SMART NATION WORKFORCE

HOW EMERGING TECHNOLOGIES ARE SHAPING SINGAPORE’S PUBLIC SERVICE WORKFORCE OF THE FUTURE
Singapore is one of the first countries to recognise the potential of several fast-maturing technologies to revolutionise the way public services are delivered:

• Advanced analytics
• Predictive modeling
• Machine learning
• Intelligent automation
• Internet of Things
• Biometrics
• Natural language processing

Accenture’s Public Sector Emerging Technologies Research finds that readiness, awareness and development of these technologies vary from country to country, with Singapore ranking as one of the most advanced and well-prepared.

With the Smart Nation agenda well-established – and now prominently positioned under the Prime Minister's Office – Singapore looks set to remain at the leading edge.

• But how much progress has been made so far compared to other countries?
• How will the adoption of these technologies affect the public sector workforce?
• And what will Singapore’s public service worker of the future look like?

SKY-HIGH AWARENESS

Singapore demonstrates an understanding of emerging technologies and a willingness to adopt and incorporate them to transform the way the public service works.

Singapore reported the highest rates of awareness of all countries surveyed for three technologies:

- **95%** Data Analytics and Predictive Modeling
- **93%** Biometrics
- **78%** Internet of Things

Most respondents are also aware of video analytics (73%) and intelligent process automation (68%), though rates were higher in other nations.

Biometrics is the most developed technology, with 69% of those aware of biometrics having piloted/implemented it at their agency.
IMPRESSIVE OUTCOMES SPARKING A MAJOR TRANSFORMATION

Singapore is making notable progress towards adopting and adapting to emerging technologies in public service. Many (64%) report their organisation has succeeded in using emerging technology to increase customer/citizen engagement, satisfaction, and collaboration – more than double the average of the other eight countries (28%).

IMPLEMENTING EMERGING TECHNOLOGIES: OUTCOMES ACHIEVED TO DATE

- Increasing citizen satisfaction: 64%
- Improving process efficiency: 46%
- Improving the work of staff: 41%
- Reducing risk and improving security: 54%
- Innovating and developing new services: 41%
- Reducing cost: 41%
LEADERS ARE INFORMED AND ENGAGED

Public sector leaders in Singapore are reported to be significantly better-informed about emerging technologies than their peers in the U.S. and Europe.

SENIOR LEADERSHIP INFORMED ABOUT EMERGING TECHNOLOGIES AND THEIR POTENTIAL

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>90%</td>
</tr>
<tr>
<td>Japan</td>
<td>86%</td>
</tr>
<tr>
<td>Australia</td>
<td>78%</td>
</tr>
<tr>
<td>UK</td>
<td>27%</td>
</tr>
<tr>
<td>USA</td>
<td>27%</td>
</tr>
<tr>
<td>France</td>
<td>21%</td>
</tr>
<tr>
<td>Germany</td>
<td>20%</td>
</tr>
</tbody>
</table>
WHAT DO EMERGING TECHNOLOGIES MEAN FOR THE WORKFORCE?

The message from our survey is clear: Jobs will be evolved and enhanced, far more than replaced, by emerging technologies.

Less than half (49%) of Singapore respondents expect emerging technologies to result in job losses, while 41% report their organisation has already used emerging technologies to improve or support the work of staff.

Much bigger proportions expect them to improve job satisfaction (78%) and free the workforce to provide more valuable and personalised services (81%).

This recognises that even the most intelligent emerging technologies are most powerful when augmenting human roles, making them more efficient and effective. Case workers can be freed from repetitive or transactional work to focus on citizen engagement, personalised services, challenging problems and creative tasks.
THE IMPACT OF EMERGING TECHNOLOGIES ON THE PUBLIC SECTOR WORKFORCE

WHAT EFFECT WILL INTELLIGENT TECHNOLOGIES HAVE ON THE WORKFORCE?

They will free up the workforce to provide a more valuable, more personalized customer/citizen experience

- Singapore: 80%
- Japan: 84%
- Australia: 82%
- USA: 33%
- UK: 26%
- UK: 24%

They will improve job satisfaction of current employees

- Singapore: 78%
- Japan: 75%
- Australia: 69%
- USA: 77%
- UK: 82%
- UK: 87%

They will lead to job losses and reduced headcount

- Singapore: 49%
- Japan: 63%
- Australia: 52%
- USA: 50%
- UK: 55%

They will improve job satisfaction of current employees

- Singapore: 78%
- Japan: 75%
- Australia: 69%
- USA: 77%
- UK: 82%
- UK: 87%

They will lead to job losses and reduced headcount

- Singapore: 49%
- Japan: 63%
- Australia: 52%
- USA: 50%
- UK: 55%
Leaders around the world are enthusiastic about using emerging technologies to expand the skills of their employees and reduce dull and repetitive tasks.

“...It’s much more motivating and interesting for our employees to work in new and efficient ways instead of doing everything paper-based. On the whole, our employees embrace these new ideas and concepts. They see that the outside world is changing, supplying more and better digital services, and expect that we also move in that direction. Our employees are dedicated to their work, but that doesn’t mean they want to do the same things over and over again for 20 years. They need and want to develop.”

Karen Schnell, Key Account Manager, Skatteetaten, Norway
The greatest impact of these technologies will be the reduction of the amount of manual labour that is needed to be carried out by the workforce. Thereby, mistakes will be reduced and compliance will be enhanced, while at the same time employees will have to spend less time on routine and time-consuming tasks.

Abuzer Firat, Desk Officer, Federal Ministry of Finance (Department IT Automation for Tax), Germany
It’s going to tackle the higher-volume, lower-complexity workloads that our human resources currently need to be applied to. What you’ll have is a human resource pool that’s being applied to the higher-value, higher-complexity interactions, whatever channel they come in from. The capabilities of the workforce therefore need to change. The workforce needs to become much more inquiry-based, with an inquiry-based questioning capability and an ability to create linkages. Those aspects become far more important in the service delivery context.

Venetia Blackman, Assistant Commissioner, Digital Program Delivery, Australian Taxation Office
CASE STUDY: WELFARE AND PENSIONS ADMINISTRATION, NORWAY

From facing paperwork to facing citizens

Norway’s Welfare and Pensions Administration (NAV) has automated 65% of sickness benefit claims and payments processing, replacing a manual procedure involving thousands of paper forms. The key challenge of the project was that the process is governed by hundreds of decision rules that change over time.

NAV has selected a system that separates the logic from the mechanics of the application. This allows teams to flexibly test, change and manage many rules without the need to rewrite the software code.

The project has increased efficiency, agility and accuracy, and had a positive impact on staff. Some 350 employees who previously handled the claims paperwork have been moved to the front office to help citizens in person.²

Implementing any major new technology is often considerably quicker and easier than the associated retraining, recruitment or cultural evolution needed to maximise it.

With high ambitions and significant pressure to make gains from emerging technologies public service agencies are under pressure to accelerate workforce development.

Not only do they need to develop in-house skills, they need to recruit specialists in data and other emerging technologies, and individuals with experience delivering successful emerging technology projects.

Singapore is already responding to this need: 86% say that their organisation has made “significant structural changes” to their workforce to implement emerging technologies.
KEY TRANSFORMATIONS ARE UNDERWAY

ORGANISATION CHANGE DRIVEN BY CURRENT AND FUTURE EMERGING TECHNOLOGY IMPLEMENTATIONS

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>We’ve made significant structural changes to our workforce to implement these technologies</td>
<td>15%</td>
<td>71%</td>
<td>5%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>We’ve made significant changes to our day-to-day processes to accommodate these technologies</td>
<td>37%</td>
<td>39%</td>
<td>15%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>We’ve adapted our organisational/business model (or models) to take advantage of these technologies</td>
<td>27%</td>
<td>41%</td>
<td>7%</td>
<td>22%</td>
<td>2%</td>
</tr>
</tbody>
</table>
Leaders from other countries emphasise the importance of communication, cultural transformation and the spread of knowledge through the organisation.

“One of my roles is setting up innovation days to understand the capabilities of some of these things, and where they might lead in future. There’s sporadic knowledge at different levels in the organisation, but it’s good for people to be able to see and touch and understand how other organisations - not just public sector organisations or police forces - are using them.”

Angus McCallum, CIO, Metropolitan Police, UK
For all organisations, either public or private, I think innovation is a way of service. If you do not invest in innovation, the cost will be higher. **A good way also to deal with the social atmosphere inside the organisation is to explain to everybody, to reassure them that this is preparing the organisation for change.** It's also a social responsibility. And the impact of the public employment service, on the economy, on citizens, is also dealing with the question of innovation.

Reynald Chapuis,
Director of Innovation Pôle emploi, France
More broadly, I’d say that my job is more focused on helping staff through change than it is leading the technical aspects of the change. In my experience, the cultural change elements are by far the most challenging when it comes to transformation.

Randall Brugeaud,
CIO, Department of Immigration and Border Protection, Australia
TALENT IS SUFFICIENT IN MANY AREAS, BUT KEY GAPS PRESENT A CHALLENGE

Available skills are relatively strong in Singapore: only 20% believe that a lack of internal skills (or the ability to hire) is one of the top three barrier to success with emerging technologies, compared to 40% in Japan and 35% in the USA.

Singapore’s public sector is well equipped with software engineers (80%), digital developers and designers (68%) and other essential skills.

But survey respondents also report that their organisations will need more of these and other skills to succeed, with machine-learning specialists (54%) being the top priority for future recruitment.
# SKILLS AVAILABLE VS. SKILLS IN DEMAND

## SKILLS CURRENTLY AVAILABLE TO DELIVER EMERGING TECHNOLOGIES PROJECTS AND IMPLEMENTATIONS

<table>
<thead>
<tr>
<th>Role</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software engineers</td>
<td>80%</td>
</tr>
<tr>
<td>Digital developers/designers</td>
<td>68%</td>
</tr>
<tr>
<td>R&amp;D staff/innovation leads</td>
<td>56%</td>
</tr>
<tr>
<td>Data scientists</td>
<td>56%</td>
</tr>
<tr>
<td>Enterprise architects</td>
<td>49%</td>
</tr>
<tr>
<td>Machine-learning specialists</td>
<td>27%</td>
</tr>
</tbody>
</table>

## SKILLS PRIORITISED FOR RECRUITMENT TO DELIVER EMERGING TECHNOLOGIES PROJECTS AND IMPLEMENTATIONS

<table>
<thead>
<tr>
<th>Role</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine-learning specialists</td>
<td>54%</td>
</tr>
<tr>
<td>Software engineers</td>
<td>49%</td>
</tr>
<tr>
<td>Enterprise architects</td>
<td>49%</td>
</tr>
<tr>
<td>R&amp;D staff/innovation leads</td>
<td>46%</td>
</tr>
<tr>
<td>Data scientists</td>
<td>44%</td>
</tr>
<tr>
<td>Digital developers/designers</td>
<td>44%</td>
</tr>
</tbody>
</table>
NEW ROLES, NEW MODELS AND NEW RELATIONSHIPS

The public service agency of the future will build an organisation that encompasses traditional and new roles. While new skills are needed, agencies also need to retain the deep sector knowledge of their existing employees.

But individuals who combine technical skills, with an understanding of the relevant public service agency and citizen needs, are not easy to find – or to keep.

MOST RESPONDENTS FROM SINGAPORE ARE EMBRACING NEW MODELS AND PRIVATE SECTOR TALENT

- Use/hire a combination of private and public sector talent: 68%
- Say the private sector has helped to a considerable extent in meeting citizen demand: 71%
- Are willing to embrace public-private partnerships and new commercial models: 83%
- Mainly look to hire the talent they need from the private sector: 59%
- Are considering "as-a-service" models as opposed to creating their own: 63%
Leaders around the world are working to bring new skills into public services—by training, recruiting or collaborating with the private sector—while also ensuring they maintain a balance of traditional skills.

“IT'S HARD TO TRAIN PEOPLE BUT, FOR EXAMPLE, WHEN YOU WANT TO BUILD A BIG DATA ORGANISATION, YOU NEED SOME VERY SkILLED PEOPLE LIKE STATISTICIANS, MATHEMATICIANS, INFOMATICIANS AND SO ON. YOU STILL NEED CUSTOMS OFFICERS, WHO PROVIDE THEIR KNOWLEDGE OF LOGISTICS AND THE WAY THE CONSIGNMENTS GO FROM ONE COUNTRY TO ANOTHER. YOU NEED TO MIX VERY SKILLED PEOPLE WITH TRADITIONAL EMPLOYEES.”

Jean-Michel Thillier,
Deputy Director General, Directorate General of Customs and Excise (DGDDI), France
Everyone you talk with around government finds it extremely challenging to get enough people with the right skills to lead these initiatives. We have a lot of people that are very committed to this but don’t necessarily have a sense of what good looks like and how to push for it. Some things that you could arrive at in a very short period of time have been debated at great length because there are a lot of bright people wanting to do the right thing but who haven’t seen it before and don't know what good looks like. That's a real challenge at every level in the organisation.

Andrew Besford,
Former Head of Business Design, Department for Work and Pensions, UK
In terms of big data and the overall data management piece, we're not really there yet. We recognise that we need to create a much bigger analytics function—a much more data-led function. But those people are a very expensive and rare commodity. We probably feel we won't be able to do that alone: make the role attractive enough to attract people or pay them the right rate. We will have to think about a partnership to deliver that - either with our universities, our local government, or with the private sector, so we can create that sort of engine room that is cutting-edge.

Dave Thompson, Chief Constable, West Midlands Police, UK
CASE STUDY: KENT POLICE, UK

Supporting the workforce with powerful algorithms

In the U.K., Kent Police has partnered with Predpol, a Californian software developer, to implement statistically focused policing. The initiative uses continually evolving algorithms to predict and prevent crime by pinpointing areas where crime is likely to occur, showing how emerging technologies can improve the effectiveness of the human workforce.

Historical data on crime type, crime location and crime date/time is used to generate “hot spots” for given times in the week, month and year. This then drives the strategy for each shift, with police officers deployed to the right places, at the right times, in the right numbers.

Since the program started in 2013, common assault, antisocial behaviour and other street crime have fallen by 7%, and the method has been shown to be more accurate than traditional crime-prediction techniques. ³

EVOLVING THE ORGANISATION FOR EMERGING TECHNOLOGIES: 4 KEY ACTIONS

Singapore has made significant progress in technology-supported public services, but the greatest transformation lies ahead. Ever-more-intelligent, emerging technologies are unlocking new capabilities that will lead to—and often demand—significant reinvention of public service workforces.4

1. EVOLVE THE REMIT OF LEADERS
Developing emerging technologies demands new skills and new thinking in the highest echelons. Part of this is about ensuring leaders have technology skills and experience, but it is also about new leadership approaches to match an era of greater disruption, including the ability to manage in horizontal, not hierarchal, ways; greater intellectual curiosity; openness to change; and going beyond “measurement and management” to inspire creativity and new ways of thinking.

2. BUILD A FLEXIBLE WORKFORCE
Rigid, formal job structures do not support the speed and agility needed to implement the next generation of emerging technologies and dynamically shape teams to changing needs. Employment opportunities need to be redefined and co-created around more responsive role-based and project-based work, while being made available to full-timers, role-sharers, contractors and remote workers alike.

3. USE DIGITAL TO LEARN DIGITAL
Not only are digital technologies good teachers, they can often be matched to a worker’s learning style, circumstance and environment. These range from massive open online courses (MOOCs) to wearable technologies that enable real-time learning at the point of need. These tools will be essential to retraining and developing the workforce at scale.

4. EMBRACE COLLABORATIVE DESIGN
Rapid experimentation is crucial to implementing technologies like predicative analytics, intelligent automation and machine learning solutions. Instead of aiming to shift the entire organisation to new practices, test them in pockets to build stronger solutions and evidence before expanding the scope. Central to this is support for a fail-fast culture and new digital ways of working—such as collaborative design and citizen crowdsourcing—ensuring ideas and projects are not isolated from other agencies, departments or end-users.
SINGAPORE’S PUBLIC SERVICE WORKER OF THE FUTURE

Winding forward to future years, as emerging technologies augment human roles and enable game-changing innovation in public services, what will Singapore’s public sector worker look like?

While the need for traditional roles will not disappear overnight, public service workers will increasingly need to collaborate outside their departmental walls, working in interdisciplinary teams and managing partner organisations. Data analysis and technology skills will of course be vital, but must be matched with creativity, an instinct to evolve the status quo and a passion for innovative public services. The future workforce also needs the right environment to thrive in, particularly one that allows for experimentation and devolves decision-making to increase agility.

These and other ingredients are key to harnessing emerging technologies in government and they will define the public service workers of the future: the architects and builders of Smart Nation Singapore.
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ABOUT THE RESEARCH
The Accenture Public Service Intelligent Technologies Research surveyed 774 IT leaders from public service organisations in nine countries (Australia, Finland, France, Germany, Japan, Norway, Singapore, the U.K., and the U.S.) in 2016. In-depth qualitative interviews with public sector leaders and subject matter experts supplemented the survey results.

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