organizational change in one-tenth of the time it takes with today's systems will yield the agility required in the digital economy.

### Deployment choice and lower TCO

Accessing solutions to run the core has to be simple. Utilities now have the choice to deploy in-house or in the cloud. In-memory computing also has a significant impact on TCO, and it will free up funds for infrastructure investment.

### Consumer-grade user experience

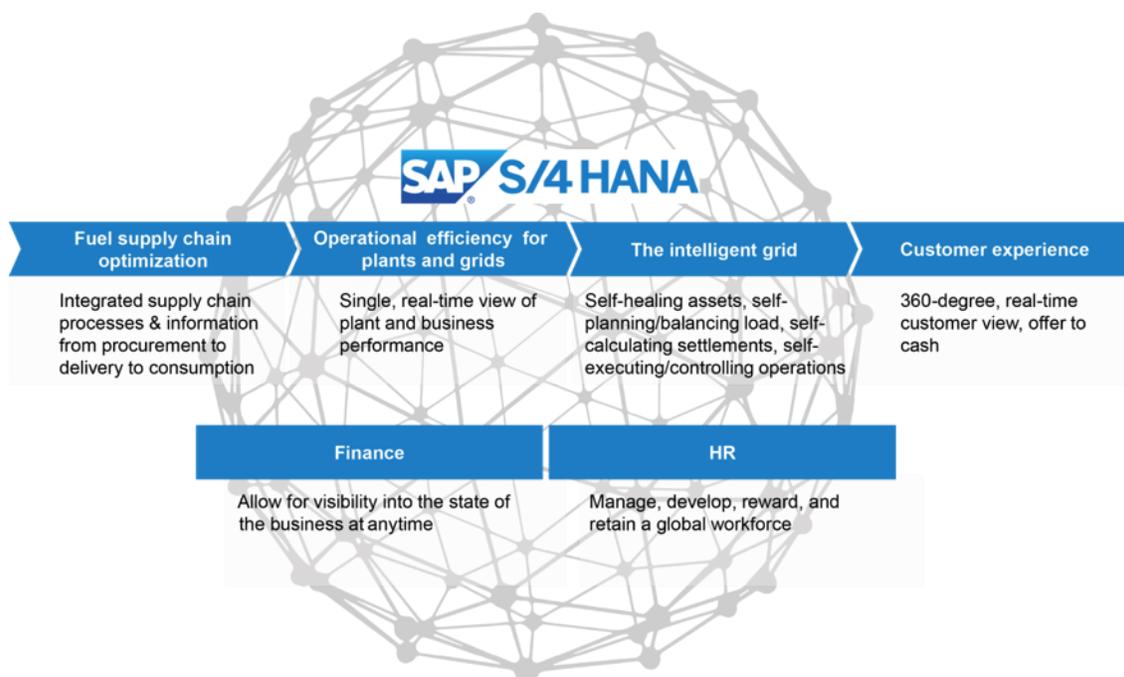
User experience is key to accepting digital change. It drives adoption, user engagement, and people productivity.

### Simplify with SAP

SAP S/4HANA is the only end-to-end solution that covers all business processes and is running in-memory. It helps utilities to run in real time for fundamentally better performance. For instance:

- Single, real-time view of plant and business performance with real-time analysis of asset performance
- Optimized energy consumption through smart meters and demand-side management and blending IT/OT data to optimize operational performance
- Obtain a 360-degree view of the customer to improve the overall customer experience

In addition, the SAP HANA Cloud Platform can be the single enterprise data source for SAP S/4HANA and the rest of your solution landscape.





## CUSTOMER EXPERIENCE

DIGITAL TECHNOLOGY HAS **CHANGED THE GAME**. BUT, CUSTOMERS **CHANGED THE RULES**. CUSTOMERS DEMAND SIMPLE, SEAMLESS, PERSONALIZED EXPERIENCES ACROSS **ANY CHANNEL, ANYTIME, ANYWHERE, AND ON ANY DEVICE**.

Three key trends are reshaping the customer experience:

### Outcome economy:

The outcome economy requires a deep change in the utility business model and new organizational and business process capabilities. It also requires a much different approach to product design and TCO across the lifecycle. Consumers want clean, reliable, and affordable energy. Managing a holistic offering around this outcome will open new revenue sources.

### Customer journey:

Customers choose their own journey in multiple channels at their convenience – the pattern that emerges is not linear, as in the past. Only 12% of companies surveyed can provide a seamless handoff between channels.<sup>26</sup> The rising complexity of the energy markets make shaping the customer journey the top priority for energy retailers.

### Big Data and marketing in near real time:

Big Data allows companies to sense and respond to customers' needs in real time to set the next engagement points. With the rollout of smart meters and the proliferation of customer-owned connected devices the data volume is expanding by orders of magnitude, giving rise to new business opportunities.

### 10 consecutive years

Gartner has recognized SAP as a leader in utility customer information systems since 2006 for 10 consecutive years.<sup>17</sup>

### \$3 trillion

is the estimated utility revenue per year generated through 3 billion invoices for 1 billion customers with SAP's market-leading customer information system.<sup>18</sup>

### 86%

of customers are willing to pay more for a better customer experience.<sup>19</sup>

### 852 million

installed smart devices by 2020 allow utilities to better understand customer behavior.<sup>20</sup>

### Digitize your end-to-end customer experience with SAP

A single platform that brings together marketing, sales, services, and commerce (includes the #1 omnichannel solution, SAP hybris) to ensure seamless digitization of the entire customer experience. SAP solutions for customer engagement and commerce powered by the SAP HANA platform enable a 360-degree view of your customer, real-time interaction, and sophisticated, predictive analytics, fully integrated to the core transactional system.

- **Orchestrate business processes** across marketing, commerce, sales, and service
- **Deliver personalized experiences** in context with each interaction
- **Create a single, harmonized experience** for your customer while reducing the burden on employees
- Be prepared to **engage your customers on the channels they choose** at any moment in their journey
- Full **integration** with your core business processes provides a unique utilities-specific platform for omnichannel customer engagement and commerce





## WORKFORCE ENGAGEMENT

THE WORLD IS GETTING **SMARTER** IN THE DIGITAL ECONOMY. BUT **COMPLEXITY IS OVERWHELMING THE WORKFORCE** IN THIS PURSUIT.

Complexity is the enemy of workforce engagement. People are working harder than ever but are accomplishing less. People do not have access to smart, consumer-grade technology to work smarter, faster, and better. Organizational complexity is driving cost and slowing down progress. Four forces need to be addressed :

### Changing of the guard

Over 50% of the workforce will be a millennial by 2020.<sup>27</sup> Utilities have to devise a workforce strategy to make work in this industry attractive for the digital generation.

### Contingent labor is on the rise

Utilities are turning more to contractors and service providers to drive agility and lower fixed costs. Utilities can outsource work, but not the responsibility for safe and compliant operations. The contingent workforce must be digitally integrated in all business processes.

### Constant reorganization

Reorganizing to adjust to the new reality is becoming a constant affair and can't disrupt efficient operations.

### Complexity is on the rise

Companies do business in more countries across many more channels. Products and services are becoming more complex. Regulations are changing by the day. Layer over layer of management is hindering speed and agility.

**41%**

Increase in **contingent workforce spending** in the past five years<sup>21</sup>

**30%**

of executives say their companies give special attention to the particular wants and needs of millennials<sup>22</sup>

**200%**

ROI in the first year through cost avoidance and productivity improvements<sup>23</sup>

**47%**

Increase in field worker productivity for the Californian utility PG&E achieved after rolling out **SAP's mobile EAM solution**<sup>24</sup>

### Improve your total workforce productivity: Simplify with SAP

Digitize your workforce with SAP: SAP S/4HANA + SuccessFactors + Fieldglass + SAP Fiori provide the tools for total workforce engagement and advanced analytics.

- **Attracting the best people**  
Recruit and onboard the best workforce, simplify their work, and ensure that regulatory and compliance requirements are met
- **Managing the total workforce lifecycle**  
Manage the total workforce lifecycle from recruiting to onboarding, performance, compensation, and learning – all in one place
- **Smarter apps with greater user experience**  
Enable the workforce to easily access the right information across any device and through a dramatically simplified user experience



successfactors



SAP Fiori



FIELDGLASS



## BUSINESS NETWORKS AND SUPPLIER COLLABORATION

B2B TRANSACTIONAL **INEFFICIENCIES ARE COSTING \$600 BILLION PER YEAR**, FROM SOURCING AND TRANSACTING TO PAYMENT PROCESSING.

Collaboration across all spend categories will change the nature of how utilities acquire products and services, outsource, and how they drive value creation across the entire value chain. Several trends are redefining the game:

### Business connectivity at scale

When utility suppliers small and large are connected in the millions, the transactional platform becomes the de facto standard. This is already a reality (examples: Ariba, Concur, Alibaba)

### B2B collaboration by category

Acquiring products, services, or managing expenses requires a set of open standards and a different community of suppliers. Those standards are now set and operational.

### User experience

Without a better user experience at work (examples: Amazon, Travelocity, Google), employees will work around the system, negating the value of negotiated contracts and driving maverick spending.

### Network of networks

Utilities are looking at end-to-end services like digital payment and invoice processing, travel booking, supplier certification, global business yellow-pages, etc. This is all possible as business networks like Ariba are aggregating the services into a one-stop shop.

### \$80 million

In realized savings, including mitigation strategies for 100 high-risk suppliers, leveraging the business network<sup>25</sup>

### From 150 to 4

Working with Ariba's working capital management services, American Electric Power, the 5.3 million customer utility, has standardized payment terms from 150 down to 4, extended its days payable outstanding (DPO) and aggressively pursuing early payment discounts, realizing a 1.5% increase in discount savings in the first year<sup>26</sup>

### 50%

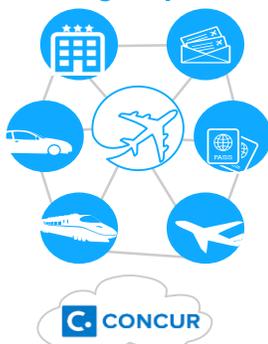
Of networked companies are more likely than their peers to have increased sales, higher profit margins, and be market leaders<sup>27</sup>

### Simplify supplier collaboration with SAP Business Networks

SAP S/4HANA gives you incredible capabilities to digitize business processes across your business – and the connectivity to the business network allows you to extend those processes beyond the four walls of your business.

- **Solution already at scale** and cover all spend categories (Direct & indirect material, labor and services, travel and expenses)
- **Business Networks operate on a global basis**, meet data security standards and operate with near zero downtime
- **Extensive offering by leveraging services** from many partners such as supply chain, financing, payment, supplier certification, etc.

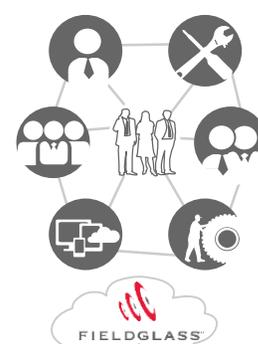
#### Manage Expenses



#### Direct & Indirect Material



#### Labor & Services



### 50-75%

Faster transaction cycles are being achieved with the Ariba Network<sup>28</sup>



## ASSETS AND THE INTERNET OF THINGS

THE MOST **DRAMATIC CHANGE** IN THE DIGITAL ECONOMY WILL BE DRIVEN BY HYPERCONNECTIVITY AND BIG DATA SCIENCE. THESE WILL **TRANSFORM NEARLY EVERY UTILITY BUSINESS MODEL.**

Utilities are finally understanding the full potential of the interlock between physical and digital assets and the Internet of Things. We are witnessing new use cases across utilities with breathtaking results. Below are some key trends:

### Smart products drive new business models

Suppliers are embedding sensors in their products and processes. As a result they are becoming technology companies that rethink the value delivered by their products and that hire hardware and software engineers to implement their ideas.

### Data-driven business models

The transformation in the utilities industry is enabled by Big Data technology and the computing power to process massive amounts of data in real time.

### Technology-driven customer engagement and engineering

Customer sales and services and engineering are spending more and more on Big Data and sensor technologies as their function is the most transformed by these new technologies.

### New alliances

Seamless collaboration is now possible around new business models involving partnerships that may not have made sense few years back. Examples include partnerships between utilities companies and satellite/weather companies, partnerships between Google and appliance makers, partnerships between utilities and technology companies, and many others.

### By 2020:

Three billion Internet users and an expected 30-50 billion connected devices<sup>29</sup>

### 80%

companies who invested in IoT increased revenues<sup>30</sup>

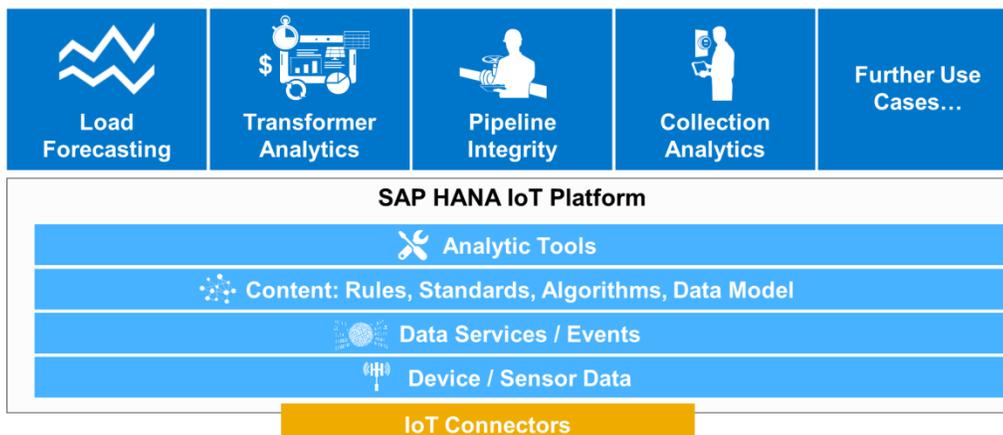
### PSE&G

Is determining the effective age of substation transformers through advanced analytics. Every minute, data points like top oil temperature, transformer load, cooling hours, and load of fans are pulled and analyzed to optimize maintenance<sup>31</sup>

## Connect, transform, and reimagine with SAP

With SAP HANA, Internet of Things edition, organizations can now take embedded device data, analyze this data into information in real time, and apply this information across the value chain to drive business insights and create new business models.

The Internet of Things platform provides the connectivity to OT systems either directly or via partners like OSIsoft. The data is stored and processed in the platform, which provides basic functions like data services (such as operations on time series), predictive analytics, and others. Applications are developed by SAP, partners, and customers and enable use cases like load forecasting or transformer analytics.



# SAP HANA PLATFORM – A NEW COMPUTING PARADIGM

## SAP HANA is the ultimate simplifier and the platform for innovation and digital business

### Dream, develop, and deliver with SAP HANA Cloud Platform

SAP HANA Cloud Platform gives utilities the mobile, collaboration, integration, and analytics capabilities you need to dream big, develop fast, and deliver everywhere, with the following capabilities:

#### Application extensions

Extend your current cloud and on-premise solutions for additional customization, enhanced business flows, and more.

#### Real-time analytics

Engage utility customers, optimize business processes, and unleash new revenues with real-time analytics apps, powered by SAP HANA.

#### New cloud apps

Quickly build innovative consumer-grade and industry apps for today's always-on, mobile, social, and data-driven world.

#### Extended storage capabilities

Holistically manage all structured, unstructured, and infinite data streams with flexible combinations of data stream processing, in-memory technology, disk-based columnar storage, and Hadoop-based storage solutions.

#### Data footprint reduction

Significantly reduce memory footprint and TCO. In ERP systems, we have seen ~6x reduction by SAP HANA's dictionary compression. Removing aggregates and actual and historical data separation further reduces the footprint up to ~10x.

### Alliander

"SAP HANA helps us in creating new business models that we couldn't think of a year ago."<sup>32</sup>

### Southern California Edison

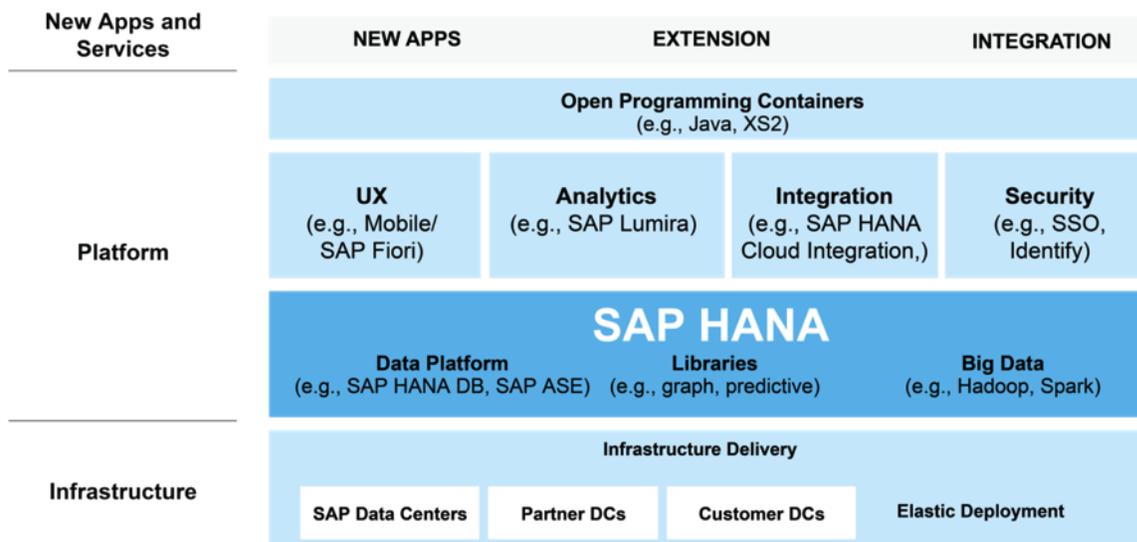
"SAP HANA is a game-changer!"<sup>33</sup>

### MVV Energie AG

"We want continued growth year over year. This is what we expect on the revenue side as a key benefit of our project to run SAP CRM powered by SAP HANA. We think we can sell better now, because our sales representatives can show energy-service scenarios using actual, real-time data on their mobile devices – rather than relying on PowerPoint presentations."<sup>34</sup>

### The SAP HANA platform is...

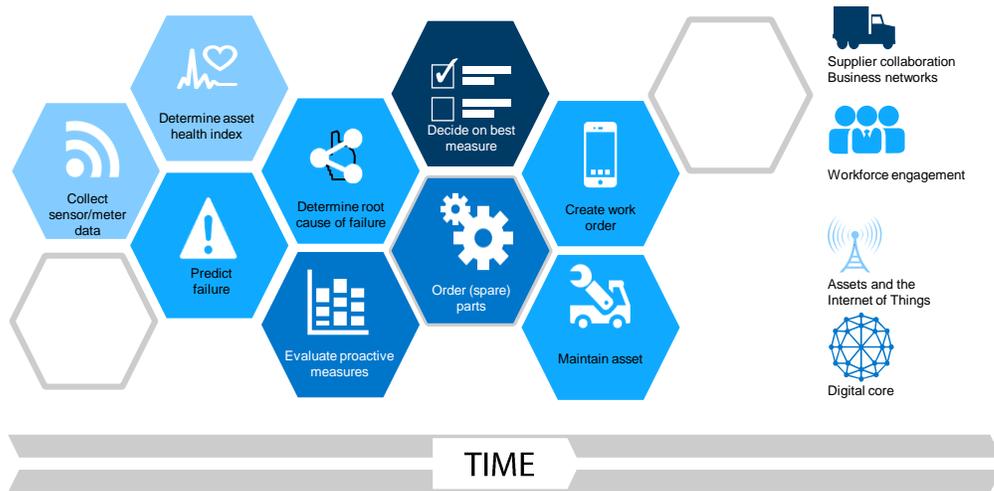
Real-time, in-memory platform • 10x data footprint reduction for ERP • Extended storage, including Hadoop • Open architecture • Developer-friendly • Embeds mobile and analytics • Secure • Cloud-ready



## HOW DOES IT ALL COME TOGETHER? – EXAMPLE

Each of the five digital business pillars delivers individual business value, but next-generation business processes will span multiple pillars to drive efficiency internally or across the business network, connect to devices, and improve asset health and performance.

### Use sensor and meter data to proactively maintain assets



Imagine that sensor data is continuously collected and analyzed in real time to determine and monitor asset status and health. This information is also fed into advanced analytics models that can predict impending failures early enough to avoid damages and outages. To evaluate the proactive measures, the system needs to determine potential root causes for an expected failure. This supports the decision for the best actions, including ordering the right spare parts, assigning the right experts, and devising a cost-effective schedule.

The digital work order dispatches the service crew and provides additional geospatial and device information to ensure that the right activities are conducted, at the right time, by qualified people, with the right spare parts and tools.

Every outage and failure that can be prevented or proactively managed minimizes cost and maximizes asset availability and customer satisfaction.

Real-time predictive analytics yields tangible business benefits:

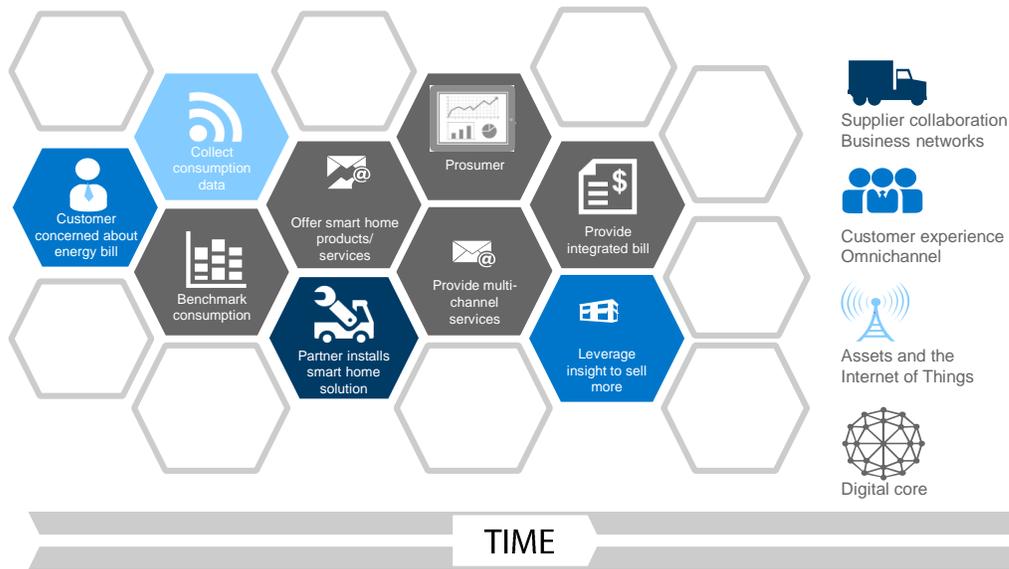
- Higher return on assets
- Faster recovery time from failure
- Higher productivity and safer work
- New service revenue streams
- Competitive service-level agreements
- Higher customer satisfaction

The Digital Energy Network enables even more innovative asset management scenarios in which equipment monitors its own health, reaches out to system experts to devise a recovery plan, devises workarounds, sources, orders, and schedules the services experts, gets 3D-printed service and spare parts, and updates its production schedule.

## HOW DOES IT ALL COME TOGETHER? – EXAMPLE

Each of the five digital business pillars delivers individual business value, but next-generation business processes will span multiple pillars to drive efficiency internally or across the business network, connect to devices, and enhance the omni-channel customer experience.

### Use customer data to offer new services and increase revenue



The digital utility now has the opportunity to use one or more communication channels to interact with customers to identify concerns about high energy bills and other questions. With the smart meters, the customer can see consumption behavior throughout the day to make better decisions in real time.

The utility now offers benchmarking services at no cost and asks the customer for permission to evaluate the metering and consumption-related information using Big Data analytics.

If the customer exceeds consumption targets, the utility offers smart home products and services with a profitability analysis to create a customized offer.

If the customer accepts the offer, the utility leverages its network to collaborate with partners to install the smart home devices. The utility also provides an option to contribute electricity to the grid through home-based solar power installations and other renewable sources, based on feasibility.

The utility continuously monitors the customer's consumption behavior and creates personalized analytics, which the customer can access using various channels. This allows customers to receive a consolidated bill, including the energy and smart home services.

The utility can now easily provide even more services to improve customer engagement and satisfaction!

Real-time customer analytics yields tangible business benefits:

- Higher customer satisfaction
- Faster response for potential high bill scenarios
- Higher profits with smarter services
- New revenue streams
- Competitive service-level agreements for smart homes
- Collaboration as an energy provider

The Digital Energy Network enables even more innovative customer management scenarios in which consumers monitor their own consumption, reach out to experts to devise an energy plan, and perhaps become a "prosumer" with personal solar panels and battery storage.



# HOW TO START

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THE JOURNEY TO THE DIGITAL ENERGY NETWORK BEGINS WITH A CAPABILITY ANALYSIS THAT RESULTS IN THE TRANSFORMATION AGENDA

## HOW TO START

### THE JOURNEY TO THE DIGITAL ENERGY NETWORK

The journey to define future business models capitalizing on the Digital Energy Network involves all disciplines of a modern utility and requires a systematic approach to identify and capture business opportunities.

### THE COLLABORATIVE VALUE AND INNOVATION FRAMEWORK

Utilities companies embarking on the transformation journey to the digital business typically start to reimagine their business with a focus on business outcomes and customers.

Answering the key questions, “What role will we play in the utilities value chain? How will we make money?” will provide direction for reimagining your business processes and operational model.

For innovation today, a new level of collaboration is required. As a result, we have developed a framework that will be a continuous and holistic partnership model designed to drive true collaboration and engagement. Outlined below are the five steps of the [SAP Collaborative Value and Innovation Framework](#):



1. **Strategy alignment:** Understand company and SAP strategic direction and identify initiatives
2. **Opportunity assessment:** Opportunity deep-dive based on strategic initiatives and prioritization based on value
3. **Solution road map and ROI:** Document end-state solution, and business case including benefits, TCO, ROI, and strategic road map
4. **Value realization:** Deliver transformation on time, on budget, and on value
5. **Governance:** Maximize investments and accelerate value creation with governance based on executive engagement, value delivery, and continuous innovation



## WHY SAP?

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SAP ENABLES THE DIGITAL ENERGY NETWORK WITH THE DIGITAL CORE, BUSINESS NETWORKS, SUPPLY CHAINS, AND THE INTERNET OF THINGS

# SAP IS COMMITTED TO INNOVATION

**Vision** Help the world run better and improve people's lives

**Mission** Help our customers run at their best

**Strategy** Become the cloud company powered by SAP HANA



- **75K employees** representing 120 nationalities
- **295K customers**
- SAP operates in **191 countries**

- Solutions for **25 industries and 12 LoBs**
- **98% of top valued brands** are our customers
- **74% of the world's transactions** managed on SAP

- **80 million** business cloud users
- **1.9 million connected businesses**
- **\$800 billion+** in B2B commerce
- **99%+ of mobile devices** connected with SAP messaging

- 2011 **SAP HANA** launched
- 2012 **SAP Cloud** launched
- 2014 **SAP business networks** are the largest marketplace in the world
- 2015 **SAP HANA Cloud Platform**
- 2015 **SAP S/4HANA:** Most modern ERP system

- Utility solutions **since 1988** for electric, gas, and water
- **88% of utilities** in the Forbes Global 2000 are SAP customers – 4,200+ in total
- **740+ utilities** managing 3 billion+ invoices

## PREDICTING CUSTOMERS IN HOUSTON

With CRM data running on SAP HANA, CenterPoint Energy is able to **analyze customer data >1,000x faster** from different sources (examples: smart meters, bill history, weather data, etc.) to accurately predict in real time why customers are calling and automatically **route the calls to the proper agent or self-service process** to significantly reduce costs.

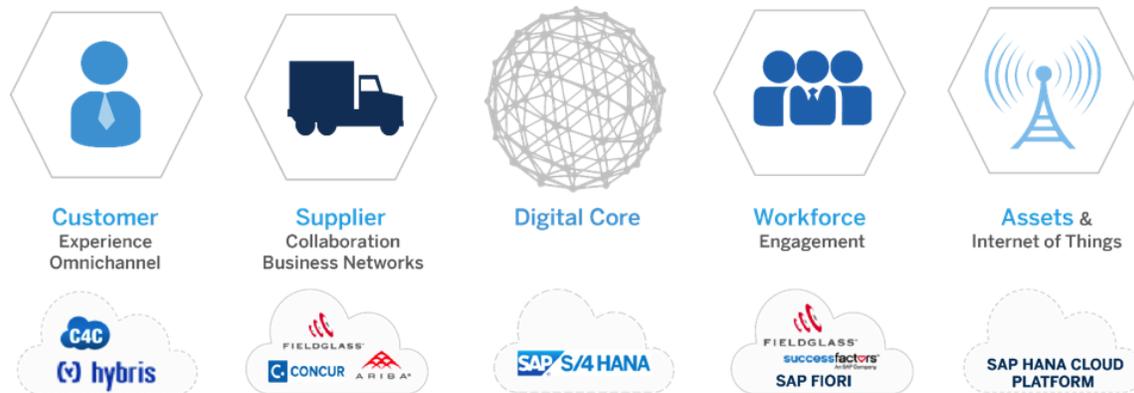
## FIRE AND RESCUE

New South Wales now has a comprehensive view of fire and disaster risk to **protect 7 million residents**. 30+ years of experience available in **real time in SAP HANA** ensures the right people are addressing emergencies at the right time.

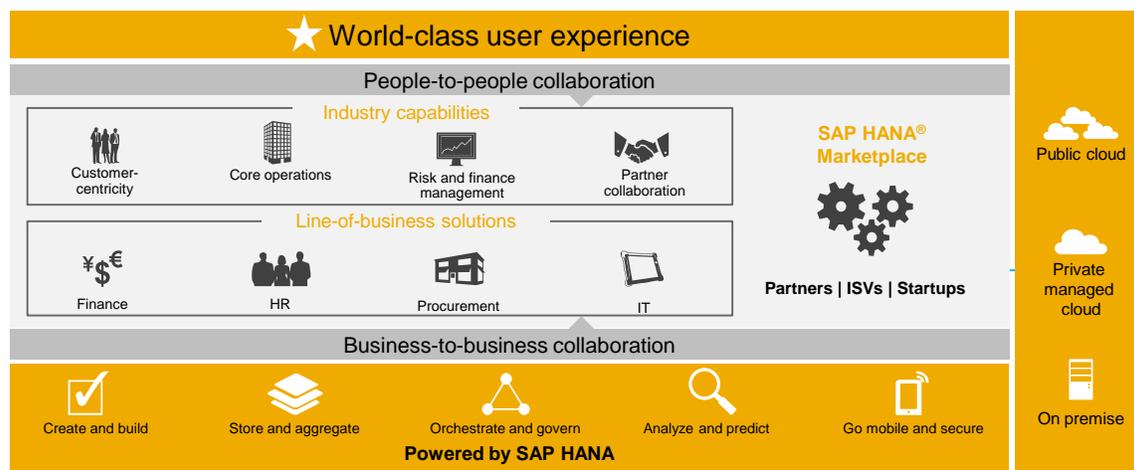
## EARLY FLOOD DETECTION IN INDIA

With SAP HANA and SAP Predictive Analytics, water levels can be **monitored in real time to alert the population** about the floods and ultimately save lives.

# CREATE COMPETITIVE ADVANTAGE THROUGH INNOVATION



SAP will bring simplification, innovation, and acceleration required to support the development of your digital business strategy. These capabilities will be leveraged throughout the SAP Collaborative Value and Innovation Framework.



## SIMPLIFY

Simplify transaction processing, account management, and customer service while enhancing utilities operations.

- Deliver superior customer service and truly connect with customers through a single view enabled by the SAP HANA platform
- Provide simplified and intuitive insight to customer energy usage profiles, anytime and anywhere
- Give customers a smooth omnichannel experience across channels such as storefront, Internet, telephone, e-mail, Web chat, and social media

## INNOVATE

Use SAP HANA Enterprise Cloud to enable utilities, suppliers, and customers to connect and collaborate.

- Connect mobile users to enterprise data on customers, accounts, and services, giving access to the information they need to better manage their energy usage
- Process and optimize data on customers and assets across all operating units and legal entities with SAP HANA in the cloud
- Adopt and apply analytics solutions through the cloud to enhance visibility into consumption and energy demand

## ACCELERATE

Predict and respond to opportunities and risks with predictive analytics solutions powered by SAP HANA.

- Address unplanned energy and asset outages more quickly
- Take new products and services to market more quickly and respond to customers on the platforms they prefer
- Balance energy demand and supply with predictive modeling and accurate and timely analytics using SAP HANA; also detect fraud more quickly

# SAP GLOBAL SERVICES AND SUPPORT TO DRIVE YOUR SUCCESS

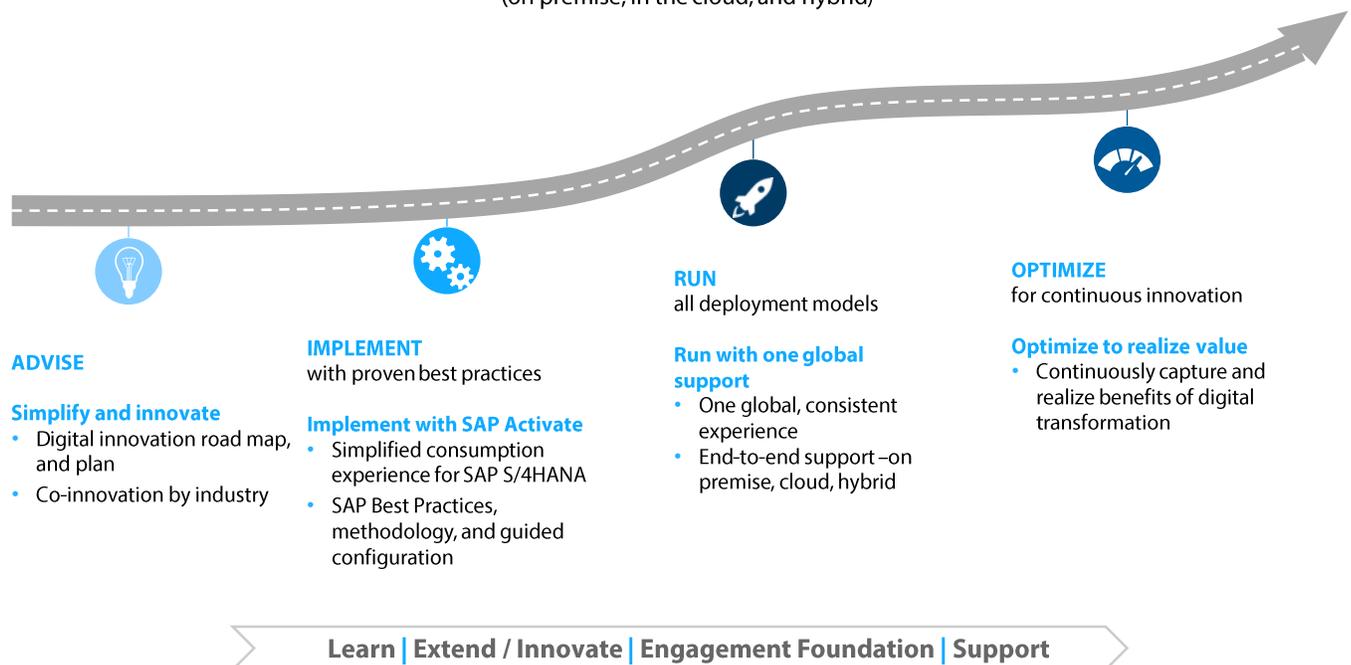
In the digital economy, simplification and business innovation matters more than ever. SAP has a broad range of services to cover the end-to-end digital transformation journey, ranging from advising on a digital innovation road map and plan, to implementing with proven best practices, to the ability to run across all deployment models, and ultimately optimize for continuous innovation across your digital journey. SAP provides both choice and value within our services, allowing you to tailor the proper approach based on your needs.

Turn to the 30,000 consultants and support professionals who can bring your digital strategy to life. SAP's global service and support model provides a consistent experience – on premise, cloud, or hybrid. SAP's global service and support provide the expertise, assets, and the proven methodologies required to accelerate business

innovation, reduce TCO, and run a stable platform (on premise or in the cloud).

SAP Activate is a new, simplified consumption experience introduced for SAP S/4HANA and cloud adoption. It provides a combination of SAP Best Practices, methodology, and guided configuration. In addition, we provide leadership in learning to drive quick time to value realization and a solid engagement foundation with SAP MaxAttention, SAP ActiveEmbedded and SAP Value Partnership across the end-to-end customer lifecycle.

SAP global service and support provide the expertise, assets, and proven methodologies required to accelerate business innovation, reduce TCO, and run a stable platform (on premise, in the cloud, and hybrid)



# SAP COMPREHENSIVE ECOSYSTEM

Orchestrating the world to deliver faster value

Our comprehensive ecosystem for utilities offers integration into:

- A wide range of business services (OEM suppliers, banks, key vendors)
- Special technology services for utilities with focus on IT/OT convergence, geospatial integration, utilities asset health management, etc.
- Open architecture: choice of hardware and software
- Complementary and innovative third-party solutions
- Reach – partners to serve your business of any size, anywhere in the world
- Forum for influence and knowledge
- Large skill sets

Our partner ecosystem includes, among others:



## BUSINESS NETWORK

- 1.8 million suppliers
- 200 major travel partners (air, hotel, car)
- 50K service and contingent labor providers

## INFLUENCE FORUMS & EDUCATION

- 32 user groups across all regions
- 40+ industry councils
- SAP community >24 million unique visitors per year
- 1,800 SAP University Alliances

## INNOVATION

- 1,900+ OEM solution partners to extend SAP solutions
- 2,000 startups developing SAP HANA apps



## IMPLEMENTATION SERVICES

- 110+ utility partner companies
- 3,200 service partners
- Delivering utility-specific solutions

## PLATFORM & INFRASTRUCTURE

- 1,400 cloud partners
- 1,500+ platform partners

## CHANNEL & SME

- 400 utilities channel partners
- 4,800 overall channel partners

## ADDITIONAL RESOURCES

Outlined below is additional external research that was used as supporting material for this white paper.

- <http://www.metering.com/smart-meters-japan-tepco-to-deploy-27m-by-2020-olympic-games/>
- <https://newsroom.accenture.com/news/accenture-and-sap-chosen-by-centerpoint-energy-to-develop-asset-analytics-solution-to-take-advantage-of-the-internet-of-things.htm>
- [https://en.wikipedia.org/wiki/Nest\\_Labs](https://en.wikipedia.org/wiki/Nest_Labs)
- [http://www.teslamotors.com/de\\_DE/powervall](http://www.teslamotors.com/de_DE/powervall)
- <http://scn.sap.com/community/hana-in-memory/use-cases/blog/2014/05/07/how-alliander-improves-its-load-forecasting-with-sap-hana>
- <https://www.iea.org/topics/electricity/sutopics/smartgrids/>
- <http://cleantechnica.com/2014/08/26/energy-storage-market-rises-50-billion-2020-according-lux-research/>
- IDC Energy Insights at SAP Utilities Conference 2015, Berlin
- <http://windenergyfoundation.org/about-wind-energy/>
- Ponemon Institute and Unisys - 2014
- [https://www.iea.org/media/training/presentations/etw2014/Day\\_3\\_Session\\_1\\_a\\_Renewables\\_Market\\_Trends.pdf](https://www.iea.org/media/training/presentations/etw2014/Day_3_Session_1_a_Renewables_Market_Trends.pdf)
- <http://www.forbes.com/sites/baininsights/2014/11/14/how-electricity-generators-can-jolt-profits-back-to-life/>
- National Grid Ariba success story – 2014
- <http://www.sap.com/germany/solution/lob/sales/software/billing-revenue-innovation/best-run-billing.html>
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- [http://www.electricenergyonline.com/show\\_article.php?mag=&article=261](http://www.electricenergyonline.com/show_article.php?mag=&article=261)
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<http://about.americanexpress.com/news/docs/2014x/2014-Global-Customer-Service-Barometer-US.pdf>
- "Press Release Telefonica, January 2014, m2m report commissioned by Telefonica" <https://m2m.telefonica.com/press/m2m-800-million-electric-smart-meters-to-be-installed-globally-by-2020>
- "The Changing Landscape of the Flexible Workforce - And Why Procurement Should Care, San Francisco Bay Area Symposium November 12, 2014, page 5"  
[http://sig.org/docs2/The\\_Changing\\_Landscape\\_of\\_the\\_Flexible\\_Workforce\\_-\\_And\\_Why\\_Procurement\\_Should\\_Care\\_-\\_Fieldglass.pdf](http://sig.org/docs2/The_Changing_Landscape_of_the_Flexible_Workforce_-_And_Why_Procurement_Should_Care_-_Fieldglass.pdf)
- "Workforce 2020: Building a strategic workforce for the future" Oxford Economics, 2014,  
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[http://www.sap.com/bin/sapcom/en\\_us/downloadasset.2014-12-dec-05-07.sap-for-utilities-solutions-supported-by-sap-hana-enterprise-cloud-pdf.bypassReg.html](http://www.sap.com/bin/sapcom/en_us/downloadasset.2014-12-dec-05-07.sap-for-utilities-solutions-supported-by-sap-hana-enterprise-cloud-pdf.bypassReg.html)
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- AEP Ariba success story – 2013
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- SAP Benchmarking
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[http://www.itu.int/net/pressoffice/press\\_releases/2014/23.aspx#.VaaCmaPD-IW](http://www.itu.int/net/pressoffice/press_releases/2014/23.aspx#.VaaCmaPD-IW)
- "2015 TCS Global Trend Study on IoT, Press Release TCS, July 22, 2015", [http://www.tcs.com/news\\_events/press\\_releases/Pages/Internet-of-Things-TCS-Global-Trend-Study-2015.aspx](http://www.tcs.com/news_events/press_releases/Pages/Internet-of-Things-TCS-Global-Trend-Study-2015.aspx)
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[http://www.sap.com/bin/sapcom/en\\_us/downloadasset.2014-10-oct-13-21.sap-hana-real-time-enterprise-stories-pdf.bypassReg.html](http://www.sap.com/bin/sapcom/en_us/downloadasset.2014-10-oct-13-21.sap-hana-real-time-enterprise-stories-pdf.bypassReg.html)
- Ron Grabyan, Manager of Business Intelligence Services, Southern California Edison  
<http://www.iisgroup.eu/wp-content/uploads/2014/01/SAP-HANA-brochure.pdf>
- MVV SAP Customer Success Story 2014 -  
<https://dam.sap.com/mac/asset/view.htm?id=2697bbf41145106fbb0180a3369153178d9b2a68>

**Note:** All sources cited as "SAP" or "SAP benchmarking" are based on our research with customers through our benchmarking program and/or other direct interactions with customers

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