Microsoft

SHR Submission Paper

Sustainable Health Review

GOVERNMENT OF WESTERN AUSTRALIA

Sustainable Health Review – Microsoft Response

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Prepared by

Dr Nic Woods

Health Industry Executive

Nicholas.Woods@microsoft.com

Contributors

Robin Moustaka; Nic Woods; Brett Lightfoot; Charles Poulsen; Cheryl Robertson; Moh Rashed; Ken Lucas.

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Executive Summary

At the core of Microsoft is our company's mission. To empower every person and every organisation on the planet to achieve more. We believe our mission aligns to the expectations that WA Health has with the Sustainable Health Review: address a growing population with changing healthcare needs, manage rising healthcare costs and improve population health outcomes with a patient-centric lens.

Microsoft envisions a significant opportunity for WA Health to transform the quality of patient care and experience and in parallel, establish efficiencies in the healthcare system that may not be apparent today. We know Australia's healthcare sector is facing a set of challenges poised to disrupt its world-leading quality of care. With an unsustainable spending trajectory, costly new medical innovations, an ageing population, increased chronic disease, and an emerging population of digitally literate consumers, it has become crucial for healthcare organisations to leverage digital tools and health technologies to improve health outcomes, reduce inefficiencies and to truly put patients at the centre of care.

In response to the invitation to provide submissions to the Sustainable Health Review, Microsoft is very grateful for the opportunity to contribute to this very important initiative from WA Health. This document from the Microsoft Australia Health and WA Government teams sets out to provide thought leadership from the industry, examples of how Microsoft and its partners are improving healthcare, and practical examples that can assist WA Health toward a more sustainable health system servicing the needs of the WA community into the future.

We have provided our insights into areas for Service improvement, as well as cost savings. One specific analysis we have done very recently (see Section 2) has identified an immediate savings of $10m pa with an ROI of only 6 months. There are many other areas for improved services and potential savings that are also highlighted in this document.

The Summary Sections proposes some potential next steps for your consideration.

1 Operational Improvement

Given the increasing demands on WA Health's 42,000 strong workforce with increased demands on inpatient, outpatient and Emergency Department services to name a few, any opportunity to improve efficiencies underpinned by technology are certainly worthy of consideration. The year on year increase in demand on services does not reveal the increase in complexity as we bear witness to a demographic shift with an ageing population and unrelenting swell in the burden of chronic diseases in our population.

Microsoft is uniquely placed in that it has a dedicated national health team with expertise in healthcare and technology as well as a diverse ecosystem of partners, whose capabilities can be leveraged to solve some of the big challenges that Western Australia Health faces. Furthermore, Microsoft's own unique capabilities with Azure cloud (such as Artificial Intelligence (AI), Machine Learning (ML), Advanced Analytics, chatbots), complement its core solutions (customer relationship management tools, productivity tools) and are increasingly finding their way into the mix for health and social systems to help take on some of these challenges. One recent example is the use of chatbots by the Federal Department of Human Services, in which a chatbot has already answered 95,000 questions from staff, freeing staff for more complex tasks.

At a system level, we see opportunity to improve efficiencies and sustainability under the following pillars. Each has examples of technology enabled approaches to stimulate thought and reflect where Microsoft and its partners have experience. Microsoft are often find clinicians within WA Health across Health Service Providers (HSPS) exploring the use or validity of some of these pillars.

Engage Your Patients

As a society, more services and industries are increasingly digitised. Patients and consumers familiarity with using digital platforms is trending towards an expectation that digital tools are available in other aspects of their lives, health being one. Globally, we see a marked uptake in *patient engagement platforms* ranging from portal views over electronic medical records (EMRs) (so patients can view their own health record, securely message treating clinical staff, receive education about their specific conditions etc), to virtual health platforms (to launch audio and video consultations between patients and clinicians). These platforms not only support patient's participation in their healthcare, they can be used to collect patient generated health data, such as information required for an upcoming appointment. Patient efficiencies can be realised through the use of *telehealth* consultations, in supplementing a regular outpatient clinic

appointment when the physical presence of the patient is not required every time for example. In telehealth, Microsoft has already supported WA Country Health Service (WACHS) to build a platform that has been successfully leveraged over the past three years to cover the disparate geographical coverage challenge of Western Australia.

Australia has emerging pockets of health delivery utilising these technologies, and there is renewed interest with how My Health Record is being developed. Primary care is seeing a number of innovators releasing *virtual consultation* platforms and many hospitals are evaluating how this technology could streamline outpatient clinic processes. We would like to work with WA Health to explore methods of ensuring vital pieces of information like discharge summaries and forms can be easily incorporated into My Health record.

Empower Your Care Teams

Although patients are naturally at the centre of digital health innovation, tools to maximise the communication and *productivity of care teams* and health service staff are critical to the overall efficiency of the health system. A key trend is that communications methods such as SMS and pagers are giving way to integrated productivity, collaboration and *communication suites*. These enable secure emailing, messaging, alerts, voice and video conferencing on any device, anywhere. Even the ability to see that someone is online and available with visual cues is a big step to improving the effectiveness of team communication. New ways of collaborating amongst teams are available to support all staff in their clinical and operational capacities, such as sharing research, preparing case studies and grand rounds as well as managing virtual collaboration sessions and meetings. WA Health has this capability from their existing enterprise agreement and we welcome the opportunity to explore pilots where this can be deployed and measure before and after productivity after working with WA Health on governance and security and risk.

Data driven insights into the demands on different services (such as Emergency Departments) together with effective *workforce management* tools are vital to maximise precious human resource capacity. The use of predictive models to more accurately forecast service demands supports organisations in planning workforce and rostering.

Optimise Clinical and Operational Effectiveness

Electronic Medical Records (EMRs) are a key foundation to a digital ecosystem and can improve the safety of processes such as electronic medication management, efficiencies with speed to access of results and historical records to name a few. As the digitisation of hospitals and the health system continues, further opportunities arise to use analytics in a quest to become a knowledge driven health system.

Techniques are available to digest data from multiple sources (clinical, operational, and other systems), normalise and standardise it and overlay rich visualisation tools. This approach is being applied in hospitals to identify patients at risk of subsequent *unplanned readmissions in real-time* and identify those at higher risk of hospital acquired infection for example. These examples are being explored and vetted within WA health in small areas, but the impact would be greater if these innovations were deployed at a wider scale.

Platforms have also been deployed to better guide higher risk medication prescribing, tailored to the patient, increasing the efficacy of the medication and decreasing the risk of toxic side effects. This is a tangible use case of the move toward *precision medicine* (see DoseMe). These approaches are not limited to hospital based data and partners are connecting data sources across hospital and primary care as well as socioeconomic data to derive greater *population health insights,* insights into high service utlisers, as well as the discovery of health system needs and variation.

Transform the Care Continuum

Changing models of care requires more than technology, with alignment of funding and, services often required. This is a complex area, but many would agree that optimally managing the increasing burden of chronic disease requires a whole of health system approach and now is a critical time to understand how new models of care can be underpinned by technology. If the adage of 80 percent of the cost of care goes to 20 percent of patients, then finding ways to manage this complex patient population is paramount in better outcomes and decreasing cost of healthcare in Western Australia.

Sharing of data is a key enabler to achieve best care across the health continuum. *Interoperability* with clinical data and systems is becoming increasingly important. Projects are underway to support data sharing between GPs and hospitals and in parallel, there are several initiatives across Australia leveraging eReferral to improve efficiency and transparency of referral processes between GPs, hospitals and private specialists.

Security and mobility of clinical records and enabling disconnected working are key capabilities to support transition of care and hospital in the home types of services. Providers of these services have been able to rapidly adopt new technologies to support staff in the field as well as provide a real time single patient, client *care management* record.

Remote monitoring solutions (that combine medical, smart home and point of care testing devices) aggregate data and use techniques such as machine learning to alert carers when an independent frail person has not returned to bed after going to the toilet at night, or alert healthcare providers when devices detect signs of deteriorating congestive heart failure from increasing weight, reduced oxygen saturations. These approaches can go a long way to support independence at home, more proactively support patients and avert the need for them to utilise hospital services leading to decrease in the cost of care.

2 Maximising Existing Investments in Technology

The WA Health sector has invested in a large information and communication technology footprint, across hardware and software, from many vendors including Microsoft. Often technologies are procured by taking a "best-of-breed" approach, rather than leveraging existing capabilities and platforms. Another common issue is that the most cost-effective way to procure ICT technologies is as "bundles" or "suites" where multiple capabilities are acquired together.

Unfortunately, this approach has led to:

1. Duplication of capabilities across multiple vendors.
2. Acquisition of capabilities which are not utilised
3. Not leveraging modern platforms to their full capability

WA Health has a significant investment in Microsoft technology and has an Enterprise Agreement with Microsoft. Within this framework, there are opportunities for addressing these issues above and maximising productivity of assets merely by fully implementing the investments already made within this agreement.

In addition to suggesting WA Health analyse their existing agreements with their key ICT suppliers including Microsoft, and compare to what technology they currently utilise, we would like to workshop with you on how you can maximize your Microsoft investments. Having a thorough understanding of the capabilities provided within existing agreements will expose the technology overlaps, gaps, and identify areas that can be investigated for cost savings or utilisation.

WA Health's Microsoft enterprise agreement provides a broad range of desktop, server, cloud, security and collaboration technology. Some specific examples of opportunity are identified as follows.

Avoid technology duplication

WA Health's Microsoft enterprise agreement provides desktop AntiVirus software as a feature of Windows 10, as well a wide range of security software. WA Health currently utilises a 3rd party AntiVirus capability. When WA Health upgrades from Windows 7 to Windows 10, by deploying the native antivirus features of Windows 10, they will no longer need to pay for 3rd party antivirus features.

Exploit unutilised capabilities

WA Health's enterprise agreement includes a modern cloud productivity service, Microsoft Office 365. By enabling Office 365, the costs of operating email (including servers, support, and operations), file servers, and information storage for the department would be greatly reduced.

Furthermore, users will have a more modern digital workplace that provides greater flexibility, optimized security and collaboration opportunities.

Leverage modern platforms

WA Health utilises many Microsoft technologies in their own data centres, and many of their servers are powered by Microsoft Windows Server. Many organisations are moving their servers and applications to modern cloud platform such as Microsoft Azure. There are many benefits of utilising cloud platforms such as

1. Agility and flexibility. Ability to provision and deprovision ICT infrastructure on demand, means less lag time on projects.
2. Consumption based. With Microsoft Azure, customers only pay for what is used. If a server is shut down overnight when nobody is using it, there is no cost for the compute power.
3. Lower cost. Ability to scale-up and scale-down means infrastructure does not need to be purchased for the high watermark of activity.
4. Secure and verified by 3rd parties. For example, IRAP certification has just been renewed for Azure workloads in 2017.

WA Health has several applications already running in Microsoft Azure, but this is a small amount compared to the wider server and application footprint.

As further evidence, in a recent study Microsoft performed with WA Health, Microsoft found that by moving server infrastructure into Azure, a cost savings estimate of $10 million per annum could be achieved with only a 6-month return-on-investment period. While moving all infrastructure into a cloud may not be practical, there are many opportunities for hybrid approaches whereby some applications that are naturally suited can be moved so that benefits (security, flexibility, and cost to name a few) can be achieved.

This hybrid strategy aligns with WA's "Digital WA" ICT strategy and GovNext whilst maximizing time to savings, time to modernization, mitigating risks and ensuring data is in an IRAP certified environment where feasible.

Some other reference material to support this modern approach are produced by Forrester and can be found here:

- Forrester Total Economic Impact - Azure Infrastructure as a Service
- Forrester Total Economic Impact - Azure Platform as a Service

3 Authentication and Identity

One of the oldest concepts in healthcare is that of patient-doctor confidentiality. While the digital world has provided us with many productivity efficiencies such as storing/processing vast quantities of data and easily sharing information, these amazing benefits must be balanced with protecting a patient's information so that it is used appropriately by authorised users. By getting this balance right, it **means less time and effort** can be spent on activities such as compliance, remediation and investigations as well as decreasing the risk of data privacy issues.

An example of a privacy issue that could occur is where a computer terminal may be left unlocked on a hospital floor. Sometimes computers are left unlocked because they are often shared amongst staff and it is easier than logging in and out every time an individual needs access. However, an unauthorised person could easily access a patient's record because somebody else logged into a system, accessed a record and walked away without logging out. Productivity versus privacy is a balance that must be struck. All too often we see unlocked terminals, particularly in EDs because of the time involved in authentication. Having strong identity management can minimize the time for authentication and therefore increase the security in clinical settings.

Identity Management is a discipline that seeks to manage security to reduce overall risk whilst providing a better user experience and a lower cost of operation. A comprehensive identity management strategy covers people, processes and technologies. Whether the user be a WA Health caregiver, employee, contractor/supplier, or patient they will benefit from a well-run identity management program at WA Health.

Microsoft recommends Department of Health implement the complements of identity management that are part of your Enterprise Agreement by introducing a program of identity management as a standard part of business operations. Getting to a point of maturity will involve several initiatives. 4 initiatives and capabilities that Microsoft recommends are:

1. User profiling and role based access controls
2. Automating security processes
3. Providing self service
4. Single Sign-on and biometrics

User profiling and Role Based Access Controls

User profiling means building a common set of personas which have consistent job characteristics and IT requirements. For example, a nurse on the hospital floor has very different IT system access requirements than a knowledge worker in the department headquarters. Profiling is an understanding of the base level of system access for a particular job role's definition. When user profiles are built out, this will drive automation leading to increased security and lower cost of administration.

Automating Security Process

By automating security processes, we achieve several benefits:

1. Less human handling means less opportunity for errors which could result in privacy breaches
2. Lower cost of processing leads to an optimised allocation of resources

These benefits can be gained by automating areas such as:

1. The onboarding of users and their IT accounts
2. The offboarding of users and their IT accounts. When a person leaves their role, they are automatically stripped of any entitlements that they no longer require. If they are an employee or contractor and leave the organisation, their user accounts are disabled
3. The auditing of access to systems
4. Entitlement and access reviews
5. Securely managing clinicians whose practice bridges both private and public facilities.

Self Service

A common occurrence in health organisations is for users to reset passwords or request access to new systems. This often results in tickets being generated, approvals being sought, work being assigned to administrators, and the work manually completed. The industry standard cost associated with this is $80 per ticket. This manual approach means 1) a long lag time between the access request and completion which could mean employee downtime 2) risk of mistakes being made and 3) workers are performing repetitive tasks 4) lessening the governance around need for password reset policies.

By providing self-service access controls, processes can be streamlined and governance can be strengthened as users can reset their own passwords, or by requesting access which follows an

automated workflow. Approvals can be managed and assigned automatically. This means faster time to execution, better trackability, less risk of mistakes and overall lower cost to execute.

Authentication, Single Sign-On and Biometrics

Organisations now face a proliferation of IT applications and the corresponding number of passwords that users need to remember. This generally leads to a situation where users choose less secure passwords that are easier to remember, or even worse they write passwords on physical pieces paper or sticky notes. Single Sign-On (authentication) is a technique where users can log in once and are automatically signed in to their applications. By having only, a single credential to remember, users can have a more secure password. In addition, they have the productivity benefit of not needing to log into every application each time they open it. We understand this is an issue at WA Health as some applications are more difficult to work in single sign on. We would like to work with you perhaps at Perth Childrens Hospital to see if we can improve this process before opening its doors.

Taking this to the next level, is looking beyond passwords as a credential. Multi-factor authentication techniques mean that users have several options:

- Something they know: e.g. a password
- Something they have: e.g.
    - Using their smart phone device
    - One-time passcodes delivered via telephone
    - Via proximity using Bluetooth devices or smart cards
- Something they are: E.g. Biometrics

Biometric authentication technologies mean users can sign into devices using their own biology such as by finger print, iris scan or voice print. Technologies such as Windows Hello give users the flexibility to sign into a device using infrared or 3d scan of their face, upon unlocking a computer running Windows 10 for example. Biometrics are much harder for attackers to break, increasing the security footprint but also providing a simpler way of signing in.

Security for Single Sign on or user authentication is not a password management strategy. It is a multi-layered security profile that starts with the identity of the user, and builds with other tools such as document rights management, user defined data classification, multi-factor authentication, amongst other things. Microsoft can work with the department on their security strategy given our extensive experience in security and compliance in complex Healthcare

environments. A multi-layered security profile is the key to ensuring privacy and compliance are upheld in the Health environment.

4 Workforce development

An important component to the transformation of any healthcare service or organisation is ensuring the workforce can adapt and change to effectively maximise the capacity and expertise available. New digital services, the democratisation of artificial intelligence and the use of chat bots are just a few examples where individuals' roles will change and shift the clinical workforce to operating in new digital paradigms. One of the major considerations with the "4th Industrial Revolution" is the speed that this revolution is taking place and the need for an urgent response. Examples include artificial intelligence supporting triage services and patient flow in an Emergency Department, chat bots supporting a patient finding a specialist and making an appointment, or artificial intelligence helping make decisions on complex care paths. All these examples are very real and in some cases, being deployed into care providers.

A couple of focus areas we would recommend WA Health focus on:

Innovation

Empowering care teams to innovate and be empowered to deliver healthcare in new more efficient means. Many processes today are burdened with the legacy of paper work that related to a history prior to electronic and digital records and work flows. In its simplest form this is empowering the end users to have an input and be involved in how they can improve their day to day operations and relieve tiresome inefficient processes. This is as much a culture change as it is a skill step, many frontline care workers are bound by policy and process, history has taught them is not to innovate but follow the process. It is imperative that there is a capability and freedom for frontline services providers to be able to have an input, be creative and to be empowered to experiment in a controlled manner to improve patient facing services . This can be executed in design thinking days, hackathons and building a culture and framework that encourages the sharing and collaboration on new ideas and thoughts that can make a difference. Start simple, can we take this paper based process today and automate it? Do I really need to refer this patient to visit a specialist or could we conduct a quick 15 min telehealth consultation? There are thousands of these examples that many can have a massive impact on cost and improve the patient experience and clinical outcome.

Educating and skilling the workforce

Digital Transformation in Healthcare is far reaching and a robust change management and education program needs to be bedded into the program of transformation. Nurses will use more devices to collect and digest data with the patient. Doctors and specialists will work remotely and make more decisions in a fully mobile world. Telehealth will be the norm and the

expected first response. Remote care options will relieve the burden on hospital beds and empower patients to recover in their homes with the support of clinicians in a clinical contact centre. Drones will help support frontline response paramedics. Radiographers will spend less time looking at images and more time digesting reports form AI engines that analyse images in an automated manner at speed. Pharmacologists will trial dose on virtual patients in the cloud before dosing the patient, reducing dosage errors and improving dosage success rates. Patients themselves will demand to engage digitally and push the boundaries with providers. All these changes in process, tools and the way we all work require a constant education and a culture of learning that is a part of every team member every day.

Microsoft understands that there is already a skills shortage in some areas of information technology and is vested in programs to support the development of workforce needed for the immediate and long term in Australia as this will be key if we are to take full advantage of the capabilities that technology is increasingly enabling.

5 Innovation Hub Support

Innovation is key to solving many of the challenges in healthcare. Models to support innovation and industry partnerships are emerging across Australia in health and in other industries. Microsoft encourage the development of similar initiatives in WA health, including an innovation hub to foster industry relationships, fund health stakeholder innovation projects and develop critical design thinking and related skills to make these programs successful. The goal of the hub will be to channel innovative ideas and be the mechanism through which these are assessed and prioritised and communicated to ensure early improvements and cost savings.

This can be setup as a next generation omni-channel digital platform to facilitate healthcare and healthcare related industries for submitting innovation ideas to WA Health.

Key Highlights

- Unique user experience between your innovation hub site and the Department of Industry's business.gov.au site
- Mobile, tablet and desktop experience
- Easy to navigate and user friendly complex logic based idea application form
- Low effort, configuration based setup

6 Future vision for Health Digital transformation

There has arguably never been a more dynamic time for healthcare globally. New medical technologies continue to deliver amazing advances. Patients are gaining greater control over their own care, and clinical outcomes are improving. Many view digital solutions as a key enabler – helping to deliver better healthcare today while preparing for the demands of the future.

It is clear that WA Health recognises that we need new models. If we look to comparable health systems, new healthcare delivery models abound, and the evidence in favour of their effectiveness is constantly accumulating. Models of care that we are seeing rapidly adopted are provided below.

- Virtual health allows us to increase access to care for those isolated by age, mobility, or even just the constraints of their busy lifestyles
- Remote monitoring can increase the fidelity of physiological data collected and decrease the latency to care team intervention
- Predictive analytics can drive down avoidable readmissions or boost the detection of fraud in medical claims
- Precision medicine allows us to tailor therapy according to individual patient genetic profiles, improving efficacy
- Population health upends our reactive 'sick care' model by getting in front of lifestyle risk factors, improving wellness, and better managing chronic disease before a crisis manifests
- Patient engagement strategies to improve patient literacy and lift treatment compliance

Collectively, these innovative approaches represent the future of our healthcare system, and signal nothing short of a sea change in how health is delivered compared to today. The common enabling factor across these innovative models is cloud technology. As data volumes rise, processing loads increase, and high order functions like machine learning and artificial intelligence become hallmarks of the system, cloud computing provides unequalled solutions that are scalable, secure, affordable and can unlock the technology opportunities that we have before us.

We believe the imperative for the WA Health Sustainable Health Review is to identify ways to model to a more affordable, accessible, proactive, patient-centred system. Cloud technology provides platforms with new capabilities that remove traditional constraints around cost, compute power, storage, interoperability, maintenance, flexibility, and agility. Cloud computing is not in itself the reason for change, but it's enabling change at an unprecedented, global scale.

It will help WA Health to leapfrog its design and deliver the next model of healthcare for a future that is already here.

Summary and Call to Action

As we have discussed in this submission, there are many opportunities to leverage technology to help achieve the goal of sustainable healthcare in Western Australia. Our goal in this paper to introduce topics for further discussion. We strongly believe there are ways to leapfrog your legacy environment by strengthening your foundation---in months not years that will provide a robust, secure technical environment for your future.

Fundamentally, this is about reducing the cost of operations and getting better productivity out of assets (physical, people and technologies) that you already own. Some of this is realized by fully deploying what you already have, some is by consolidating and rationalizing your supported platforms and some is not a technology issue at all but one of culture –the need to shift mindset within WA Health to one of digital transformation.

As a key technology partner for WA Health, we have identified areas that we can uniquely assist with these such as:

- Providing operational improvement, by empowering care teams with better tools and engaging patients through more intelligent information
- Maximizing existing investments in technology by understanding what assets are available, identifying overlap, eliminating waste and leveraging unused capabilities. As discussed, Microsoft has already quantified large cost savings in this area
- Maturing the approach to authentication and identity, which will lead to better patient privacy outcomes, enable a simpler and yet far greater flexible environment to work
- Workforce development and training staff up in digital skills
- Creating an innovation hub and supporting to prove out new innovative ways of solving problems

We welcome discussing further how we can assist with the opportunities above. We strongly believe you can leapfrog your current environment and be the preeminent healthcare provider in Australia and we are available to partner and share the risk of doing this in months, not years and by deploying what you have already invested in can save tens of millions of dollars per annum. We recommend an initial workshop to listen to your feedback, ask questions, meet our Health team, and discuss a path forward to convert these ideas into real outcomes that improve the care of WA citizens.

To arrange this discussion or for any follow-up questions, please contact:

Robin Moustaka, RN, BSN
Microsoft WA Healthcare Executive
[redacted]
[redacted]

Thank you for your consideration and please stay up to date with our latest innovations by visiting http://microsoft.com/health