



Enabling Connected, Livable Communities

How to survive and thrive
in a digital real estate
economy



Run Simple



The real estate industry is long overdue for fundamental change, and the VC community is banking on it with significant investments into new technologies.

Michael Shomberg
Global Vice President and General Manager
Head of Industry Business Unit for Construction & Real Estate
SAP SE

Dear Colleagues,

Global real estate value was US\$217 trillion in 2016,¹ far exceeding the size of the global equities market. Adding to the incredible market size is the fact that our population is rapidly “urbanizing” or gravitating towards cities to live, work, and play. The combination is an explosive mix with huge opportunities and ramifications for the commercial real estate (CRE) market. One thing is clear: one of the oldest industries in the world is on the verge of disruption.

Commercial real estate providers are facing three challenges:

- Tenant expectations are evolving faster than the pace of change.
- New business models, adopted in other industries, are starting to encroach.
- Advances in building and information technology are redefining what is possible with buildings.

Clients have an expectation that their work and entertainment spaces are at least as intelligent as their homes, which are advancing rapidly with new technologies for security, energy management, and entertainment. However, the CRE industry is well known as one of the slowest to adopt technology and has seen only superficial changes. The venture capital market has noticed opportunity, and real estate technology is one of the hottest areas for investment. No one wants to be left out of markets similar to those of Uber, Amazon, and Airbnb, all of which have disruptive parallels to the CRE industry.

The industry's changes provide great opportunities for industry leaders. The move to digital is not optional, and it will result in significant advantages for the innovators. We see four key areas being impacted by digitalization and the transforming industry:

- Digitalization of space access will enable customers to determine and access the best property for their needs, whether it is from a CRE's property portfolio or underutilized and repurposed corporate real estate.
- Digitalization of operations management will help CFOs lower the cost per square area of operating real estate significantly, directly impacting the bottom line.
- Digitalization of transaction management will automate many of the brokers' and agents' processes with more-efficient technology, increasing the speed and accuracy of transactions.
- Digitalization of investment portfolio management will help CRE companies evaluate hundreds of parameters in real time to optimize the pricing, investment strategies, and their overall competitive position.

At SAP, we did not invent the digital economy, but we understand where it's going. We started a journey five years ago, building the agile platform and solutions needed for the digital economy. This took over \$30 billion in acquisitions and billions in R&D. The results speak for themselves – as we are the only company to provide the end-to-end solutions to manage the complete real estate lifecycle and help CEOs solve their diverse challenges. Our vision is to help CRE companies build and enable connected, livable communities.

This document offers our perspective of the most-significant trends, the industry direction, and how SAP can help in this digital journey. Now is the time to forge a bold vision for a different kind of data-driven business. Without this vision and the desire to act on it, organizations run the risk of falling behind rapidly moving competitors. Thank you for your interest, and we look forward to your feedback. organizations run the risk of falling behind rapidly moving competitors. Thank you for your interest, and we look forward to your feedback.

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MARKET OVERVIEW

Real estate has a huge impact on all aspects of our lives

Unprecedented Growth

The real estate industry is headed for unprecedented growth to meet the needs of our changing world:

- The global population is projected to grow to 9.7 billion by 2050.²
- Two out of three people will live in cities by 2050.³
- By 2025, millennials will represent 75% of the workforce.⁴

Real estate assets are worth \$217 trillion worldwide, which is 2.7 times the world's GDP (see figure). "The value of global real estate exceeds – by almost a third – the total value of all globally traded equities and securitized debt instruments put together."⁵

Residential property accounted for 75% of the total value of global property. In the United States, the real estate market is approximately \$50 trillion, with \$26 trillion in residential and \$24 trillion commercial real estate.⁶

Currently, 200,000 people are moving to cities every day, the equivalent of creating a new "New York City" every six weeks. If nothing else were changing, these demographic changes would put a huge strain on current real estate companies to meet the rising demand.⁷

As the saying goes, "a picture is worth a thousand words." The before and after photographs of Dubai⁸ and Shenzhen⁹ speak to the dramatic growth of cities.



Dubai UAE 2005



Dubai now

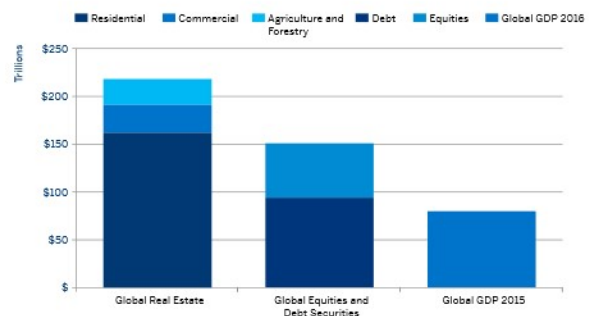


1964 Shenzhen, China



Now Shenzhen, China

Global real estate universe in comparison



Source: Savills Research, Bank for International Settlements, Dow Jones Total Stock Market Index, Oxford Economics

MARKET CHALLENGES

Transformation has been occurring over the last 10 years, such as:

- **Office:** Physical file cabinets have been replaced by computer servers and cloud storage applications, cubicles have given way to flexible open spaces, and telecommuting and flexible hours are more accepted. These all contribute to changes in commercial and corporate space requirements, but the need to drive down costs for space dramatically exceeds the modifications made to date. Unfortunately, there is still a significant amount of underutilization of space and costly energy waste.
- **Retail:** E-commerce and omnicommerce have driven changes in distribution networks, warehouses, and shopping malls, and more advances are rapidly coming.
- **Industrial:** New megawarehouses have been built and, while improving deliveries, demands for even faster deliveries are evolving.
- **Residential:** The demand for housing space in urban and suburban environments is increasing heavily.

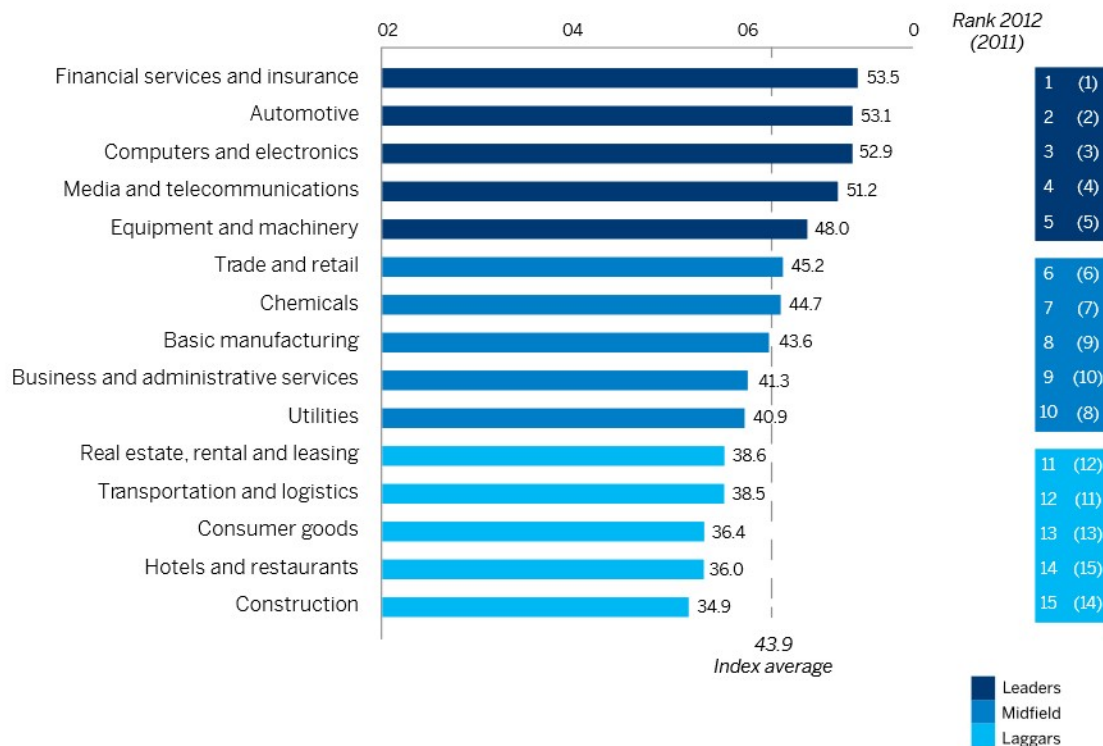
Other changes are raising the stakes even higher, such as:

- The expectations, habits, and desires of occupants are evolving faster than the pace of change.
- Business models and requirements are changing rapidly.
- Building and information technology advances are redefining the way people interact with buildings.

Clients expect their work space to be at least as intelligent or automated as their homes, which are now taking advantage of new technologies for home security, heating, lighting, energy use, and so on.

Unfortunately, the commercial real estate market has been identified as one of the slowest industries to adopt new digital processes and technology innovations.

Industry digitalization index, 2012¹⁰



Source: 2012 Industry Digitization Study

A prime example is the real estate transaction process – it has remained much the same as the manual process in place a hundred years ago, involving paper and people at every step. To understand how the commercial real estate industry will deal with these challenges we first need to understand the larger disruptions that are evolving. Then we can examine how the nimble can meet and turn these challenges into massive opportunities.

Evolving expectations, habits, and desires

The millennial generation, 83 million and growing in the United States, is beginning to exert significant influence on the real estate industry. Roughly 10,000 to 12,000 baby boomers are retiring daily, and by 2025, millennials will represent 75% of the workforce.¹¹

Multiple studies indicate that millennials want work spaces that are at least as smart as their homes, offering the flexibility to meet their changing daily requirements. They want collaborative environments for team activities, “quiet spaces” to focus on complex tasks, and easy access to games or spaces to relax. In general, all workers are looking for convenience and flexibility in their place to work and work hours versus a rigid workplace and 9-to-5 work hours. At home, millennials value flexibility, density, diversity, accessibility, and sustainability, and the trend has been toward renting versus owning. They also tend toward environmental consciousness, meaning they want space that is comfortable and also green.

Between 2012 and 2050, the United States will experience considerable growth in its older population. In 2050, the population aged 65 and over is projected to be 83.7 million, almost double its estimated population of 43.1 million in 2012.¹² This group is also moving to urban environments for the increased accessibility to amenities, including public transportation, restaurants, and entertainment.

Both groups appear to be willing to compromise on personal space for an increase in shared or communal space. Unfortunately, current real estate portfolios are not equipped for this configuration. This leaves current real estate assets unsuited to future needs.

These factors make finding suitable office space and affordable housing more and more challenging, while leaving real estate companies uncertain how to design and build to meet the needs of tomorrow's population.

Rapidly changing business models and requirements across all segments

Office: Over 75% of jobs will disappear over the next 10 years due to automation. A recent study by the University of Oxford suggests there is a 97%–99% potential that artificial intelligence algorithms will replace the jobs of real estate brokers.¹³

Therefore, today's office spaces are fit for a purpose that will soon no longer exist. In fact, today, typical corporate real estate assets are utilized only 40% to 50% during working hours and are rapidly becoming outdated.¹⁴ Most corporate CFOs realize that their real estate assets are one of the largest items on their balance sheets, yet these assets are not a core competency, are increasingly underutilized, and are raising operating costs. CFOs must get more value, increased flexibility, and reduced costs across their portfolios, or they need to spin them off to others that can. Companies such as WeWork, PivotDesk, and Industrious have rapidly grown by leasing commercial real estate space and creating flexible co-working environments for transient workers. This is an evolution, but may not be the optimal business model for commercial real estate and corporate clients, as these groups could easily create their own solutions to meet the changing needs, without paying the premium charged by these new players.

Retail: With the advent of omnichannel commerce, retailers realize that they require various ways to engage a customer other than with brick-and-mortar-stores. The retail store model is being transformed with an online component; huge regional warehouses with smaller local fulfillment centers and stores to complete the “last mile.” A store's primary role will shift to enabling consumers to experience products, rather than being the sole fulfillment center. This model will lower cost per square foot for retailers, which goes straight to improving the bottom line. With the potential for 3D printing to completely disrupt this emerging model again in the near future, the future of retail property becomes more and more uncertain.

Multiunit residential: With the urbanization of our population and the desire for flexibility, consumers are moving to multiuse facilities with better amenities, greater sustainability, and fewer commitments. Consumers are willing to have less personal space in exchange for more communal space. This all adds up to more flexibility required in our assets.

Asset-light or asset-less portfolios: Across all sectors, we see the potential shift from asset-heavy portfolios to asset-light or asset-less portfolios with improved flexibility. Companies such as Uber (doesn't own cars), Alibaba (doesn't own inventory), Airbnb (doesn't own rooms), and, to a lesser extent, Amazon and Netflix (don't own stores) have dramatically changed business models to where **physical assets** have become commodities and **access to consumers** is the core business value. In a few short years, each of these has grown to billion-dollar entities, with valuations exceeding the combination of the top 5 to 10 competitors in the industry by increasing access, while providing unprecedented flexibility at extremely low operating costs.

Today's values are changing rapidly, from valuing assets to valuing access. The above examples demonstrate that traditional asset-based models are ripe for disruption. New companies are emerging that provide flexible, higher-revenue, lower-cost services without sacrificing traditional amenities, thus making current business models obsolete or in significant danger.

Building and information technology is redefining our interactions with buildings

Proliferation of low-cost sensor technology: With the Internet of Things (IoT), there are more objects connected to the Internet in the world than people. Today's buildings consume over 40% of the world's energy¹⁵ and 65% in the United States.¹⁶

Much of it is wasted with gross inefficiencies due to the lack of monitoring and optimization of real estate assets.¹⁷ Sensors can turn real estate assets and their systems (such as HVAC, security, elevators, and so on) into "smart" buildings. Smart assets can provide up to 25% better energy efficiency,¹⁸ improved security, and improved customer satisfaction through increased uptime of key assets and value-added services. Smart buildings are not only about collecting and automating activities within the building. They can also be connected to service and parts suppliers to connect the whole supply chain to fix systems before they fail. This will transform building management operations, dramatically by decreasing the cost per square meter, while increasing customer satisfaction.

Although smart buildings represent a large segment of the smart city initiative, few buildings, comparatively speaking, are equipped with sensors. Companies that react quickly in this segment will reap the rewards while others will become uncompetitive.

Augmented reality and automation: Augmented reality and automation are not new technologies. However, their application to real estate is starting to accelerate with the availability of BIM/3D modeling, robotics, and virtual reality (VR) capabilities. Agents and brokers have been able to create video tours. The creation of a "digital twin" of the physical real estate asset enables a host of disruptive approaches, from virtual configuration (colors, materials, and so on), to virtual tours (internal or external and day or night), and VR-augmented facility maintenance. All of these can dramatically lower costs and improve the consumer's overall experience.

Information aggregation (Big Data) and cybersecurity:

Consumers are becoming more data driven than ever. With more-powerful computing and machine-learning capabilities, consumers can customize and optimize purchases like never before. No longer will they allow for the slow filtering of data from brokers and agents, when they can go directly to the source for accurate, unfiltered, and timely data. There are sites that provide access to all available space, not just one CRE company's, but to all space, including excess corporate space. There is technology dedicated to competitive market conditions and trends, financing options, and crowdfunding, providing access to all investors (not just real estate investment trusts, commercial real estate companies, and wealthy personal investors). There are also sites dedicated to optimizing the contracting process, such as online contracts and real estate documents, and digital signatures. Providing this access requires a new level of security for real estate transactions, where blockchain technology is starting to emerge and can provide secure transactions anywhere in the world.

Embracing disruption: reimagining business models, processes, and work

Because of the changing market dynamics previously discussed, commercial real estate is on the verge of disruption where we will need to reimagine everything, from business models and business processes to the very nature of work itself.

Do you have the right strategy?

Unprecedented growth presents enormous opportunities, but also considerable challenges. Leading real estate companies are changing their core business models and processes. These leaders are realizing greatly improved margins and quality. Digitalization of core business models, processes, and work is forcing all real estate companies to reevaluate where they invest, how they compete, and if they are prepared.



REIMAGINE BUSINESS MODELS

The prevalent commercial real estate model in place today, where a developer builds a building with the intent of placing a long-term tenant in the space, is under assault from all angles and has many players in the process ripe for elimination.

Assets as a service

Commercial real estate leases are assets as a service, just as taxis are assets as a service, and a similar disruption is possible. Uber applied technology to leverage underutilized assets already in the market to create a new business model and significantly disrupt the taxi industry. Some studies indicate that corporate real estate is, on average, only 40% utilized. Applying an Uber-style model to these assets represents a significant new opportunity for commercial real estate companies.

Online space aggregators

Residential real estate has long relied on online visibility to listings, so most people are comfortable with this process. However, the commercial market often relies on personal interactions or visiting a single-vendor Web site to search the market for available space. Online space aggregators are beginning to disrupt this old model and make visibility to space more universal. Now, commercial real estate companies must connect with these aggregators and differentiate their space online by offering a more-interactive experience.

Crowdfunding

Many commercial real estate companies devote significant effort to managing institutional and individual high-net-worth investors to fund their projects. The advent of crowdfunding for ventures of all kinds represents a new potential source of project funding. But since the number of investors in a single project could reach into the thousands or even millions, it requires a new business model, new ways of interacting with investors, and potentially new regulations.

Short-term leases

The days of the multiyear lease may be near their end. Today's businesses need to be more nimble, and the short-term lease is becoming more popular, with pop-up stores around holidays, such as Halloween, becoming commonplace.

Space sharing and multiuse real estate

With LiquidSpace and other startups leasing blocks of space and subletting it as shared space at high profit, the space-sharing business model has been validated. Not surprisingly, traditional real estate companies with the proper technology foundation are beginning to investigate how they can offer these services directly within portions of their portfolio to increase overall profitability.



REIMAGINE BUSINESS PROCESSES

To thrive in the digital economy, real estate companies need to leverage technology to streamline processes and eliminate non-value-adding players.

Virtual brokers and digitalization of leasing

Managing the leasing process is one of the most labor-intensive processes in the commercial real estate industry. It contains many players, from marketing and sales agents to legal departments that review terms and conditions to contract specialists that abstract leases into lease management systems. New technologies (such as blockchain, machine learning, and virtual reality) offer tremendous opportunities for improvement. Imagine a world where prospective tenants review spaces on line in a VR environment where they can configure the space to their needs with simple instructions. Where they can then make an offer on the space and quickly complete a binding contract using blockchain technology that is reviewed for conformance with corporate policy and best practices by a virtual attorney powered by machine learning. This simplified digital leasing process can improve time to value and reduce overall cost.

Tenant relationship management

Traditional tenant relationship management (TRM) focused mostly on servicing complaints about the space. TRM in the digital economy will be radically different. First, complaints will be practically eliminated by the proactive monitoring and maintenance (discussed in the next section), and TRM will leverage the capabilities of smart buildings to offer value-added services. Facilities like The Edge in Amsterdam are leading this transformation. It is equipped with 28,000 sensors to monitor everything from motion and light to temperature and humidity, and it does not end there. It also provides a smart application that checks the tenants' schedules, directs where they park, and assigns desks for the day. The building has flexible workspaces, desk configurations, and meeting rooms, and adjusts the light and temperature based on user preferences. Now imagine the next step, where the information collected in this process is used to service the needs of the tenant. As the tenant settles into her workspace, her latte arrives with an extra shot, just the way she likes it. Need a space across town for a meeting? Taken care of. And all charged to the tenant's business or personal account, as appropriate.



REIMAGINE WORK

Providing the right content to the right people at the right time; allowing fewer, less experienced people to achieve results superior to those of the larger, more-experienced teams of today.

Proactive monitoring and maintenance

Today, most maintenance is based on the concepts of periodic maintenance and break-fix. That means we change air filters every three months and dispatch a technician to repair an HVAC system based on a tenant's complaint. In the digital world, sensors monitor airflow and particulate content to determine the appropriate time to change filters, whether that is at two months or six months. Sensors monitor the condition of equipment, such as the operating temperature, vibration levels, and energy consumption. This information will be continuously analyzed using predictive algorithms that can accurately warn of impending failure and dispatch a maintenance worker with the proper parts to complete the repair. This worker will be equipped with augmented-reality devices that will guide him to the appropriate location and walk him through the repair. Since the repairs are made prior to the tenant experiencing a problem, tenant satisfaction increases.

Simulation-based decision making

Today, lease managers spend many hours preparing lease-level forecasts for their properties in an effort to understand the long-term profitability of their properties. They rely almost solely on their experience, intuition, and judgment in determining the factors that drive these forecasts. With next-generation Big Data tools and predictive analytics, the digital lease managers will rely on simulations that provide them with insight into the likely outcomes of their decisions and enable them to make better decisions faster than ever.

Portfolio management

Even more-complex work such as portfolio management will change significantly. No longer will managers maintain spreadsheets of assets, logs of potential capital improvements, or have teams spending hours allocating costs. The connected facilities will feed all the information they need to their control cockpit where they can take immediate action. That action can be to approve a maintenance contract, review and prioritize a capital projects plan, or execute a change order to keep the contractor moving on a high-profile project.

Digitalizing commercial real estate

Embracing disruption

Demystifying the impact of digitalization trends in commercial real estate

Before we get too far, let's first demystify what digitalization means in the commercial real estate industry, and discuss how new models, processes, and technologies can help you transform the marketplace. There are four major areas that digital technology will transform.

Digitalization of space access

To lower the cost of space and increase space utilization, companies will have to think outside the box or outside their space. Rather than just consider their own space, CRE companies need to aggregate views across all spaces, including under-utilized corporate space. Using corporate space is a win-win for everyone, as it lowers the burden of constructing additional space, while helping corporations shed underutilized space and create revenue for their companies. To do this, CREs will have to create space-aggregating systems, similar to Zillow or realtor.com, for the commercial space. If CRE companies don't do it, others will, driving traditional CRE companies into the commodity market.

To optimize space, CRE companies need to get innovative in converting conventional space into flexible space at a low cost and potentially offering services to corporations to reconfigure current spaces. In addition, CRE companies need to be able to react quickly to changes in requirements (quiet space versus collaboration space). By owning the access to tenants' information or the information assets of the tenants, CRE companies can take it one step further and become the brokers of information. To do this, they will need to make the space not only flexible but also smart, so it recognizes tenants as they enter the property and optimizes services for complete tenant satisfaction.

Digitalization of operations management

A major cost for real estate is the management and maintenance of the space, and most CFOs are looking for ways to reduce the cost significantly. However, few companies have implemented the centralized monitoring and controls needed to optimize energy use, availability, and security across their entire real estate portfolio, thus relying on local decision making and rarely eliminating inefficiencies. The cost of sensors has dropped, and the computing capability to analyze and optimize facility management is now available to allow facility management to be centrally monitored and controlled with proactive maintenance based upon usage, performance parameters, and operating characteristics, eliminating inefficient scheduled or break-fix maintenance. In fact, the complete supply chain can be automated for ordering parts and scheduling contractors centrally, leveraging corporate discounts, and eliminating paying for inefficient maintenance operations.

Digitalization of transaction management

According to a study by Oxford University, real estate brokers and agents have a high potential of being replaced with artificial intelligence computer algorithms.¹⁹ As stated previously, many of the procedures used in the sales cycles (contracts, listings and so on) have not changed significantly in over 100 years. A tremendous amount of data is available to clients, such as historical rental rates, financing and mortgage rate information and trends, customer satisfaction data, and so on. Access to this data will change from filtering by an agent to CRE companies providing tools for clients to turn the data into buying information and decisions, thus supporting better and faster decisions. Leading CRE companies will be able to provide access to their own real estate assets or available corporate assets, maintaining control of access to customers, their information, and their buying habits. Once tenants or customers have narrowed down their search, they can take virtual tours of existing buildings or various properties under construction, using 3D models to create photo-realistic views based upon their preferences, basically eliminating and automating most of the activities performed by today's real estate agents.

Once the client decides on a property, the transaction can be completely paperless, including executing the contract in a secure manner using blockchain technology and digital signatures. From the CRE firm's perspective, all the digital information can be abstracted automatically into its lease accounting system, eliminating inefficient manual entry.

Digitalization of investment portfolio management

With the influx of real estate investment funds due to crowdfunding and the potential availability of underutilized corporate space, it will become vital for CRE companies to critically evaluate all alternatives as demand rises. They will have to trade off new construction versus price elasticity versus accessing space by nontraditional means. Many factors make these decisions very difficult, but the information is available. However, large and challenging datasets will require new analytical tools to handle the massive amounts of data and to quickly synthesize the data into actionable information. CRE companies will have to determine how much to invest in physical assets versus information or access assets, as described earlier. All of this points to eliminating paper and going directly to the data in real time while evaluating many more data points to lower the overall investment risk. These tools exist, and many are used for stock investing. Now, CRE companies need to digitalize to optimize their decisions in similar way.

Winning in the disruption of commercial real estate

Leading candidates to capitalize on the disruption of the commercial real estate market

Three different groups are well positioned to either break out or drive the disruption of the CRE market. The ultimate winners in this \$217 trillion market will be the ones that adopt digital technologies to drive tenant satisfaction, lower operating costs, and tap into new revenue sources.

Commercial real estate companies

CRE firms can drive their own disruption by:

- Eliminating the middle men or space aggregators by offering their own solutions for the short-term leasing of commercial space
- Leasing underutilized corporate space or offering their real estate management services to corporate clients
- Providing increased flexibility to clients by offering a mix of their own assets or the assets of others
- Using new lease-contract platforms to be faster and more flexible in initiation and fixing contracts
- Providing corporations access to their assets while the corporate assets are being transformed to meet emerging needs

The main challenge of CREs is they do not have insider knowledge of the corporate real estate assets and contacts that will be vital as the industry requires information on all available space.

Real estate services companies

Real estate service providers arguably have the most extensive set of customer and operations data of the potential disruptors and act as the “fuel” for digital transformation. Because they provide brokerage or financial services and property management (maintenance, security, cleaning, and so on), they have the contacts and a majority of the data required to transform current industry practices by increasing speed, simplicity, and utilization, while reducing costs. Turning the data into actionable insight and driving the effectiveness of their high-margin services are the keys to success. In addition, they are not burdened with large capital investments in real estate, so they can move more nimbly as market conditions change and have more flexibility to provide creative solutions for their customers

Space aggregators

Space aggregators have initiated the disruption with a highly profitable model of purchasing leases and then subleasing highly flexible space to clients, such as WeWork, Industrious, and LiquidSpace. All are trying to do to the real estate market what Uber, Airbnb, and Amazon have done to their markets. Early results in valuation have been promising, however, generating profitability has proven to be more elusive. While niche markets can be exploited (for example, space for sales people), widespread adoption will require better access to data sources for information to transform today's business models.

Ultimately, to be successful, we believe the winners will effectively manage the complete real estate lifecycle from construction and property acquisition to tenant relationship and space management, through to facility management.

The result may be provided through partnerships of the three groups identified above. However, the expectation has been set by tenants: they expect their environment to exceed the level of digitalization provided in many homes today. Now it's up to the market to determine who provides the best commercial real estate services at the best price.



DIGITAL BUSINESS FRAMEWORK

A SIMPLE AND PROVEN APPROACH TO VALUE CREATION THROUGH DIGITALIZATION

Every CRE firm needs a simple approach to build a pragmatic and executable vision of its digital strategy.

Building a digital business framework for growth and flexibility

Commercial real estate companies must digitalize to grow margins and profits, reduce costs, and improve tenant satisfaction by simplifying their operations. But the real value will be in how to best serve the tenants through end-to-end digitalization. Commercial real estate companies need to build a platform for innovation and business process optimization, connecting the workforce, the Internet of Things, the supply network, and the customers.

In the digital economy, simplification and business innovation matter more than ever to maintain pace with tenants' requirements and the competition. To do this effectively, it's important to provide an end-to-end digital solution across the real estate lifecycle; from the construction or acquisition of assets, to managing tenant relationships, to operating the assets efficiently.

The digital core is required for innovation and business process optimization. The digital core consists of several key components, starting with a strong financial and analytical foundation provided by SAP S/4HANA® Enterprise Management, which delivers a single, trusted version of the truth for all financial and operational aspects of the company. Many companies have invested in financial and analytical solutions that are typically not well integrated with their real estate operations systems. Even worse, the real estate operations systems are not integrated with each other, forming islands or silos of information that require a great deal of manual data entry and periodic synchronization of data. At SAP, we think there is a better, more-efficient way. SAP integrates the construction applications to the tenant applications and to the operations applications, eliminating the silos and manual entry across the entire real estate lifecycle. It also opens up new possibilities, for example using design authoring files to enable virtual visits during the sales process and to provide visual instructions during the maintenance phase, all to increase the efficiency of the organization.

World-class core ERP and procurement

The core SAP® ERP application is proven across various industries and disciplines. It provides synchronization of key functions such as finance, procurement, and lease management.

Powerful analytics

Using a new in-memory platform, companies can now get real-time and in-depth analytics on their business without the bother of expensive data warehouses with out-of-date information.

Unified dashboard and reporting

Customers can now use the flexible SAP BusinessObjects™ Business Intelligence Reporting package to create virtually any report, while leveraging SAP Fiori® for a next-generation user experience and SAP BusinessObjects Lumira software to enable users' data exploration.

Open integration

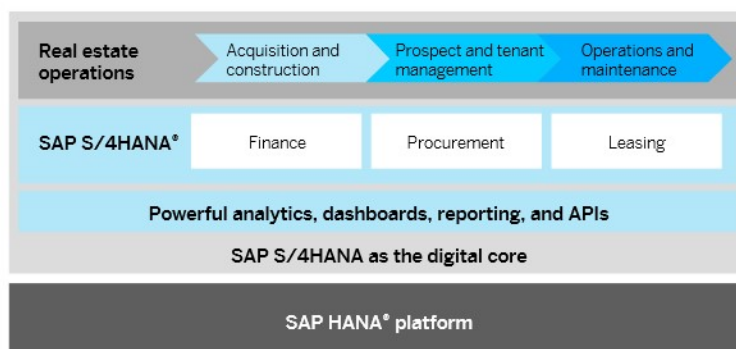
The digital core has certified interfaces with industry tools, such as scheduling and estimating systems, while maintaining control and a single version of the costs. This integration with SAP solutions allows contractors, owners, and other partners to leverage existing tools to accelerate time to value.

Visualization engine

SAP 3D Visual Enterprise applications can harmonize over 120 different 2D or 3D design-authoring tools and synchronize the data with information from SAP solutions to provide a unique, comprehensive view of the as-built information with operational information. This will enable a virtual fly-through of real estate and help provide visual instructions for maintenance.

Mobile access

Through SAP Cloud Platform, users can integrate information from the field without restricting their choice of mobile devices or operating system.



Acquisition and construction management

SAP provides robust analytical tools to help you make the key acquire/build decisions. If you decide to build, SAP provides project management tools to help you complete the project on time, within budget, and to your scope or requirements, all while providing near-real-time forecasts and progress reports.

Prospect and tenant management

Whether you are selling assets or leasing them, SAP has an integrated solution to manage all aspects, covering portfolio management, lease and transaction management, site analysis, and expense recovery.

Enterprise asset management for operations and maintenance

SAP provides ticketing and work order management that allows companies to efficiently and centrally dispatch approved vendors to address maintenance and operational issues. The software also tracks utilization of equipment and resources. Combined with IoT functionality, SAP solutions can provide companies with a way to proactively address issues before components fail.

SAP SOLUTIONS AND THE DIGITAL BUSINESS FRAMEWORK

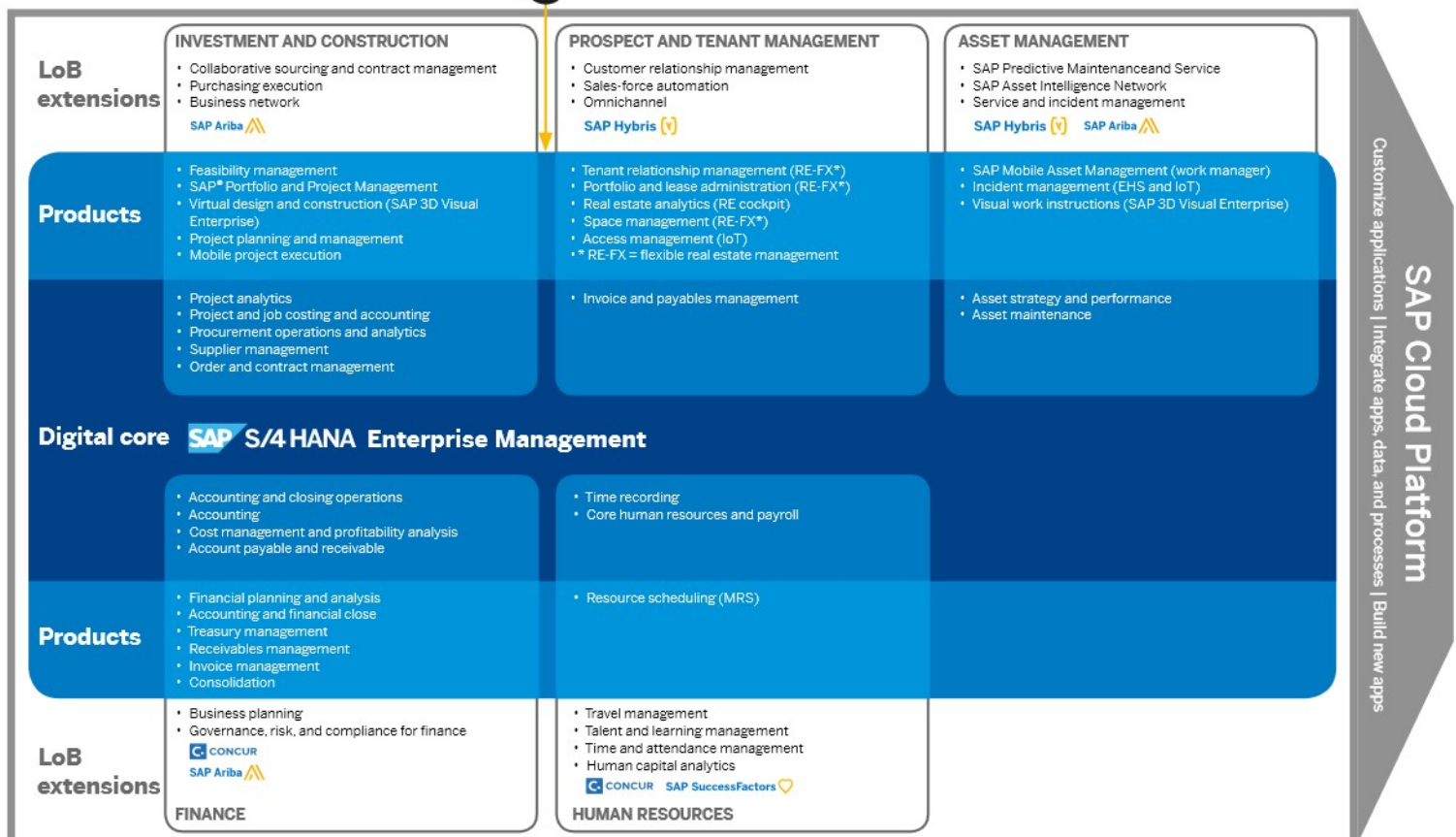
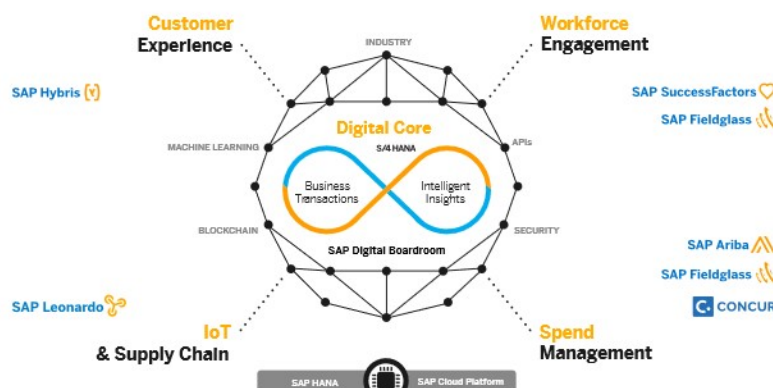
Building five pillars of digitalization

SAP has defined five pillars of digitalization to address the continuously changing requirements that are posing big challenges for businesses today. We developed the digital business framework to help real estate companies develop and execute on their enterprise strategy. In doing so, real estate companies can grow profits and reduce costs by digitalizing and simplifying their operations.

The digital core is the platform for innovation and business process optimization. It is the heart of the business where SAP is a leader. The digital core connects the workforce, the Internet of Things, spend management networks, customers, and stakeholders.

The digital business framework will help companies create:

- A smarter and **engaged** workforce across all employees and contractors
- **Spend management** to reduce costs and accelerate growth
- Outcome-based **tenant and stakeholder engagement** across all physical and digital channels
- Full utilization of **assets leveraging the Internet of Things** to drive real-time insights and enable new business models
- Real-time business transactions and analytics connected by a **digital core**, so everything is smarter, faster, and simpler

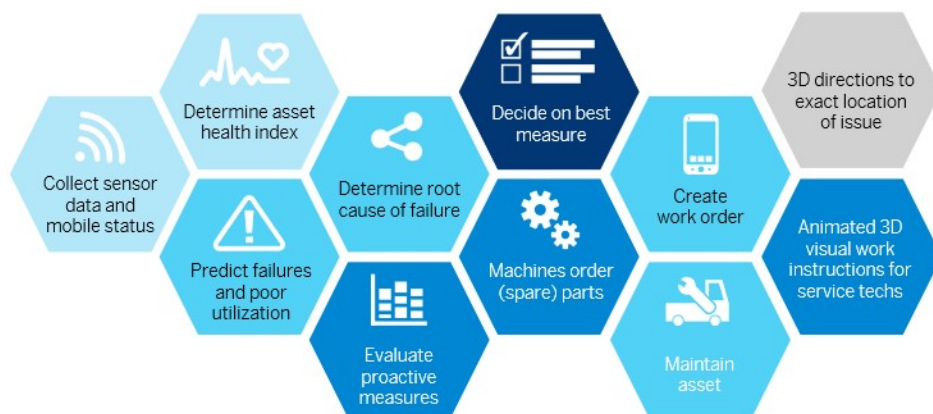


HOW DOES IT ALL COME TOGETHER?

EXAMPLE: intelligent buildings

While the five digital business pillars deliver significant value as standalone capabilities, the ultimate goal is to design the next generation of business processes that will extend across all the digital pillars. Real estate solutions span from construction to tenant management and facility maintenance. Supply chain and services have to be aligned with the real estate lifecycle management strategy so products and services are maintained proactively. Better energy efficiency, increased tenant safety, and fewer outages of key systems all drive new levels of tenant satisfaction.

Digital business scenario: connected, proactive maintenance



Spend Management

Workforce Engagement

IoT & Supply Chain

Digital Core

Here is a real estate company that is running live and running simple. It competes for tenants in large cities, so it needs to deliver unparalleled services.

The facility manager, Alex, is responsible for making sure all the systems and equipment are always operational at the lowest possible cost. By tracking the performance of systems, he can see the status of all the equipment and proactively maintain assets before there is an issue for the tenants.

1. The sensors on the HVAC motor collect performance information.
2. The sensor data is compared to historical performance to determine anomalies.
3. Out-of-tolerance data is provided to Alex in the form of alerts.
4. The alert conditions are analyzed compared to past alerts.
5. Proactive measures are initiated to prevent an outage.
6. Alex can determine the best course of action and automatically kick off workflows.
7. Machines communicate the information on the defective part to the procurement system. The parts are ordered automatically and shipped to the building.
8. A work order is automatically generated to schedule an approved technician to replace the part at a time that causes the least interruption to tenants.
9. The technician arrives on-site with an accurate map of where the faulty equipment is located, and the replacement part has been delivered.
10. Visual work instructions are provided to the technician to ensure the work is done in the most cost-effective and safe manner.
11. The costs (parts and labor) are posted to Alex for approval, and the system is back in operation.

With an integrated, end-to-end scenario like this, you are able to create a proactive facility management solution, one that earns lifetime loyalty of tenants and also delivers significant efficiencies and new business opportunities to the real estate company.



Watch the real estate lifecycle video





HOW TO START

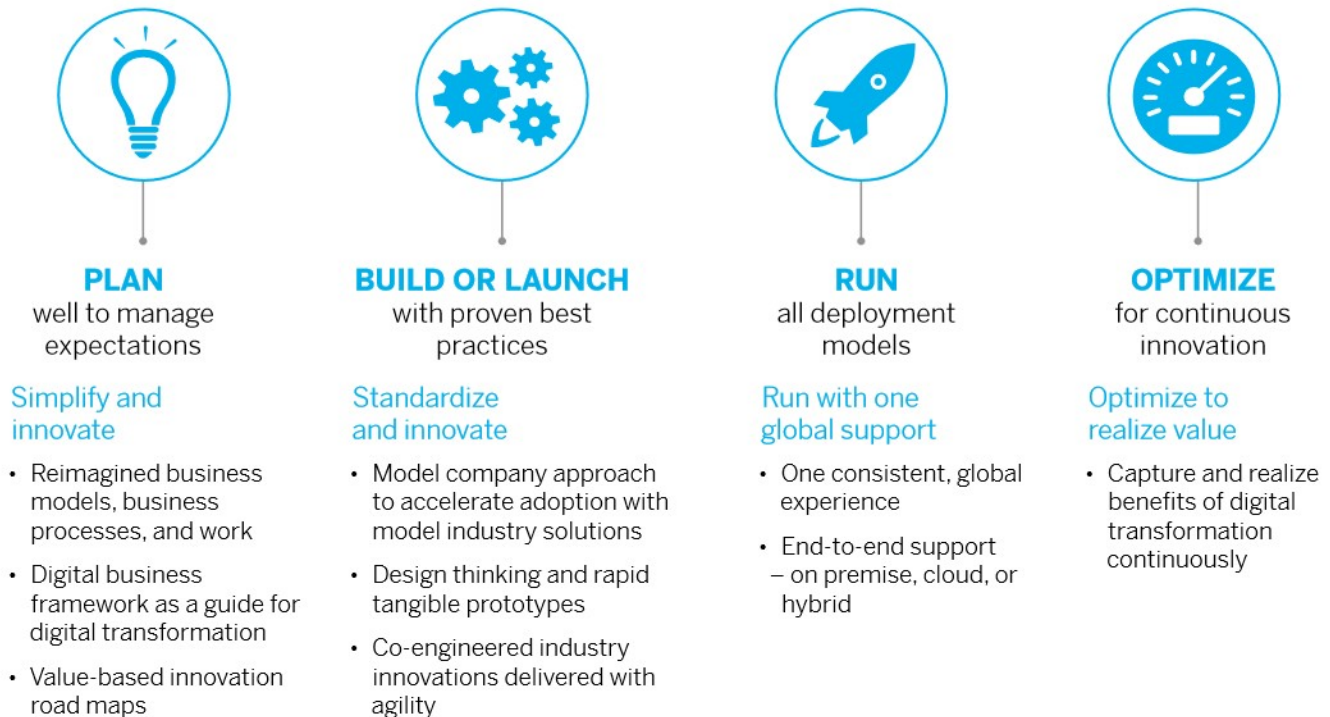
**THE JOURNEY TO DIGITAL CRE
BEGINS WITH A CAPABILITY
ANALYSIS THAT RESULTS IN A
TRANSFORMATION AGENDA**

TRANSFORMING FROM YOUR CURRENT STATE TO DIGITAL

The keys to success

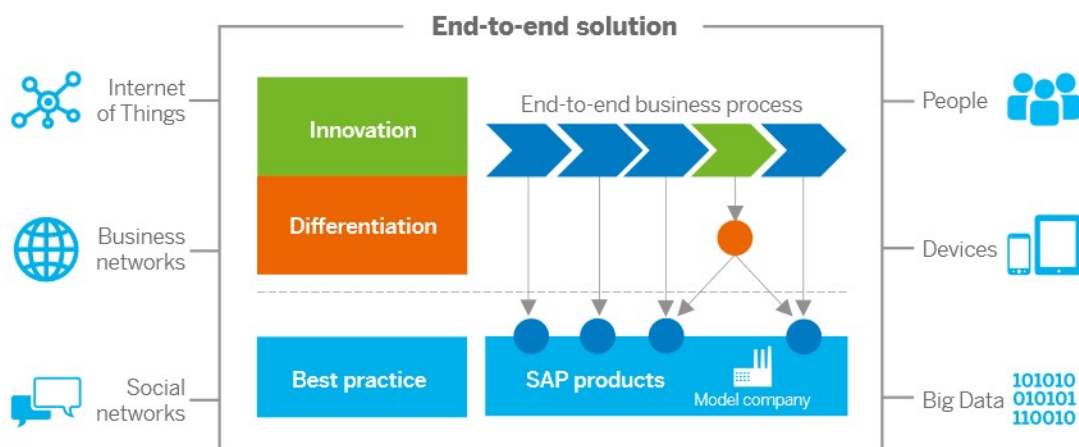
In the digital economy, simplification and business innovation matter more than ever. To do this effectively, it's important to cover the end-to-end digital transformation journey, ranging from planning a digital innovation road map and implementation plan with proven best practices to the ability to run all deployment options and, ultimately, optimize for continuous innovation with a focus on outcomes.

The end-to-end digital transformation journey



And to move forward with speed and agility, it helps to focus on live digital data, instead of Big Data, and combine solution know-how and industry-specific process expertise with data analytics so that the right digital reference architecture is defined and delivered. In that context, we believe that a model company approach is very relevant to enable you to transition from your current state to digital. Model companies represent the ideal form of standardization for a specific line of business or industry. They are built on existing SAP solutions using best-practice content, rapid prototyping solution packages, and additional content from customer projects. They provide a comprehensive baseline for rapid, customer-specific prototypes, cloud demos, and quick-start implementations.

Model Company Approach



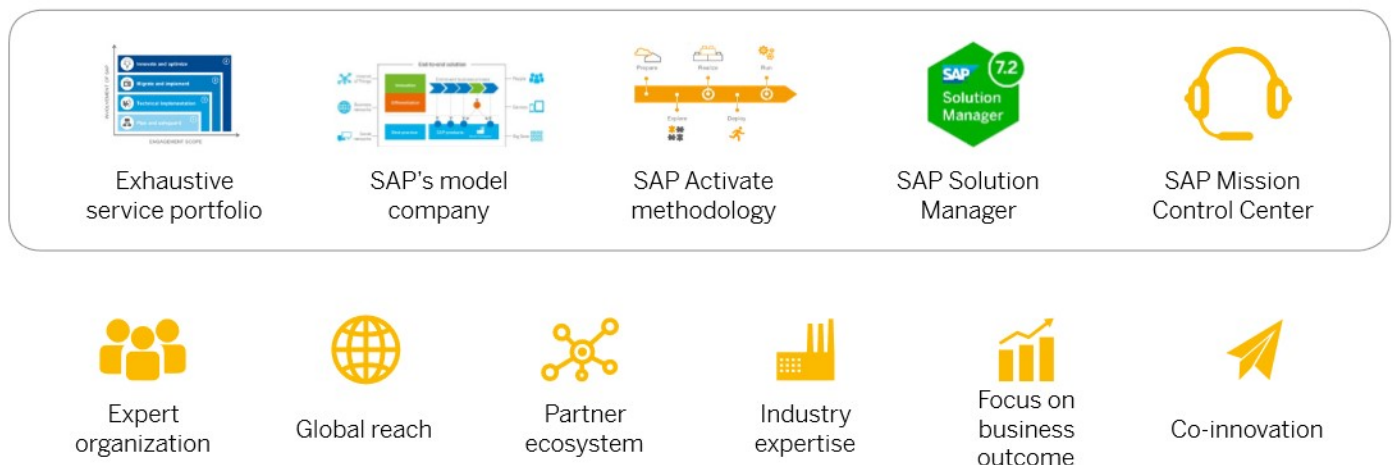
Enabling your success in digital transformation

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 implementation plan with proven best practices to the ability to run all deployment options and, ultimately, optimize for continuous innovation. We provide both choice and value within our service offerings, allowing you to tailor the proper approach based on your company's expectations and industry requirements.

- 25,000 professionals in 70 countries
- Serving customers in 130 countries
- Outcomes delivered as one team in one contract
- Projects connected in real time to global network of support functions through SAP Mission Control Center
- SAP MaxAttention™ and SAP ActiveEmbedded services to safeguard investment
- Consistent experience – on premise, cloud, or hybrid
- Standardized adoption of processes and tools
- Streamlined onboarding and ramp-up of stakeholders

From proposing a comprehensive digitalization proposal to realizing and running it, SAP delivers on the digital transformation promise to its customers, on time, on budget, and on value.

Our value delivery relies on unique differentiating assets:



The SAP Digital Business Services organization delivers digital innovation with simplification and accelerated implementation, which is key to adoption and value realization. Continuous improvement is supported through ongoing assessments of real-life data insights and joint governance with customers.

SAP value delivery focuses on the following deliverables:





WHY SAP?

SAP ENABLES DIGITAL REAL ESTATE WITH THE DIGITAL CORE, BUSINESS NETWORKS, SUPPLY CHAINS, WITH THE INTERNET OF THINGS RUNNING ON A COMMON REAL-TIME PLATFORM

It took years of innovation, strategic investment, and the forging of new strategic relationships to build the digital business platform.

COMPREHENSIVE SAP ECOSYSTEM

Orchestrating the world to deliver faster value

Our comprehensive ecosystem for CRE offers:

- A wide range of business services (suppliers, banks, key vendors, travel, and many others)
- Open architecture: choice of hardware and software
- Complementary and innovative third-party solutions
- Broad reach with partners to serve businesses of any size, anywhere in the world
- Forum for influence and knowledge
- A large pool of industry experts with broad and deep skill sets

Our partner ecosystem includes, among others:



INFLUENCE FORUMS AND EDUCATION

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

INNOVATION

- >1,900 OEM solution partners to extend SAP solutions
- 2,000 startups developing apps for the SAP HANA® platform

BUSINESS NETWORK

- 1.9 million suppliers
- 200 major travel partners (air, hotel, and automobile)
- 50,000 service and contingent labor providers



IMPLEMENTATION SERVICES

- 3,200 services partners overall
- Delivering real estate-specific solutions and services

PLATFORM AND INFRASTRUCTURE

- 1,400 cloud partners overall
- >10 industry platform partners

CHANNEL AND SME

- 4,800 channel partners overall

Vision

Help the world run better and improve people's lives

Mission

Help real estate companies in the fast-moving, global marketplace to better innovate, compete, and stay relevant. To do this, we will provide real estate solutions that improve the delivery of consistent, contextual, and relevant experiences.

Strategy

Become the cloud company powered by SAP HANA

GLOBAL PRESENCE AND RELEVANCE

- 82,400 employees representing 130 nationalities
- 335,000 customers
- Operations in 190 countries

REAL ESTATE INDUSTRY FOCUS

- >3000+ real estate and construction customers worldwide
- Industry-driven, robust advisory councils that help ensure alignment
- Deep industry-specific capabilities with clear industry road map
- 40+ years of delivering value to real estate companies

DIGITAL ECONOMY READY

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

INNOVATION LEADER

- 2011: SAP HANA launched
- 2012: SAP Cloud solutions launched
- 2014: SAP business networks the largest marketplace in the world
- 2015: SAP HANA Cloud Platform
- 2015: SAP S/4HANA – the next-generation business suite

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

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Run Simple

