

Thinking Digitally...

How health and care can form the foundation of your smart community

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Important Notice

“The guidance provided in this report is of a generic nature and cannot be specific to your organisation or operations. Please contact your Cisco partner or Account Manager to discuss your specific requirements. The guidance is provided in good faith based upon reference materials sourced from the NHS, Department of Health and other Healthcare organisations up to the date of publication. Errors and omissions are excepted. No warranty is given or implied.”

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1. Introduction and Purpose

1.1 The bigger picture

Perpetual budget constraints, ever leaner workforces and limited resources mean most public sector business leaders and IT professionals are immersed in the here and now. However, stopping to look at the bigger picture could result in savings and increased efficiencies, as well as potentially delivering better outcomes for citizens and patients.

At the root of this opportunity is the increasing influence of digital technology.

As we discussed in our companion papers [Defining Digital: A Business Enabler for Local Government](#) and [Digital Strategy for Connected Health and Care, part 1](#) and [part 2](#), it is essential that technology investments are tightly coupled to business need. In “Thinking Digitally”, we step away from the day-to-day pressures and take a hierarchical view, to understand the needs of agencies across the whole community and determine how each organisation within that community operates.

With that in mind, we aim to connect two strategic imperatives for healthcare organisations and local authorities:

- the integration of health and social care
- the development of smart cities or communities.

1.2 Our methodology

Our recommended approach is to follow the principles of Enterprise Architecture. Frameworks such as [TOGAF](#) and [Zachman](#) are used extensively in the private sector and are proven methodologies for business-led technology investment.

Such an approach determines which capabilities are needed by an organisation – or group of organisations – and almost by default, encourages integration, re-use and re-exploitation of joint investments for mutual benefit. It also requires organisations to collaborate, share information and think differently.

In this paper, we:

1. Explain the role that digital plays in delivering regional strategies which in turn, fulfil Government policy.
2. Advocate that investments in technology made wisely today can realise greater benefits tomorrow.
3. Outline our role as a trusted advisor to local authorities and health and care organisations.

2. Why Lead With Health and Care?

2.1 The health and care imperative

The evolution from 'healthcare' to 'health and care' reflects the well-documented growing pressures on both the NHS and social care. It also acknowledges the realisation that lack of integration between these services often shifts those demands from one to the other, resulting in even greater pressure on both.

The NHS is constantly battling with funding constraints, a lack of resources and physical capacity, while social care accounts for up to 70% of some local authorities' budgets. Finding ways to drive efficiencies and improve outcomes across health and care must therefore be priorities across our communities. The areas of concern shown in Figure 2.1 highlight the need to think differently about how services are delivered. Each of these drivers alone are significant challenges, but together present a perfect storm, demonstrating that we cannot continue to work in the same, fragmented ways.

However, introducing new models of care and different ways of working represent a monumental change, with three principle areas that must first be addressed:

- People: staff and citizens/patients - replacing ingrained cultural and working practices with an appetite for change.
- Process: understanding that new models of care will mean new funding models and governance structures.
- Technology: embracing the innovation and opportunities that digital can bring.

In order to succeed, the regional level system needs to be considered in its entirety as opposed to individual use cases, pathways or organisational concerns. Each of these are important in their own right, but fundamental change across the health and care system can only be achieved by looking at the whole.

Drivers of Change

An Ageing Population

- There are now more people aged 65 and over. (*Old-age dependency ratio, Eurostat*)
- People over 65 occupy 51,000 acute care beds at any one time - 70% bed days. (*RCP: Hospitals on the Edge - Time for Action*)
- A need to support people to live independently and provide remote care.

Chronic Conditions

- Lifestyle could be a contributory factor.
- Chronic disease is also a natural consequence of an ageing population.
- Required a focus on prevention, early intervention and education.
- Self-management and independent living.

Healthcare Professionals

- Scarcity of resources.
- The EU estimates a shortage of 1 million healthcare professionals by 2020. (*EC Staff Working Document on an Action Plan for the EU Health Workforce, EC*)
- A need to support people to live independently and provide remote care.

Figure 2.1: Drivers of Change

2.2 The health and care continuum

Healthcare and social care are intrinsically linked in terms of shared workflow and information sharing dependencies.

In England for example, emerging models of care, including Sustainability and Transformation Partnerships (STPs) and Integrated Care Systems (ICs), necessitate greater collaboration across health and care economies. Yet although the 2017 PWC annual survey of local authority leaders, [The Local State We're In](#), reported that 77% of local authority leaders felt greater integration of health and social care services could benefit health outcomes, more than half said that their council had not been fully engaged in the STP process.

This paradox of inter-dependency and lack of integration can be seen in Delayed Transfers of Care (DTOCs), a growing problem for many NHS trusts. The inability to discharge patients due to lack of suitable care facilities inevitably creates backward pressure into the NHS. This results in prolonged hospital stays and beds unnecessarily occupied, which is detrimental to patients as well as draining NHS resources.

Another example is the pressure placed on emergency services and departments when citizens are admitted due to lack of clinical or nursing support in residential care facilities rather than needing emergency medical care.

With these examples in mind, it is helpful to consider a pathway that cuts across both the health and social care domains (see figure 2.2.).

From supporting people to live independently for longer to reducing pressure on A&E departments, the key component is the common underlying technology platform that supports each use case.

The principle of developing platforms for re-use and re-exploitation has the dual benefit of driving operational efficiency and integrating services for better outcomes. This clearly demonstrates the potential for a common IT strategy across health, care and local government throughout the entire community, and the benefits this could bring.

Health & Social Care Continuum Use Case

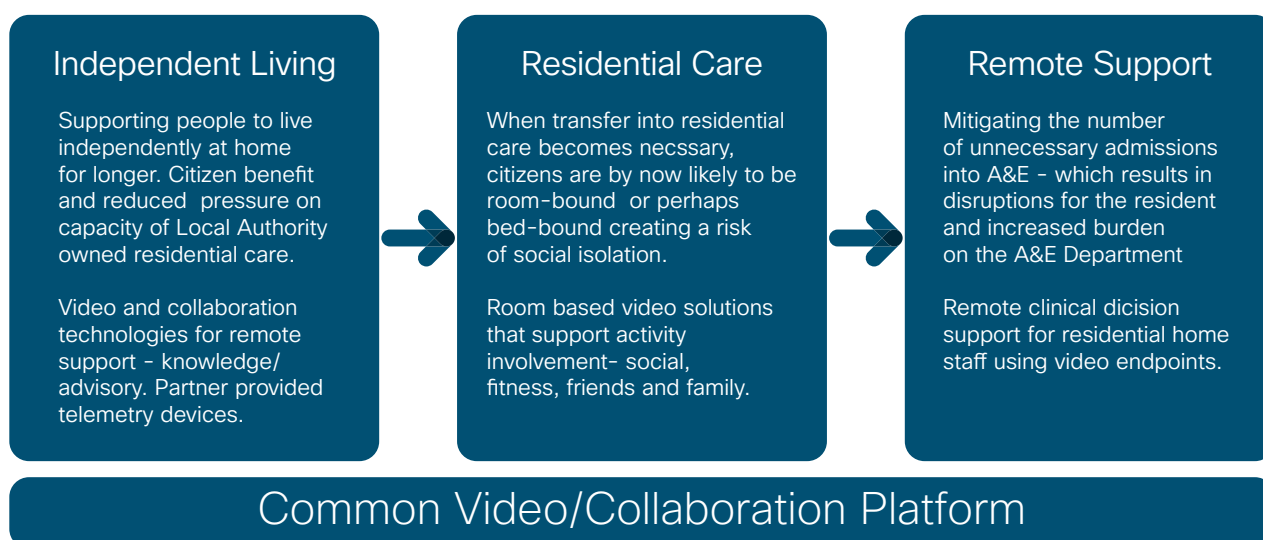


Figure 2.2: Health & Social Care Continuum Use Case

2.3 Other health and care use cases

The previous example represents just one set of connected use cases that can be supported by a common technology platform. Others include:

Prevention

Helping people avoid becoming ill, supported by digital media and social channels.

Telehealth and Telecare services

[Video and collaboration](#) technologies used to provide remote support as well as securely carrying telemetry information across networks.

Nursing Home support

Video and collaboration technologies used to support staff and reduce unnecessary hospital admissions. The same technology can be used to [connect residents/patients](#) who may otherwise be confined to bed/isolated from their families, support services, etc. This is already happening in some NHS trusts.

Transfers of Care

Enable speedier discharge with [mobility technologies](#) that allow decisions to be made and paperwork completed at the bedside. Using collaboration tools to bring together different areas of the care system to coordinate planned transfers of care.

Community care

Mobility technologies and devices of choice with collaboration tools that 'connect' different aspects of community care, integrating home care planning and avoiding unnecessary repeat home visits.

Mental Health

Consider use of advanced contact centre technologies for Crisis Line support and examine appropriate use of social media to connect service users.

Primary Care

Using [video and collaboration](#) technologies to support GP decision making, minimising needless referrals. The same platform can also be used for discharge support, enabling a three-way consultation between patient, GP and specialist where appropriate.

Remote/ Virtual Consultations

Build solutions that offer convenience and avoid preventable hospital visits. These may be GP, Triage services or follow up appointments. Exploit video and collaboration technologies that support a virtual waiting room environment.

Digital Front Door

Present an omnichannel approach that allows patients and citizens to access the services they need in the way that they want. Consider contact centre, social media, collaboration and mobility technologies.

Community Hubs

Shared buildings enable estates rationalisation across healthcare and local government. Telephony, mobility and collaboration technologies can support hot desking arrangements, while side rooms equipped with video units could be used as private meeting areas or consultation rooms.

Multi-Disciplinary Teams (MDTs)

Modernise MDT arrangements with high definition video and integrated remote workers, making care planning more integrated and inclusive.

City Wide Access

Consider community Wi-Fi solutions that connect health and care professionals wherever they are, including connected vehicles.

Productivity support

[Mobile devices](#) for clinical and support staff, which can reduce the need to report to nurses' stations or work-desks for safe and secure data entry and retrieval.

Medical Education

Deliver a multichannel learning platform that supports continuing medical education and professional development - with the potential for resale into other markets.

Location and Assets

Exploit mobility technologies that underpin location services, wayfinding and asset tracking.

By mapping multiple use cases across the organisation, common capabilities can be identified, one example being the collaboration tools needed for agile working, which might also support independent living or virtual meetings between care agencies.

This methodology helps identify the platform requirements that can support multiple use cases, allowing re-use and re-exploitation, ensuring a greater return on investment. In addition, where isolated projects previously determined siloed technology, a platform approach ensures that all investments are inherently connected.

Our voice, video and collaboration technologies for example, are used extensively across UK health and social care settings, including:

- [North East London CSU](#)
- [Airedale Care Homes](#)
- [Nottingham University Hospitals](#)
- [Cumbria: Remote Specialist](#)

At a regional level, the big opportunity is achieving these and other examples of digital innovation, but all delivered from one technology platform.

2.4 The number one priority

Designing any infrastructure with health and care in mind naturally reaches out across any community – from hospitals to GP surgeries, homes, pharmacies, opticians and more. This means that infrastructure has a community footprint, connecting public sector organisations, citizen homes, business and the mobile environment – the same footprint needed for a smart community. Therefore, making health and care the lead consideration when embarking on smart communities projects makes sense, as the breadth of health and care delivery together with its financial impact, means that it necessitates all of the following:

- Connectivity – cross-community infrastructure and networks
- Greater collaboration capability
- Interoperability
- A secure, protected environment
- Shared services – however they are delivered
- Improved network access at home and across the community.

All of the above could potentially be supported by the [Health and Care Social Network \(HSCN\)](#), which supports cross-organisational information access and sharing, with the majority of these capabilities also fundamental to other smart community work-streams.

In summary, while there are other quick wins to be gained, health and care should be the strategic priority for any smart community project. A healthier community helps reduce NHS and other services expenditure, including social care provision. These savings can then be reinvested into other areas to create even smarter and more citizen-friendly environments, from smart lighting systems that can cut costs and help reduce crime, to [air quality](#) and [congestion monitoring](#), all of which contribute to creating healthier communities.

3. The Whole System Approach for Health and Care

Our vision for integrated health and social care is based upon what we call the 'Whole System Approach' model. In principle, it consists of a cross-community platform of secure connectivity and collaboration that connects all stakeholder organisations and underpins emerging new models of care. The concept is shown in Figure 3.1.

The overarching message is one of re-use and re-exploitation of your digital technology investment. The potential for savings ranges from being IT oriented, e.g. de-duplication of Data Centre environments, to operational efficiency with reduced travel time and costs. Inherently connected technology releases integration benefits in terms of access to information and collaboration across health and social care partners, improving outcomes for all.

The depiction of the centralised IT environment is notional. There are several options for the provision of these applications including Private and Hybrid Cloud, along with traditional 'on premise' options. However, there is also the opportunity to 'burst' to the Public Cloud (and multiple providers), where appropriate and safe to do so. The key is to bring as much of this together as possible into one single management plane.

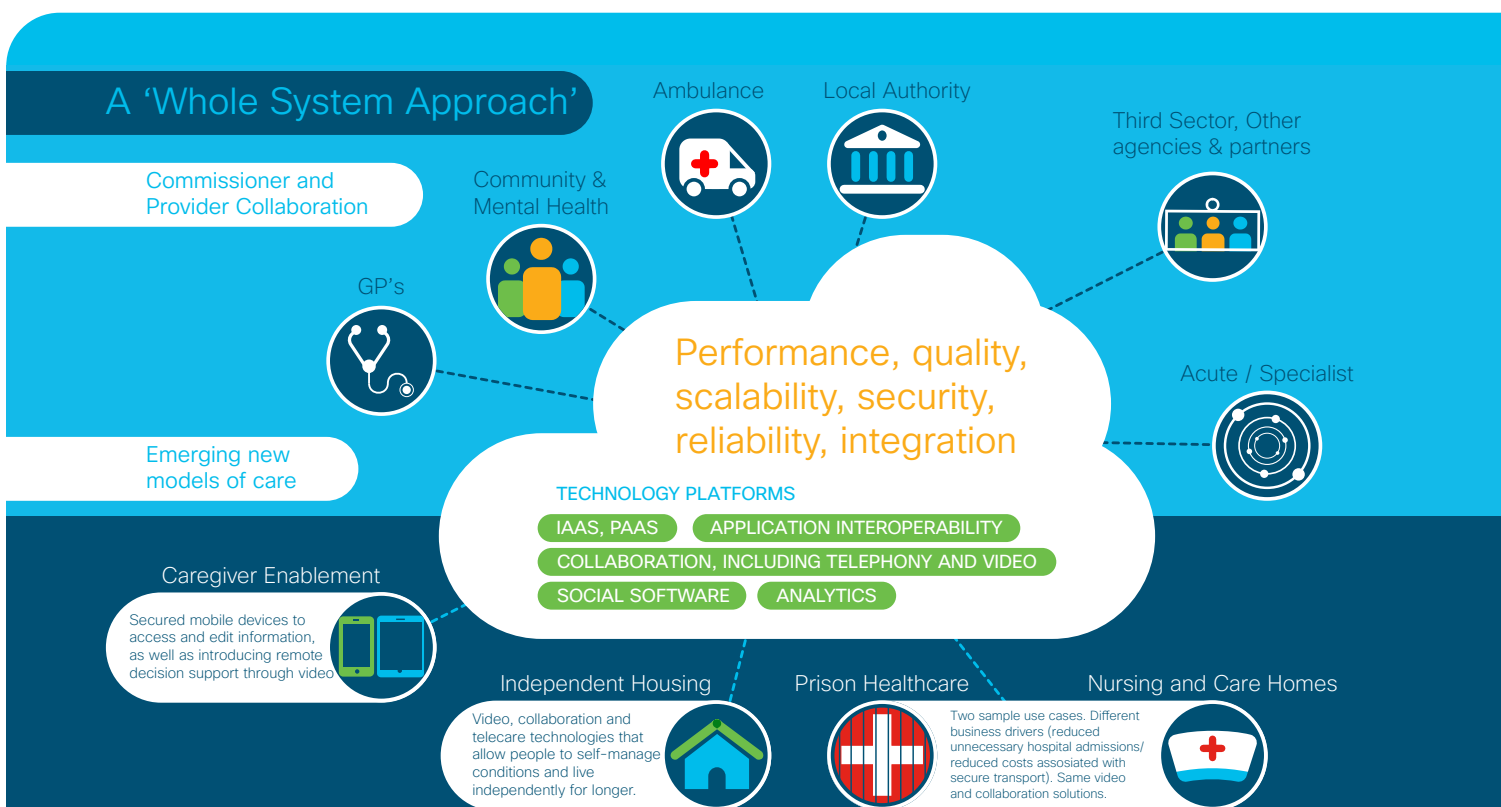


Figure 3.1: A 'Whole System Approach'

Once established, centralised systems could include interoperability solutions for legacy applications, social software and business intelligence-related data management solutions that support secure, appropriate data sharing.

The benefits accrued from such an approach include:

- Support for one health and care community
- Greater cross-community collaboration
- Agility - location independent working
- Support for self-management and independent living
- Population health
- Estate rationalisation (both built environment and IT)
- Best practice sharing
- Improved citizen/patient engagement
- An agile and consistent user experience.

3.1 Three key capabilities

When considering the use cases listed in section 2.3, it is of course possible to address each one in isolation and identify technologies that can deliver the capabilities required. However, siloed investment often means that solutions and their technologies become disconnected. And as different vendors, products and protocols are used, the environment becomes more complex, leading to a need for ever-expanding interoperability solutions at ever greater expense.

We believe that all use cases should be considered, thereby creating the 'Whole System.' In doing so, it is possible to define a set of required common capabilities and build out a digital technology platform to suit.

There are three key capabilities that underpin everything we have discussed. These can develop a truly integrated health and social care system, together with other services offered across the region

- **Secure connectivity** – cross-community, bringing all stakeholder organisations together to provide the platform for new models of care and new ways of working.
- **Collaboration technologies** – allowing people across the health and social care system, including citizens, to share information appropriately and collaborate, for better outcomes.
- **Interoperability** – an integrated information system that binds existing application sets, ultimately providing better visibility for all caregivers, and creating the foundation for improved business intelligence.

3.2 Building the Platform – where we can help

Working with our partners, Cisco’s key competence is to deliver technology platforms for connectivity and collaboration.

As shown in Figure 3.2, the foundation of this approach is the network; the common, underlying layer that unites all solutions. The network consists of campus, wide-area, virtual and mobility domains, all combined in a unified access arrangement that allows a common set of credentials to be used to securely access services regardless of device or location.

The network may be self-provisioned, service provided or Internet-based. Our approach is agnostic in this regard, but we are able to support customers in whichever option – or combination of options – they choose.

Overlaying the network is the collaboration platform, which releases user-facing services that support many of the use cases described earlier. Collaboration technologies include voice, video, contact centre (omni-channel) and tools such as persistent chat and enterprise-class social media. This category of digital technology brings people and communities together in a recognisable, reliable and consistent way, regardless of location.

Overall, the benefits of this platform approach grow as the user community expands due to the potential for rationalisation of IT estate, reducing maintenance costs and simplifying management.

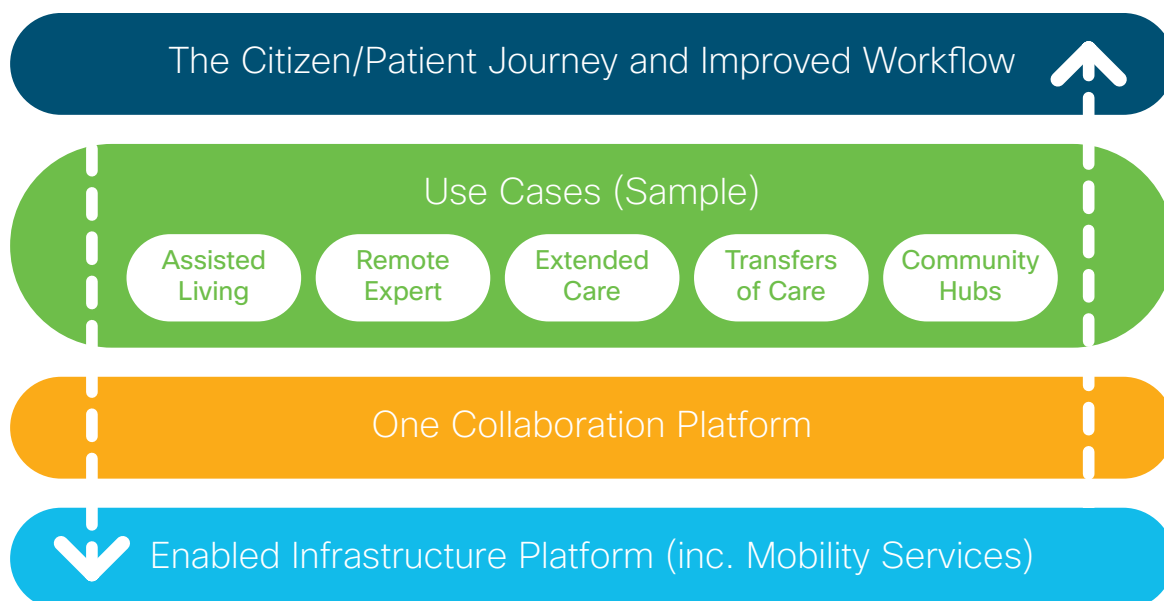


Figure 3.2: A Layered Platform

4. What is a Smart Community and Why Should I Care?

The [Local State We're In](#) (2017) found that 54% of respondents thought some local authorities would probably suffer serious financial problems during the next year, rising to 88% in the next five years.

In such a difficult financial landscape, it is therefore not surprising that the last decade has seen a growing interest in [smart cities and smart communities](#), in particular their potential to automate and deliver better public services while reducing costs. Until recently, much of this coverage had been unwarranted, but genuine, beneficial innovation in this space is now taking place.

For example, the Manchester [CityVerve](#) demonstrator project (see 4.1) was established to demonstrate digital technology's ability to transform and support the whole fabric of a community, from cycle route planning and bike sharing to supporting self-care. Cisco is playing a major role in CityVerve and several other smart communities projects, both in the UK and around the world. Over time, all are helping demonstrate that smart communities are not only possible but can derive multiple benefits, helping local councils save money and create sustainable and healthier communities – and healthier populations.

4.1 CityVerve

[CityVerve](#) aims to make Manchester smarter and more connected in order to deliver more effective public services and improve conditions for residents. It consists of a range of Internet of Things (IoT) initiatives, including:

- [Chronic condition management](#): smart inhalers and in-home sensors are being used to monitor patients with mild to moderate chronic obstructive pulmonary disease (COPD). Helping people stay healthy through medication compliance, exercise, etc., can relieve pressure on local NHS services and potentially cut hospital admissions.
- [NextGen bike sharing](#): information collected on cyclists' travel patterns should help the local council plan its cycling infrastructure and investment. The project also aims to encourage residents to take more exercise by cycling rather than driving, also reducing carbon emissions and improving air quality.
- [Community wellness and neighbourhood support](#): IoT devices are being used to encourage people to go out and move more, helping them improve their fitness while tackling social isolation. Connected services for neighbourhood support teams meanwhile will support nurses and allow them to offer virtual patient care and clinical advice.

4.2 Other smart community projects

Southend on Sea: around 8% deaths each year in the UK are linked to air pollution. In 2017, we formed an agreement with Southend-on-Sea Borough Council to support its wide ranging digital strategy, which includes air quality monitoring, using the [Cisco® Kinetic for Cities](#) platform to assess the town's existing air pollution levels and assess where improvements can be made.

Swindon: Cisco is working with several partners to help Swindon Borough Council explore how it can ease traffic congestion, particularly around the A4312 / A420 corridor, a vital section of Swindon's commuter network. This should help reduce pollution and improve local air quality as well as improving road travel by cutting congestion.

4.3 Beyond the UK

[Around the world](#), our technology is helping demonstrate that relatively small pockets of innovation can have a positive impact throughout a community:

- Emergency responders in Houston are using smart technology to reduce non-emergency calls and emergency room visits by 80%, saving the city around \$928,000 annually and helping improve workforce efficiency.
- New York City's interactive digital kiosks not only offer citizens practical information such as street directions and public transport timetables, but also collect data on air quality, public safety, traffic congestion, etc.
- 1200 video cameras together with a state-of-the-art command and control centre have helped cut car theft and other crimes in Pune, India by up to 27% where these cameras have been installed.
- Smart lighting is playing a major role in fulfilling Adelaide's carbon-neutral strategy, while also demonstrating the potential for any town or city to save £millions in lighting costs, which could be reinvested into other areas.

All of these innovations should have a positive impact on both health and care provision and the wider community. Yet many smart projects continue to be delivered in isolation - beacons of innovation within siloes of business need.

And so the question arises, what is the best way to build a smart community?

5. Evolve to a smart community

Our 'Whole System Approach,' explained in section 3, is intentionally centred on delivering a platform for integrated health and care. This involves connecting organisations but also community sites, residential care settings and households. It's therefore clear that designing for health and care provides the widest reach across a community.

And so, we circle back to the beginning of this document. We have now established the basic infrastructure platform for a smart community. With only incremental investment, we now have the baseline required to support use cases such as air quality, transport, waste management and others.

5.1 How to get there ...

Throughout, we have advocated health and care as a leading use case, and that designing with this in mind leads to the development of smart communities. Here we discuss the new business models for delivering services in a different way and then tightly aligns this with technology platforms.

5.1.1 New business models

Over the last couple of years, new business models have come to the fore. Devolved regions have been established with the delegation of powers for a range of services. Within health and care, there are currently two devolved regions – Greater Manchester and Surrey – whose main ambition is to deliver an integrated health and social care service.

Other health and care models include the introduction of 44 Sustainability and Transformation Plans (STPs) across England, aimed at putting the NHS [Five Year Forward View](#) into effect on a regional basis – once again integrating health and care services. More recently, eight of the most mature STPs became Integrated Care Systems.

Beyond this there are of course, a number of Unitary Authorities, removing the two-tier system of local government and Combined Authorities and making collective decisions across council boundaries.

Whatever the model adopted in any given region, the direction of travel is clear – community approaches to integrated and shared services are here to stay.

5.1.2 Community Networks

In order to build such communities, it is necessary to connect organisations and the citizens they serve. From a technology perspective, the logical place to begin is the network.

Over the last decade or so there have been attempts to create community networks, which have seen some success. In healthcare, we have seen Community of Interest Networks (CoINs), while the Public Sector Network (PSN) saw mixed success depending on the region.

Today, some of these PSN networks are being upgraded or re-procured, while the [Health and Social Care Network \(HSCN\)](#) presents an opportunity to underpin the integration of health and social care services across a given community. While aimed specifically at health and care, HSCN clearly has the potential to expand and become a true cross-community platform for other services – i.e. a smart community.

Indeed, Cisco believes that HSCN should be seen as the underlying platform for the Whole Systems Approach model outlined in section 3. In order to achieve this however, consideration must be given to the functionality embedded in the Customer Premise Equipment (CPE). Delivering feature-rich equipment will realise the best chances of success and support capabilities such as automation, analytics and security – critical capabilities for any extended network with multiple stakeholders.

Making the right choice today can reduce cost pressures in the future by avoiding early re-procurement or the need for overlay networks. In addition, it will release the potential of the shared services model, creating more integrated citizen services by default, and reducing operational expenses through initiatives such as de-duplication of Data Centres, Community Hubs and bursting out to the Public Cloud.

5.1.3 Emerging and enabling technology

Technology developments are rapid and in recent times, new software-defined approaches have abstracted policy from underlying hardware platforms in the network. This means that administrators can create a unified policy across a network regardless of access methods, and with automation, invoke that policy across the whole networked environment. These are critical capabilities when networks become far-reaching (e.g. across a community).

We support this differentiated approach with our Software Defined Access (SDA) solution. Our policy engine (known as [Cisco DNA™](#)), works with the hardware components throughout the network, easing administration and providing scalability.

In the Wide Area Network (WAN) another emerging technology is disrupting the way in which these networks are architected. Software Defined WAN (SD-WAN) challenges traditional approaches by supporting the use of the Internet as a transport, as well as traditional transport technologies. It supports increased agility, advanced threat detection and greater returns based on the new cost model. [Cisco's SD-WAN](#) solution is based on Viptela technology

5.2 Kinetic for Cities

Kinetic for Cities is our new digital cities and communities platform. Our platform-based approach securely connects data from a variety of devices, sensors, cameras, applications etc., in an open, standards-based infrastructure.

The digital solutions enabled by the platform connects to a single federated data layer, eliminating redundancy and facilitating greater collaboration across any given community. Addressing the evolving challenges that cities and other communities face, Cisco provides the secure data infrastructure to facilitate robust and efficient urban services.

Cisco Kinetic for Cities is a cloud-hosted subscription service that delivers an intuitive digital model and set of tools for creating a sustainable smart community framework. When combined with the **Cisco Digital Network Architecture for Cities and Communities** (Cisco DNA™), it enables customers to securely and effectively extract, move and compute data from community-wide devices.

The platform approach also provides modelling for correlated data across different solutions and domains for co-ordinated community management. For example, a city operator can associate vehicle flow density, emissions, lighting and video data, which can simultaneously be used by traffic authorities, parking enforcement agencies and local planners.

Cisco solution architecture for smart cities

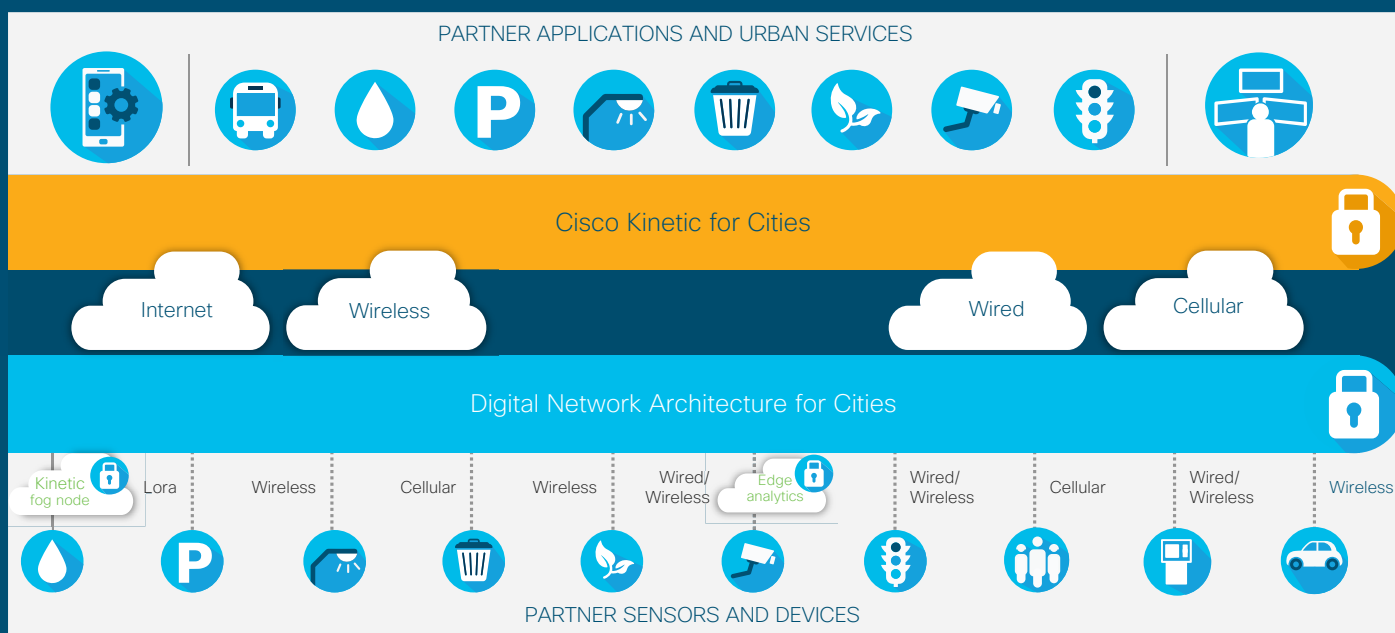


Figure 5.1: Cisco's Solution Architecture for Smart Cities

Collaborating with our trusted ecosystem of certified partners, Cisco Kinetic for Cities is the foundation that communities can use to solve problems and more effectively manage across domains, such as:

- Citizen engagement
- Environmental monitoring
- Lighting
- Operations and command centres
- Parking
- Public safety and security
- Urban Mobility, including traffic, transit and crowds
- Waste management
- Water quality.

Our 'Kinetic for Cities' platform as part of our Whole System Approach, demonstrates the importance of thinking differently when delivering public services. It also has the potential to integrate and exploit the evolving IoT domain across a region, delivering benefits across every area of public service delivery and day-to-day operations, creating a truly smart, connected and cost-effective community.

5.3 What next?

From planning your HSCN transition to creating a safer town or city, establishing secure WiFi connectivity across your community or improving air quality, whether you are embarking on any of these or more, we can help you think differently by **'thinking digitally'**.

If you would like to further this discussion and help personalise it to your local organisation or community, please [contact us](#) to get started.

6. About Cisco in UK Healthcare and Local Government

For 20 years, Cisco's dedicated Healthcare and Local Government teams have provided personalised consultative advice and regularly issued guidance papers into the marketplace, advising on a business-led approach to technology investment for both business and technical audiences.

In 2016, we united the Healthcare and Local Government teams, predominantly in response to market moves toward the integration of healthcare and social care, whether through devolution, Integrated Care Systems (ICS) or the implementation of Sustainability and Transformation Partnerships (STP).

Find out more at:

<http://www.cisco.com/uk/healthcare>

<http://www.cisco.com/uk/localgovernment>

<https://www.cisco.com/uk/smartcities>

Contact us

Appendix A. Supporting use cases and references

Use cases and case studies:

North East London CSU

Airedale Care Homes

Nottingham University Hospitals

Cumbria: Remote Specialist

CityVerve:
Manchester Smart Communities Demonstrator

Swindon Borough Council:
Smart Communities Traffic Management

Southend on Sea Borough Council:
Air Quality Monitoring

References

Cisco – Digital Strategy for Connected Health and Care: Part 1

Cisco – Digital Strategy for Connected Health and Care: Part 2

PWC – The Local State We're In

Cisco – Defining Digital

NHS – Fire Year Forward View

Appendix B. Additional information

Cisco – Health and Care Social Network (HSCN)

Cisco – Kinetic for Cities