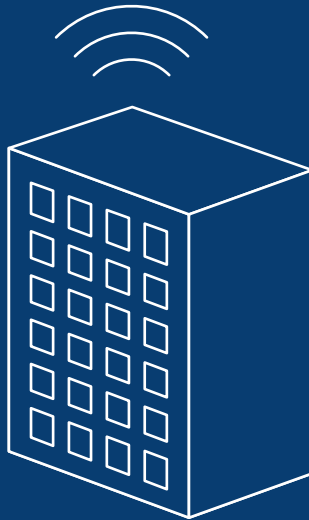




Smart office ecosystems



Innovation through
co-creation

The smart office market is in the midst of major growth. Stakeholders often want to have a better understanding of the various components required in the creation of a smart office and how they interact. In a smart office, the traditionally separated domains like parking, access management, facility management, WiFi, lighting, audio-video should work seamlessly together. The key to success lies in exploring new ways of thinking and the creation of partnerships of companies willing to work together to create the smart offices that realize their potential. In this white paper, we take a look under the hood and explore the relationships, interactions, and roles that comprise the elaborate ecosystem of a smart office.

“To me, the key to a smart office is collaboration. This white paper aims at providing an overview of the key insights we have obtained at Mapiq in the last years. I hope it provides new insights and stimulates office partnerships.”

—

Sander Schutte,
CEO of Mapiq



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Collaboration is key in a smart office

Dynamic work environments bring out the best in employees and create space for efficiency and innovation. Today, everything is connected, and offices can be the flexible workspaces that adapt to the needs of every employee.

To accomplish this, collaboration between technology and business decision-makers in different industries is essential.

Collaboration is key in a smart office

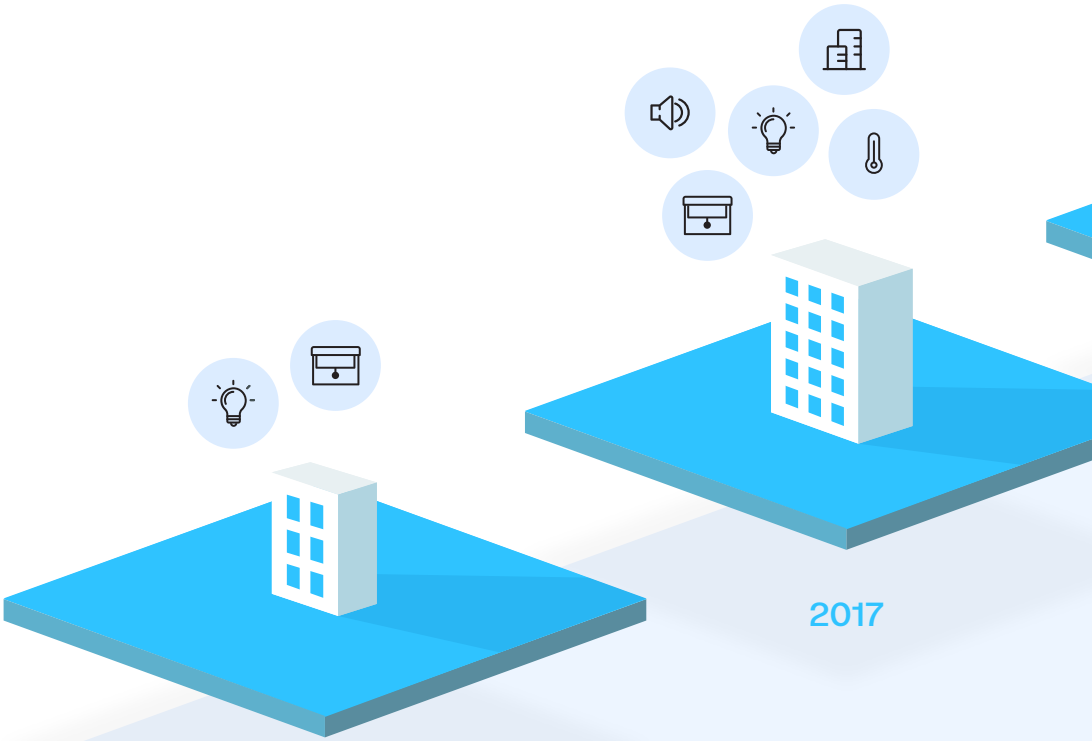
Driven by the rapid surge in the Internet of Things-related technology, the way how offices operate and are being used has drastically changed in recent years. Offices now are complex, interconnected and made up of a series of structures, systems and technology. They deliver useful services that make occupants productive at the lowest cost and environmental impact over their lifespan. The term “smart office” is often used to describe these modern, connected offices.

Additionally, the fundamental nature of work is changing. With activity-based working, employees now have the freedom to choose how, when, and where to work. As a result, having access to a variety of work settings and the right technology is gaining importance. The smart office spaces should improve sharing, collaboration, facilitate greater creativity, and keep employees motivated.

Office owners and facility managers now have a wide array of smart office technologies at their disposal to create this perfect work environment.

This, however, creates a new set of challenges. What does it take to create a truly smart office? What are the best available technologies? Will these technologies work together? By the time the technology is implemented, will it be obsolete? In other words, how can smart office technology ensure the cost savings and sustainability that are expected? The key to success lies in the creating partnerships of companies willing to work together to realize the smart offices potential.

The evolution of smart buildings



2014

2017



Smart office potential

The smart office market is in the midst of major growth. Between 2016 and 2021, it is expected to grow from \$5.37 billion USD in 2016 to \$24.73 billion by the year 2021 representing a compound annual growth rate of 34%. Global advanced sensor revenue is expected to increase from \$1.2 billion in 2016 to \$3.2 billion in 2025¹. A prime example of this growth is the Edge office in Amsterdam² which has a network of 28,000 sensors making it one of the most advanced and sustainable offices on Earth.

A system change. The checkbox of a SMART process for the creation of a smart office



There is a clear vision on the bigger picture; a holistic approach



All vendors involved are aligned on the goal of the project



Make sure data can be shared across multiple domains



There is strong alignment over the government of this data



Implement standardized, plug-and-play integrations



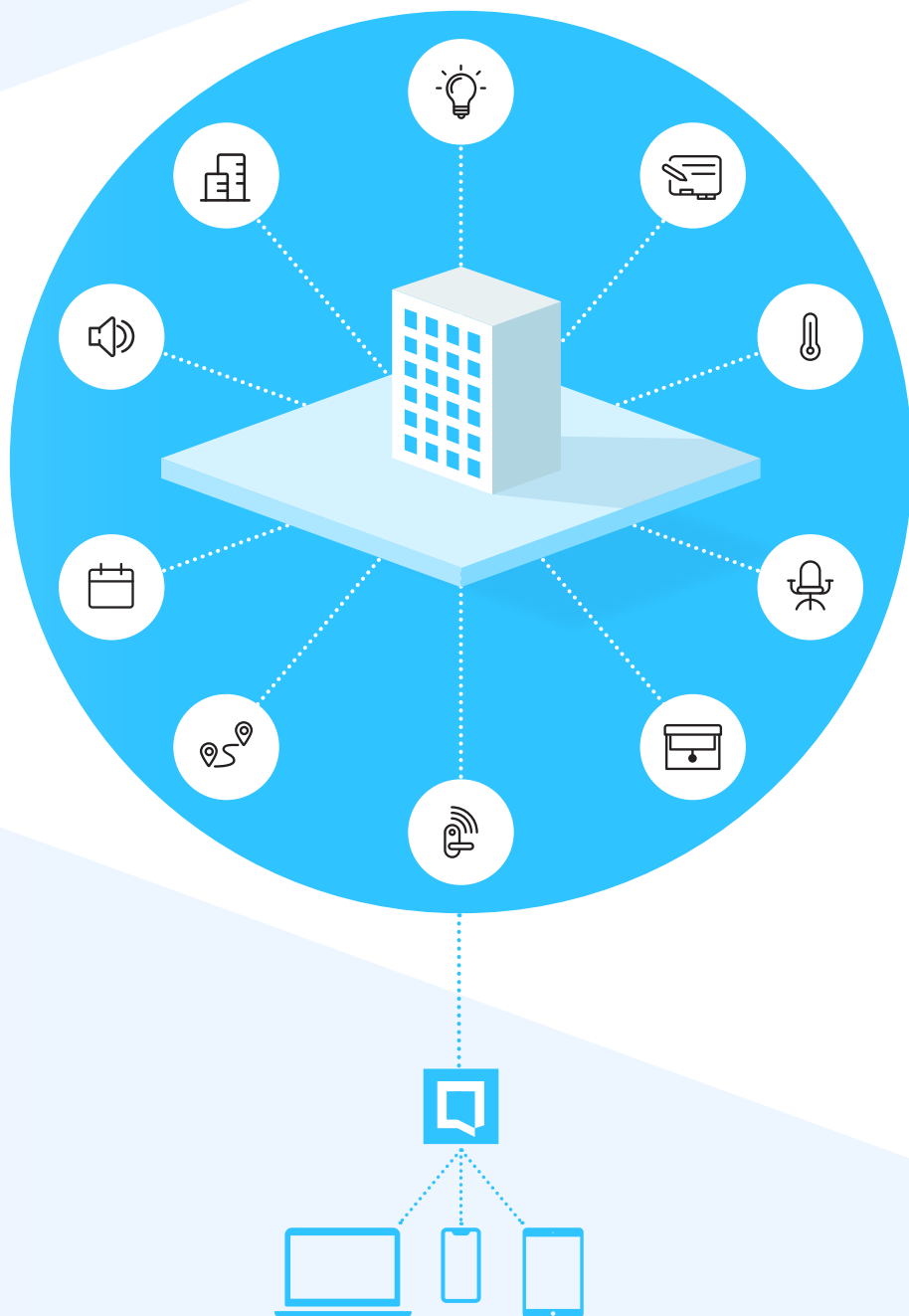
Integrate systems into a workplace experience platform to provide one user-experience



Embraces rapid development of new technology by using service models

A traditional process

- Contains a large number of ad-hoc integrations
- Consists of independently procured systems with proprietary applications
- Has no central data acquisition which hinders data-analytics
- Makes no use of service models which inhibits adaptability to future innovations



A system change

In a traditional process of creating smart offices, a real-estate owner or tenant, is often in the driver's seat. They are used to work in a system that is focussed on separate purchase budgets which counteracts collaboration between different service providers. This leads to the use of ad hoc technology and conservative implementation. Collaboration between potential service providers, who are able to add value to the office is prohibited. Leaving opportunities of collaboration unattended. This can have a substantial effect on the technology's efficiency, counteracting data collection, and diminish future cost savings. Besides, the world of technology is evolving at a faster rate than ever before. This creates the need for an innovative process that is able keep up with that the pace and the current standards – in other words future proof.

To recognize the potential of sharing resources, vendors are beginning to look at smart office technology from a more

holistic point of view. The smart office technology relies on numerous departments from multiple companies within different industries to collaborate and integrate information. Organizing collaboration on such a large scale requires a coordinated approach - a smart office requires a smart process: collaboration between enterprises on technical, legal, commercial and social levels. This is the only way to leverage the available technology to create an innovative, optimized environment that delivers the fully connected workplace experience.

This also goes for internal communication and alignment. There are multiple roles and departments in a company that are involved in the implementation of smart technology. Organizational change is required in order to capture the potential of smart offices in companies. Collaboration between departments and different roles is essential.

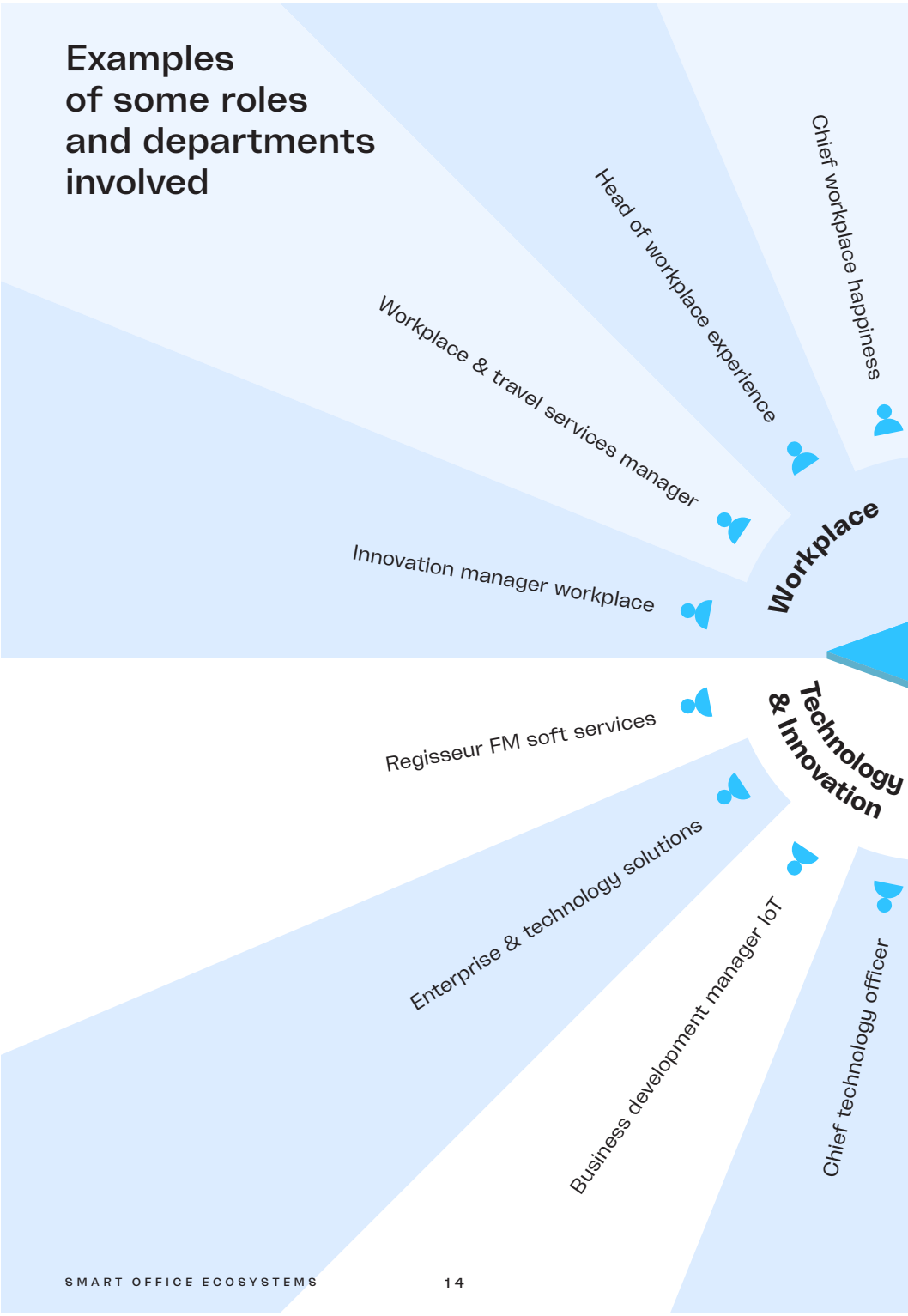
“The adoption and implementation of smart office technology requires a shift from closed off, traditional processes, to open collaboration.”

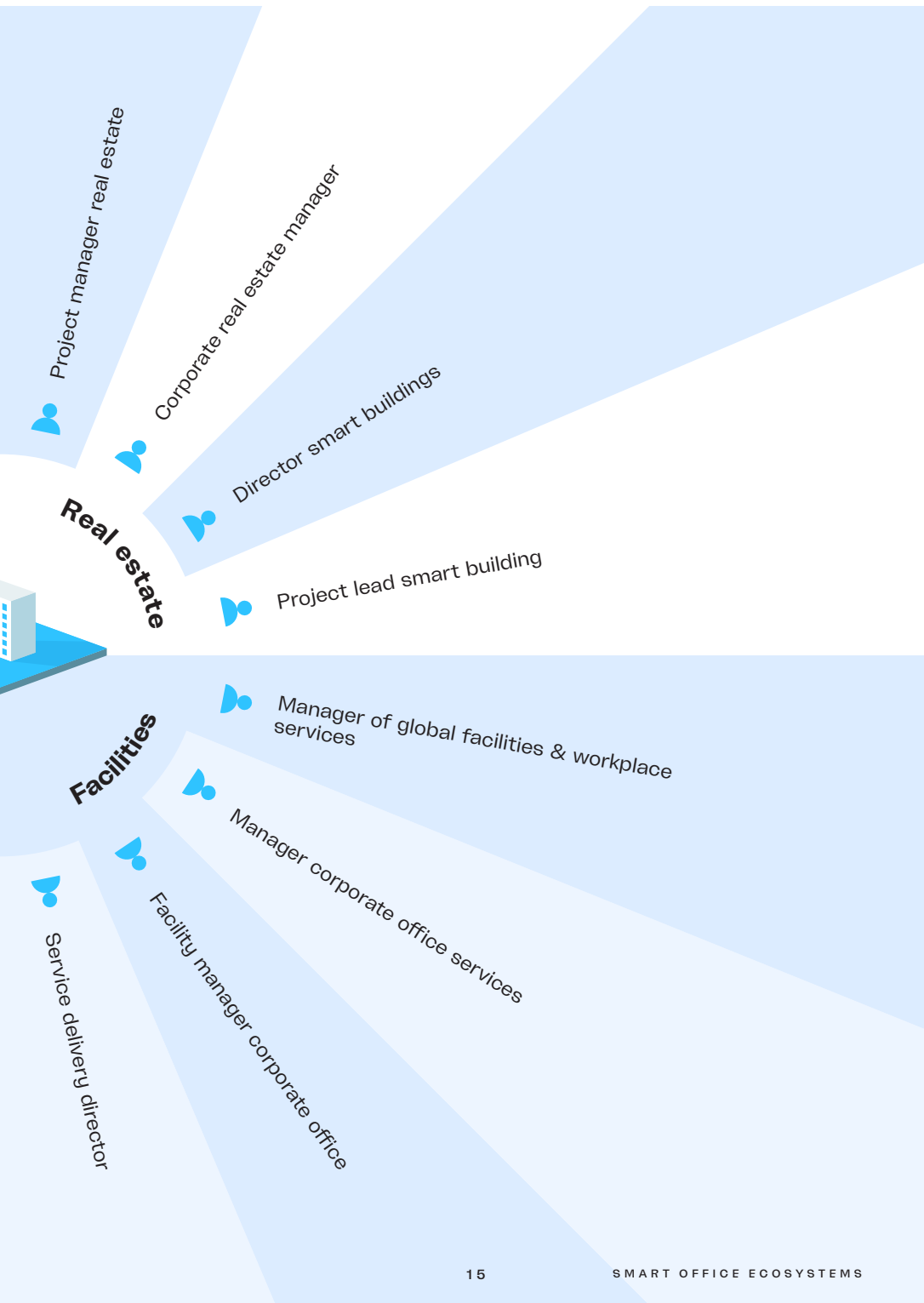
The challenge of innovating together

The technology exists to convert any office into an intelligent system. But to fully realize its potential, we need to explore beyond the technology. The IoT and the future of the smart office are inextricably bound to the relationships between systems and vendors in the network in which they reside.

The adoption and implementation of smart office technology requires a shift from closed off, traditional processes, to open collaboration. This initiates a continuous process of lowering costs, improving performance of an office and increasing productivity of workers. With a focus on partnerships, we can make the connections necessary to unleash the potential of smart offices and ultimately pave the way towards a smart office network. But what hurdles are on the road to collaborative innovation, integrate systems and encourage collaboration between enterprises and vendors?

Examples
of some roles
and departments
involved









2

The smart office platform

Companies in the ecosystem are beginning to understand that combining information is key to their product and services. However, these companies still need the technical systems in place to bring together all the information.

Sophisticated technology platforms offer the possibility to integrate previously disparate systems, providing advanced knowledge-sharing capabilities. A software platform is a set of subsystems and interfaces that form a common infrastructure. This forms the basis on which a set of related products are developed¹¹. A smart office platform can be used to connect all functionalities of an office to a central network, rendering functional and integrated data as an output.

Applications are at the forefront of this new, personalized work experience made possible by such a smart office platform. The applications in an ecosystem together serve the demands of an entire business, not just single departments. Nowadays they are mostly cloud-based and delivered as a service (SaaS) and designed to take advantage of the benefits of cloud computing¹³:

Benefits of SaaS products:

- Implementation times are much shorter as no additional hardware or software installation is required.
- Enables quicker, faster upgrades. All customers are upgraded at once since it is a single instance.
- Seamless, dynamic expansion of computing resources to scale with usage and/or users.

With SaaS, the user no longer has to maintain either the physical servers or the cloud-based software application. Instead, customers pay a subscription fee to access an already developed software application via a web browser or smartphone app. They don't have the responsibility of maintaining the software.

Uniting specialists

There is a fundamental challenge in connecting the components of different vendors in the ecosystem: on the one hand these systems are often highly domain-specific and make use of domain-specific standards, while on the other hand these systems need to interoperate in a 'common language' that all ecosystem partners can use. In order for the platform to deliver its purpose and maintain connections with partner companies, the platform makes extensive use of Application Programming Interfaces (API's) of the systems that are being interconnected. An API is a set of routines, protocols and tools for office software applications¹². The API specifies the way in which these different software components can interact with each other and enables content and data to be shared between components. In general terms an API achieves this by facilitating interactions between code modules, applications

and backend IT systems. In the world of smart offices however, the term API is used specifically to indicate a web-based API that adheres to modern cross-platform web protocols and data formats, like REST and JSON. Through this, the smart office platform is able to provide end-users with a unified experience on a single interface.

Whether a company is open and trusting about making their APIs accessible – their API strategy – can influence the size and growth of an ecosystem. Opening up APIs lets organizations outsource innovation by allowing other participants of the SECO to experiment with their information resources and share revenue streams. They can also regulate usage when needed by limiting access to particular partner¹⁰. Platform providers' API strategies usually reflect their business strategy to enhance their market position, set development priorities, and establish partnership preferences^{13,14}.

The API story

An API connection is an essential component in the smart office ecosystem. It acts as a messenger by enabling different programs to communicate, making it easier and faster to create, build and operate complex services. APIs offer clear business advantages and numerous operational benefits:



APIs reduce distractions

Companies can out-source specific parts of their operations and infrastructure to other companies with the right expertise, by exposing their API.



APIs help companies acquire knowledge

Allowing parts of an application infrastructure to be handled by experts puts companies in the position to acquire best practices.



APIs help companies tap into a broader application ecosystem, broadening their network of talent and increasing their own expertise

The more that businesses allow experts to help with non-core parts of an application infrastructure, the more experts they are connected with.



“There is a fundamental challenge in connecting the components of different vendors in the ecosystem: on the one hand these systems are often highly domain-specific, while on the other hand these systems need to interoperate in a ‘common language’ that all ecosystem partners can use”

Built by teams of experts

Vital to the realization of a smart office is the well-organized software architecture – a smart office platform. These platforms make use of API's. API's make sure that systems can interact with each other and enables content and data to be shared between components. This provides end-users with a unified experience on a single interface. APIs are not only essential to experience of an end-user but also strategically important in an ecosystem game plan. Companies need to work together to create new APIs and open the knowledge network because it requires advanced knowledge to combine the systems through API technology. Furthermore, the upcoming years participants in the ecosystem are required to discuss the various elements of their API strategy and set of governance mechanisms to apply it.

Data governance

So of the goals of smart office technology was to combine these various elements to offer a holistic view of the entire operation of the office. In essence, when adopted, smart office technology must fit seamlessly into the complex ecosystem of the office to offer an integrated system that would enable the free and yet secure exchange of information.

When participants in the smart office ecosystem start working together and sharing data, the need for data governance also increases. Data governance refers to the overall management of the availability, usability, integrity, and security of the data employed in an enterprise¹⁵. When operating in a smart office ecosystem questions like 'who owns the data' and 'what privacy legislation is applicable' become essential for both the ecosystem partners and their customers. With the new EU privacy directive entering into force early 2018, protection of privacy is a hot topic in board rooms. To successfully leverage the technical possibilities of a smart office it is crucial to involve the customer's privacy officer, security officer (and often the works counsel) as an integral part of the project team.

3

The software ecosystem

Integration of software and collaboration between vendors is essential in the creation of a smart office. The basis of this collaboration is clarity in the roles each component has and how they work together – this creates a network of collaborative parties – a software ecosystem.



The roles in the ecosystem

In a healthy ecosystem, functional roles within the social dynamic are vital. The following list gives an overview of the most common roles within an ecosystem⁶:

Software ecosystems refer to the set of businesses and their relation to a common software product or service market. An ecosystem consists of a set of software solutions that enable, support and automate activities and transactions by the players in the ecosystem^{3,4}. In this case, work together to create a smart office.

A loose network

An ecosystem can be seen as a loose network - suppliers, distributors, outsourcing firms, makers of related products or services, technology providers and a multitude of other organizations - that affects and is affected by the contributions of every vendor⁴. The players are moderately interdependent to develop a successful product. As an organization starts seeking partnerships, they open up their business strategies and go beyond organizational borders. In practice, however, organizations are still trying to understand the ecosystem and recognize their role in it ^{4,5}.

“Software ecosystems refer to the set of businesses and their relation to a common software product or service market. ”



Keystone⁶: an independent entity responsible for the overall health and orchestration of the ecosystem. This actor typically manages the ecosystem by running the platform; creating and applying rules, processes, business procedures; setting and monitoring quality standards and/or orchestrating the ecosystem actor relationships.



Niche Player⁶: contributes to the ecosystem by developing or adding components to the platform and producing software and services required by the customer base. This actor complements the work of the keystone by providing additional value to the ecosystem.



Reseller⁶: the company or business entity that makes profit from selling the products of the ecosystem to customers, end-users or other vendors. These products may be complete integrations, components, and selling or leasing of licenses or support agreements.



Customer⁶: the person, company, or entity that either purchases or obtains a product developed by the ecosystem or a niche player. This transaction is completed either directly with the ecosystem/niche player or through a reseller.



External Actor⁶: one that makes use of the possibilities the ecosystem offers, thus providing indirect value to the ecosystem. This actor is external to the ecosystem management.

As a dynamic environment, it is important to boost actor participation and community connectivity to sustain the ecosystems platform. In that sense, the people that run the smart office are a crucial component of its intelligence.



“Closer relationships between the organizations in an ecosystem enable and improve active engagement of various stakeholders in the development of the technology.”

Network of social relationships

Communication between actors is crucial to effective knowledge transfer and the success and stability of the ecosystem. Successful information distribution provides keystone software vendors with competitive benefit in terms of ecosystem stability, attractiveness, software quality and end-user satisfaction⁸. Mutual trust between ecosystem participants is vital for effective information circulation within software ecosystems⁸. Ecosystem participants should aim for stable, truthful and robust relationships. Indifferent or suspicious participants can weaken or even discontinue propagation of their information to partners, which may cause these partners to shift their contribution and focus to other, competing ecosystems^{8,9}.

In non-hierarchical, horizontally organized governance systems, good interpersonal relationships and communication between the platform leader and other actors - especially niche players - are crucial to the well-being of the ecosystem. These relationships are frequently underpinned by a common technological platform and operate through the exchange of information, resources, and artifacts.

Actors in a smart office ecosystem become entwined in an interdependent network of organizations reliant on each other for components or platforms vital to the precise operation of their software. Closer relationships between the organizations in an ecosystem enable and improve active engagement of various stakeholders in the development of the technology.

Integrations for better workplace experience

Let's take a look at a couple of our partners.

Smart office technology, integrated with the appropriate system(s), is drastically transforming where and how we work. The sophistication and power of smart office technology is advancing at an unprecedented rate. Companies are spending billions to constantly improve on and unleash the potential of these digital technologies. Yet, with the rapid development of new technology, comes a brand-new set of challenges and the need to adjust the way we think.

The traditional strategy of procuring isolated, extensive systems within the organization is disappearing. Nowadays, there is a need for component-based, modular systems that integrate with each other. If we are to realize the full

potential of the smart office, we must move towards a fully integrated, holistic approach. Not only between technology and systems, but also between participants.

The "innovation and software ecosystem" is at the heart of a successful smart office. When we learn to innovate through co-creation, the potential of the smart office will not only be realized, but surpassed.



When we learn to innovate through co-creation, the potential of the smart office will not only be realized, but surpassed.

Vecos

The increased number of activity-based work environments in recent years has resulted in a multitude of flexible workspaces and so called hot-desks.

Today, employees are able to work whenever, wherever they want and most do not have private desks or offices anymore. In order to support this environment, it became a necessity for employees to gain access to facilities to store their personal belongings. As a result, the usage of smart lockers in organizations has strongly increased. Vecos and Mapiq collaborate to meet this demand.

Vecos smart locker system is connected with the Mapiq platform through the Mapiq API. Mapiq shows the location and real-time availability of smart lockers in the interactive 3D map of the office. Additionally, employees are able to control the smart lockers by opening, closing and releasing them through Mapiq on their devices. Because of the integration between Vecos and Mapiq the usage of smart lockers became more efficient.

The integration with Vecos made it possible to offer a range of solutions to our clients, such as:

- Easy smart locker location using an interactive 3D map of the office.
- Control smart lockers through personal devices (no key or lock needed).
- Real-time locker data is visualized in the Analytics dashboard.
- Enables organizations to comply to the needs of an activity-based working environment while enhancing employee productivity and satisfaction.

The partnership between Vecos and Mapiq has resulted in the successful completion of international smart office projects for companies such as: EDGE Technologies, KONE, KPN, PWC and IA.

Pointgrab

Due to the increase of activity-based work environments and mobile workforces, many office spaces become over- or -underutilized, resulting in substantial fluctuations of operational expenditures. PointGrab's CogniPoint™ human-activity sensing platform makes it possible to accurately monitor occupancy levels in flexible workspaces. The integration between CogniPoint and Mapiq's cloud-based software adds advanced deep-learning technology to the platform making it possible to accurately count the number of employees in workspaces anonymously. The collected data is visualized real-time in the Analytics dashboard of Mapiq, which can then be used by the facilities team to optimize workspaces and improve employee performance levels.

PointGrab is a leading machine learning and computer vision company that provides an innovative sensing platform to the smart office industry. The company applies its superior deep-learning technology to enable accurate

tracking and understanding of human activity and space utilization. It is a fast-growing company with offices in Israel and the US.

The integration with PointGrab makes it possible to offer a range of solutions such as:

- Accurate and anonymous employee counting in workspace.
- Combining utilization data with booking data to reduce no-shows.
- Real-time workspace data visualized in a single analytics dashboard.
- Enhancing employee productivity and well-being.

The partnership between PointGrab and Mapiq has resulted in the successful completion of international smart office projects for companies as: Nokia, Proximus and EDGE Technologies.





A smart office ecosystem

These companies believe in a change in process, collaboration, and way of thinking to create smart offices all over the world.



STUDIO BANANA



PLP/ARCHITECTURE

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Colophon

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