Information and Communications Technology (ICT)

A GUIDE FOR PROFESSIONAL ACCOUNTANCY ORGANISATIONS IN AFRICA

Acknowledgments

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The views expressed do not necessarily reflect the UK government's official policies.

Endorsement

The Pan African Federation of Accountants (PAFA) is a regional organization dedicated to supporting the development of the accountancy profession, facilitating convergence to international standards, and providing leadership in addressing issues affecting the accountancy profession in Africa.

PAFA endorses and recommends this publication to all existing and aspiring professional accountancy organizations in Africa.

Copyright Statement

Disclaimer

The contents of this guide are based on current technology and systems thinking at the time of writing.

Contents

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Introduction by IFAC

A healthy economy needs a well-functioning accountancy profession—one supplying high-quality financial information produced by skilled professionals. These professionals are best supported by strong professional accountancy organisations (PAOs). When PAOs function effectively, they help sustain a strong accountancy profession that is able to serve the public interest and contribute to economic stability and growth. As such, focusing capacity building efforts on strengthening PAOs supports the production of high-quality financial reporting, auditing, and financial management. This in turn:

- attracts foreign direct investment;
- promotes growth and development of the small- and medium-sized entity sector;
- increases transparency and accountability in the use of public funds; and
- enhances the effectiveness and efficiency of official development assistance.

The IFAC PAO Capacity Building Program, currently funded by the UK Department for International Development (DFID), supports PAOs' development and growth around the world. By working with IFAC's global stakeholders—PAOs, international donors, the international development community, and many others—the Program works to solve the global need for growth and development in the accountancy profession, all in support of the public interest.

The full spectrum of a PAO's responsibilities can be divided into nine components that, when properly addressed, contribute to a successful PAO that serves both the public and private sectors. The components are interdependent and fall into three categories, considered the "building blocks" of PAO capacity building.

- **Sustainability:** appropriate legal foundation(s), governance structure, and operational capacity.
- **Standards and enforcement:** facilitating the adoption and implementation of standards for accountancy education, ethics, audit, and public sector accounting based on international benchmarks and monitoring compliance.
- **Relevance:** the connectivity between a PAO and its membership base and broader society in order to understand and respond to the needs of both groups across the private and public sectors.

A strong Information Communication Technology (ICT) system is key to a PAO's effective functioning. It improves efficiency and enhances service delivery to members, students, and other constituents, thereby leading to increased public trust and contributing to the organization's on-going sustainability.

Executive Summary

Strong Information and Communications Technology (ICT) systems are a key component of an effective PAO. Fit-for-purpose ICT is critical for the successful development and long-term sustainability of PAOs. Developed systems should support and strengthen the PAO's capability across all of its operational activities. Every PAO should have a clear vision for the maturity of their systems and a roadmap detailing how they plan to achieve this vision.

With limited resources and time, it is essential that PAOs have confidence in their ICT strategy and roadmap to achieve that strategy. IFAC has therefore commissioned a project under its UK Department for International Development (DFID) funded capacity building programme to develop guidance on building strong ICT systems for PAOs in Africa.

The ICT regional guide, developed through this project, provides a framework to help PAOs to undertake a holistic view of their organisation and determine how they should invest to harness the benefits of Information Communication Technology.

This guide provides a framework to develop an ICT strategy and supports the development of a tailored roadmap to deliver that strategy. The guide should enable PAOs to develop ICT roadmaps that:

- Meet the individual needs of the user (PAO), based on their current infrastructure, level of development, regulatory obligations and number of stakeholders.
- Consider external and environmental factors that may impact their ICT planning.

The guide will help PAOs develop their ICT roadmap to underpin the full range of services to its stakeholders and will support the development of long-term sustainable ICT systems for PAOs in the African region. The guide has been developed using ICT best practice and experience of the systems used by PAOs across the globe and at all levels of maturity.

The guide assesses:

- The core activities required to service a growing student and member community – using a standard r**eference architecture.**
- A PAO's individual current ICT capability against their future ICT vision and requirements – in the context of their own strategy, level of development and environmental impacts – using a **maturity model**.

The gap between these two states will form the basis for PAOs to develop their ICT roadmap.

The adoption of this guide as a common model, based on international best-practice, will foster re-use, knowledge transfer and the sharing of best practice amongst PAOs in the region. This will also allow a structured approach to facilitate the preparation of tender proposals for system procurement and development.

We are grateful to the following contributors during the development of this guide:

- Association of Chartered Certified Accountants (ACCA)
- Institute of Certified Public Accountants of Kenya (ICPAK)
- Institute of Certified Public Accountants of Rwanda (iCPAR)
- Institute of Chartered Accountants Ghana (ICAG).

1. Introduction

Often organisations will undertake the implementation of information systems without a clear analysis of their needs and how the technology will drive the organisation.

This can result in an ICT landscape that is based on perceived immediate need rather than alignment to the organisation's core business capabilities.

This document provides guidance on good practice in planning and procuring ICT systems for PAOs in Africa. The guide will help PAOs to enhance their ICT strategy and develop an ICT roadmap that supports the delivery of a full range of services to its stakeholders. If followed, the guide should support the development of long-term sustainable ICT systems for PAOs in the African region.

The guide has been developed using ICT best practice and experience of the systems used by PAOs across the globe and at all levels of maturity.

The guide includes a reference architecture that encompasses the core activities required to service a growing student and member community.

In addition to the reference architecture, a maturity model enables PAOs to assess their individual current ICT capability against their future ICT vision and requirements. The gap between these two states will form the basis for a roadmap for change.

The adoption of this guide as a common model, based on international best-practice, should foster re-use, knowledge transfer and the sharing of best practice amongst PAOs in the region. This structured approach should also facilitate the preparation of tender proposals for system procurement and development.

2. Audience

This document is primarily intended for PAO employees that are involved in or have responsibility for ICT planning and budgeting or technology architecture related activity. These roles may include:

- Chief Executive Officers
- Chief Finance Officers
- Chief Information Officers
- ICT managers
- Internal audit or risk managers
- Information standard or policy officers
- ICT architects
- Software developers and solution designers
- Programme and project managers
- Examination Directors
- Continuing professional development (CPD) administrators
- Councils or Boards of various PAOs.

3. Regional Perspective

CONTEXT

Africa is fast becoming the new frontier for emerging market investors. The region is recognised as the world's poorest inhabited continent however across the continent there are vast natural resources, a low cost labour force, strengthening trade ties with Asian and Middle East countries and improving literacy and education. Africa is expected to further realise its potential in the future and become an important player in the international arena.

The continent accounts for 12% of the world population but generates 1% of global GDP and only 2% of world trade. Despite this, six of the world's ten most rapidly expanding economies are now located in sub-Saharan Africa.

Planning and investment are critical if Africa's huge economic and developmental potential are to be realised.

Africa requires major investments in three areas, namely **institutions**, **integration** and **infrastructure**.

THE ROLE OF THE ACCOUNTANCY PROFESSION AND STRONG, EFFECTIVE PAOS IN ECONOMIC DEVELOPMENT

One group of institutions that is critical to the transformation is PAOs. Effective PAOs form the foundation for a strong accountancy profession, they hold the power to support the production of high-quality financial information, embed ethical and well-regulated practices and contribute to public and private sector development, economic growth, and the aid effectiveness agenda.

Currently, the African region includes many entities that can be considered PAOs – national-level membership bodies comprised of individual professional accountants, auditors, and/or accounting technicians who perform a variety of roles in the field of public and private sector accountancy and adhere to high-quality standards of practice. Of these organisations, twenty five PAOs in twenty four countries are recognised as IFAC members or associates.

Although this represents only approximately half of all countries in the Africa region, many more are currently striving to achieve recognition. They are actively working with IFAC, IFAC Recognized Regional Organisations (ROs) and Acknowledged Accountancy Groupings (AAGs) to follow the path set by the IFAC Statements of Membership Obligations (SMOs) to strengthen their operations and the accounting profession.

In addition to national-level PAOs, there are also three regional accountancy organisations with status in IFAC that support development of the profession in Africa.

While PAO capacity is generally low across the region, there are some PAOs that maintain strong staffing, professional management, an adequate committee structure, and sufficient funding to facilitate core functions and membership services.

Africa region PAOs tend to maintain strong volunteerism and leverage this to meet their objectives.

Support from the donor community has greatly aided in raising awareness of the importance of a strong accountancy profession and the role PAOs play in the economy as a resource for national accountancy development; however, the need for support in this area continues.

THE STRUCTURE OF PAOS AND ACCOUNTANCY EDUCATION AND REGULATION IN THE AFRICA REGION

PAOs in the Africa region typically require a university degree or completion of the PAO's accountancy education program as a first step in attaining membership. In addition, most PAOs require passage of an examination as well as three years of practical experience prior to being certified as a professional accountant.

Requirements for practical experience and CPD vary more widely. At this point, few Africa region PAOs maintain formal systems for monitoring the achievement of practical experience and CPD.

One important trend at the regional level regarding professional certification is the development of a broader profession with different education requirements, assessment, and practical experience suited for different areas of focus within the broader accountancy profession (e.g. accounting technician, management accountant, and auditor).

Many PAOs struggle with the task of updating accountancy education, examination and CPD materials to reflect additions and modifications to international standards.

In recognition of these challenges to CPD, several PAOs have indicated the intention to consider CPD systems and undertake activities to bring their systems into greater alignment with International Education Standards (IESs), issued by the International Accounting Education Standards Board (IAESB), in the future.

Although the use of Internet technologies provides new directions for scholarship and access to services is growing there are discrepancies among nations and regions. As a result these technologies have not been fully exploited in Africa and there is an opportunity for forward thinking PAOs to take the lead.

INFORMATION TECHNOLOGY

Africa has a legacy of failed ICT projects and underutilised equipment with numerous examples of systems that are not used because of the lack of secondary equipment, suitable electric power or training and there has been insufficient progress in the use of technology to solve real business problems.

Part of the problem is that few ICT policies or strategic buying plans exist which clearly identify the needs that are likely to bring

overall benefit to a nation, or which determine what may be achieved with the available resources.

The application of ICT systems in sub-Saharan Africa have so far been mainly the result of isolated initiatives without preconceived strategies or plans. The lack of long-term business plans at many organisations results in systems being purchased but not used properly and this remains true within the PAO community. Significant progress could be made through the dedication of sufficient resource in planning stages, rather than post the purchase of hardware and software.

The sub-Saharan countries, largely because of the influence of foreign suppliers, consultants, and organisations, have come to believe and accept that computer systems can help organisations make more effective use of financial, managerial and socio-economic resources. Furthermore, with the cost of IT falling dramatically, and with systems becoming much easier to use and maintain, some of the prohibitive cost and infrastructural problems are being lessened. So an increasingly affordable and broadly applicable technology is available to play an essential part in the process of development.

Instead of trying to "catch up" with the industrialised world, sub- Saharan organisations should instead use ICT for selected and discriminated applications to bring substantial benefits to their economies and people. What Africa needs most is the ability to exploit existing products effectively, and this can only be achieved through education. Development is all about people, their needs and their potential, and not with the sophistication of technology.

ICT innovations are delivering home-grown solutions in Africa, transforming businesses, and driving entrepreneurship and economic growth, says a joint report published by the World Bank and African Development Bank, with support from the African Union.

The report, *Transform Africa: The Transformational Use of Information and Communication Technologies in Africa*, provides new data on the technological revolution that is taking place in Africa and its transformational impact on the continent's development. At the start of 2012, there were some 650 million mobile subscriptions, making the African mobile telephony market bigger than either the EU or the United States. Some 68,000 km of submarine cable and over 615,000 km of national backbone networks have been laid, greatly increasing connectivity across Africa. The Internet bandwidth available to Africa's one billion citizens has grown 20-fold since 2008.

"The Internet and mobile phones are transforming the development landscape in Africa, injecting new dynamism in key sectors," said **Jamal Sather, World Bank Director for Sustainable Development in the Africa Region**. *"The challenge is to scale up these innovations and success stories for greater social and economic impacts across Africa over the next decade."*

FUTURE OF PAOS THROUGH INFORMATION TECHNOLOGY

The accountancy profession has always helped to shape and support businesses, other organisations and economies of all types and sizes. To continue to add value, professional accountants – and those who educate and employ them – must be able to meet current needs and anticipate emerging demands.

The spread of digital technologies and their impact on business will transform the practice of accounting and the competencies that professional accountants require. Smart software and systems will replace manual work (such as bookkeeping), automate complex and multifaceted processes (such as financial close), and support the trends towards outsourcing some services and repatriating others.

Knowledge of new models for business, funding, payments and services such as wider block chain-based applications including distributed ledger will be vital for all professional accountants. Expert use of analytics will enable more; better and closer to real-time reporting, increase predictive analysis and highlight the interconnectedness of financial and non-financial performance. Greater use of video and social media will improve collaboration, disclosure, presentation and stakeholder engagement

As businesses evolve so will the expectations of professional accountants. They will need the competencies, skills and outlook to enable them to meet more requests for comprehensive and forward-looking information and more frequent ad hoc reporting from ever more stakeholders.

Therefore, PAOs should position themselves to lead this trend, and harness IT efficiency and effectiveness in delivering future professional accountants that uphold public interest. This provides the need for a clear ICT guide for the Africa Region PAOs.

Strong ICT systems and a clear development roadmap will support the goals of growing PAOs by:

- Enabling the repeatable, scalable and cost effective delivery of new products and services.
- Allowing PAOs to extend their reach and influence by making intellectual property and services available digitally.
- Ensuring the better management of core financial, HR and governance processes.
- Enhance the delivery to professional accountants who uphold public interest.

4. Reference Architecture

This guide describes a conceptual reference architecture for a PAO. This includes the full range of activities that a mature PAO may undertake – and is intended as a model only. The following section goes on to introduce this reference architecture to allow users of the guide to familiarise themselves with this architecture before they commence an assessment of their own circumstances and their ICT vision.

The reference architecture is expressed in terms of:

- Business capabilities, processes and activities (See Business Capabilities, p12)
- Logical applications needed to support key business activities. These are described as logical solution components and functions. Groups of related components are labelled as platforms and components are broken down into functions. For example: the Business Intelligence **component** performs the Analytics **function** and is part of the Information **Platform**. (See Logical Application Model, p14)
- The information (data) requirements in order to support those activities (See Logical Application Model, p14)
- The underlying technology requirements (See Technology Requirements, p24).

This has been developed using a structured process of documenting business capabilities and functions and then translating these into conceptual business processes and logical application components, which all possess information (data) and technology requirements.

The benefit of this approach is that it allows the functions of PAOs to be described as high level building blocks composed of processes, applications, information and technology and the relationships between them.

For example, a building block could be "Exam Booking" or "Member Self-Service." These can then be assessed for current and target maturity to support the development of an ICT strategy and roadmap. This holistic approach to identifying ICT requirements allows a PAO to progress separate work packages in the confidence that they will fit into their overarching strategy and objectives whilst developing a consistent set of systems as they grow and mature as an institute.

There are common building blocks within the reference architecture which are critical across all business capabilities:

- Digital Customer Engagement
- Customer Relationship Management
- Core Enterprise Resource Planning (known as ERP and covering Order to Cash, Procure to Pay, Financial Management and Products and Pricing).

Section 7 ("How to use the Guide") describes how to use these components to build the roadmap in a structured fashion. It is recommended that the PAO fully familiarises itself with the reference architecture before undertaking that exercise.

4.1. BUSINESS ARCHITECTURE

4.1.1. Reference Business Capability Model for PAOs

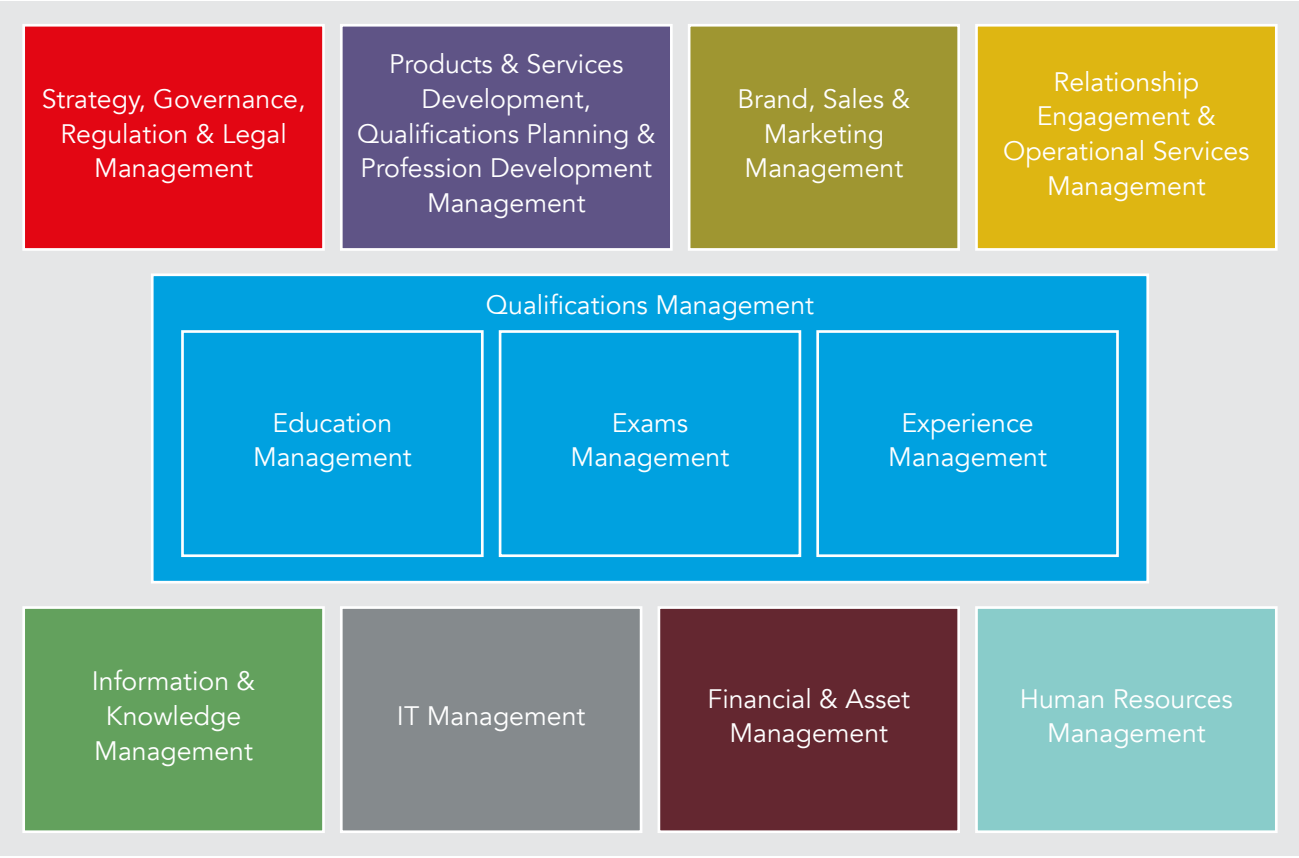
A business capability defines a PAO's capacity to successfully perform a unique business activity. A business capability is a representation of WHAT a PAO "does", independent of the PAO's structure, processes, people or domains. It is "what we do" and not "how we do it".

Business capabilities represent services that a group of processes and people perform; these are supported by the relevant applications, information and underlying technology. The capability represents the what, whereas the process and people represent the how and who.

Business capabilities are the building blocks of a business. They represent stable business functions that are unique and independent from each other, abstracted from the organisational model. A business capability map can be used to model business capabilities, processes and functions and associate with IT solutions.

The following business capability model is a representation of a PAO's desired business capabilities. It is high level and generic, as each PAO may have its own specialities; this model is intended as a conceptual enterprise reference only. The colour key is to enable the easy identification of the capabilities.

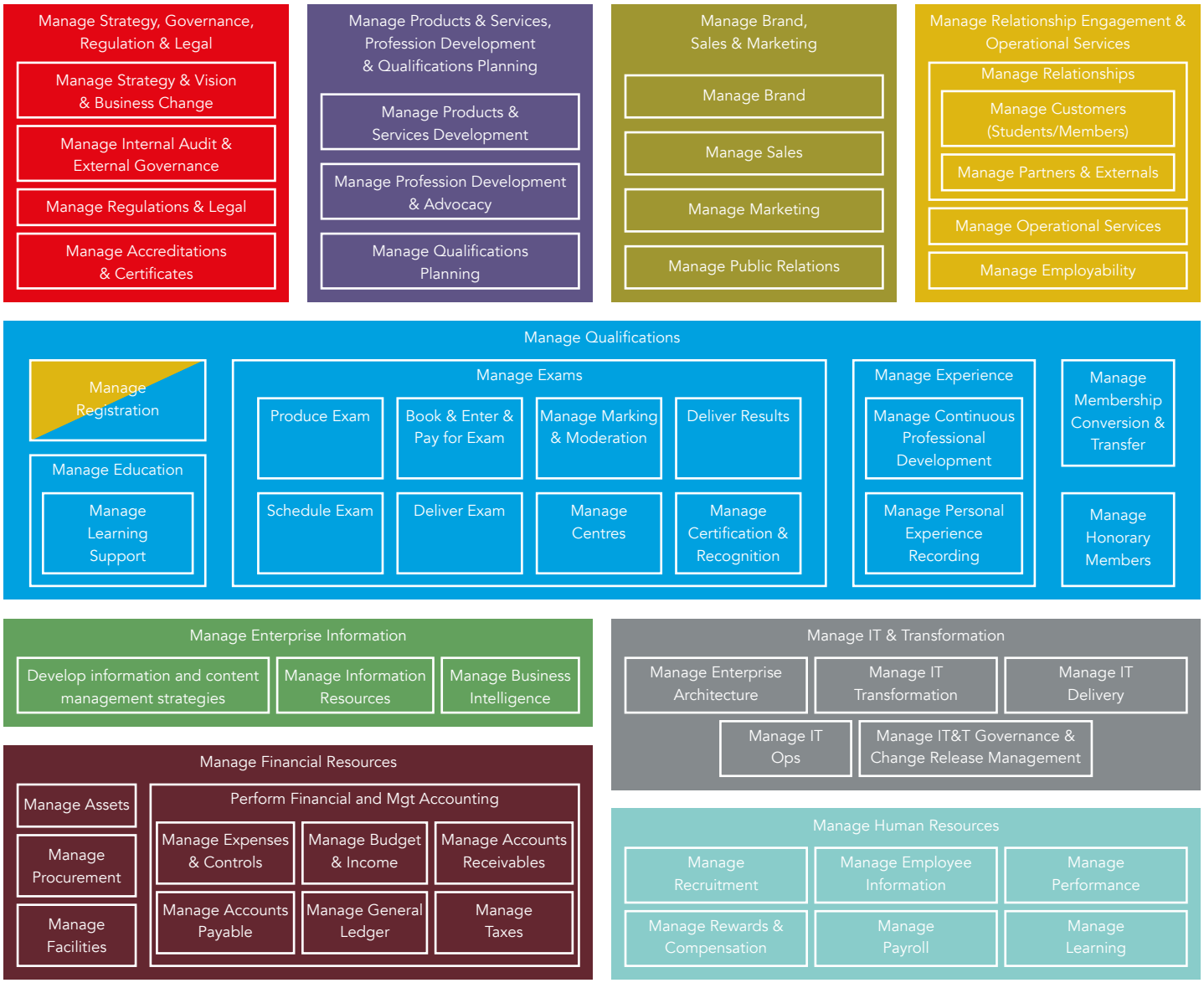
Figure 1: Reference Business Capability Model for Professional Accountancy Organisation – ACCA Pre-existing work



4.1.2. Reference Business Process Model for PAOs

The common business processes and activities which a PAO would be expected to engage in are described below in the context of the business capability map. A business process is a set of activities and tasks that, once completed, will accomplish an organisational goal. This model is also high level and non-exhaustive. Each PAO may have its own particular business processes; this model is intended as an enterprise reference only. The colour key is further used to enable the easy identification of the linkage between a business capability and the business process that it realises, and any dependencies across different business capabilities.

Figure 2: Reference Business Process Model for Professional Accountancy Organisations



4.2. LOGICAL APPLICATION MODEL

The logical application model describes the applications needed to support key business activities. These are described as logical solution components and functions. Groups of related components are labelled as platforms and components are broken down into functions.

For example: the Business Intelligence **component** performs the Analytics **function** and is part of the Information **Platform**. Each business capability will use specific functions to achieve its goals. Generally, other than the "Common Conceptual Components", each function will support one business capability. It should then be clear to a PAO looking to develop specific capabilities which functions they need to develop or procure.

HOW A PAO REALISES EACH OF THE COMPONENTS, FUNCTIONS AND PLATFORMS IN THE MODEL WILL BE DIFFERENT. THERE IS NO SINGLE SUPPLIER OR SOLUTION THAT WILL SATISFY ALL REQUIREMENTS AND PAO'S WILL INEVITABLY ACQUIRE OR BUILD A RANGE OF SOLUTIONS.

4.2.1. Common Conceptual Components

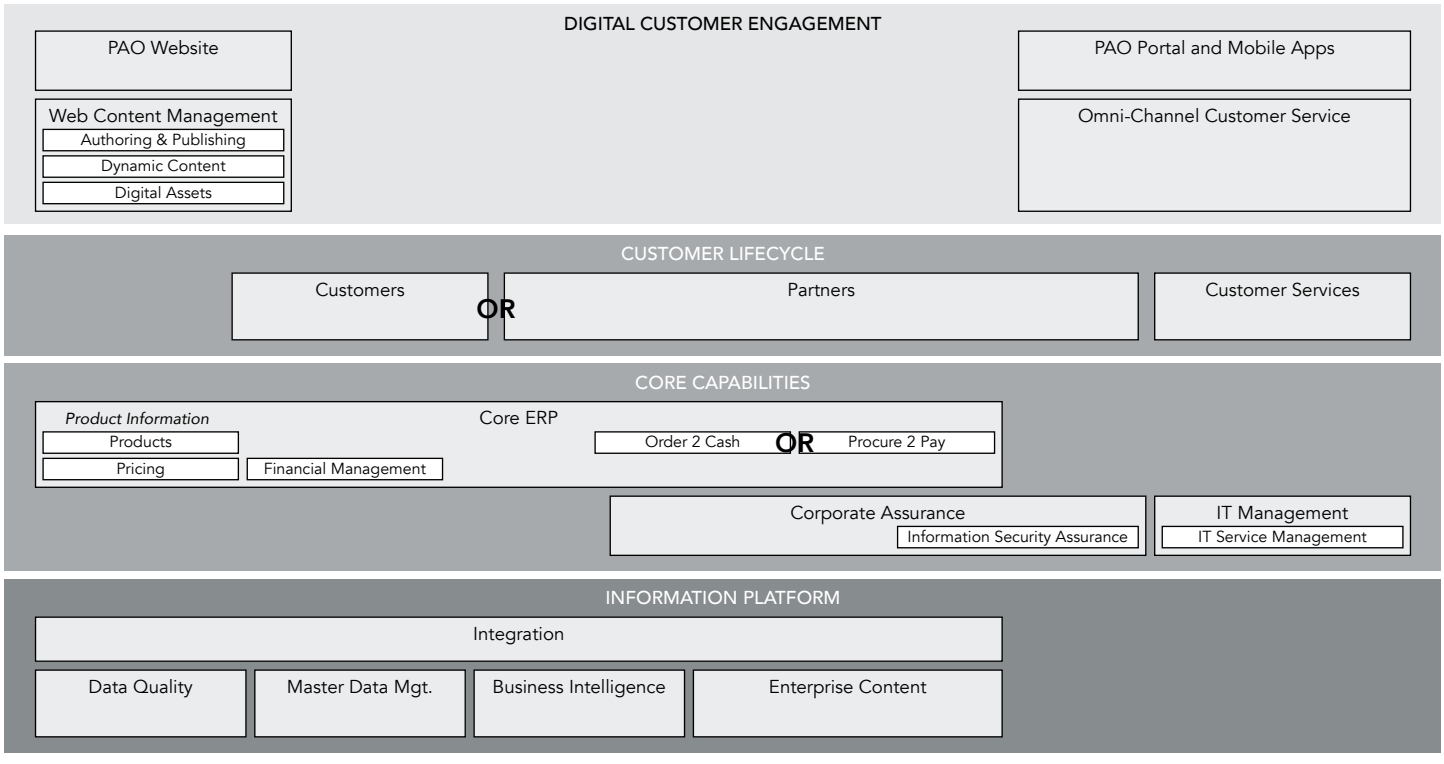
There are common components in the reference architecture, as outlined in the diagram below and table in Appendix 1.

These are defined as:

- Digital Customer Engagement
- Customer Relationship Management
- Core Enterprise Resource Planning (known as ERP and covering Order to Cash, Procure to Pay, Financial Management and Products and Pricing)
- Information Platform.

Almost all business capabilities will require a level of investment in one or more of these platforms. For instance "Manage Qualifications" may require a website to make exam booking available, ERP to process the payments for that exam and Business Intelligence to enable reporting on exam uptake. It is important that to simplify ICT complexity, deliver value and maximise time to market, that PAOs look to re-use these capabilities wherever possible. However PAOs should be aware that not all common components are *essential* for all business capabilities. For example, some of the components in the Information Platform may *only* be realised in a mature PAO.

Figure 3: Common Conceptual Components

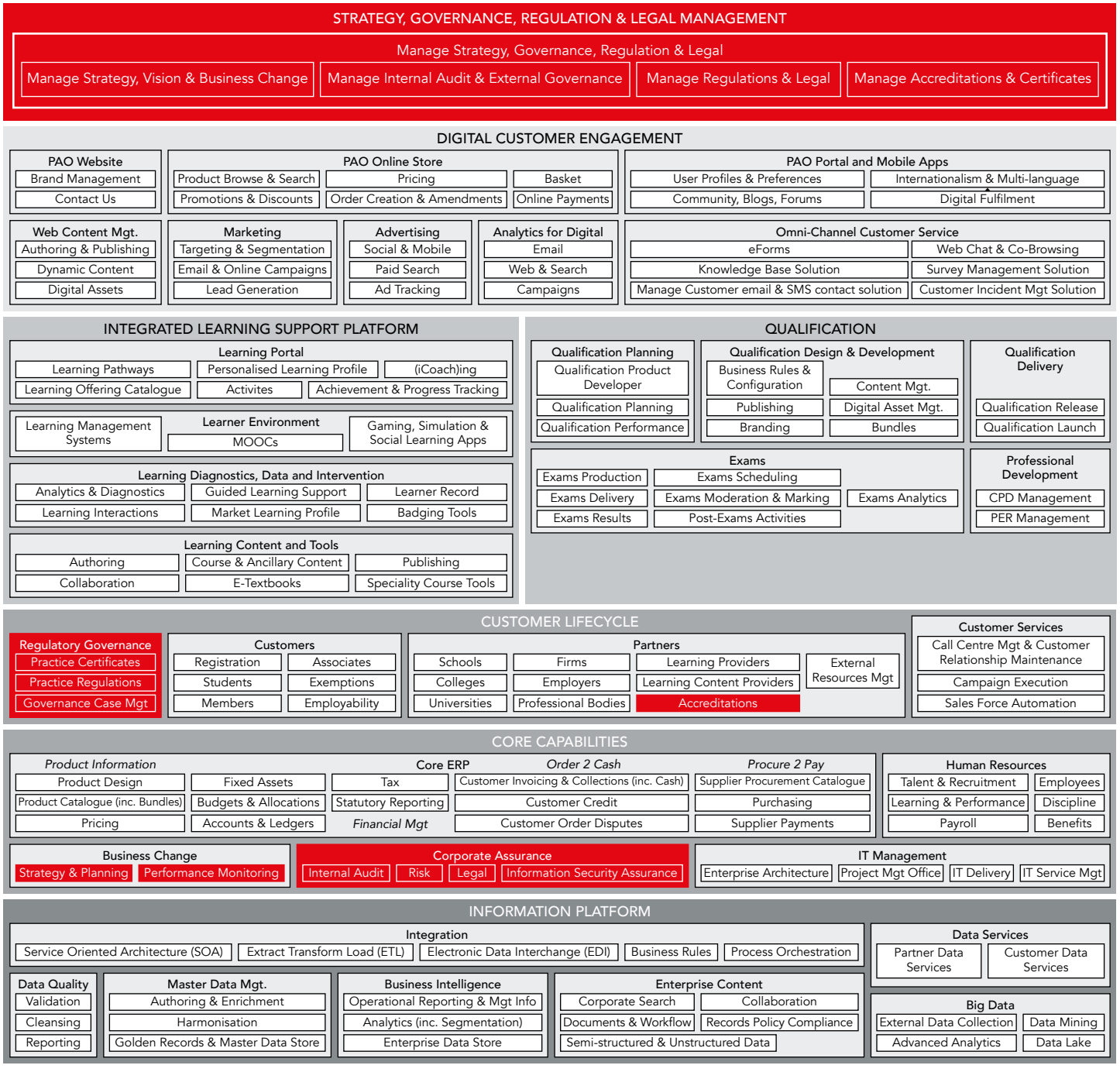


Please refer to Appendix 1 – Table 1: Common Conceptual Components

4.2.2. Strategy, Governance, Regulation & Legal Management

These capabilities are the core of an enterprise's capability to ensure that it manages its own strategic vision and business change processes. A PAO must meet both its internal and external regulatory requirements. Its operations must comply with its unique regulatory and legal framework, whilst ensuring its own members, students and employees adhere to its standards and practices. A PAO must govern its enterprise in order to ensure compliance with its standards and policies and ensure it meets its legal obligations and is legally viable.

Figure 4: Strategy, Governance, Regulation & Legal Management

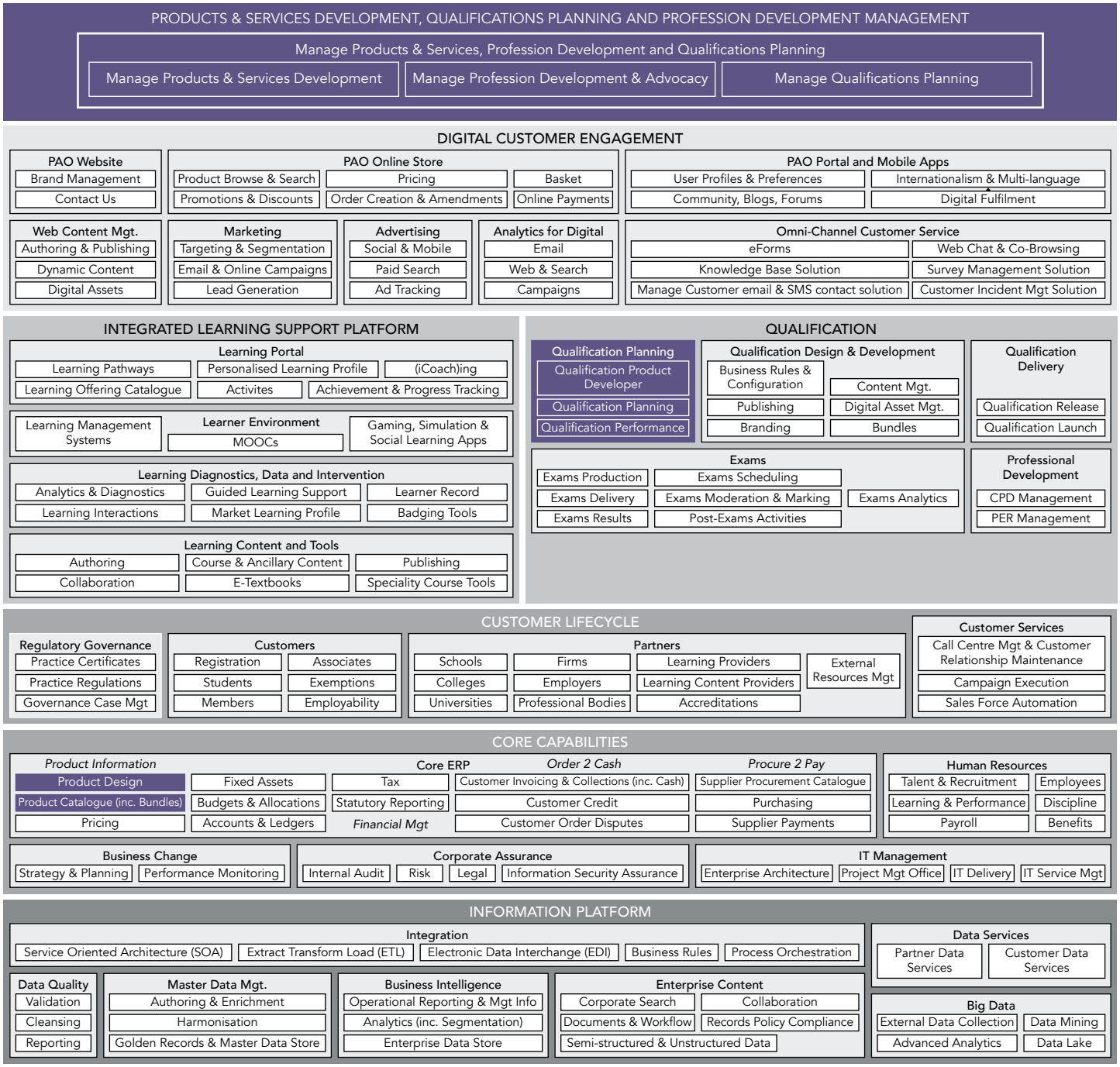


Please refer to Table 2: Strategy, Governance, Regulation & Legal Management

4.2.3. Products & Services Development, Qualification Planning and Profession Development Management

A PAO's offering, in terms of its products, services and qualification range should be in support of its Strategy. These sub capabilities enable the "realisation" of the PAO's business strategy by planning its offering as part of a standard product lifecycle development. A PAO should also consider the development of the accountancy profession as part of their planning process.

Figure 5: Products & Services Development, Qualification Planning and Profession Development Management

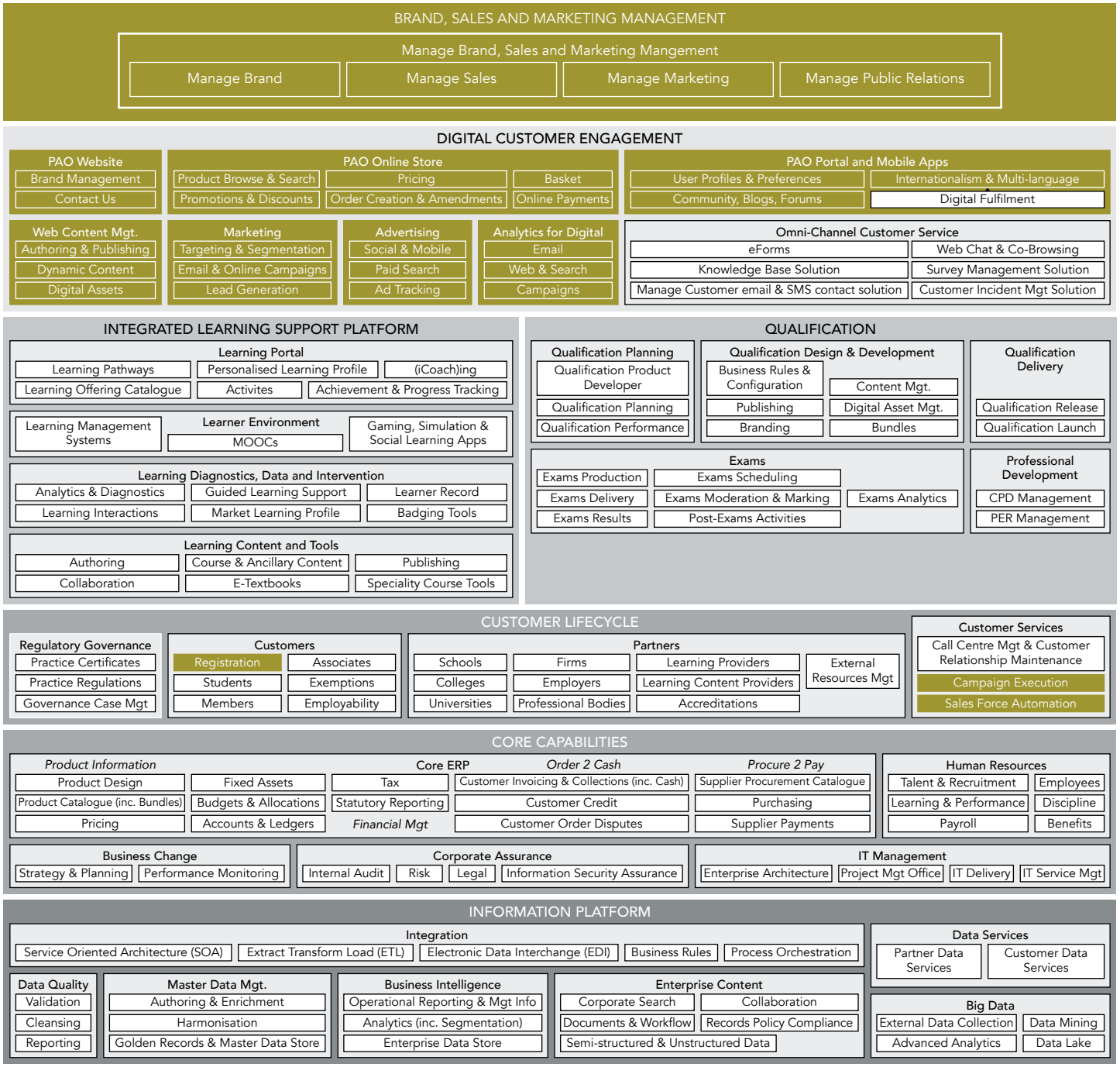


Please refer to Table 3: Products & Services Development, Qualification Planning and Profession Development Management

4.2.4. Brand, Sales and Marketing Management

Brand, Sales and Marketing Management capabilities are required by a PAO in order to support its Products, Services, Qualification and Profession in the market place. Brand Management is the capability of planning how a brand is perceived in the market place in order to attract and retain customers. Sales Management is the management of commercial operations from Opportunities to Sales. Marketing management is the capability of analysing the industry context in which the PAO operates and managing its marketing resources and activities accordingly.

Figure 6: Brand, Sales and Marketing Management

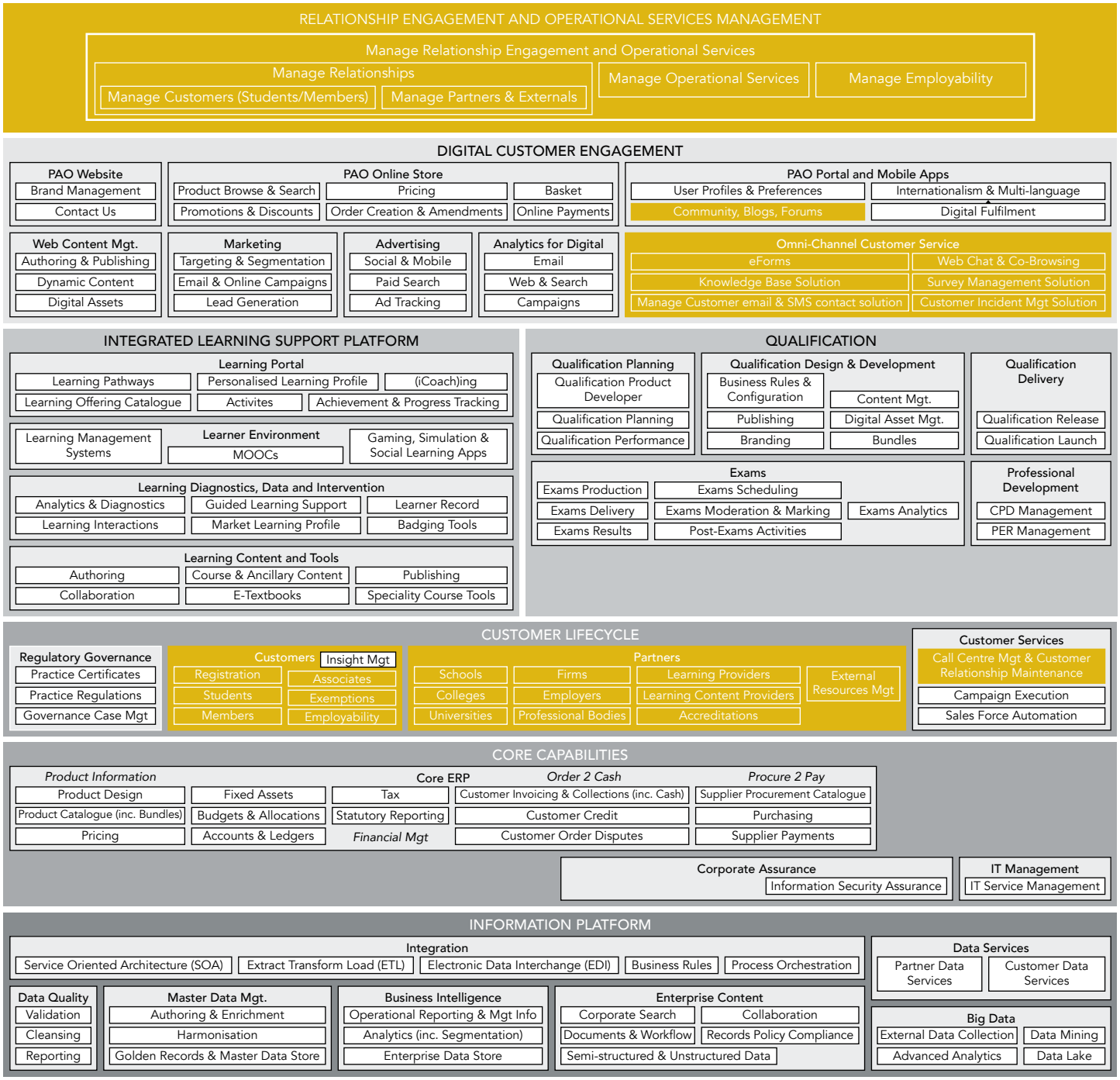


Please refer to Table 1: Brand, Sales and Marketing Management

4.2.5. Relationship Engagement and Operational Services Management

These capabilities are the core of an enterprise's capability to successfully manage its on-going relationship with customer (of all types), partners (of all types), promote employability of its members and manage its customer services business function.

Figure 7: Relationship & Engagement and Operational Services Management

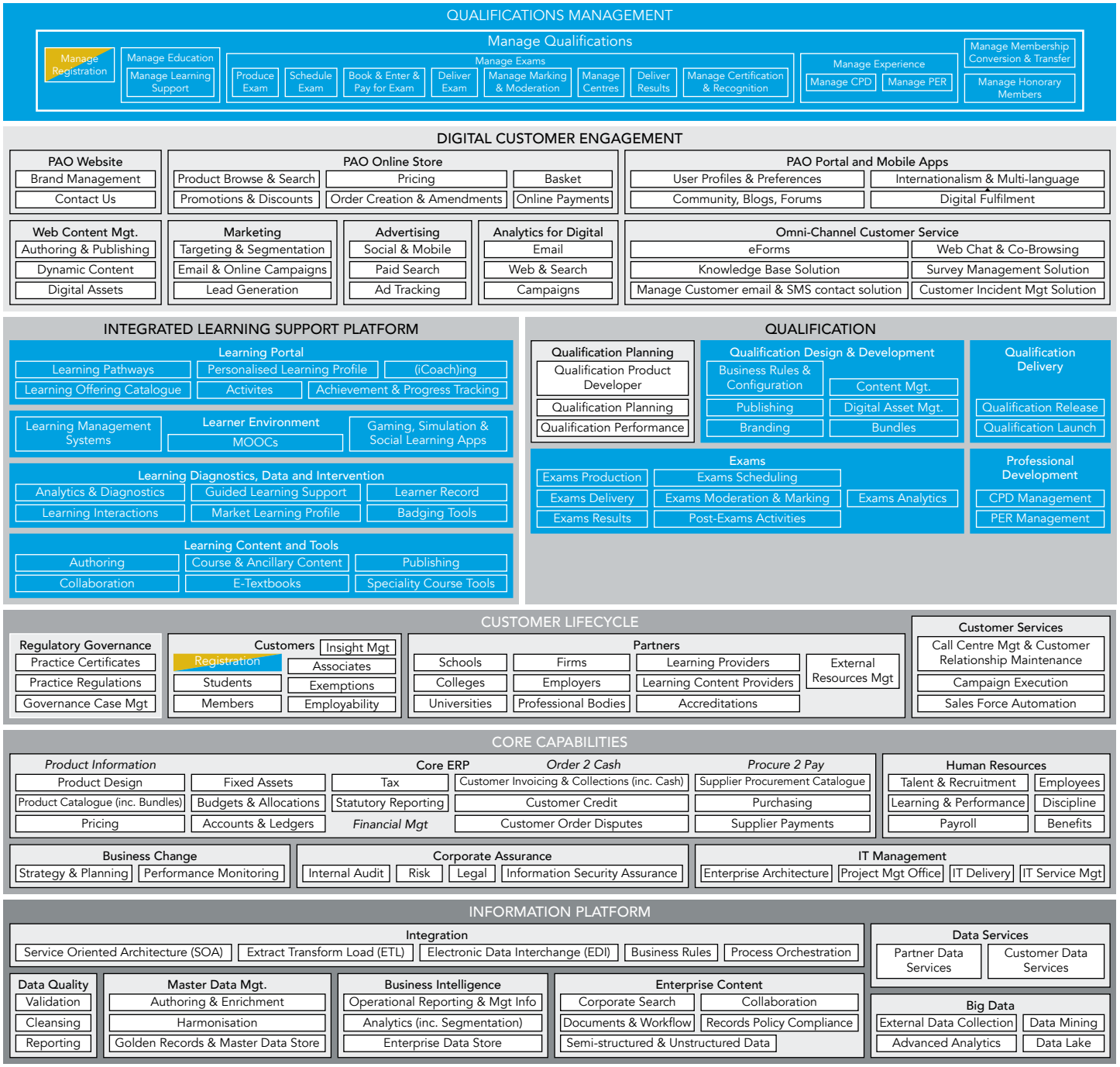


Please refer to Table 5: Relationship & Engagement & Operational Services Management

4.2.6. Qualifications Management

Qualification Management is a consolidated capability which is used to describe sub-capabilities of Education, Exams and Experience Management. These sub capabilities are at the core of a PAO's business and allow for PAOs to add their own specific offering such as their own Qualifications, Learning and Exams and Experience. There are common logical components which underpin the Qualification Management business capability such as Digital Customer Engagement, Customer Lifecycle and ERP processes (such as Order-to-cash, Procure-to-Pay and Financial Management).

Figure 8: Qualifications Management

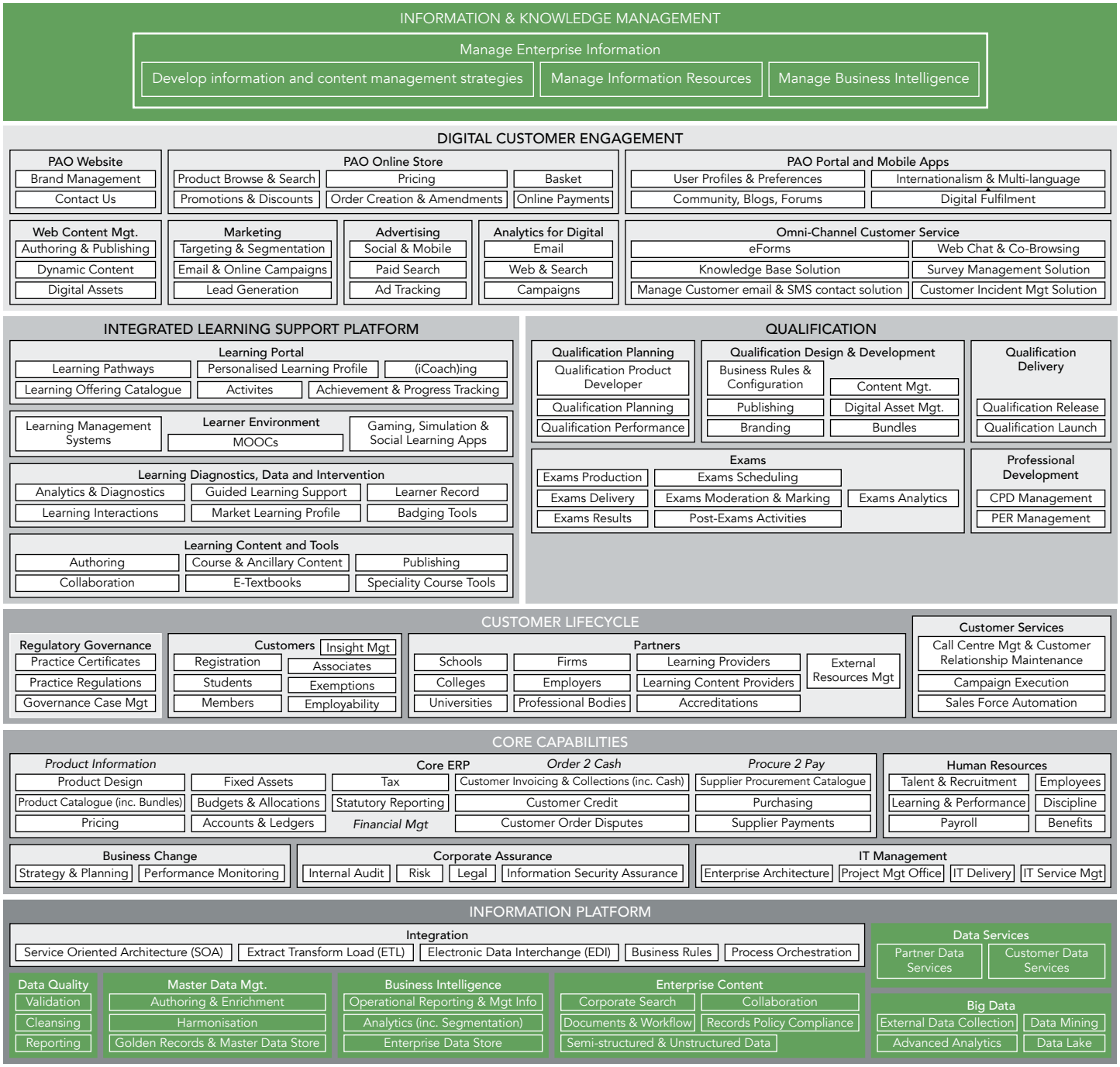


Please refer to Table 6: Qualifications Management

4.2.7. Information & Knowledge Management

Information & Knowledge Management are the capabilities that allow a PAO to manage its Enterprise Information.

Figure 9: Information & Knowledge Management

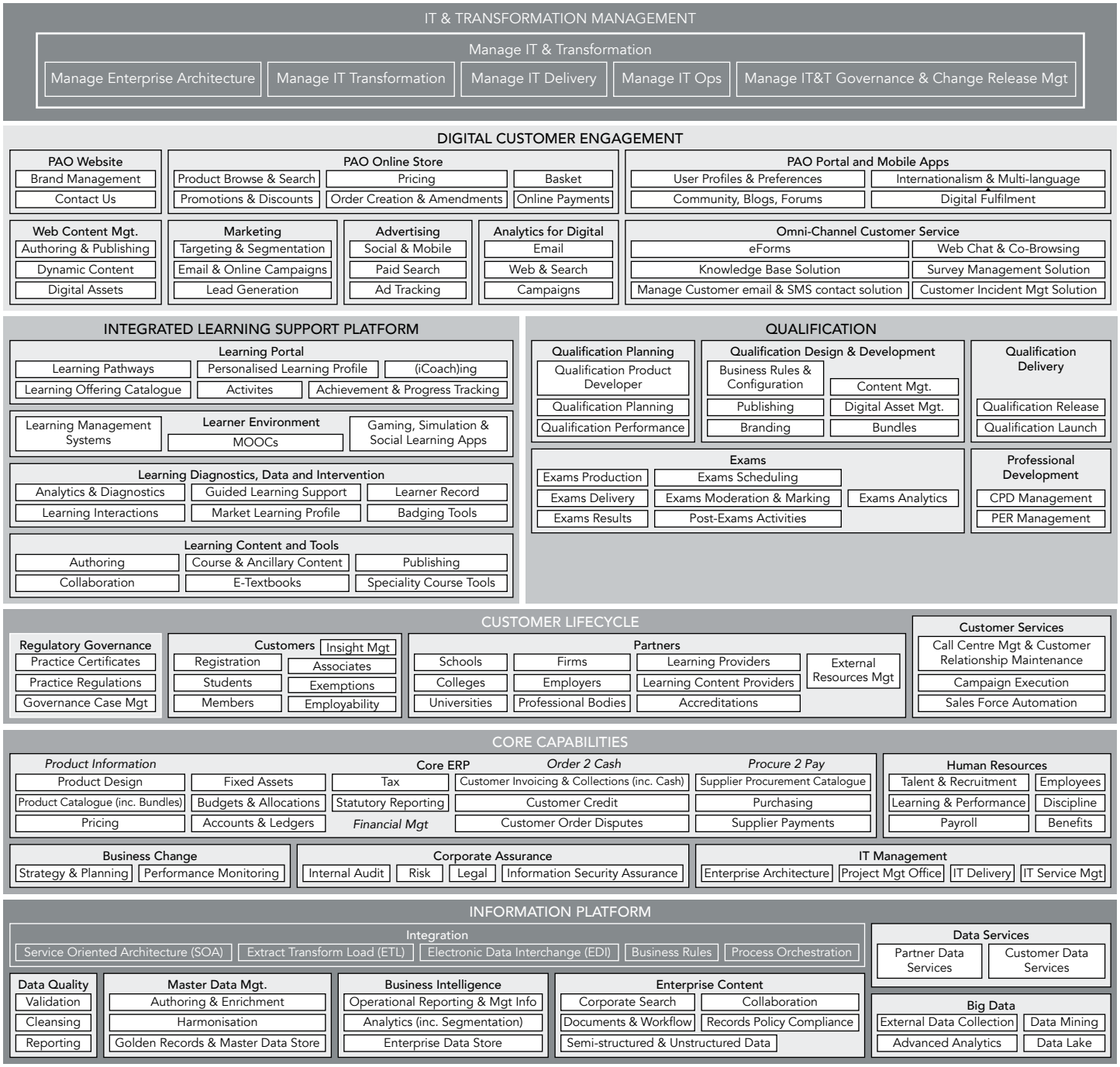


Please refer to Table 7: Information & Knowledge Management

4.2.8. IT Management

Information Technology Management is a consolidated capability which is used to describe sub-capabilities of enterprise architecture, IT delivery, IT operations, IT Governance and change and release management. These capabilities are the core of an enterprise's capability to ensure that it manages all its IT related resources.

Figure 10: IT & Transformation Management

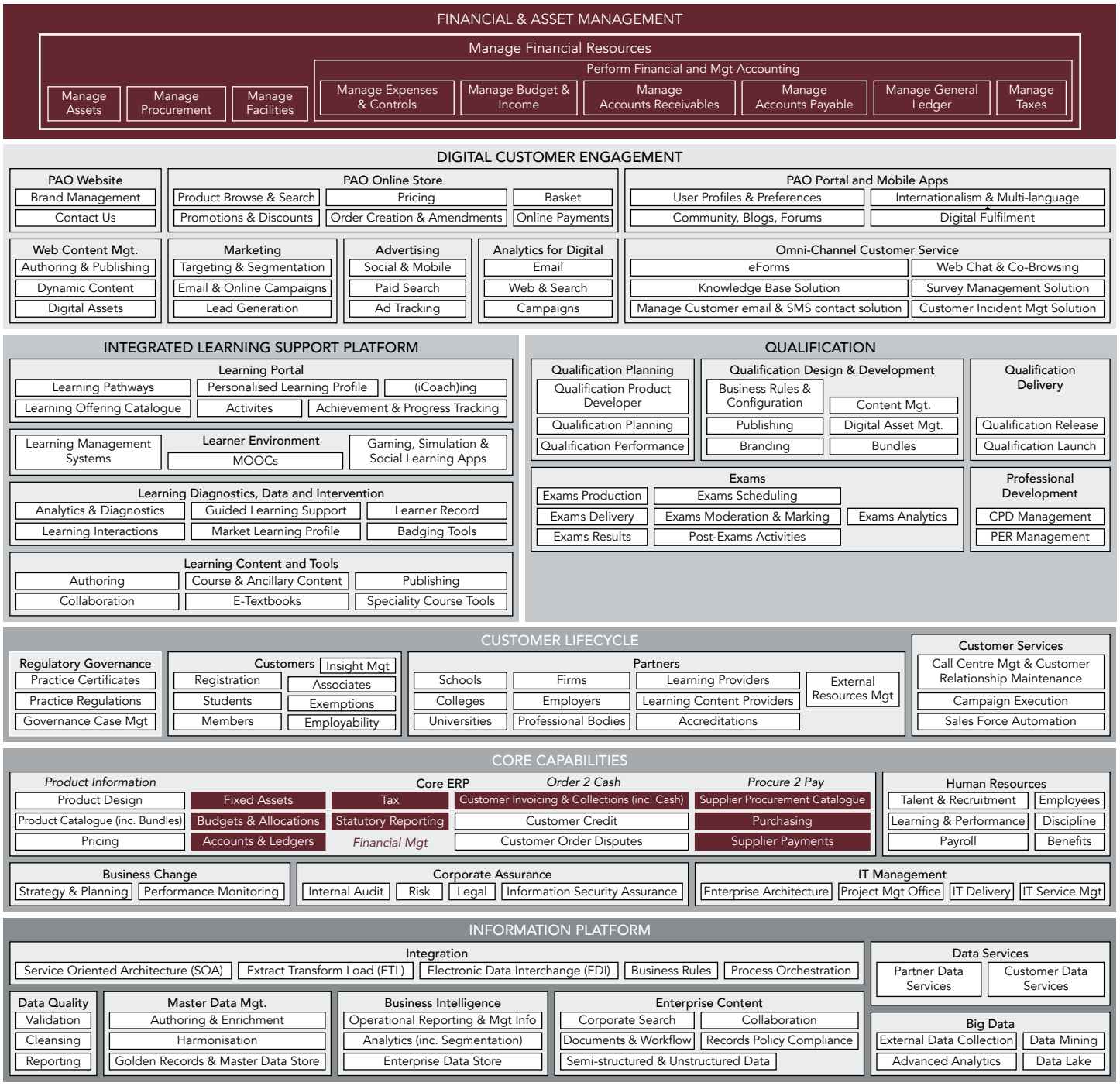


Please refer to Table 8: IT & Transformation Management

4.2.9. Financial & Asset Management

Financial & Asset Management is a consolidated capability which is used to describe sub-capabilities of asset management, procurement, facilities management, expenses, financial management, budgets, income and tax management These capabilities are the core of an enterprise's capability to ensure that it manages all its financial and related resources.

Figure 11: Financial & Asset Management

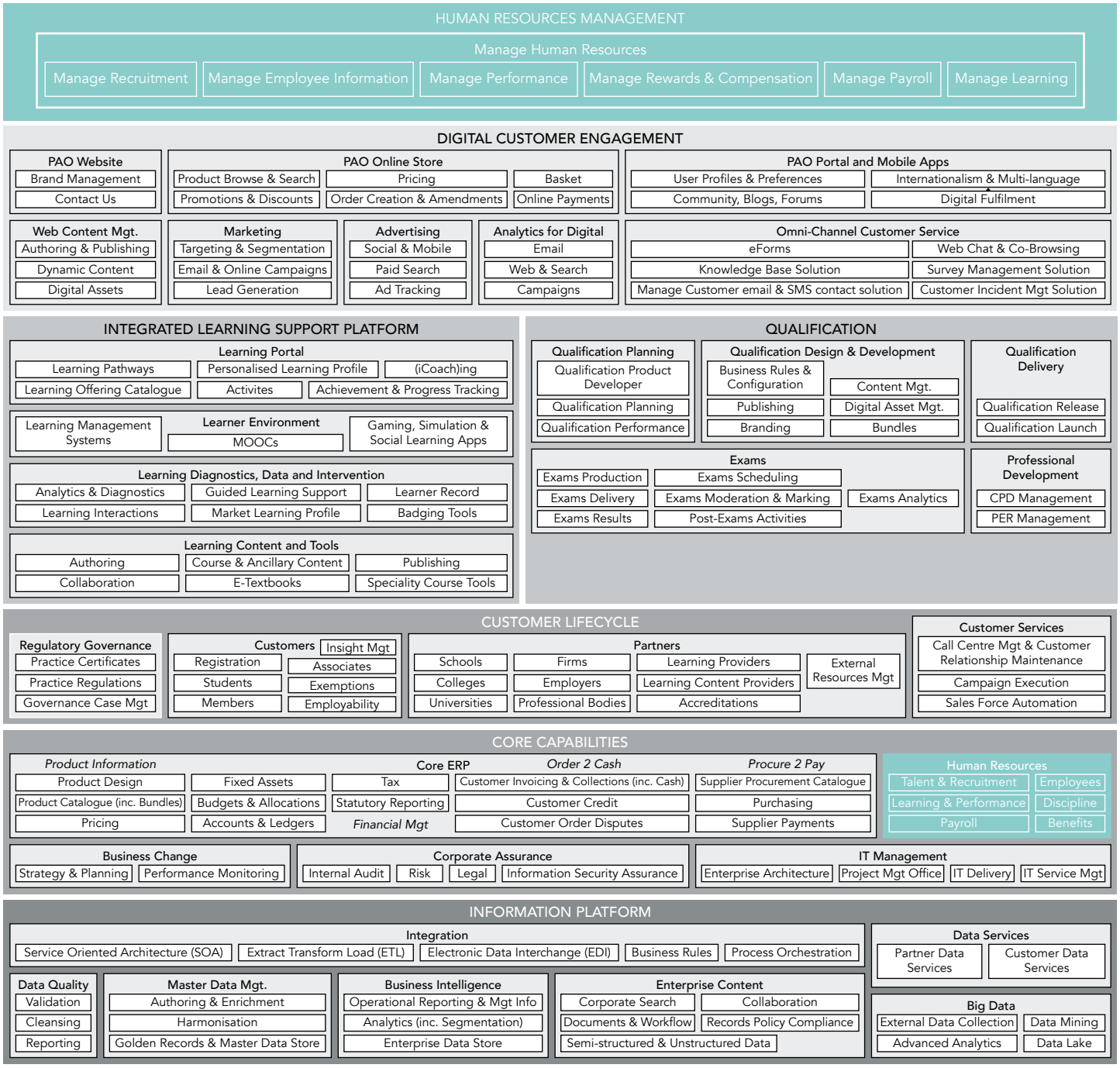


Please refer to Table 9: Financial & Asset Management

4.2.10. Human Resource Management

Human Resource Management is a consolidated capability which is used to describe sub-capabilities of recruitment, employee information management, rewards and compensation, payroll, performance, learning and internal communications. These capabilities are the core of an enterprise's capability to ensure that it manages all its available human resources.

Figure 12: Human Resources



Please refer to Table 10: Human Resources

5. Technology Requirements

In addition to the functional requirements of its systems, the PAO must also consider the technology and how a system is expected to perform. The latter can be considered to be technology requirements (sometimes referred to as Non Functional Requirements). ICT planning should include an assessment of how a system should perform. This will be determined by the specific use cases for the system. For example, an external customer portal may need to be available at all times, whereas a strategy planning tool is just required during standard working hours at certain times of the year. It is important to be clear on the usage in each case so as not to pay for more than is required. The strategy tool does not require a 24/7 support agreement or high levels of resilience. In each case the PAO should determine how to deliver the overall best value. Technology requirements are described below:

Usability refers to the ease of operation of an ICT system. A high degree of usability will enable the end user to perform a task with a high degree of success without the need for external assistance. Generally low degrees of usability will result in low acceptance and commitment by system users and increase the number of support requests and complaints.

African PAOs face a major challenge in designing systems that will be used by users with minimal or basic ICT background knowledge. To answer this challenge, the usability characteristic should therefore be systems that are very intuitive i.e. easy and quick to learn. Other examples of usability characteristics include the use of visual cues (clear warnings and descriptions) and of the provision of relevant options (e.g. language).

Portability refers to the capability of ICT systems to be used in different computing environments e.g. mobile or web.

Users demand access to services in different ways and from different locations. In the Africa region, there are advances in penetration of the Internet. The use of desktop computers and laptops is common-place but is soon going to be matched and even overtaken by the use of smart phone devices. African PAOs need to support varying user types, such as members, who may have access to a computer and may also own a smartphone, and students, who may currently only own a mobile phone. In order to respond to the rising use of smart phones and computers, PAOs need to develop IT systems that work in this heterogeneous environment; this includes across mobile (use of mobile apps, USSD, SMS, responsive web sites) and computers (websites, online portals).

Availability refers to the capability of the system to perform a required function at a given point in time, under stated conditions of use. Availability may be affected by factors under the PAO's control, such as maintenance windows, and external factors, such as the stability of power. To create value for the user, systems should be available when they need them - which may differ across stakeholder groups for example:

- staff may only access IT systems during office hours
- members may opt to check and update information over the weekend or after working hours
- students may prefer more frequent short periods of access – in a cyber café or an Internet hot spot.

As a result, IT systems, especially those accessible to staff, members, students and public, need to be designed to ensure the appropriate level of availability.

Where required, high availability can be achieved using a variety of methods e.g. high utilisation of cloud or advanced recovery mechanisms to allow auto-failover. In addition, the use of appropriate technology can help to mitigate the effects of unplanned service outages.

Recoverability refers to the ability to restore services quickly following a system failure or disaster.

The ability to recover quickly is necessary for any African PAO shifting services to an IT system. IT systems seldom work 100% of the time. Failures are inevitable, and because they support critical operations, these failures may have a significant negative impact. PAOs therefore need to ensure that the design of their IT system includes the ability to respond to unplanned outages. In many cases, the speed of recovery will determine the impact of the outage (financial losses, brand disrepute). Quicker recovery rate may minimise the impact of an outage.

Integratability refers to the degree to which a system can work together with another system to achieve a desired objective.

The IT system architecture for PAOs at an intermediate or high level of maturity will consist of several systems each performing a set of objectives. To fulfil these objectives more efficiently and effectively, it is necessary for these systems to exchange data between each other. For instance, an exam management system may need to access exam payment information from a financial system. Similarly, a CPD system may need to obtain member data from a member management system. Good integratability ensures non-duplication of system roles and greater accuracy and integrity of the overall IT system. PAOs should therefore factor in integratability in the design of IT systems. PAOs would be advised, where possible, to consider this at the outset as it will be simpler in the long term to integrate systems which have been designed for connectivity and data sharing than to do this retrospectively.

Capacity refers to the degree to which a system can accommodate simultaneous user activity in the system or specific number of transaction volumes within a span of time.

IT Systems for African PAOs need to be designed with a certain degree of capacity. Given the diverse types and needs of system users, such IT systems need to have capability of accommodating several users online at one time doing several tasks. For example, a member portal typically needs to allow several members to login at one time, and also track and manage their activities real time e.g. profile update, CPD recording, online payment etc.

Scalability refers to the degree to which the IT system can handle stress caused by increased usage while not impacting on other system functionality. This requirement specifies the ways in which the system may be expected to cater for peaks and abnormal system activity.

Most PAO activity is not evenly spread out over time. Different operations will often peak at certain times. For example, exam / event bookings will likely peak when nearing a deadline, member applications may peak during the first quarter of the year, or student logins may peak when results are declared. It is important for PAOs to study such peaks and design scalable systems that will cater for predicted demand. This ensures that systems are always available during peak and off-peak periods and can lower IT system costs by not having to sustain high system specifications "just in case." A PAO that is growing should also consider whether it has the capability to maintain system performance and availability as it increases usage.

Security refers to the capability of the ICT system to prevent misuse. This includes deliberate attacks intended to gain unauthorised access to information resources, or to make unauthorised modifications to information or to the IT System so as to provide the attacker with some advantage or so as to deny service to legitimate users.

An ICT system for an African PAO will typically be accessed by a range of stakeholders, including: PAO staff, members, students and the general public. Also, most access will be provided via the Internet, which poses risks to the ICT system. For example, there is the need to ensure that staff, members and students with access to the system access perform only what they are required to do and nothing else.

Security requirements must consider a number of issues, for example the need to ensure the confidentiality, integrity and availability of data, to make systems physically secure and to provide robust rules around access to information and processes.

Testability refers to the capability of the entire ICT system or software product or any part of it to be validated before incorporation to the production environment.

Although ICT systems often simplify processes, ICT system errors usually have more impact than user errors. Any ICT system needs to be properly tested before being put into production. Testability ensures that system bugs are identified and resolved before causing more complications during live system operation. At the same time, the ICT system or any part of it needs to be properly tested to ensure conformance to previously identified requirements.

Maintainability and Extensibility refers to the capability of the system functionality to be modified, or have additional functionality added. Modifications may include corrections, improvements or adaptation of the software to respond to changing conditions.

PAO IT systems will need to change and evolve with time to meet demands of users and changing IT Infrastructure. IT systems should therefore be designed to allow for such advancements.

6. Maturity Model

The maturity model contained in this document is a business tool for PAOs to assess their current and target state against three defined levels. It enables the PAO to assess its ICT needs, in the context of business capabilities, in relation to people, processes, data, systems and technology. This will allow the PAO to assess how well Information Communication Technology can reliably and sustainably support the overall business strategy.

The term 'maturity' relates to the degree of formality and optimisation of processes, from ad-hoc practices, to formally defined steps, to managed result metrics, to active optimisation of the processes.

In order to apply this reference architecture, it is recommended that the PAOs perform a self-assessment of their target maturity level.

To ensure a consistent approach, 3 levels of maturity have been identified:

- Maturity Level 1 - Initial
- Maturity Level 2 - Evolving
- Maturity Level 3 – Mature

Each PAO's evolving maturity in relation to the Reference Architecture and Maturity Model will be unique and should be not be assessed against other PAOs but should consider the factors outlined in figure below.

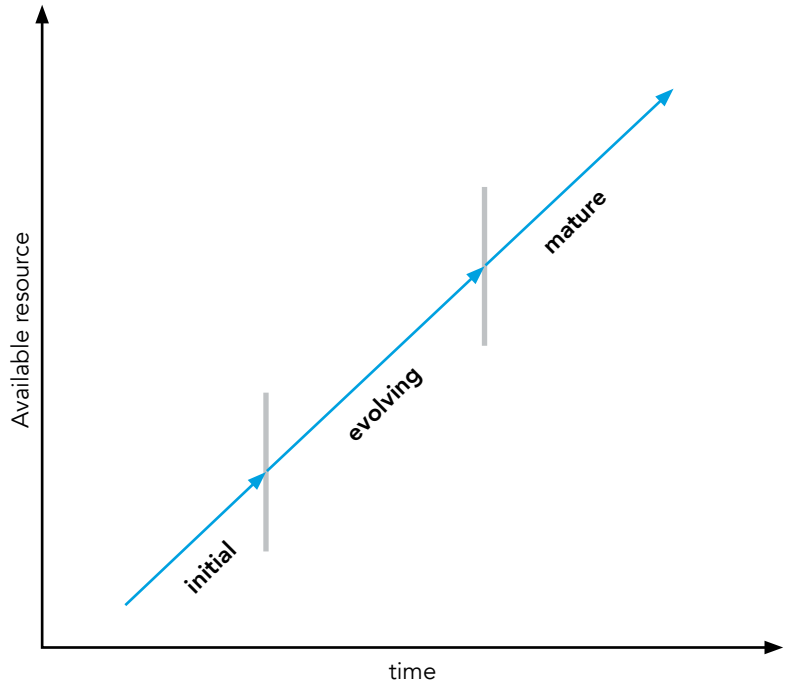
Over time a PAO will have at its disposal a finite set of resources. These resources include, but are not limited to:

- Income from customers, grants and other sources
- Staff with relevant skills and capacity
- IT partners with relevant skills and capacity
- External factors including the socio-economic and political environment.

For example, a PAO with relatively low numbers of students and members may still expect to be 'evolving'- even if it has been operating for a significant number of years, and benefit from a benign socio-economic environment and has ready access to IT partners. Conversely a PAO with relatively high numbers of students and members may expect to have a maturity of 'initial' if it has a lack of IT skills and/or capacity and operates in a challenging social-economic environment.

Having assessed itself against the maturity matrix the PAO should consider all relevant constraints and opportunities before identifying what improvements are reasonable and achievable whilst providing the right level of growth and capacity development within the PAO.

Figure 13: Evolution of Maturity



7. How to use this Guide

This section outlines how a PAO uses the information in the guide to produce an IT roadmap, enabling effective use of this resource. This section outlines:

1. How to understand and use the reference architecture
2. How to work with the maturity model to evaluate both current and target levels of maturity for the PAO
3. Guidance on roadmap planning and procurement

The section includes suggestions for who should be involved and what additional information (for example organisational strategy) should be used in any assessment.

It is recommended that PAOs treat the completion of the maturity model as a project and assign a project manager to coordinate inputs and ensure that all relevant stakeholders are engaged.

The process to be undertaken is visualised in Figure 14 below.

7.1. INPUTS

Prior to using this guide, a PAO should consider its own specific business drivers, risk and opportunities. These may include the following factors which could shape and impact the decision around the content and timing of roadmap activities. PAOs using this guide will need to first:

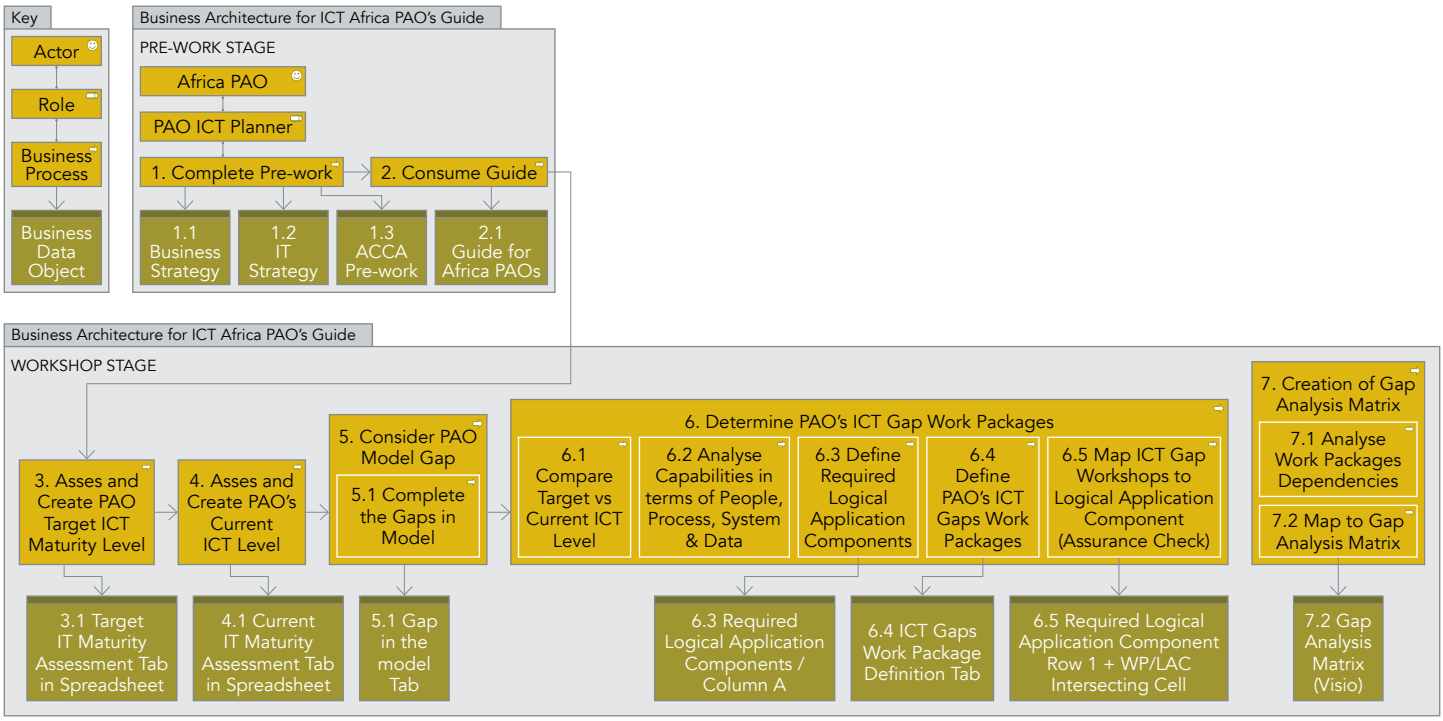
- establish what qualifications it intends to offer and subsequently what the learning needs of its students would be in order to pass those exams
- determine how it wants to deliver those exams (i.e. Paper or Computer-based, session based or on demand).
- determine to what level it wants to offer Ethics and Professionalism skills, and
- understand what level of experience it wishes its students and members to achieve on an on-going basis.

All of these decisions will be based on the market reality of the areas in which the PAO operates.

Stakeholder requirements will need to be considered, particularly members – consideration should be given to factors such as licence to operate, professional insights, networking and continuing professional development. The role of the PAO in shaping the public agenda needs also to be defined.

The commercial model for the PAO will affect choices on the roadmap. For example, the PAO may choose to operate primarily through learning partners and employers (B2B) or directly with students and members or indeed a hybrid. This can determine choices around, for instance, payments. Some PAOs may be a member body only and not offer its own qualification.

Figure 14: How to use the ICT Guide



Any specific regulatory and legal obligations need to be identified. These might relate to local recognition and rules around incorporation or certification. The PAO should also identify laws on, for instance, privacy and data protection.

An assessment also should be made of the competitive market. If there is another local or global body in country then the PAO should know how it intends to manage this as a threat or opportunity.

Each country that the PAO operates will have specific needs around factors like language, currency, payment preferences and cultural needs. This should be factored in.

An awareness of the existing state of the PAO's ICT landscape and plans, budgets and resources will also be useful.

Lastly, the PAO should be aware of its own appetite for growth, investment and risk. Funding factors such a projected income and donations should be known.

It may be that a number of these drivers, opportunities and risks are already articulated in existing business documents such as a published strategy or target operating model. If not then they can be captured through interviews and workshops with key stakeholders within and outside of the organisation.

7.2. STEPS[1]

1. Determine the PAO's target maturity level for each business capability

Generally speaking, a cost/benefit analysis shows that not all business capabilities need operate at the highest level of maturity. In conjunction with the assessment of the PAO's drivers, opportunities and risks appetite, the target maturity for some business capabilities may be, for instance, initial or evolving. A PAO may not want to expend the resources to move all business capabilities to a high level of maturity and accepts the risk that the business capabilities objectives have a higher probability of failure as a result.

The target maturity level can be assessed using the process described below using the Target ICT Maturity Assessment Form

2. Assess the current level of maturity for each business capability

PAOs should complete the Current ICT Maturity Assessment Form, an excel spread sheet, to assess overall level of maturity.

PAOs should consider each statement in the Maturity Model for each category (People, Process, Data and Technology) against each capability. They should then enter "YES" into the appropriate cell in the spread sheet for the statement that best matches their current capability.

Only YELLOW cells should be modified. The Technology requirements should be considered when assessing maturity for the last section of the model. Only enter YES for the highest level of maturity for each combination of Business Capability and category.

Example:
A PAO reads each of the statements relating to Strategy, Governance, Regulation and Legal Management and decides that the statement related to People in the Maturity level **Mature** best reflects their current situation and enters **YES** in the relevant cell. The PAO then decides the statement related to Process in the Maturity level **Evolving** best reflects their current situation and enters **YES** in the relevant cell. The PAO finally decides that the statements related to Initial in the Data and Technology in the Maturity level Initial best reflects their current situation and enters YES in the relevant cell.

Figure 15: Example of completed section of the Current IT Maturity Assessment Form

Capability/ maturity level		Strategy, Governance, Regulation & Legal Management	Score
Mature	People	YES	30
	Process		0
	Data		0
	Systems		0
Evolving	People		0
	Process	YES	15
	Data		0
	Systems		0
Initial	People		0
	Process		0
	Data	YES	5
	Systems	YES	5
			55

This gives an overall score for the level of maturity of the specific Capability.

Once complete the spread sheet will calculate the overall score and assign a current overall maturity for the PAO. Please note this is indicative and should only be used as a baseline by the PAO to consider next steps in the **Report** step.

Figure 16: Example of overall score and maturity

TOTAL SCORE	1000
MATURITY	Evolving

1 The authors acknowledge https://www.iia.org.uk/ in development of the steps section.

3. Consider what the model may have missed

Any capabilities, sub capabilities, platforms, components or functions that are missing and relevant to the PAO should be identified. If these missing elements are material to the model the PAO should include them into the process modifying the matrix and form. In addition, the PAO should consider informing IFAC to ensure the model is updated with these additional considerations.

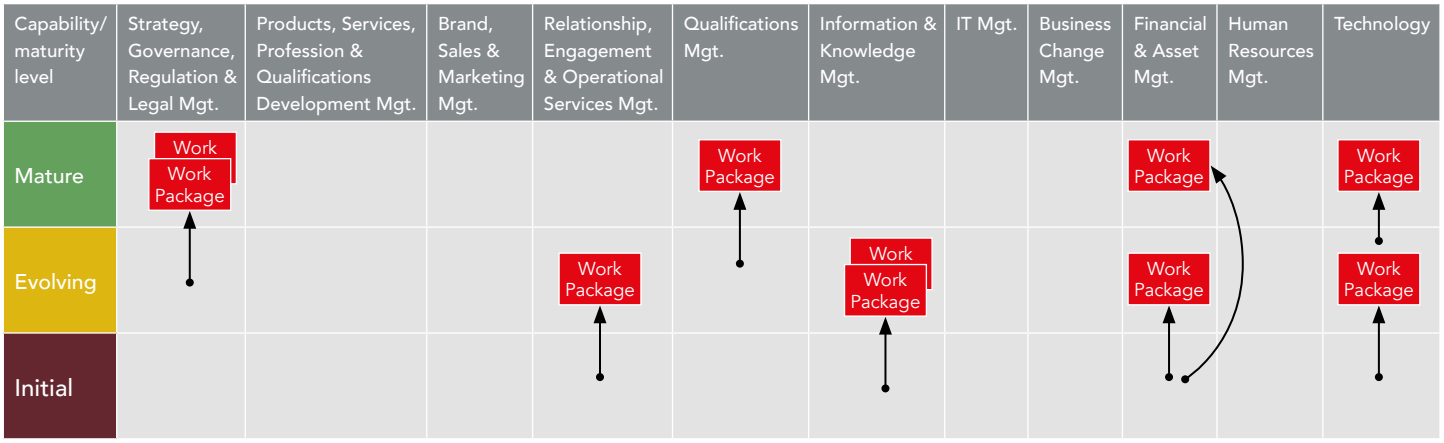
4. Consider the gaps

At this stage the PAOs will have assessed their individual current ICT capability against their future ICT vision and requirements expressed in the completed and verified Current and Target IT Maturity Assessment Forms. The PAO should identify gaps between the current and target maturity. It is recommended that the PAO undertakes this task for each capability to see the gap between the current and target state.

The PAO is then in a position to review the gaps. The PAO should then define candidate projects (or "work packages") which will address each gap.

These work packages should then be recorded on a Gap Analysis chart (see example below)

Chart 1: Gap Analysis chart (example)



Legend	Description
Work Package	A set of actions identified to achieve one or more objectives for the business. A work package can be a part of a project, a complete project, or a program.
	Circle indicates current maturity level. Arrow head indicates target maturity level.

Individual work packages may focus on improving people and process maturity for a given business capability. The PAO may choose to identify work packages within a specific business capability that improve maturity that had a mixed current assessment.

A prioritisation exercise should then take place upon the work packages. This will be done in consideration of the identified risks, opportunities and drivers. For instance, available funding may limit the amount of change possible or changing regulations may necessitate immediate developments.

The PAO should then map the gaps and related work packages back to the reference architecture. This should take the form of a matrix which has all the logical application components in the reference architecture and all the work packages

This will allow the PAO to specify the IT developments needed to support the maturity improvement.

The prioritised and sequenced list will form the substance of a roadmap which will be incorporated into the Report.

5. Report on conclusions

The PAO can then use the roadmap to report back to stakeholders as necessary to secure support and funding.

It is recommended that this information is also used as structured input to any commercial tender process for system procurement or development.

Matrix 1: logical application component / work package matrix (example)

Logical application components / Work packages	Work Package	Work Package	Work Package	Work Package	Work Package	Work Package	Work Package
Brand Management	✓		✓				✓
Digital Assets			✓				
Customer Credit				✓	✓		
Business Rules						✓	

Legend	Description
Work Package	A set of actions identified to achieve one or more objectives for the business. A work package can be a part of a project, a complete project, or a program.
Digital Assets	A logical application component as described in the reference architecture.
✓	Indicates that the work package will deliver a change to the logical application component.

8. Maturity Levels

Capability/ Maturity Level	Strategy, Governance, Regulation & Legal Management	Products, Services, Profession & Qualifications Development Management	Brand, Sales & Marketing Management	Relationship, Engagement & Operational Services Management	Qualifications Management	Information & Knowledge Management
Mature	Defined IT Team to support this capability, measured by IT KPIs. Business processes to support this capability are defined and effective e.g. PAO's business planning cycle process is followed annually based on strategic measures, PAO's governance process is in place with automated workflow & business rules and monitored by KPIs. Data value is understood and fully utilised through data being available, integrated (shared) and trusted. Systems are accessible, integrated and support the complete (end-to-end) business processes through the development or procurement of IT Systems including a Governance Case Management system; Regulation Management; Internal Audit, Risk Management; Legal Management; Performance Management and Information Assurance. In addition the above systems are integrated with or are supported by (a) the PAO's web content management system and published on PAO's website; (b) a Document management system; (c) a CRM; and (d) Automated Regulatory reporting.	Defined IT Team to support this capability, measured by IT KPIs. Business processes to support this capability are able to enable the high quality value development of a PAO's products and services. Data value is understood and fully utilised through data being available, integrated (shared) and trusted. Systems are accessible, integrated and support the complete (end-to-end) business processes through the development or procurement of IT Systems including a Qualification Product Developer solution; a Qualification Planning solution and a Qualification Performance. In addition the above systems are integrated with or are supported by (a) a generic product design and product catalogue solution as part of an ERP; (b) the PAO's web content management system and published on PAO's website; and (c) Document Management & Enterprise Workflow engine.	Defined IT Team to support this capability, measured by IT KPIs. Business processes to support this capability are efficient and focussed on high value activity e.g. Customer Relationship Optimisation, Campaign Management and Execution, Brand Recognition. Data value is understood and fully utilised through data being available, integrated (shared) and trusted. Systems are accessible, integrated and support the complete (end-to-end) business processes through the development or procurement of IT Systems including a Brand Management solution; e-Commerce platform; Marketing platform; Advertising Platform; an analytics tool to measure the effectiveness of Advertising and Marketing initiatives; Extending the capability with specific solutions that address branding, sales and marketing of the PAO's products and services relating to qualifications and learning. In addition the above systems are integrated with or supported by (a) CRM that supports campaign execution and sales force automation; (b) the PAO's web content management system and published on the PAO's website; (c) a products & services pricing engine, optionally as a module within an ERP; (d) a "Contact Us" form on the PAO's website; and (e) an online registration solution.	Defined IT Team to support this capability measured by IT KPIs. Business processes to support this capability are efficient and focussed on Customer satisfaction and nurturing. Data value is understood and fully utilised through data being available, integrated (shared) and trusted. Systems are accessible, integrated and support the complete (end-to-end) business processes through the development or procurement of IT Systems, including a Contact Centre Management platform; CRM; and online Customer Self-Service. In addition the above systems are integrated with or are supported by (a) an authenticated portal that supports personalisation and customisation; (b) mobile applications; (d) ERP; (g) an Integration Platform; (h) the PAO's web content management system and published on PAO's website; (i) Business Intelligence; (j) Master Data Management; and (k) a Data Quality management tool.	Defined IT Team to support this capability, measured by IT KPIs. Business processes to support this capability are efficient and focussed on supporting student success in learning and qualification journey. Data value is understood and fully utilised through data being available, integrated (shared) and trusted. Systems are accessible, integrated and support the complete (end-to-end) business processes through the development or procurement of IT Systems including an Learning Portal; an online learning management system; an analytics tool to measure the effectiveness of Learning activities; a learning content developer & publication solution; a Qualification developer & launch solution; an Exams and Ethics Management platform including analytics; a Continual Professional Development solution; a Practical Experience Recording solution; a Registration solution. In addition the above systems are integrated with or are supported by (a) an e-Commerce platform; (b) an authenticated portal; (c) mobile applications; (d) on-line customer service; (e) Customer Relationship Management; (f) ERP; (g) Integration Platform; (h) Enterprise Content Management; (i) Business Intelligence; (j) Master Data Management; (k) a Data Quality management tool; (l) access to external data sources; and (m) a products & services pricing engine, optionally as a module within an ERP.	Defined team to support this capability, measured on KPIs e.g. Data Stewards, Data Scientists. Business processes to support this capability supported by principles, standards, policies which are appropriately governed. Data is secure, trusted, accessible e.g. to follow and can be used confidently for analytics to improve decision making. Master data automatically aligned across IT systems. Data measures related to strategic measures. Systems are accessible , integrated and support the complete (end to end) business processes through the development or procurement of IT Systems including (a) an Integration Platform e.g. web services and api's ; (b) an Master Data Management solution ; (c) a Business Intelligence platform and Data Quality solution and (d) an Enterprise Content Management platform.

LEGEND: 1. People; 2. Processes; 3. Data; 4. Technology
Above colours do not apply to Technology requirements.

Capability/ Maturity Level	IT Management	Business Change Management	Financial & Asset Management	Human Resources Management	Technology
Mature	Defined IT Team to support this capability with defined roles, responsibilities, measured by IT KPIs. Specifically a dedicated Service Desk function. Business processes to support this are based on IT Service Management best practice e.g. ITIL, IT4IT. In addition appropriate design and delivery governance. Data value is understood and fully utilised through data being available, integrated (shared) and trusted. Systems are accessible, integrated and support the complete (end-to-end) business processes through the development or procurement of IT Systems, including an IT Service Management solution. In addition the above systems are integrated with or are supported by (a) PAO Intranet; (b) Staff self-service; (c) mobile applications; and (d) Business Intelligence.	Defined IT Team to support this capability with defined roles. For example project managers, business analysts, enterprise architects and test analysts. Responsibilities, measured by KPIs. Business processes to support this are based on a design framework, a project management framework, and a solution development framework. Business change models are stored in structured data repositories, accessible by reporting capabilities. Systems are accessible, integrated and support the complete (end-to-end) business processes through the development or procurement of IT Systems, including an Integrated Development Environment, a Project Management solution, and a Design tool. In addition the above systems are integrated with or are supported by (a) PAO Intranet for publication; and (b) Business Intelligence.	Defined IT Team to support this capability, measured by IT KPIs. Business processes to support this capability are efficient and focussed on high value activity. Data value is understood and fully utilised through data being available, integrated (shared) and trusted. Automated, custom financial reporting. Financial decisions are driven by data. Systems are accessible, integrated and support the complete (end-to-end) business processes through the development or procurement of IT Systems, including an ERP, which includes financial management, products, pricing, order-to-cash and procure-to-pay, as well as a facilities management solution. In addition the above systems are integrated with or are supported by (a) an e-Commerce platform; (b) an authenticated portal; (c) Customer Relationship Management; (d) an Integration Platform; (e) Business Intelligence; and (f) Master Data Management.	Defined IT Team to support this capability measured on IT KPIs. Business processes to support this capability are fully supported by the PAO's HR principles, standards and policies. The processes are developed to a high level of maturity e.g. there is a an HR system which the HR team use daily to manage the business processes , payroll would be calculated automatically and wages paid via BACS (Bankers Automated Clearing Services - electronic payment) with no manual intervention, Learning processes would be automated i.e. learning requirement would be "pushed" to the employees with reminders to complete courses , internal communications would be managed by a central team and would be "PAO branded" Data value is understood and fully utilised through data being available, integrated (shared) and trusted. Automated, custom HR reporting. Systems are accessible , integrated and support the complete (end to end) business processes through the development or procurement of IT Systems including an HR system with an employee self-service web portal which allows employee data to be updated by the employee and also an online internal Learning solution , an online rewards gateway and an intranet. In addition the above systems are integrated with or are supported by (a) Integration Platform (b) Business Intelligence (c) Master Data Management.	High utilisation of web and mobile technologies e.g. mobile apps, USSD. Use of cloud and/or dedicated on-premise solutions. Full Disaster Recovery Solution within 1 day. Implementation of advanced and automatic recovery mechanisms e.g. server mirroring, auto-failover to ensure minimal service outage. IAM supports members, internal staff, public and other stakeholders. Use of integrated IAM to manage user access across systems i.e. use of one profile to access multiple systems. High degree of system interoperability, enabling seamless integration across multiple systems. High degree of system capacity i.e. IT system accommodate seemingly unlimited number of users brought about by flexibility of computing environment. High degree of scalability through implementation of advanced scalability technologies e.g. load balancing and fine-tuning of computing environment. Use of a wide range of security technologies i.e. public key encryption, account management policies, firewalls etc.

LEGEND: 1. People; 2. Processes; 3. Data; 4. Technology
Above colours do not apply to Technology requirements.

Capability/ Maturity Level	Strategy, Governance, Regulation & Legal Management	Products, Services, Profession & Qualifications Development Management	Brand, Sales & Marketing Management	Relationship, Engagement & Operational Services Management	Qualifications Management	Information & Knowledge Management
Evolving	Generic IT role in place, which supports, but is not dedicated to business capability. Business processes to support this capability are a mixture of manual and partially automated, e.g. PAOs can plan strategic measures, govern, regulate and provide legal support through a mix of manual and automated processes. Data is a combination of structured and unstructured, stored in simple databases and network drives. Systems are not specialised at process level, generic, not fully integrated but considered. They still support the following business processes (a) Manage Strategy and Vision (i.e. updated strategy on PAO web site); (b) Manage Internal Audit & External Governance (relational database in place); and (c) Manage Regulation and Legal (systems considered to be in place with data export for reporting & email)	Generic IT role in place who supports but not dedicated to business capability Business processes to support this capability are a mixture of manual and partially automated, as a result staff are able to focus on value add core activities such as insightful development of a PAO's Products and Services Data is a combination of structured and unstructured, stored in simple databases and network drives Systems are not specialised at process level ,generic , not fully integrated but considered but still supports the following business processes (a) Manage Product & Services Development, details of which are published on the PAO website; (b) Manage Accountancy Profession Development; and (c) Manage Qualification Development via Standard Software Productivity tools e.g. excel and word.	Generic IT role in place, which supports, but is not dedicated to business capability. Business processes to support this capability are a mixture of manual and partially automated, as a result staff are able to focus on value-added core activities e.g. Customer Relationship Optimisation, Campaign Management. Data is a combination of structured and unstructured, stored in simple databases and network drives. Systems are not specialised at process level, generic, not fully integrated but considered. The following business processes are still supported (a) Manage Brand, realised through the PAO's website; (b) Manage Sales through e-mail; and (c) Manage Marketing via e-mail and the PAO's website.	Generic IT role in place, which supports, but is not dedicated to business capability Business processes to support this capability are primarily manual with a degree of automation, specifically customer engagement happens through a number of channels with standard service levels. Data is captured in a structured manner, therefore simple reporting can be enabled Systems are not specialised at process level, generic, standalone, but still supports the following business processes (a) Manage Customers; (b) Manage Partners & External Relationships; (c) Manage Operational Services via an electronic data store; and (d) a PAO website which supports electronic forms.	Generic IT role in place, which supports, but is not dedicated to business capability Business processes to support this capability are primarily manual with a degree of automation to support the production of Qualifications and Exams. Data is captured in a structured manner, therefore simple reporting can be enabled Systems are not specialised at process level, generic, standalone, but still supports the following business processes: (a) Manage Registration (i.e. PAO web site & relational database in place, in person bank payment, in person to PAO, manual entry and PAO emailed or physical receipt); (b) Manage Education (PAO web site with a link to LPs , manual accreditation of LPs with database update); (c) Manage Exams (PAO provides own exams on Productivity tools, central print & secure transport, physical marking at specialised Centre Of Excellence, recorded in database, manual moderation and marking quality assurance, results and prize-winner letters produced from database, marks & membership form via post); (d) Manage Ethics & Professionalism; (e) Manage Experience - CPD and PER are in place with manual recording; and (f) Manage Membership Conversion and Transfer (manual transfer on database).	Generic role in place to support this capability. Business processes to support this capability supported by some principles, standards and policies. Personal Data (e.g. PII, PHI and PCI) is secure and the PAO is perceived to be a trusted custodian of customer data. Retrospective data quality solutions in place. Data quality scorecard in place. Concept of master data understood and procedures in place for management. Master data in different systems, somewhat manually aligned. Cross domain enterprise metrics framework in place. Systems are not specialised at process level, generic, standalone, but still supports the following: (a) a Reporting tool; (b) Data Quality via excel; (c) Data Exchange via e-mail; (d) Content Management. Data Security would be considered and active use is made of standard security functions e.g. passwords.

LEGEND: 1. People; 2. Processes; 3. Data; 4. Technology
Above colours do not apply to Technology requirements.

Capability/ Maturity Level	IT Management	Business Change Management	Financial & Asset Management	Human Resources Management	Technology
Evolving	Generic IT role in place, which supports, but is not dedicated to business capability. Business processes to support this capability are primarily manual with a degree of automation. Data is captured in a structured manner; therefore simple reporting can be enabled. Systems are not specialised at process level, generic, standalone, but still supports the following business processes: (a) service strategy; (b) service design; (c) service transition; (d) service operation; (e) continual service improvement. Specifically, problems and Incidents are recorded on spread sheets. Service strategy and design are captured using productivity tools.	Generic IT role in place, which supports, but is not dedicated to business capability Business processes to support this capability are primarily manual, with a degree of automation. Data is captured in a structured manner; therefore simple reporting can be enabled. Systems are not specialised at process level, generic, standalone, but still supports the following business processes: (a) Design; (b) Delivery e.g. Visio, PowerPoint or Open Source equivalent.	Generic IT role in place, which supports, but is not dedicated to business capability Business processes to support this capability are primarily manual, with a degree of automation. Data is captured in a structured manner; therefore simple reporting can be enabled. Manual transposition of data between key processes and ledger. Systems are not specialised at process level, generic, standalone, but still supports the following business processes: (a) Manage Assets using spread sheets; (b) Manage Procurement using spread sheets, e-mail, telephony and post; (c) Manage Facilities using Standard Software Productivity tools; (d) Perform financial & management accounting, using a stand-alone accounting application.	Generic IT role in place who supports but not dedicated to business capability Business processes to support this capability are supported by some principles, standards and policies and PAO are evaluating organisational design. The processes are developing with a degree of automation although still primarily manual e.g. there is a "central place" which holds the employee data but has been manually entered, payroll can be calculated automatically, wages are paid through computer produced cheques, internal communications are typed and communicated via email Data is captured in a structured manner stored in simple databases therefore simple reporting can be enabled. Systems are not specialised at this process level but whilst generic and standalone still support the following business processes (a) Manage Recruitment using paper application (b) Manage Employee Information using spread sheets or a generic database (c) Manage Performance (d) Manage Rewards and Compensation (e) Manage Payroll (f) Manage Internal Coms (g) Manage Learning all are using Standard Software Productivity tools	Limited use of mobile technologies, Some moderate degree of utilization of web technologies e.g. content management, qualification management. Use of lower-level hosting services in non-dedicated platforms with little or no flexibility of configuration. Presence of dedicated on-premise infrastructure to host some systems. Full Disaster Recovery within 3 days. Implementation of less advanced recovery mechanism e.g. database backups, which require human intervention. IAM supports mostly internal staff and limited support to members. Limited use of integrated IAM i.e. users have different credentials to access different systems. No or limited degree of interoperability, requiring human intervention to synchronize data between systems. Limited capacity to support a large number of users due to restriction on the computing environment. Low degree of scalability due to shared platform limitation, no implementation of specific technology to support scalability. Limited use of security technology e.g. public key encryption.

LEGEND: 1. People; 2. Processes; 3. Data; 4. Technology
Above colours do not apply to Technology requirements.

Capability/ Maturity Level	Strategy, Governance, Regulation & Legal Management	Products, Services, Profession & Qualifications Development Management	Brand, Sales & Marketing Management	Relationship, Engagement & Operational Services Management	Qualifications Management	Information & Knowledge Management
Initial	No separate or specific IT Role defined to support this capability. Business Processes to support this business capability are all manual, non-documented and not defined by strategic measures. Data would be stored on manual books or local hard drives. Usage of Standard Software Productivity Tools (Microsoft suite or open source).	No separate or specific IT Role defined to support this capability. Business Processes to support this business capability are all manual. Data would be stored on manual books or local hard drives. Usage of Standard Software Productivity Tools (Microsoft suite or open source).	No separate or specific IT Role defined to support this capability. Business Processes to support this business capability are all manual. Data would be stored on manual books or local hard drives. Usage of Standard Software Productivity Tools (Microsoft suite or open source).	No separate or specific IT Role defined to support this capability. Business Processes to support this business capability are all manual; specifically customer contact is via face-to-face, phone or post. Data would be stored on manual books or local hard drives, not integrated. Usage of Standard Software Productivity Tools (Microsoft suite or open source).	No separate or specific IT Role defined to support this capability. Business Processes to support this business capability are all manual and recorded physically on paper (attendance, questions, answers, marking) and generic non-personalised course material. PAOs may not provide their own examinations or be provided by separate party. CPD and PER may not be implemented. Data would be stored on manual books or local hard drives. Usage of Standard Software Productivity Tools (Microsoft suite or open source).	No separate or specific role defined to support this capability. Business Processes to support this business capability are all manual and recorded physically on paper e.g. no data quality processes, no data management procedures, no reporting processes established. Manually intensive integration (e.g. copy & paste). Data would be stored on manual books or local hard drives. No metrics framework in place. No data quality measures in place. Little or no cross domain enterprise reporting. Usage of Standard Software Productivity Tools (Microsoft suite or open source). Master data in different systems or spread sheets, little or no alignment, silos.

LEGEND: 1. People; 2. Processes; 3. Data; 4. Technology
Above colours do not apply to Technology requirements.

Capability/ Maturity Level	IT Management	Business Change Management	Financial & Asset Management	Human Resources Management	Technology
Initial	No separate or specific IT Role defined to support this capability. Business Processes to support this business capability are ad-hoc and on-demand. Data about Information Technology assets would be stored manually if at all or on spread sheets stored on local hard drives. Usage of Standard Software Productivity Tools (Microsoft suite or open source).	No separate or specific IT Role defined to support this capability. Business Processes to support this business capability are ad-hoc and on-demand. Data would be recorded manually or electronically stored on local hard drives. Usage of Standard Software Productivity Tools (Microsoft suite or open source).	No separate or specific IT Role defined to support this capability. Business Processes to support this business capability are all manual e.g. payments are made in person at a bank by cheque, invoices are paper-based, handwritten and delivered by post. Data would be stored on manual books or local hard drives with manual aggregation, reconciliation, checking, data fixing and financial reporting. Usage of Standard Software Productivity Tools (Microsoft suite or open source).	No separate or specific IT Role defined to support this capability Business Processes to support this business capability may not adhere to any principles, standards or policies and also are all recorded manually or may not be part of the PAO's current organisational design e.g. employee information and status such as joiners , leavers and movers would be maintained manually, payroll would be calculated manually and wages paid in cash or cheques written by hand , internal communication may be via letters or noticeboard based , learning process may be paper based Data would be stored on manual books or local hard drives with manual recording Usage of Standard Software Productivity Tools (Microsoft suite or open source)	Limited use of web technologies e.g. simple website. No dedicated on-premise infrastructure to host systems – systems reside mostly on staff member's machine. IAM geared to internal staff only. No interoperability between systems. Use of mostly single-user systems. No scalability. No specific technology to handle security.

LEGEND: 1. People; 2. Processes; 3. Data; 4. Technology
Above colours do not apply to Technology requirements.

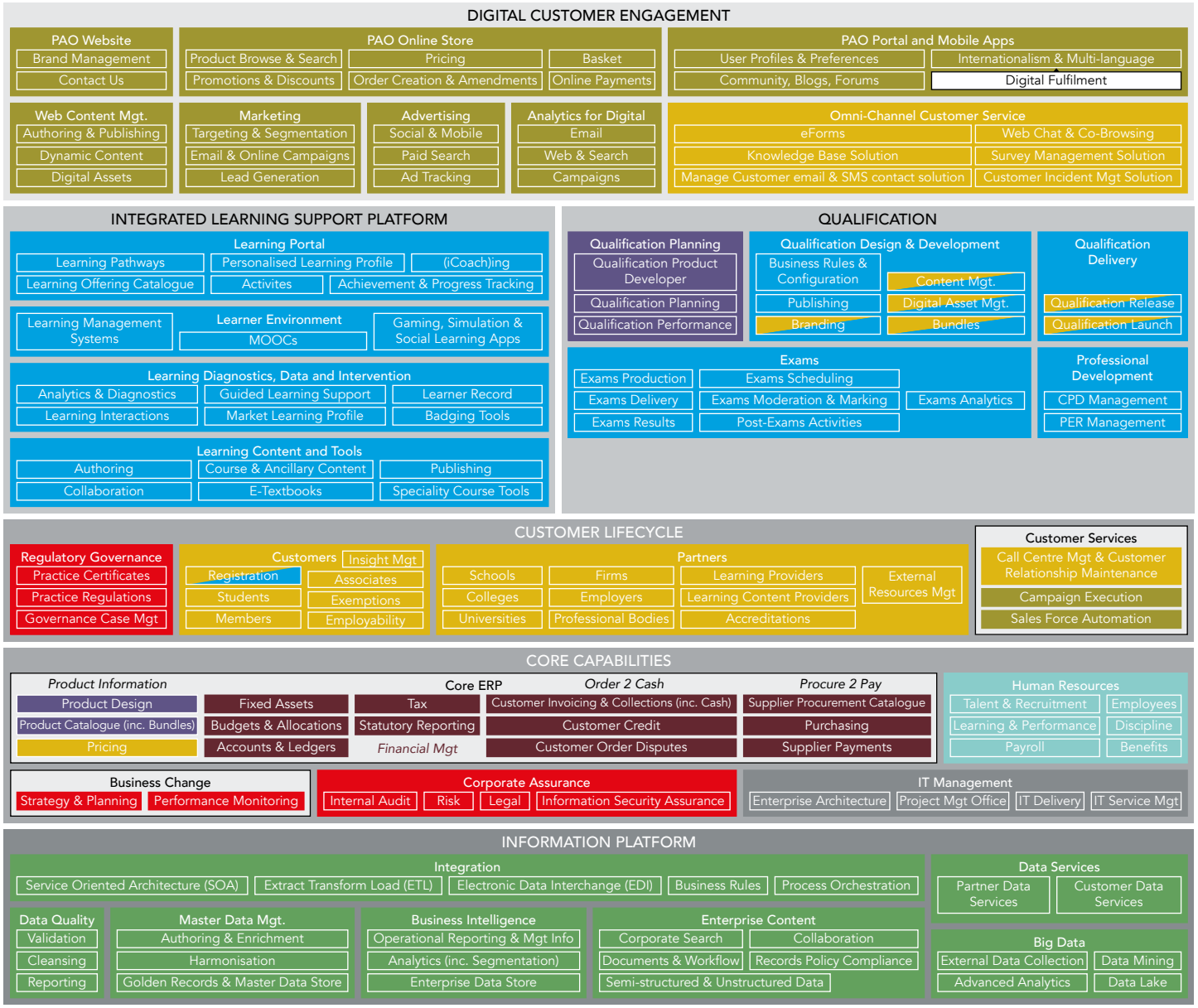
9. Glossary

The following table is a list of terms used in this document, with accompanying definitions. It is intended to aid the reader to understand the document and the intent of the authors.

TERM	DEFINITION
ACCA	Association of Chartered Certified Accountants
CPD	Continual Professional Development
ICPAK	Institute of Certified Public Accountants of Kenya
ICT	Information and Communication Technology
IFAC	International Federation of Accountants
MOOC	Massive Open Online Course
PAO	Professional Accountancy Organisation
PER	Practical Experience Recording

10. PAO Reference Architecture

Figure 13: PAO Reference Architecture



11. Appendices

Table 1: Common Conceptual Components

TYPE	IDENTIFIER	DESCRIPTION
Platform	Digital Customer Engagement	This platform comprises all components, applications and functions that promote the PAO brand and services. Prospects, Customers and Partners have personalised access to information and apps.
Component	PAO Website	This component comprises all applications that manage a PAO's website estate this includes monitoring, Brand Management and Contact Us.
Component	Web Content Mgt.	This component comprises all applications that manage a PAO's web content including authoring and publishing, dynamic content and digital asset management.
Function	Authoring and Publishing	This function comprises all applications that support the authoring and publication of content. This can include a content management solution which supports the creation and modification of digital content. Including publishing, format management, history editing and version control, indexing, search, and retrieval.
Function	Dynamic Content	This function comprises all applications that support a customised experience for users visiting the PAO website(s) and other digital solutions. This may include content that updates on a scheduled basis without author intervention. Dynamic content may require the user to register with the PAO's website.
Function	Digital Asset (Management)	This function comprises all applications that support the management of a PAO's Digital Assets including ingestion, annotation, cataloguing, storage, retrieval and distribution. Digital Assets can be digital documents, audible content, images, motion picture, and other relevant digital data.
Component	PAO Portal & Mobile Apps	This component comprises all applications that support a PAO's transactional relationship with customers and partners. Including secure access to content and services only available to authenticated users. This also applies to those transactions and paid-for content that the PAO chooses to make available via mobile applications downloaded via an app store.
Component	Omni Channel Customer Service	This component comprises all applications that enable customers to engage with a PAO online via a range of options and channels including submission of e-forms, web chat and co-browsing, integration of an online knowledge base, management and execution of online surveys, email and SMS contact and customer incident recording and management.
Platform	Customer Lifecycle	This platform comprises all components, applications and functions that manage a PAO's on-going relationship with its customers and partners including Customer Services.
Component	Customers	This component comprises all applications used to manage a PAO's on-going relationship with its customers from registration through students to affiliates and members. Including management of exemptions and improvement of employability of students and members.
Component	Partners	This component comprises all applications used to manage a PAO's on-going relationship with its partners i.e. schools, colleges, universities, firms, employers, professional bodies, learning providers, learning content providers and any other partners a PAO has a relationship with.
Component	Customer Services	This component comprises all applications used for non-product based customer service and includes functions to cater for customer complaints regarding product or service delivery, problems with billing, etc. It includes Call Centre management, Customer Relationship Maintenance, Campaign Management and Sales Automation.
Platform	Core Capabilities	This platform comprises all components, applications and functions used to support the management of the PAO's generic business functions typically found in all organisations regardless of industry, sector or geographic region.
Component	Core ERP	This component comprises all the applications that support the following functions product design, products catalogue, pricing, fixed assets, budgets and allocations, accounts and ledgers, tax, statutory reports, financial management, order-to-cash and procure-to-pay.
Function	Products	This function comprises all applications that support management of a PAO's products and services including product details, measures, related purchase accounts and sales, product type and reusability.

TYPE	IDENTIFIER	DESCRIPTION
Function	Pricing	This function comprises all applications that support the pricing of a PAO's products and services including price configuration, modelling, bundling and promotions.
Function	Financial Management	This function comprises all applications that support the efficient and effective management of money (funds) in such a manner as to accomplish the PAO's objectives. Including the management of fixed assets, accounts receivable, accounts payable, allocations, general ledger, budgeting and project accounting.
Function	Order-2-Cash	This function comprises all applications that support full Order-to-Cash transactions including management of relevant reference data in relation to customers, PAO products and services and price and the process of credit and contract management, order management, billing and invoicing, customer collections, cash application and dispute management.
Function	Procure-2-Pay	This function comprises all applications that support full purchase-to-payment process including management of suppliers, contracts, catalogues and the process of raising a requisition, authorising a Purchase Order, receipting and invoice and making a payment.
Component	Corporate Assurance	This component comprises all applications that support the PAO's corporate assurance business function. The internal control model consists of three lines of defence made up of the Business Units, Control Specialists and Internal Audit, including internal audit, risk management, legal case management and Information Security Assurance.
Function	Information Security Assurance	This function comprises all applications that support the assurance of the confidentiality, integrity and availability of a PAO's information whilst in transit, storage, or processing.
Component	Technology Support	This component is wholly composed of the IT Service Management function.
Function	IT Management	This function comprises all applications used by a PAO plan, design, deliver, operate and control the Information Technology services offered to customers both internal and external. Typically aligned to ITIL v3.
Platform	Information Platform	This platform comprises all components, applications and functions used to support Integration, Data Quality, Master Data Management, Business Intelligence, Enterprise Content (Management), Data Services and Big Data.
Component	Integration	This component comprises all applications used to support data, process and system integration including a SOA solution, an ability to Extract, Transform and Load data from one system to another, support the exchange of documents in a standard electronic format between the PAO and its partners, a Business Rules Engine and Process Orchestration solution.
Component	Data Quality	This component comprises all applications used to ensure that data used by a PAO is fit for its intended uses in operations, decision making and planning including data validation, cleansing and data quality reporting. Typically aligned to, or compliant with ISO 9000.
Component	Master Data Management	This component comprises all applications used to support tools that consistently define and manage the critical data of a PAO to provide a single point of reference including management of a Golden Records (a single view of a customer or partner), Master Data Store, Data harmonisation to improve data quality and usage through the use of machine learning functionality, data enrichment from industry leading sources and the centralised authoring of master records in a "neutral" application.
Component	Business Intelligence	This component comprises all applications used to support the collection, analysis, presentation and dissemination of business information including support for the development and management of operational reports and management information, all aspects of analytics, including segmentation and the management of an Enterprise Data Store.
Component	Enterprise Content (Management)	This component comprises all applications used to capture, manage, store, preserve, and deliver content and documents related to the PAO's processes. Including Enterprise Search, Document and Records Management and related workflow, Collaboration between staff and partners and the enforcement of relevant records management policy.

Table 2: Strategy, Governance, Regulation & Legal Management

TYPE	IDENTIFIER	DESCRIPTION
Platform	Customer Lifecycle	See Common Conceptual Components.
Component	Regulatory Governance	This component comprises all applications used by the PAO to govern its regulatory and governance capability.
Function	Practise Certificates	This function comprises the application that supports the PAO in managing its certification processes for accredited institutions / practises.
Function	Practise Regulation (Monitoring)	This function comprises all the applications used by the PAO to monitor and regulate its accredited institutions / practises.
Function	Governance Case Management	This function comprises all the applications used by the PAO for its case management for the Governance process (i.e. complaints against its students and members).
Component	Business Change	This component comprises all applications used by the PAO to support their business change capabilities, this may include productivity tools such as road mapping software.
Function	Strategy and Planning	This function comprises all applications used by the PAO to support their Strategy and Planning processes, this may include productivity tools.
Function	Performance Monitoring	This function comprises all applications used by the PAO to support its Performance Monitoring processes , this may include productivity tools.
Component	Corporate Assurance	This function comprises all applications used by the PAO to support its Corporate Assurance processes, this may include productivity tools.
Function	Internal Audit	This function comprises all applications used by the PAO to support its Internal Audit processes, this may include productivity tools.
Function	Risk Management	This function comprises all applications used by the PAO to support its Risk Management processes, this may include productivity tools.
Function	Legal Management	This function comprises all applications used by the PAO to support its Legal Management processes, this may include productivity tools.
Function	Information Security Assurance	This function comprises all applications used by the PAO to support its Information Security Assurance processes, this may include productivity tools.

Table 3: Products & Services Development, Qualification Planning and Profession Development Management

TYPE	IDENTIFIER	DESCRIPTION
Platform	Qualification	This platform comprises all components, applications and functions used to support Qualification Planning, Exams, Qualification Design and Development, Qualification Delivery and Professional Development.
Platform	Core Capability	See Common Conceptual Components.
Component	Product Information	This component comprises all applications used by the PAO to design and deploy its product information.
Function	Product Design	This function comprises all the applications used by the PAO to design its products.
Function	Product Catalogue	This function comprises the applications used by the PAO to deploy its products across the enterprise (i.e. to the core ERP and to the Digital Customer Engagement platforms).
Component	Qualification Planner	This component comprises all applications used to assist a PAO plan new qualifications or make macro level adjustments to existing qualifications. Including Qualification Product Developer, Qualification Planning and Qualification Performance.
Function	Qualification Product Developer	This function comprises all applications that support modelling of new qualifications, allowing PAO to decide which features of a qualification are important to the subsequent development of related materials. For example – the name of qualification, target markets, level of qualification in relation to others and so on.
Function	Qualification Planning	This function comprises all applications that support planning for the introduction of new qualifications and changes to existing qualifications (including retirement). Qualification Planning will include the skills and capacity required to design, develop, configure and launch new qualifications across the organisation. In addition this function should support impact assessment on other qualifications, business process which will require integration with and an enterprise knowledge base populated by SME's.
Function	Qualification Performance	This function comprises all applications that support the definition of how the performance of qualifications will be measured e.g. KPIs. Linked to Enterprise performance management these applications allow the PAO to configure performance parameters. This function will require actual qualification performance data to analyse against the agreed KPI's.
Component	Profession Development	This component will use a variety of platforms, components and functions from the PAO reference architecture in order to support the development of the profession such as including web site, events management , information platform , etc.

Table 4: Brand, Sales and Marketing Management

TYPE	IDENTIFIER	DESCRIPTION
Platform	Digital Customer Engagement	See Common Conceptual Components.
Component	PAO Website	See Common Conceptual Components.
Function	Brand Management	This function comprises all applications used by the PAO to manage its brand. It supports the planning and creation of brand engagement.
Function	Contact Us	This function comprises all applications used by the PAO to manage its generic inbound contact channels.
Component	Web Content Mgt.	See Common Conceptual Components.
Function	Authoring & Publishing	See Common Conceptual Components.
Function	Dynamic Content	See Common Conceptual Components.
Function	Digital Asset (Management)	See Common Conceptual Components.
Component	PAO Online Store	This component comprises all the applications used by the PAO to support its Digital Online Store.
Function	Product Browse & Search	This function comprises all the applications used by the PAO to support its digital product catalogue including browsing and searching.
Function	Promotions & Discounts	This function comprises all the applications used by the PAO to support its digital promotions and discount processes in order to maximise sales.
Function	Pricing	This function comprises all the applications used by the PAO to support its digital pricing in conjunction with its digital catalogue.
Function	Basket	This function comprises all applications that allow visitors to the PAO online store to select the products they want and then go to the checkout for payment. In addition the basket functionality should be able to summarise user requests within the possibilities offered by the catalogue, check the basket and possibly cancel/modify the items placed in it and start the payment process for the selected products.
Function	Order Creation & Amendments	This function comprises all the applications used by the PAO to create and amend its digital customer orders. These orders will interface via Digital Fulfilment component to the PAO's Core ERP.
Function	Online Payments	This function comprises all applications that the PAO uses to manage payment of the eCommerce basket.
Component	Marketing	This component comprises all the applications used by the PAO to manage its Marketing processes.
Function	Targeting & Segmentation	This function comprises all the applications used by the PAO to manage its Customer Targeting and Segmentation processes in support of Marketing.
Function	Email & Online Campaigns	This function comprises all the applications used by the PAO to manage its email and Online Campaigns process.
Function	Lead Generation	This function comprises all the applications used by the PAO to manage its marketing process of stimulating and capturing interest in a product for the purpose of developing the PAO's sales pipelines.
Component	Advertising	This component comprises all the applications used by the PAO to manage its Advertising.

TYPE	IDENTIFIER	DESCRIPTION
Function	Social & Mobile	This function comprises all the applications used by the PAO to manage its Social and Mobile Online presence through channels as Twitter, LinkedIn, Facebook and WhatsApp.
Function	Paid Search	This function comprises all the applications used by the PAO to manage its Paid Search Services.
Function	Ad Tracking	This function comprises all the applications used by the PAO to manage its Ad Tracking Services.
Component	Analytics for Digital	This component comprises all the applications used by the PAO to manage its Digital Analytics processes.
Function	Email	This component comprises all the applications used by the PAO to analyse its customer emails as part of its Digital Analytics processes.
Function	Web & Search	This component comprises all the applications used by the PAO to analyse Digital Web and Search effectiveness as part of its Digital Analytics processes.
Function	Campaigns	This component comprises all the applications used by the PAO to analyse its Digital Campaigns effectiveness as part of its Digital Analytics processes.
Component	PAO Portal and Mobile Apps	See Common Conceptual Components.
Function	User Profiles & Preferences	This function comprises all the applications used by the PAO which enable a User to set their Digital Personal Profile and Preferences i.e. User Title, Favourites, Time Zone, Currency , Language and Units of Measurements.
Function	Internationalisation & Multi-language	This function comprises all the applications and tools used by the PAO to ensure all its websites and portals can be easily adapted to specific local languages and cultures. Including but not limited to creating web site graphics so that their text labels can be translated inexpensively. Finally ensuring text can be translated from languages with single-byte character codes (such as English) into languages requiring multiple-byte character codes (such as Japanese Kanji).
Function	Registration	This component comprises all applications used to support the student registration process. This process will be unique to each PAO but will have some common elements.
Platform	Customer Lifecycle	See Common Conceptual Components.
Component	Customer Services	This component comprises all applications used to by a PAO to manage the operational service with customers and other stakeholders.
Function	Sales Force Automation	This function comprises all applications used to by a PAO to manage sales activities.
Function	Campaign Execution	This function comprises all applications used to by a PAO for the execution of its Sales and Marketing Campaigns.

Table 5: Relationship Engagement and Operational Services Management

TYPE	IDENTIFIER	DESCRIPTION
Platform	Digital Customer Engagement	See Common Conceptual Components.
Component	Omni-Channel Customer Service	This component comprises all applications that deliver e-forms capability, knowledge base, manage customer e-mails and sms communication, support web chat and co-browsing. In addition this component allows PAOs to carry our customer surveys, report on and manage customer issues.
Function	e-forms	This function comprises all applications that deliver an online form function including auto formatting, calculations, lookups and validation.
Function	Knowledge Base solution	This function comprises all applications that allow a PAO to create, manage and share knowledge with staff and customers.
Function	Manage Customer e-mail & sms contact solution	This function comprises all applications and tools to allow a PAO to communicate with customers via e-mail and sms.
Function	Web Chat & Co-Browsing	This function comprises all applications and tools that allow a PAO to provide a web chat and co-browsing service. Typically used by customer service staff to provide an enhanced customer experience.
Function	Customer Incident Management Solution	This function comprises all applications and tools that allow a PAO to record, manage and resolve incidents issues, and complaints raised by customers. Typically supports multiple channels and either part of or integrated with a CRM solution.
Platform	Customers	This platform comprises all components, applications and functions that manage the on-going relationship between a PAO and its customers including students, members and associates. In addition this includes applications and tools that support employability and exemptions.
Function	Students	This function comprises all applications that assist the PAO in managing the on-going relationship between a PAO and Students. Including self-service, maintenance and reporting of student data, handling records of examinations, assessments, marks, grades and academic progression and providing statistical reports.
Function	Members	This function comprises all applications that assist the PAO in managing the on-going relationship between a PAO and Members. Including self-service, renewals, workflow for membership lapses and terminations, suspended membership, maintenance and reporting of membership data, career progression and providing statistical reports.
Function	Associates	This function comprises all applications that assist the PAO in managing the on-going relationship between a PAO and Associates. Including self-service, renewals, workflow for associate lapses and terminations, suspended associates, maintenance and reporting of associate data, career progression and providing statistical reports.
Function	Exemptions	This function comprises all applications that assist the PAO in managing the accreditation of external courses and qualifications to allow students to apply for exemptions in relation to qualifications offered by the PAO.
Function	Employability	This function comprises all applications that assist the PAO in managing a careers job board to match students, associates and members with employers. This should allow employers to advertise jobs and students, associates and members to upload CVs etc.
Component	Partners	This platform comprises all components, applications and functions that manage the on-going relationship between a PAO and its partners including schools, colleges, universities , firms, employers, professional bodies, learning providers, learning content providers and external resources. In addition it includes applications and tools that support accreditations.

TYPE	IDENTIFIER	DESCRIPTION
Function	Schools	This function comprises all applications that assist the PAO in managing the on-going relationship between a PAO and Schools.
Function	Colleges	This function comprises all applications that assist the PAO in managing the on-going relationship between a PAO and Colleges.
Function	Universities	This function comprises all applications that assist the PAO in managing the on-going relationship between a PAO and Universities.
Function	Professional Bodies	This function comprises all applications that assist the PAO in managing the on-going relationship between a PAO and relevant professional bodies.
Function	External Resources Management	This function comprises all applications that assist the PAO in managing the on-going relationship between a PAO and External Resources including, but not limited to, markers and invigilators. Typically includes vetting, selection, monitoring and payment of external resources.
Function	Learning Providers	This function comprises all applications that assist the PAO in managing the on-going relationship between a PAO and Learning Providers.
Function	Learning Content Providers	This function comprises all applications that assist the PAO in managing the on-going relationship between a PAO and Learning Content Providers.
Function	Accreditations	This function comprises all applications that allow the PAO to manage the accreditation of partners to provide services related to or on behalf of the organisation.
Component	Customer Services	See Common Conceptual Components.
Function	Call Centre Management & Customer Relationship Maintenance	This function comprises all applications that assist a PAO in managing the relationship with customers post-sale -everything from service and support to on-going marketing. It can cover areas as diverse as self-service solutions to customer complaint and problems through to escalating conflicts with customers to higher management levels.

Table 6: Qualifications Management

TYPE	IDENTIFIER	DESCRIPTION
Platform	Integrated Learning Support Platform	This platform comprises all components, applications and functions used to support a Learning Portal, Learner Environment, Learning Diagnostics data and intervention, Learning content and tools.
Component	Learning Portal	This component comprises all applications used by learners to access their personalised and customised learning "ecosystem". The Portal allows the PAO to manage learning offerings, target learners based on their progress including Learning Pathways, Learning offering catalogues, personalised learning profiles, activities, iCoaching, Achievement & Progress Tracking.
Function	Learning Pathways	This function comprises all applications that support the management of data related to a PAO's Learning Pathways which could be a set of common or specialised Learner journeys. These pathways when followed correctly will result in a Student achieving their targeted qualification.
Function	Learning Offering Catalogues	This function comprises all applications that support the PAO in managing all the Learning Offerings (products) including meta data e.g. free/price, part no, description which would then allow learners to search and order Learning Offerings via the Learning Portal based on the selected pathway. (i.e. a PAO's Qualification may comprise of three Exams and one specialised exam from a choice of two (Audit ,Tax , etc.), each exam may require specific learning i.e. three text books, multiple practise test, a spread sheet case study - all could be offered and ordered via the catalogue).
Function	Personalised Learning Profile	This function will be realised as part of the Learning Portal component. The data of the profile will be driven from the Learning Pathway which the Student selected. It will associate the required Learning from the PAO's Learning Offering Catalogue and create a personalised view of their target learning.
Function	Activities	This function enables the transactional recording of the completion of the Student's personalised learning activities (i.e. the completion of a practise test or a past paper).
Function	iCoaching	This function provides study support tools. It will ensure that Students are assigned a Learning Coach who can provide immediate and urgent support on their Learner journey (i.e. recommend the student sit some practise tests or read more research before taking their actual exams).
Function	Achievement & Progress Tracking	This function creates a view for the Student on their progress against their target learning journey and of their related learning achievements (e.g. four text books read, four practise tests sat, 99.5% pass rate on practise tests , high practise test pass rate).
Component	Learner Environment	This component comprises all applications used to support the student's learning process. Including learning management systems, MOOCs, gaming, Simulations and Social Learning apps.
Function	Learning Management System(s)	This function comprises all applications that support the administration, documentation, tracking, reporting and delivery of electronic educational technology (also called e-learning) courses or training programs. These may be provided directly by the PAO or a number of third parties.
Function	MOOCs	This function comprises all applications that support the delivery of online courses aimed at unlimited participation and open access via the web. These may be provided directly by the PAO or by a number of third parties.
Function	Gaming, Simulations and Social Learning apps	This function comprises all applications that support the development and delivery of a game experience for learning and training to achieve specific learning goals by increasing the motivation of learners. In addition Social Learning apps are those tools that utilize social software and/or social media in order to facilitate learning through interactions between learners and systems.
Component	Learning Diagnostics, Data and Intervention	This component comprises all applications used to consolidate the data within the Learning Support Platform. Including Analytics and Diagnostics, Learning Interactions, Guided Learning support, Market Learning profile, Learner Record (Store) and Badging tools.
Function	Analytics and Diagnostics	This function enables the analysis of Learning data creating valuable business intelligence for the PAOs on the learning behaviour, patterns and progress of their Students. It will also allow for Diagnostics on a Student's journey to be gathered and allow a PAO to pro-actively intervene rather than letting Student sit exams and potentially fail (i.e. if a Student hasn't recorded enough learning, the diagnostic test may recommend that they delay their exam sitting to another session after completing more learning).

TYPE	IDENTIFIER	DESCRIPTION
Function	Learning Interactions	This function will record all the Student's learning interactions with a PAO at a transactional level.
Function	Guided Learning support	This function enables a PAO to provide Students with guided Learning Support. It will provide an automatic study plan based their exam diet dates , a study calendar, a daily to do list and hints and tips for exam success.
Function	Market Learning profile	This function enables a PAO to create a profile per local market i.e. a PAO may not provide Learning itself but allow a 3rd party to do so and this profile will enable linkage to that 3rd party web site through the maintenance of urls etc.
Function	Learner Record (Store)	This function comprises all applications that implement the concept of a Learning Record Store (LRS.) This is a data store system that serves as a repository for learning records necessary for using the Experience API (xAPI). The Experience API is also known as the "Tin Can API" and is an Open Source e-learning specification which allows the learning experience of a learner across a range of learning management systems and MOOCs to be recorded, analysed and acted upon in the one place.
Function	Badging tools	This function comprises all applications to support the PAO in the creation, issuing, acceptance and management of achievements i.e. badges – or micro-credentials - which are a digital, bite-sized, portable way to represent the skills learners attained.
Component	Learning content and tools	This component comprises all applications used to consolidate the PAO's Learning content and tools within the Learning Support Platform. Including Authoring, Collaboration , Course and Ancillary content, e-textbooks, Publishing and Speciality course tools.
Function	Authoring	This function comprises all applications which a PAO or its 3rd party learning suppliers would use to author raw Learning content.
Function	Collaboration	This function comprises all applications which a PAO or its 3rd party learning suppliers would use enable workflow on its raw Learning content and allow for Collaboration in-house or between the PAO and its 3rd party learning supplier.
Function	Course and Ancillary content	This function comprises all applications which a PAO or its 3rd party learning suppliers would use to create a learning course and its required supplementary data as required.
Function	e-textbooks	This function comprises all applications that allow the PAO or partner to author electronic books (or e-books) which are books made available in digital form, consisting of text, images, or both, readable on the flat-panel display of computers or other electronic device.
Function	Publishing	This function comprises all applications which a PAO or its 3rd party learning suppliers would use to publish a learning course to the PAO's Learning portal.
Function	Speciality course tools	This function comprises all applications which a PAO or its 3rd party learning suppliers would use to create a specialised learning course.
Component	Qualification design and development	This component comprises all applications used to assist a PAO in configuring all meta data for new and existing qualifications. In addition this component will assist the PAO management of all related qualification assets. Including Business Rules & Configuration, Publishing, Branding, Content Management, Digital Asset Management and Bundles.
Function	Business Rules & Configuration	This function comprises all applications that support the management of business rules and meta data related to a qualification. This function may be wholly part of an Enterprise level Business Rules Engine. Typical rules captured will be eligibility, progression, duration. In addition, this function will allow the PAO to record specific meta data for a qualification that will be used by downstream functions to avoid hard coding of conditional logic.
Function	Publishing	This function comprises all applications that support the publication of all information related to a qualification across a range a mediums e.g. on-line, printed. Typically integrated with an Enterprise level web content management system but also available to other consuming technologies e.g. printers.

TYPE	IDENTIFIER	DESCRIPTION
Function	Branding	This function comprises all applications that support the development of the Qualification brand, typically integrated with a Digital Asset library. The brand assets can be accessed by the Publishing function.
Function	Content Management	This function comprises all applications that support the development of static content in relation to a qualification. This content will can be accessed by the Publishing function.
Function	Digital Asset Management	This function comprises all applications that support the management of a PAO's Digital Assets relevant to Qualifications including ingestion, annotation, cataloguing, storage, retrieval and distribution. Digital Assets can be digital documents, audible content, images, motion picture, and other relevant digital data.
Function	Bundles	This function comprises all applications that support the management of all assets produced by branding, content management and digital assets management into one single view of a qualification for the purposes of sales and marketing.
Component	Qualification delivery	This component comprises all applications used to manage the delivery of qualifications including release and launch.
Function	Qualification Release	This function comprises all applications that allow the PAO to co-ordinate the release of a new qualification, changes to an existing qualification (including retirement) across a range of channels, including, but not limited to the PAO's websites, partner organisations , news and media organisations, social media, go-live on exams systems etc.
Function	Qualification Launch	This function comprises all applications that support the launch of a new qualification, including, but not limited to, pre-release to PAO staff and launch events.
Component	Exams	This component comprises all applications used to manage a PAO's exams. Including Exam Production, Exam Scheduling, Exam Delivery, Exam Moderation and Marking, Post Exam Activities Results and Exam Analytics. A PAO's exams diet may also include an Ethics and Professionalism exam.
Function	Exams Production	This function comprises all applications which enable the secure production of exams covering the creation, modification, deletion of exam content through compilation of content to create specific exams.
Function	Exams Scheduling	This function comprises all applications which enable a PAO to schedule its Exams including the set-up of exam meta data where required, Exam Entry and Booking/Payment and capacity and allocation management.
Function	Exams Delivery	This function comprises all applications which enable a PAO to deliver its exams including its preparation for its centre network, preparing and distribution of exam materials and actual exam execution.
Function	Exams Results	This function comprises all applications which support a PAO to securely calculate and produce results, publication of results and conversation and transfer of students to associates and members.
Function	Exams Moderation & Marking	This function comprises all applications which allow a PAO to manage the secure return of exam responses for marking and associated documentation and to ensure quality and consistency of exam marking and manage any marking adjustments.
Function	Post Exams Activities (Management)	This function comprises all applications which manage production and issue certificates, prize winners, admin reviews, requests and appeals.
Function	Exams Analytics	This function enables the analysis of Exams data and transforming that data into valuable business intelligence for the PAO on exam performance, patterns and progress of their Students.
Function	CPD Management	This function comprises all applications which support Members on their Continuing Professional Development (CPD) - customers in recording of practical experience and the PAO to manage report and assess student progress.
Function	PER Management	This function comprises all applications that support Customers in recording of practical experience and the PAO to manage report and assess student progress.

Table 7: Information & Knowledge Management

TYPE	IDENTIFIER	DESCRIPTION
Platform	Information Platform	This platform comprises all components, applications and functions used to support Integration, Data Services, Data Quality, Master Data Management, Business Intelligence, Enterprise Content Management and Big Data.
Component	Integration	This component comprises all applications used to deliver integration capabilities using a cloud-managed and provisioned model which provides centralised oversight and governance.
Function	Service Oriented Architecture (SOA)	This function comprises all applications that support integration patterns whereby services are provided to the other components by application components, through a communication protocol over a network.
Function	Extract Transform Load (ETL)	This function comprises all applications that integrate data in a bulk fashion by extracting data sets from one source data store, transforming data structures to a target definition and loading into a target data store.
Function	Electronic Data Interchange (EDI)	This function comprises the capability to deliver electronic communication methods that provide standards for exchanging data via any electronic means, primarily between organisations. There are many EDI standards (including Rosetta, EDIFACT etc.), some of which address the needs of specific industries or regions.
Function	Business Rules Engine	This function comprises all applications that support the execution of business rules in a runtime production environment. A business rule system enables company policies and other operational decisions to be defined, tested, executed and maintained separately from application code.
Function	Process Orchestration	This function comprises all applications used to compose individual services and rules into executable business process models.
Component	Data Services	This component comprises all applications used to share information via APIs and services with partners and external agents in the PAO ecosystem.
Function	Partner Data Services	This function comprises all applications required to consume APIs and services exposed by partner or external agencies.
Function	Customer Data Services	This function comprises all applications required to expose PAO APIs and services to customers and partners in the ecosystem.
Component	Data Quality	This component comprises all applications used to automate the management of PAO data quality.
Function	Validation & Verification	This function comprises all applications required to validate and verify data at the point of on-boarding and manipulation.
Function	Data Cleansing	This function comprises all applications required to match, merge, parse, profile and standardise data.
Function	Data Quality Reporting	This function comprises all applications required to produce data quality dashboards.
Component	Master Data Management	This component comprises all applications required to process, govern and standardise that consistently define and manage the critical cross-domain PAO data to provide a single point of reference.
Function	Authoring and Enrichment	This function comprises all applications that support the authoring of master data, namely the creation of new records and the application of custom business rules and publishing.
Function	Harmonisation	This function comprises all applications that harmonise master data by merging data from different data sources, applying rules for duplicate suspects and survivorship.
Function	Golden Records & Master Data Store	This function comprises all applications that support the storage of harmonised master data.

TYPE	IDENTIFIER	DESCRIPTION
Component	Business Intelligence	This component comprises all applications used to support the collection, analysis, presentation and dissemination of business information.
Function	Operational Reporting & Management Information	This function comprises all applications used to provide single-domain or departmental level reporting.
Function	Analytics	This function comprises all applications used to provide cross-domain or organisational discovery, interpretation, and communication of meaningful patterns in data.
Function	Enterprise Data Store	This function comprises all applications used to store cross-domain information used for BI, typically a data warehouse or operational data store.
Component	Enterprise Content	This function comprises all applications required to systematically collect and organise structured and unstructured data sets.
Function	Corporate Search	This function comprises all applications involved in making content from multiple enterprise-type sources, such as databases and intranets, searchable to a defined audience.
Function	Documents & Workflow	This function comprises all applications required to track, manage and store documents.
Function	Semi-Structured and Unstructured Data	This function comprises all applications used to store and retrieve data not stored in a relational-style database management system (RDBMS), including images, social content, videos etc.
Function	Collaboration	This function comprises all applications used to allow different user groups to work together to create and publish content – includes, authoring, approval, workflow.
Function	Records Policy Management	This function comprises all applications used to manage the lifecycle of records in line with PAO policy, from creation through to archival and destruction.
Component	Big Data	This component comprises all applications used to process and analyse large amounts of unstructured and structured data sets, typically defined by the "3Vs" of velocity, variety and volume.
Function	External Data Collection	This function comprises all applications used to collect data sets from external agencies.
Function	Advanced Analytics	This function comprises all applications used to perform complex (e.g. predictive analytics), primarily based on algorithms and statistical techniques.
Function	Data Mining	This function comprises all applications used to discover patterns in large data sets involving methods at the intersection of artificial intelligence, machine learning, statistics, and database systems.
Function	Data Lake	This function comprises all applications used to provision a storage repository that holds a vast amount of raw data in its native format, including structured, semi-structured, and unstructured data.

Table 8: IT & Transformation Management

TYPE	IDENTIFIER	DESCRIPTION
Platform	Core Capabilities	See Common Conceptual Components.
Component	IT Management	This component comprises all applications used to manage a PAO's Information technology capability delivery including enterprise architecture, PMO, IT Delivery and IT Service Management.
Function	Enterprise Architecture	This function comprises all applications that support the PAO's architecture capability to develop, manage and govern architectures. Enterprise Architecture will typically adopt a recognised framework e.g. TOGAF, Zachman.
Function	Project Management Office (PMO)	This function comprises all applications that support the PAO's PMO business function to define and maintain standards for project management. Typically includes a document management solution and project management solution.
Function	IT Delivery	This function comprises all applications that support IT Delivery e.g. Application Lifecycle Management, source control, Integrated Development Environment (IDE's) , Environment Management, Continuous Integration (CI), Continuous Development (CD).
Function	IT Service Management	This function comprises all applications that support IT Service Management, likely to be based on ITIL (IT Infrastructure Library). This includes the following processes 1. Event Management, 2. Access Management, 3.Request Fulfilment, 4. Problem Management, 5. Incident Management and the following functions 1. Service Desk, 2.Technical Management, 3. Application Management, 4. IT Operations Management.

Table 9: Financial & Asset Management

TYPE	IDENTIFIER	DESCRIPTION
Platform	Core Capabilities	See Common Conceptual Components.
Component	Core ERP	See Common Conceptual Components.
Function	Fixed Asset	This function comprises all applications which support the fixed assets management process. Fixed assets management is an accounting process that seeks to track fixed assets for the purposes of financial accounting, preventive maintenance, and theft deterrence. A Fixed Asset Management solution will track the location, quantity, condition, maintenance and depreciation status of a PAO's fixed assets.
Function	Budgets & Allocations	This function comprises all applications which support the analysis, organisation and oversight of costs and expenditures for a PAO. This includes allocations which is the process of shifting overhead costs to cost objects, using a rational basis of allotment. Allocations are most commonly used to assign costs to products, which then appear in the financial statements of a PAO in either the cost of products sold or the inventory asset.
Function	Accounts & Ledgers	This function comprises all applications which support the following processes: General Ledger, Accounts Receivable, Accounts Payable and chart of accounts.
Function	Tax	This function comprises all applications which allow a PAO to configure, collect, manage and report on Tax. Typically integrated with other financial management solutions to consolidate tax information and generate tax reports.
Function	Statutory Reporting	This function comprises all applications that allow a PAO to produce data and reports that can be shared with relevant statutory bodies to ensure compliance. In addition this function may include regulatory reporting capabilities.
Component	Order-2-Cash	See Common Conceptual Components.
Function	Customer Invoicing & Collections (Inc. Cash)	This function comprises all applications which allow Orders to be raised invoices to be sent and payments to be collected.
Function	Customer Credit	This function comprise all applications which enable a PAO to grant credit, set the terms credit is granted on and recover this credit when it's due. This is the capability within a PAO to control credit policies that will improve revenues and reduce financial risks.
Function	Customer Order Disputes	This function comprises all applications which support the creation and management of complaints (disputes) with a PAO's customers with regard to incorrect invoices and credits or missing invoices and credits as dispute cases.
Component	Procure-2-Pay	See Common Conceptual Components.
Function	Supplier Procurement Catalogue	This function comprises all applications that allow PAO's to manage supplier catalogues including products and services. The catalogue can be maintained centrally or federated accessing supplier catalogues.
Function	Purchasing	This function comprises all the applications which support a PAO to raise and authorise requisitions, convert to a Purchase Order, send Purchase Order to a supplier, acknowledge receipt, receive and record invoice, 3 way matching and approve for payment.
Function	Supplier Payments	This function comprises all applications that support a PAO in terms of paying suppliers following approval for payment.

Table 10: HR

TYPE	IDENTIFIER	DESCRIPTION
Platform	Core Capabilities	See Common Conceptual Components.
Component	Human Resources	This component comprises all applications that manage a PAO's Human Resources. This includes Talent and Recruitment, Learning and Performance, Payroll, Employee Management, Discipline and Employee Benefits.
Function	Talent & Recruitment	This function includes all applications that allow a PAO to attract talent, manage and track the sourcing, selection, screening and on-boarding of applicants, train and develop staff, ensure staff retention, manage promotions, career planning, succession planning and exit management.
Function	Learning & Performance	This function includes all applications that allow a PAO to manage employee learning and performance including competency mapping and performance appraisal.
Function	Payroll	This function includes all applications that allow a PAO to manage and control payroll for all employees ensuring regulation compliance and associated payroll reporting.
Function	Employee (Management)	This function includes all applications that allow a PAO to search, maintain and view employee data e.g. name, position, business team etc., manage and implement HR policies, manage and track – joiners, movers, secondments and leavers, record and manage absence including specific leave of absence such as maternity, paternity, career break etc.; contract changes such as flexible working, fixed term contracts, change in hours, promotion, contingency workers etc.
Function	Discipline	This function includes all applications that allow a PAO to manage all aspects of employee discipline and grievance.
Function	(Employee) Benefits	This function includes all applications that allow a PAO to manage and maintain benefit plans for all employees.