CHANDLER
INSTITUTE OF GOVERNANCE

Managing Technical Experts in the Public Sector

A Practice Guide

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Introduction

The public sector needs specialists with technical expertise in order to function well. But developing and retaining these experts in the public sector can be problematic. It requires strategic management and innovative thinking to keep up with change, and also to avoid the loss of wisdom, when technical experts resign and retire. Drawing on lessons from Singapore and wider research, this guide outlines some of the most effective and innovative practices to keep expertise in the system.

Why government needs technical experts

Imagine a world without technical experts in government. Without computer engineers, who will maintain the government's IT systems, or develop policies on telco infrastructure? Without civil engineers, who will ensure that good building contracts for public housing, or transport systems, are awarded to qualified vendors. Without trained lawyers, who will represent the government in international courts or run the country's judicial system?

While most public servants are commonly thought of as generalists or administrators, some functions of the public service require experts with specific technical knowledge. Such experts may include lawyers, engineers, economists and scientists, amongst others.

Why retaining technical experts in government is difficult

Companies and governments across the globe compete for talent. Graduates with coveted technical qualifications can choose to work in either the private or public sector. Even if they do join the public sector there is still the risk that sooner or later, they may leave for the private sector. This could be for a number of reasons, which differ for each specialisation and organisation. The key swing factors are:

1. **Remuneration**
   Public sector technical experts generally get paid less than their counterparts in the private sector.

2. **A lack of career pathways that recognise, reward and develop technical expertise**
   Public servants are often promoted for their ability to lead and manage. Technical knowledge can be overlooked when it comes to promotion. When technical experts opt for management roles, they risk losing the full mastery of their technical skills.

3. **Loss of future employability**
   The training and development opportunities on offer for public servants may not be sufficient for specialists to keep up with the latest industry standards of expertise. Upgrading professional skills to keep relevant may require intense training, such as a master's programme or practicums in other settings. Very often, the public sector may not offer these opportunities.

With less pay, a lack of career progression and facing the prospects of diminishing professional credentials, keeping technical experts in the public sector is an uphill struggle. Added to these risks, when an experienced expert resigns, the government loses much more than one talented individual. They lose the networks that have been cultivated, the institutional capacity to work around complex issues and the pipeline for career progression to higher levels of management. Only a systemic approach can address these issues.

Five Strategies for Stewarding Technical Expertise

This guide shares some of the best practices for stewarding technical experts across the 'life cycle' of their careers in the public sector. This begins when they are hired and continues in how their talents are cultivated, and ultimately in how their expertise can be institutionalised for the benefit of the whole organisation. Based on inputs from public sector practitioners and wider research, this guide is specifically designed for public sector HR professionals, technical experts themselves, and senior managers who employ technical experts in their ranks.

The guide is intentionally practical, and outlines the five core strategies that governments can adopt to retain technical expertise in public service:

1. **Effective Human Resource Policies for Hiring Technical Experts**
2. **Efficient Management of Technical Experts Within the Service**
3. **Tapping into Professional and Academic Networks**
4. **Plugging the Talent Gap with Expert Consultants**
5. **Wisdom Management**

1. Effective HR policies for hiring technical experts

Successful retention begins even before the hiring process kicks in. The below HR strategies are grounded in the need for building up a strong talent pipeline that attract, grooms and retains technical experts. Officers may be joining the public service early in their career, or even as a mid- to late-career move.

i. Provide realistic expectations and experiences

To attract the right candidates, any recruitment drive should highlight the unique motivations and rewards of serving in the public sector. However, there are some unique challenges associated with working in public service. There is often more paperwork, due to process and accountability requirements, and decision-making may take longer, due to more internal and external stakeholder coordination. Being honest and open about these challenges at the recruitment stage helps to attract the right employees and allows them to adjust more easily once on the job. Realistic job previews (RJPs) can help organisations and jobseekers find a good match. RJPs can be a short-term shadowing of a person on the job, or even internship programmes. Research has shown that those who experienced RJPs are less likely to take up job offers, but those that subsequently do take up the offer are more likely to stay on.

ii. Ensure diversity when hiring

Given that hiring technical experts is already challenging, all qualified candidates, regardless of gender, ethnicity, age or physical ability should be encouraged to apply. This is particularly so for less diverse professions such as engineering and science. For example, in 2016, when the Singapore government made concerted efforts to improve the remuneration and career pathways of engineers, a record 47 percent of female engineering students chose the government as their ideal employer, compared to 38 percent of men. Work benefits such as flexi-schemes, that appeal to those with caregiving responsibilities, can be highlighted. "Back to work programmes" for women with technical expertise who have left the workforce are also to be encouraged.

iii. A careful selection process

While mid-career hires may have prior work experience, not all of this may be relevant. The minimum qualifications and experience required for each level must be made clear to candidates. For example, Singapore's Legal Service Officer and the Information Officer (IO) schemes require mid-career hires to have at least five years of relevant experience. The Singapore Economist Service scheme gives examples of those who have already made successful transitions into public service, such as academic faculty, analysts from leading banks and public officers from statutory boards.

EXAMPLES

How the Economist Service (ES) in Singapore assesses potential candidates

1. Candidates are first selected based on qualifications;
2. Candidates are then required to sit for a test that is assessed by senior economists;
3. Only successful candidates can proceed to the next round, which is an interview on economic issues with members from the ES.

Attracting and cultivating young legal talent for the Singapore Legal Service

In the 1990s, the Singapore judiciary was facing a serious backlog in the cases awaiting trial. Many young lawyers were attracted by the better remuneration that the private sector had to offer.

It was concluded that a "concerted effort to attract the best of our young lawyers into the Legal Service" was necessary. To make the service attractive for bright young lawyers, salaries were raised to be on par with the private sector. The Justices' Law Clerk (JLC) Scheme was set up to attract young talent. It is a structured two-year programme in which young lawyers work directly under senior judges to provide research and support on cases. The Talent Development Scheme (TDS) was formally set up in 2006. Talented officers, whether they are JLC or not, are identified and are systematically groomed through scholarships for postgraduate degrees, milestone programmes, attachments to commercial organisations and postings to law firms or chambers.

iv. Effective onboarding

In the words of one economist who left the private sector to join the ES, "It was extremely challenging moving from a private sector culture that was profit-driven to one that is research-based and public policy-oriented. I also had difficulty recalling all the economic theories that I studied at university several years before! Thankfully, I received a lot of guidance and help from my fellow economists and managers." Effective onboarding and orientation can shorten the time needed to reach productivity and increases long term retention. This is even more important for mid or senior career hires, as their positions carry more risk for the organisation.

v. Competitive remuneration

Ideally, technical experts should be fairly rewarded and compensated in accordance with their technical skills. However, most governments struggle to compete on salary terms with the private sector. Where the public sector has more wiggle room is with benefits such as vacation leave, sick leave, other forms of leave, bonuses, allowances, pension plans and healthcare insurance. The public sector may also be able to offer better benefits and working conditions such as flexible working hours or generous leave for staff development.

EXAMPLES

Singapore legal service remuneration review and structure

The Singapore Judiciary had difficulties getting "leading practitioners" to serve in the High Courts during the early 1990s. Junior legal officers were also leaving the for the private sector because of better pay. In his last speech before his retirement on the opening of the legal year in 2006, Chief Justice Yong Pung How noted the high regard for Singapore's bench regionally "is not built up simply on the back of higher judicial salaries." However, "without adequate compensation, we would not have been as successful in convincing the best to accept appointment".

The Legal Service adopts a market-driven and performance-based compensation framework to attract, retain and manage the performance of their officers. Like the rest of the Singapore civil service, Legal Service Officers (LSOs) are paid based on their individual assessed performance and potential. Besides the basic pay, all eligible LSOs are considered for the award of an annual Variable Increment (VI), a performance bonus (PB), a Long-Term Incentive (LTI) and a Legal Professional Allowance (LPA). While the pay of civil servants in Singapore are given in a lockstep (i.e. same salary ranges for those in the same grade), the rate of increment annually (VI) can be increased with the PB if performance is good. The LPA is given to recognise the unique contributions they make, while the LTI is to encourage LSOs to think about their career in the service in the longer term.

Reviewing the salaries of public sector engineers in Singapore

More recently, the Singapore government decided to raise the salaries of engineers and data scientists. Unlike lawyers and economists, engineers do not have a dedicated career track. Hence, salaries for engineers vary across different agencies, with some paying market rates and some lagging behind.

In his speech to the Committee of Supply in 2016, Deputy Prime Minister Teo Chee Hean announced a pay increase of 20% on average for all engineers in public service, with starting salaries from $3,800/$4,000 monthly. These rates were determined after taking reference from the market for starting salaries for good engineers and IT professionals.

The Singapore government "will pay a premium" for engineers with:

a. skills that are high in demand and in short supply such as cyber forensics and malware analysts, and
b. niche skills that are important to the government but with little market demand outside.

Such moves are necessary to increase the number of engineers for infrastructure projects and 'Smart Nation' initiatives. Competition for engineers has grown sharply in recent years with Silicon Valley recruiting worldwide. Computer Science graduates now command the highest pay among fresh graduates, rivalling graduates from Law and Medicine. Additionally, many engineering and IT graduates' skills are also in demand in other well-paid industries, such as Finance and Banking.

2. Efficient management of technical experts within the service

Technical experts are a precious human resource. They deserve targeted and careful management. They should be engaged in positions that primarily make use of their technical knowledge - doing the work that only they can do. The following management strategies priorities the value of their expertise.

i. Ring-fencing posts for technical experts

Certain positions require the specific knowledge and skills of technical experts. These positions should be strictly reserved, or 'ring-fenced', for those who meet the requirements. This helps focus technical expertise where it is most needed, and provides a clearer picture of any potential HR pipeline shortages.

Technical experts can and should be encouraged take on more managerial and leadership roles while maintaining their ring-fenced status. For certain functions which require a balance of both technical and generic skills, minimum and maximum quotas for such expert posts can be set. For example, a hypothetical department may need to procure scientific instruments on a regular basis and so requires at least one technical expert with a scientific background to be in the team to ensure the procurement specifications are sound. For departments which require technical advice only occasionally, they can rely on experts from other departments. Such experts can be assigned as desk heads and provide advice on an ad-hoc basis. This ad-hoc work should be considered part of their core responsibilities.

ii. Centrally managing professionals under one agency

Rather than leaving individual agencies to manage their technical experts, it can be more effective and efficient to centrally manage them under one agency. The central agency could be the Prime Minister's Office or any other agency performing a centralised function. It could also be the agency that has the greatest need for a particular professional expertise. Figure 1 shows the various benefits that arise from centrally managing technical experts.

EXAMPLE

The Information Officer (IO) Scheme

The Ministry of Communications and Information (MCI) in Singapore hires all Information Officers (IO) as communications specialists for the government. MCI trains these IOs on the job and sends them for rotations in different divisions to help them understand the workings of government. IOs are seconded to ministries to help communicate policies and programmes to the public. Experienced IOs go on to head the corporate communications divisions of government agencies or act as the Press Secretaries of Ministers.

See Annex A for a list of professional public service schemes in the Singapore government.

Fig. 1. Benefits of centrally managing technical experts

iii. Creating a Career Roadmap for technical experts

Career 'roadmaps', and corresponding training and development roadmaps, give clarity to technical experts about where their skills and ambitions can take them within government. Such roadmaps help the organisation to develop future leaders and give scope for deep technical expertise to grow within the public service.

Good roadmaps include detailed and accurate job profiles for each position that outline the core responsibilities, qualifications and experience required for each job. Organisations may need to consult subject-matter experts, interview functional leaders, and conduct external industry benchmarking to keep job profiles relevant and up-to-date. If resources are available, a further step is to develop a **core competency framework** which refers to behaviours expected for each role. Once the job profile and competencies are outlined, a training and development roadmap for each technical expert role can be drawn up and implemented.

A career roadmap can also be used as a framework to peg remuneration. Each position in the roadmap should be compensated with reference to an equivalent position in the private sector. If there is no equivalent position outside the public sector, it can be pegged to roles with similar qualifications and experience.

EXAMPLE

Career Roadmap within the Singapore Economist Service

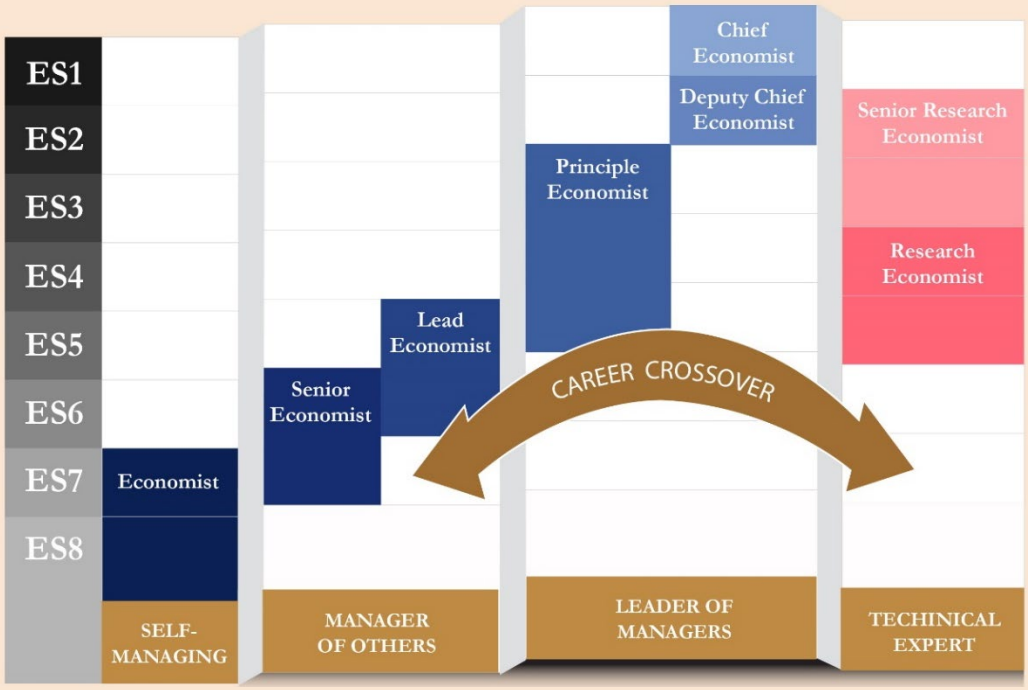


Fig. 2. Career Roadmap within Singapore's Economist Service. Source: MTI (2020)

Figure 2 above shows the career roadmap within the Economist Service (ES) in the Singapore government. The roots of the ES can be traced back to the mid-1980s when Singapore experienced a major recession which caught the government off-guard. To better prepare for such situations in the future, the Ministry of Trade and Industry (MTI) set up an Economic Research Unit (ERU) to monitor the economy. The scope of work by ERU grew as it started to provide economic analysis for policymakers on microeconomics efficiency and other policy issues, beyond just looking at trade and inflation. The ES was set up in 2001 to meet these broader needs.

The coloured boxes above show the two key tracks within the scheme, with those on the management track in blue and those on the research track in pink. The different heights and substantive grades show the relative seniority of each position despite the different tracks they may be on. All new economists with no or little work experience enter as an Economist, in job grade ES8 or ES7, at the Economics Division at the parent ministry. Once they are promoted to grade ES6 as a Senior Economist, they will be seconded to other divisions in MTI, such as the Energy Division or the Foreign Economic Policy Division. They may even be seconded to other ministries, statutory boards or international organisations, like the OECD. At this point, the officer may begin to consider which career path he/she will choose going forward.

Good roadmaps also include detailed and accurate job profiles for each position that outline the core responsibilities, qualifications and experience required for each job. Organisations may need to consult subject-matter experts, interview functional leaders, and conduct external industry benchmarking to keep job profiles relevant and up-to-date. If resources are available, a further step is to develop a core competency framework which refers to behaviours expected for each role. Once the job profile and competencies are outlined, a training and development roadmap for each technical expert role can be drawn up and implemented.

EXAMPLES

Competency frameworks and career roadmaps for public sector engineers in Singapore

The Singapore government has developed competency frameworks for engineers from seven public agencies, such as the Public Utilities Board (PUB), the Defence Science and Technology Agency (DSTA), JTC Corporation (an industry infrastructure development agency) and the Housing Development Board (HDB). The framework articulates the knowledge and skills that public sector engineers require as they progress in their careers. Engineers use the framework to identify their own training needs, and develop expertise and mastery in specific areas.

Specialist tracks for the Singapore Legal Service

The Singapore Legal Service has two specialisation tracks for Legal Service Officers (LSOs) - the legal track for legal consultants in the public service and the judicial branch for serving in the supreme, family justice and state courts. LSOs take on increasingly complex work that requires deep specialisation for both branches. The demand for legal advice in drafting bills is in high demand in government and the Attorney-General's Chambers (AGC) specialises in new areas such as economic crimes. At the same time, the courts are also taking on more complex cases. The size of the LS has increased to a scale where officers can specialise without fear of limiting their career prospects and growth; in 2014 there were 587 LSOs in the service which is about a tenth of all practising lawyers in Singapore.

3. Tapping into Professional and Academic Networks

Building up capacity internally amongst public service technical experts can be taken to the next level by tapping into more external networks. These include the professional bodies, industry players and academic institutions that are associated with each specialisation. Tapping into these networks can unlock all sorts of opportunities for growth and innovation. Below are some strategies for increasing technical expertise collaboration.

Technical experts in governments, academia and professional bodies have synergies that can be unlocked. Collaborations between these three parties can help to increase the capacity in all three sectors.

i. Networks that inform policy

Even experienced teams of experts need outsiders' perspectives to consider the development and impact of policies. This is especially so in areas where the government requires the cooperation of the professional community to implement key policies, such as in response to a disaster or a pandemic. For a specific issue, temporary networks can be created such as an advisory panel. Such panels conduct reviews and connect the public sector to key persons, networks and resources.

For longer-term institutional cooperation, governments can collaborate more strategically with the respective academic and professional bodies or societies. One such high profile exchange is the InterAcademy Partnership (IAP), a global (and regional) network of professional academies that mobilises the best scientists and engineers worldwide to provide high quality, in-depth advice to international organizations and national governments on critical scientific issues.

EXAMPLES

The Royal Society Pairing Scheme

The Royal Society of the United Kingdom is an independent scientific academy, dedicated to promoting excellence in science for the benefit of humanity. One of their many initiatives is their Pairing Scheme that links researchers with parliamentarians and civil servants. Each year, about 30 scientific researchers are 'paired' with civil servants and parliamentarians for around one week, to help each other understand how their respective professions operate, and so better inform the public policy process.

Department of Transport initiatives

Another novel tactic that can bring scientists and policymakers together, is engaging a **Relationship Manager** to help build the expertise network. The UK's Department for Transport (DfT) seconds such a manager from the Engineering and Physical Sciences Research Council (EPSRC) for this purpose. The manager provides the DfT with an overview of current research being conducted by the research community and so enables the DfT to better engage with academia. The relationship manager has, for example, linked up the department with the Alan Turing Institute and other research hubs for collaboration on cybersecurity and energy policy.

ii. Industry and institutional secondment schemes

There are several schemes where public sector technical experts are seconded to professional bodies, academic institutes or even private companies. Governments should also consider having such professional bodies and academic institutes second their own staff to the public sector. The resulting institutional knowledge exchange also helps each party understand how they function in the broader landscape of their specialisation. The experts involved are more likely to create synergies and broker future collaborative projects. If and when the government needs more technical experts to work on short or mid-term projects, then the external experts from these schemes are easier to tap on.

iii. Higher education exchange

EXAMPLE

Japan's Cross-appointment schemes

Japan has a cross-appointment system where a researcher or expert is allowed to be employed by two or more organisations, including universities, public research institutes and companies, while engaging in mutually-agreed R&D and educational efforts. The aim of the scheme is to share knowledge and foster innovation between the various parties. Such a scheme also means that organisations can share knowledge without poaching talent from each other. Researchers can stay with their current employer and enjoy a temporary transfer, without suffering any disadvantages or restrictions in terms of social insurance or retirement benefits. For example, three days a week, a researcher who belongs to a company can be involved in open innovation joint R&D in a university, or a public research institute, while continuing involvement in services to the company.

Universities have long been a forum for government representatives to work closely with academics, educators and professional bodies to exchange the latest research and training ideas for their respective fields. Senior technical experts from government can be appointed as adjunct faculty in academic institutions to research and teach on topics related to the public sector. Universities are also one of the best settings for governments to learn from and collaborate with technical experts visiting from overseas.

EXAMPLES

UK Intellectual Property Office outreach to academia

As part of their learning and development, senior patent examiners from the UK Intellectual Property Office (IPO) often participate in programmes led by external organisations. In return, the IPO gives back to the academic community by providing IP training for academics through the "IP for Academia Programme" with the Universities of Cardiff and of South Wales. Such activities have enabled senior examiners to ensure that their knowledge in specialist fields is current, supports their work when searching and examining patent applications, and provides leadership opportunities for those managing these exchanges.

Social and Family Research Network in Singapore

The Social and Family Research Network was launched in 2018 to promote a multi-disciplinary approach and greater expertise around social and family research. It brings together academics, researchers, social sector professionals, and policy-makers who work with social and family issues in Singapore. Spearheaded by the Ministry of Social and Family Development, the network holds a conference annually which serves as a platform for members to share findings and new developments in their field. The network brings together evidence from these various disciplines to better develop and implement policies.

iv. Setting standards, certification and raising awareness of the profession

Universities and professional bodies are the main authorities that grant professional or technical certification and set the standards for an industry. Working with these bodies allows government to better understand the skills and competency frameworks of the profession. Such frameworks can also help the government develop their own internal career frameworks. Similarly, professional bodies can collaborate with government to improve technical education in schools and universities. Additionally, they can collaborate to better educate the public about the important roles technical experts play in government and society.

EXAMPLES

Professionalising geographers in the UK government

In recent years, the UK government has worked with the Royal Geographical Society and the Institute of British Geographers (RGS-IBG) - the learned society and professional body for geography respectively – in many areas to better support geographers in government. The society was closely involved in aligning the government's professional geography skills framework with the requirements of the Chartered Geographer professional accreditation.

National Social Work Competency Framework of Singapore

In 2015, the National Social Work Competency Framework was launched. Supported by the Ministry of Health and Ministry of Social and Family Development, a 16-member team comprising senior social workers from various fields and academics, developed the framework which now guides the development of all social workers in the public and the community sector.

v. Workforce and manpower planning

Government and professional bodies can collaborate to conduct regular surveys on employment trends for each profession, asking where technical experts are employed, their rank, pay and career trajectories. This can help governments in their own planning and recruiting of technical experts. The professional body themselves can in turn provide recruitment information to their members.

EXAMPLE

Japan Ministry of Economy, Trade and Industry (METI) Industry-Academia-Government Collaborative Roundtable on Human Resources Development in Science and Technology

METI hosts a regular roundtable with representatives from the private sector, government and academia to ensure that there is a match between the talent developed at educational institutes to meet the human resources needs of industry. Current representatives include senior executives from Toyota and Toshiba, who also represent the Japan Business Federation and Council of Competitiveness-Nippon. Representatives from academia are senior representatives from science and technology educational institutes. Two government representatives are part of the roundtable, one from METI and one from MEXT (Ministry of Education, Culture, Sports, Science and Technology). The roundtable not only discusses current issues but also collaborates on concrete initiatives such as science outreach and employment opportunities for postgraduates.

vi. Communities of Practice

A Community of Practice (CoP) is defined as an organized group of professional people who share the same interests in resolving an issue, improving their skills, and learning from each other's experiences. A CoP can be as informal as a regular coffee session for technical experts working in the same organisation or it could be a more formal network meeting with contemporaries from several organisations. Very often, the professional body or relevant academic institute has greater capacity and expertise than the government, and is the driving force for centres of excellence and CoPs.

CoPs also exist as online platforms. CoPs attract both 'seekers' and contributors', but all are practitioners, the most experienced of whom make for the best facilitators. There are many benefits of CoP networks for technical experts, including sharing of best practices, testing out new ideas, stewarding knowledge and fostering collaboration (see Fig.5).

If there is sufficient capacity, Centres of Excellence can be instituted and regular technical conferences organised for sharing research, current best practices and new industry developments.

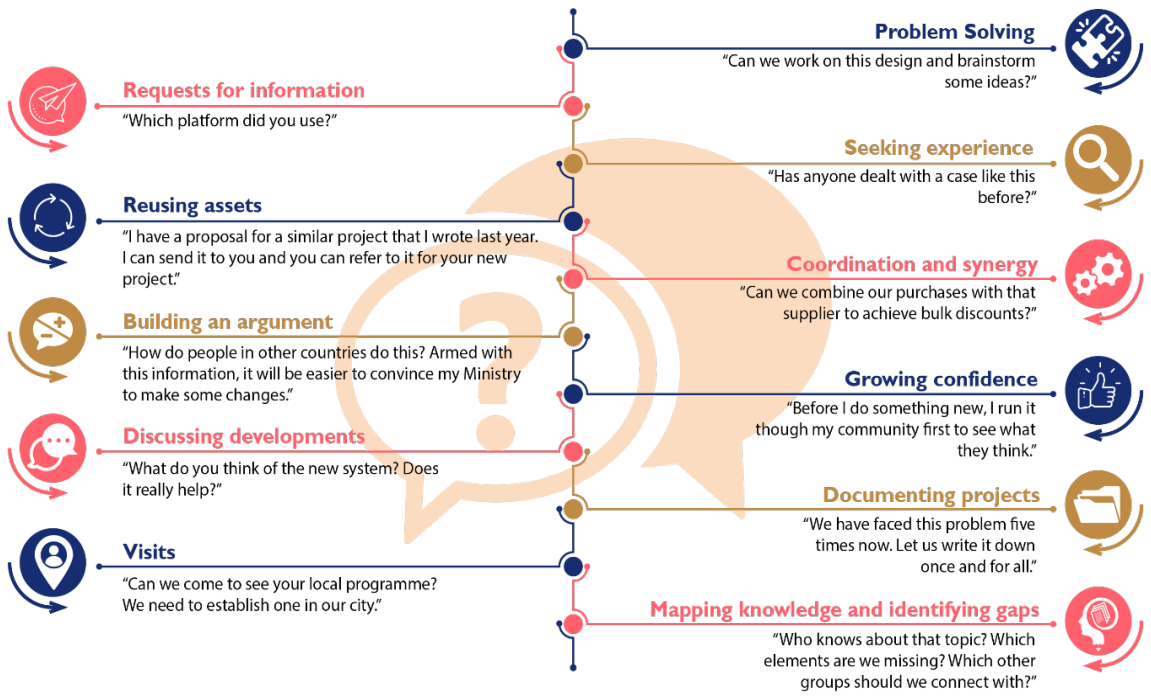


Fig. 5. What CoPs Can Offer to Their Members
(Adapted from Wenger-Trayner, 2015)

EXAMPLE

Singapore's Engineering "CentExs"

In 2016, several initiatives were announced to energise public sector engineering, including the first bi-annual Public Sector Engineering Conference, attracting more than 1,000 engineers. At the 2018 Conference, Deputy Prime Minister Teo Chee Hean announced that Singapore had set up six Engineering **Centres of Excellence**, or "CentExs", in the following six specialisations: cybersecurity, tunneling, underground caverns, facility management, geospatial systems, command and control systems and digital technologies. "These CentExs help to develop deep engineering expertise, and provide a platform for our officers and engineers to exchange ideas and develop solutions to meet societal challenges."

4. Plugging the talent gap with expert consultants

For some public sector organisations, hiring or developing certain technical experts 'in-house' is not possible. This happens for a number of reasons. For example, the government may be investing in a new technological innovation or infrastructure project that has never been attempted by that country before e.g. the rollout of a 5G network or the construction of a new petrochemical industry hub. The required technical expertise simply does not already exist within government.

In some jurisdictions, inflexible pay schemes or assessment frameworks that do not take into account technical expertise can block the permanent full-time hiring of skilled technical experts. In such instances, organisations hire in the required experts as consultants on a contract basis. Funding for these contracts usually falls outside the standard manpower frameworks.

The many principles and processes involved for the selection and use of consultants is beyond the scope of this guide. Indeed, the use of expensive external consultants in the public sector has been the target of much criticism, both from within and outside the government. However, this practice is widespread and should be seen as an opportunity for organisational learning and knowledge transfer. Some key points to bear in mind for retaining the important expertise imparted by the consultants are:

- Where possible, institutionalise the intellectual property and technical know-how generated from the project on an ongoing basis;
- Encourage consultants to train and mentor the pipeline of in-house technical experts with a view to managing new and future projects;
- Consider how the expertise gained in one agency project can be shared to other parts of the public sector.

5. Wisdom Management

When a retiring or highly-skilled officer leaves public service, the organisation does not simply lose headcount, it loses a wealth of knowledge, and very often, wisdom. These experts have accumulated knowledge, experience and insights that over time become synthesised and refined into wisdom. Passing on this knowledge and wisdom is not simple. The organisation must proactively and systematically capture, store and transfer these "deep smarts" continuously, for the community of technical experts to grow and learn. Below we outline what types of knowledge can be captured, whom is involved and some strategies for capturing and retaining the knowledge and wisdom of technical experts.

Types of Knowledge

It is important to decipher what type of knowledge can be passed on – is it explicit, implicit or tacit?

Box 1. Explicit, Implicit and Tacit Knowledge

High-performing individuals draw upon many types of knowledge to work effectively and efficiently. This knowledge can be broadly grouped into three main types:

Explicit knowledge

Documented in some form:
Can be provided by the expert without much, if any, additional verbal explanation.
This could be a contacts list or a document template.

Implicit knowledge

Undocumented but easily articulated:
Not formally documented but can be mapped as categories of tasks, skills or roles.
This could be knowing whom to consult for expertise within an organisation.

"Rule-based":
Not documented or embedded in processes but can be articulated in rules, steps, stages or techniques.
This could be knowing how to craft a certain type of document for an external stakeholder.

Tacit knowledge

Understood but cannot be articulated:
Never articulated before but can be explained when probed. *This could be sensing that something is wrong with some specialised equipment.*

Unconscious:
Not recognised as knowledge by the person him/herself. Sometimes, the person him/herself describes it as a "gut feel". *This could be knowing how to act in a crisis or challenging situation.*

Easier to access

More difficult to access

Senior and experienced officers accumulate all three kinds of knowledge through their work and often possess superior explicit knowledge of their field. But their greatest value lies in their implicit and tacit knowledge.

Having this range of knowledge enables such experts to perform the below tasks with ease:

- Seeing things from a **system perspective,** both technical and organisational (understanding the organisation's culture and history; "institutional knowledge")
- Making **accurate judgements** in different contexts (including understanding"unwritten norms")
- Swiftly **recognising patterns**; having great "intuition"
- **Networking** with a wide range of people easily
- **Inspiring loyalty and building teams** with good interpersonal skills
- **Communicating effectively** to different stakeholders
- **Knowing which questions to ask** and what to look out for in different situations.

Types of Expert

Beyond technical "deep smarts" of explicit, implicit and tacit knowledge, experts often build up a vast and valuable relationship network over the course of their careers. Experts with this accumulated "relationship capital" know best whom to contact across a variety of situations. Experienced experts are often the "central connectors" and "brokers" in their community (see Box 2).

Central Connectors

Central Connectors are a **hub** for building interpersonal connections. They are highly sought after for their opinion and expertise, and have a high number of direct relationships with other experts. When central connectors do not have a ready answer to a question, they usually know someone that does, and they have the influence to get a response quickly. When central connectors leave organisations, colleagues have a harder time connecting with others for advice or collaboration. Connections take longer or may not even develop at all. By simply connecting the right people together to tackle an issue, central connectors save their organisations both time and money. Central connectors are ideal for leading project teams, introducing newcomers to an organisation and leading Communities of Practice.

Brokers

Experienced experts sometimes act more like **brokers.** They act as "bridges" between two subgroups of people. They may be technical experts who are able to translate technical knowledge into layman's terms for policy makers, or technical experts who know relevant contacts in academia, industry or other networks. While they may not have as many links as a central connector, a broker's ability to understand and work with different subgroups brings value to the organisation. This is especially so in organisations where people tend to work in silos. Brokers are harder to identify, but their absence is felt, especially when collaborations begin to falter. Brokers are well-suited to regular job rotations and lateral transfers which allow them to understand and network across several functions.

Box 2. Central Connectors and Brokers

Listed below are some techniques for capturing the knowledge, networks and wisdom of experienced staff who may be due to leave the organisation.

i. Alumni networks

Not every exit of an expert need be a loss for the organisation. Alumni networks can provide an opportunity for peer learning across external organisations. One example in Singapore is **GovTech**, the agency driving the 'Smart Nation' initiatives. Their alumni network offers mentoring and networking opportunities, and other strategies for advancing the broader "tech ecosystem".

Alumni from all sorts of specialisation may even eventually re-join public service, bringing valuable industry expertise and a working knowledge of how the public sector operates.

Re-Hiring Talent from Alumni Networks

"Our objective is not to retain all […] talent in the Legal Service throughout their careers. We want some of these officers to stay on and move up to hold senior appointments in the Legal Service, while others move out to practise law in the private sector, or perhaps to follow academic careers. Later, having acquired experience and made a name for themselves in the profession, then they can be considered for appointment as Solicitor General, Judicial Commissioners, or Judges. For the top posts in our legal system, we must recruit from both within and outside the Legal Service those who have had the widest exposure, and the necessary temperament and ability. We should not revert to the old Colonial Legal Service system in which promotion to the bench is only from within the service, as this would result in too narrow a range of experience at the top. "

- **Minister of Law, S. Jayakumar (2006)**

ii. Re-engaging retiring staff

There is often less flexibility around when public sector workers can choose to retire. However, for those highly-valued retiring experts, there are ways and means to keep their knowledge and wisdom in the system:

- Re-employment or engagement as an advisor or consultant, potentially on an ad hoc basis, within the same or an allied organisation;
- A research or teaching position in an affiliated academic or research institute, which also allows for the opportunity to codify and share their knowledge.

In Singapore, some permanent secretaries continue to contribute to the public service as senior fellows at the Civil Service College or as adjunct professors in the Lee Kuan Yew School of Public Policy. Those with senior experience and technical skills are sometimes offered consultancy positions on the Boards of Ministries.

iii. Capturing the "deep smarts" of experienced experts

Many retiring or exiting officers have led important projects, handled critical situations and made significant decisions that impacted the organisation. Very often, senior experts are not fully aware of their unique abilities or experiences. They may have worked so many years that their skills and acumen have become second nature. One way to capture these "deep smarts" is through a recorded interview. The skilled interviewer should draw out the thinking of the senior expert and the reasons for their actions and decisions. People who have worked with the expert should also be interviewed to establish what makes the expert and their experiences so special.

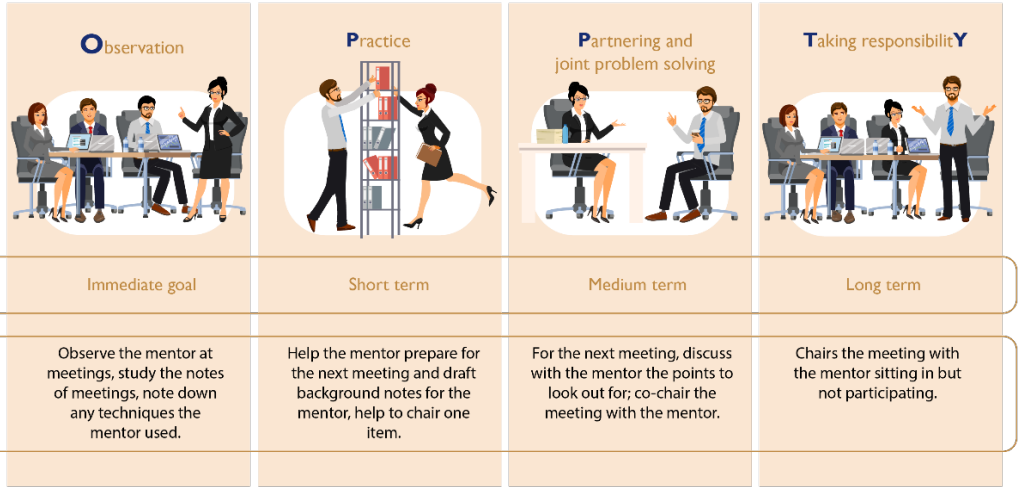
The interview material can be used for immediate knowledge transfer or it can be carefully categorised and archived for further study and analysis. Other sharable resources can be created such as case studies. This sort of first-hand material is also unique for finding the stories that help an organisation build the story of its past, and the folklore of an organisation.

Annex B contains a questionnaire to draw out the implicit and tacit knowledge of experts while Annex C provides a list of questions for delving more deeply into a past important event.

iv. Mentoring for succession and knowledge transfer

Mentoring for succession elevates **knowledge transfer** as the key priority. One framework that fits this form of mentoring is abbreviated as the **OPPTY** action plan, which comprises **Observation, Practice, Partnering and Taking responsibility** (see the Figure 4 example below). The responsibility for learning falls on the mentee as they identify what they wish to learn from the mentor. The effort and skills required of the mentee increases with each stage. For each stage, the mentee and mentor identify a mini-experience, which both of them will undertake together. The mentee logs their learning points from the experience, with added feedback from the expert. In this way, the mentee actively learns from the expert and improves their own skills.

Example: A mentee wishes to learn how the Chief Engineer is able to chair a meeting engaging policy makers and other non-experts.



	Observation	Practice	Partnering and joint problem solving	Taking responsibilitY
Timeframe	Immediate goal	Short term	Medium term	Long term
Example of relevant mini-experience	Observe the mentor at meetings, study the notes of meetings, note down any techniques the mentor used.	Help the mentor prepare for the next meeting and draft background notes for the mentor, help to chair one item.	For the next meeting, discuss with the mentor the points to look out for; co-chair the meeting with the mentor.	Chairs the meeting with the mentor sitting in but not participating.

Fig. 4. The OPPTY Action Plan,
adapted from Leonard, Swap, & Barton (2014)

The OPPTY mentor-mentee action plan for knowledge transfer can be adapted to fit all sorts of roles and responsibilities of a given job, and for various levels of experience within the organisation.

Conclusion

As the world becomes more complex, the importance of technical expertise in government will only increase. We have learned that hiring, developing and retaining technical experts needs to be a carefully planned and managed process. The best prepared governments will have strategic plans and policies in place for working with industry, academia and the wider profession. They will be thinking ahead for how to create a strong pipeline of talent and how to capture and institutionalise the wisdom of experienced experts. In these ways, the public sector can truly harness the value of technical specialists and best serve their citizens.

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Professional Service Schemes in the Singapore Government

The Singapore government has a number of professional service schemes. Officers in these schemes have their own career roadmaps and pay scheme, compared to non-expert civil servants. A list of such schemes is provided in the table below. Please note that this list is not exhaustive, and non-technical service schemes (e.g. Administrative Officer scheme, Management Executive scheme) and the uniformed services are not included.

Allied Educator Scheme of Service The scheme is for allied educators, including teaching aides for children with special needs, school counsellors and outdoor adventure educators.	Ministry of Education	Central Agency
Economist Service Scheme This scheme is for government economists who specialise in conducting economic analysis for public agencies.	Ministry of Trade and Industry	
Foreign Service Scheme This scheme is for officers who will staff Singapore missions and embassies overseas. Some of them may become chief-of-missions and ambassadors.	Ministry of Foreign Affairs	
General Education Officer Scheme The scheme is for teachers teaching in public schools.	Ministry of Education	
Information Officer Scheme This scheme is for Information officers (IOs), the communication specialists in the government. Senior IOs head the corporate communications or public relations operations in public agencies or serve as the press secretaries to ministers.	Ministry of Communication and Information	
Legal Service Officer Scheme Legal Service Officers are lawyers working in the public sector. They act as legal representatives and consultants for public agencies, serve in the Attorney's General Chambers, or in the judiciary.	Ministry of Law	
Engineer What's Next 'Engineer What's Next' is not a single scheme but a campaign and website that showcases the huge variety of careers available for public sector engineers across multiple ministries and agencies.	Public Service Division	

Questionnaire to Draw Out the "Deep Smarts" of Experienced Officers

General	- What are three things that you have learned that you wish you had known sooner? - What is the biggest challenge your replacement will face? - What are the three projects you are most proud of and why?
Foundation Knowledge	- What reference materials do you use? • Are these readily available within the organisation? • What are the websites, journals, resources etc. that you find most useful? • Which are the best professional associations to join or follow? - How do you track technical trends?
Professional Network	- Whom do you contact most for industry information, and why? - Whom do you ask about trends and innovations, and why? - Can these people continue to help us and how can we contact them?
Technical Knowledge	- What kinds of problems do people bring to you to solve? - Can you describe a problem brought to you recently? - Which technical mistakes are newcomers most likely to make? - What are the biggest risks around the project, processes or system you manage?
Problem-Solving	- How do you know if a task, situation, process or problem is being handled well? - What mistakes are newcomers likely to make when handling such a situation? Can you tell me a story of when you handled such a situation well, and another when it did not go so well?
Organisational	- Who are the major stakeholders in the project, process or system you manage? - What are the positions of the stakeholders? - Where are the competing priorities? - What are the biggest mistakes newcomers make in trying to get projects going? - Can you given me examples of such mistakes and suggest how to avoid them?
Customer	- What value do we add when serving citizens? - What is the best way of presenting that value? Can you give me an example? - What problems have we run into in serving them? - Tell me about the history of these problems, how they were solved and by whom.
Interpersonal	- What criteria do you use to choose team members and why? - How do you ensure a team is connected to the vision, mission and action plan? - How do you motivate the people that report to you? - Which communication strategies are the most effective in this organisation?

Adapted from Leonard, Swap, & Barton (2014)

Annex C

Critical Event Questionnaire

1. Start with the event.
    a. What happened and why?
    b. Who was initially involved?
    c. What was your role as an expert?
    d. What were the immediate consequences of the event?

2. Create a timeline with key decision points or actions noted before, during and after the main event. At each decision point, ask the following questions, as applicable.
    a. Who was involved?
    b. What was the decided and why?
    c. What action resulted?
    d. Were other actions and decisions considered? If yes, why were they rejected?
    e. Provide context: What events or situations outside the actors' control had an influence?
    f. For some decisions: What assumptions or expectations were held at that point?
        i. Who made these assumptions or had these expectations?
        ii. Were they tested? Were they valid?
        iii. Were they right or wrong?
    g. For some decisions: What cues or signals were important to note?

Adapted from Leonard, Swap, & Barton (2014)