Case studies on digital transformation of social security administration and services

CASE STUDY
DENMARK

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ACKNOWLEDGEMENTS

For further information please contact:

ILO Country Office for China and Mongolia
1-10 Tayuan Diplomatic Office Building
Beijing, 100600
China
https://www.ilo.org/beijing/
beijingl@ilo.org

UNU-EGOV
Campus de Couros
Rua Vila Flor 166
4810-445 Guimarães
Portugal
https://egov.unu.edu/
egov@unu.edu

1. INTRODUCTION

This case study on digital transformation of social security administration and services in Denmark consists of seven parts:

- The context of Denmark, digitisation and social security.

- Governance, intergovernmental collaboration and coordination in relation to technology for the digital transformation of social security and social assistance.

- Legal and regulatory framework, standards relating to digital transformation of social security and social assistance.

- Front-end service delivery ecosystem for social security administration and services in Denmark.

- Back-end service production ecosystem of social security administration and services in Denmark.

- Skills and capacities within social security entities and for social security clients and customers.

- Expanding Inclusion and coverage.

The case study concludes by summarising lessons learned from the Danish experience.

Specific links to core research questions and draft questions to guide the case survey and /or interviews are outlined for each section of the case study.

2. CASE CONTEXT

Denmark is a relatively small country with roughly 5.9 million citizens, but a considerably higher population density and level of urbanisation. Danish is the official language, and the country is considered a nation-state with a relatively small number of immigrants (or decedents thereof). While Greenland and the Faroe Islands are part of the Danish Commonwealth, this case study does not cover these. Denmark is a high-income country, with a corresponding standard of living and a more consistent GDP growth rate (Ozols & Meyerhoff Nielsen, 2018a). Denmark has also been a member of OECD since 1961, the EU since 1973, and of NATO since 1949.

Population (July 2021 est.)	5,894,687
Territory (km^2)	43,094
Population density (2020)[1]	146
Official language	Danish
Life expectancy / median age (2021 est.)	81.45 / 42
Urbanisation (%) of total population (2021)	88.2 % (2019)
GDP (PPP) (USD, 2020 est.)	326,2 billion
GDP per capita (PPP) (USD, 2020 est.)	55,900
GDP growth rate (%) (2019 est.)	2.85%
Unemployment (2019 est.)	3.05%
Imports (billion USD (2020 est.))	170.33 billion
Exports (billion USD (2020 est.))	191.53 billion

Table 1: Socio-economic data (CIA - Central Intelligence Agency, 2021)

Although various forms of social security have existed in Denmark for centuries, more structured approaches to alleviating poverty resulting from a series of reforms in the 1780's were sporadic, heavily dependent on charities and religious institutions. With industrialization and urbanization in the 1860s onwards, social benefits were expanded by industrialists, but as in earlier times these tended to focus on food aid for the extremely poor, homeless, orphans and the like. The expansion of the public sector provided social security and welfare services started in earnest in the 1930s, with the so-called "welfare state" – covering education, health, welfare and social security services - emerging more seriously during the 1960s.

Social security benefits in the Danish context cover a multitude of areas. Key areas and services include:

- Family, e.g. child benefits, child care, maternity/parental benefit.

- Health, e.g. public healthcare, sickness benefit, home care service, benefits to care for close relatives.

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[1] The World Bank (2021). Accessed 1-15 November 2021:
https://data.worldbank.org/indicator/EN.POP.DNST?end=2020&locations=AU-CA-DK-FR&name_deforsc=false&start=1961&view=chart

- Incapacity, e.g. industrial injuries (accidents at work and occupational diseases), disability pension, senior pension and flexi-job.

- Old-age and survivors, specifically old-age pension, early retirement and survivors.

- Social assistance benefits.

- Unemployment benefits.

As a rule, citizens and permanent residents are eligible to social security benefits, however additional qualifying conditions may apply. Nationals of any EU country as well as of the European Economic Area (i.e. Iceland, Norway, Liechtenstein and Switzerland) as well as the territories of Greenland and the Faroe Islands are covered if residing in Denmark, or if they lived here and gained entitlements in the past (e.g. pension).

Social security benefits are generally financed though income taxes, employers' and employee contributions. Set minimum benefits are established for potential recipients with top-ups often applied to help out low-income or marginalised recipients (e.g. single parents, low-income pensioners etc.).

In terms of organisation, specialised authorities at central government level set the parameters for a given area of social security, including legal, regulatory and operational parameters. These include eligibility, type of benefit (financial or non-financial), strategic and operational key performance indicators, and who is responsible for managing a given benefit. Two key principles of assessing eligibility are applied in the Danish social security context. Subjective assessment (i.e. based on an individual assessment of personal circumstances, context and preference within a framework of qualitative and quantifiable criteria), and objective assessment (i.e. based on a set of defined, quantifiable and binary criteria). With respect to digital transformation of social security, the assessment principle is of particular relevance, as objective assessment often requires in-person consultation to identity the most appropriate combination of financial and non-financial benefits for a given individual and their context. Subjective assessments are sooner binary, and may often be automated to a greater extent (DK1; DK2; DK3; DK4).

At an operational level, most high-volume, frequently requested social security services are managed by single centralised government agencies. These include many family benefits (e.g. child support, maternity/parental leave), various pensions, unemployment benefits which are manged by e.g. ATP and Udbetaling Danmark (UDK, Payment Denmark). These are often based on subjective assessment and eligibility criteria. Benefits based on objective assessment and eligibility criteria are generally provided in collaboration with other specialised agencies, authorities, or local authorities. These include non-financial benefits for e.g. seniors and incapacitated people, where ATP and UDK often work hand in glove with local authorities, or unemployment benefits provided by Styrelsen for Arbejdsmarked og Rekruttering (STAR, Danish Agency for Labour Market and Recruitment) in collaboration with the national network of government job centers and local authorities for non-financial jobs and career development. Similarly, a number of health benefit payments are managed by ATP and UDK, but in close coordination with non-financial benefits provided in collaboration with e.g. local home care provision managed by local authorities, and medical professionals (e.g. family doctors and hospitals) (DK1, DK2, DK3, DK4).

Internet access and a minimum level of digital literacy and competencies are essential pre-conditions for online service delivery to succeed. (Meyerhoff Nielsen, 2017b) Investment in the internet and communications infrastructure ensures that Denmark offers widely accessible online government services, by way of comparison. Denmark is among the most connected countries globally, with high rates of internet use and good availability of high-speed infrastructure.

Population covered by a mobile-cellular network (2020)	100%
Population covered by at least 3G mobile network (2020)	100%
Population covered by at least 4G mobile network (2020)	100%
Households with Internet access at home (2020)	93%
Mobile-cellular subscriptions per 100 inhabitants (2020)	123
Active mobile broadband subscriptions per 100 inhabitants (2020)	137
Fixed broadband subscriptions per 100 inhabitants (2020)	44
Individuals using the Internet (% of the population) (2020)	97%

Table 2: Connectivity and use of the Internet by households and Individuals (ITU, 2021)

Another essential element for the high online service take-up is the country's general ICT skills. Data shows that 65% of the population in Denmark possess basic ICT skills, while 56% have standard ICT skills. This gives government the opportunity to move towards the digital-by-default principle for public service delivery.

Basic ICT skills	65%
Standard ICT skills	56%
Advanced ICT skills	14%

Table 3: Basic, Standard, and Advanced ICT skills 2019 (ITU, 2021)

Denmark leads the world in providing government services and information over the Internet, according to 2018 and 2020 EGDI surveys (UNDESA, 2018, 2020). Denmark, the country occupying first place on EGDI (E-Government Development Index) in 2020, has consistently been amongst the Top-10 countries assessed by UNDESA EGDI, except for in 2014, when the country ranked 16th.
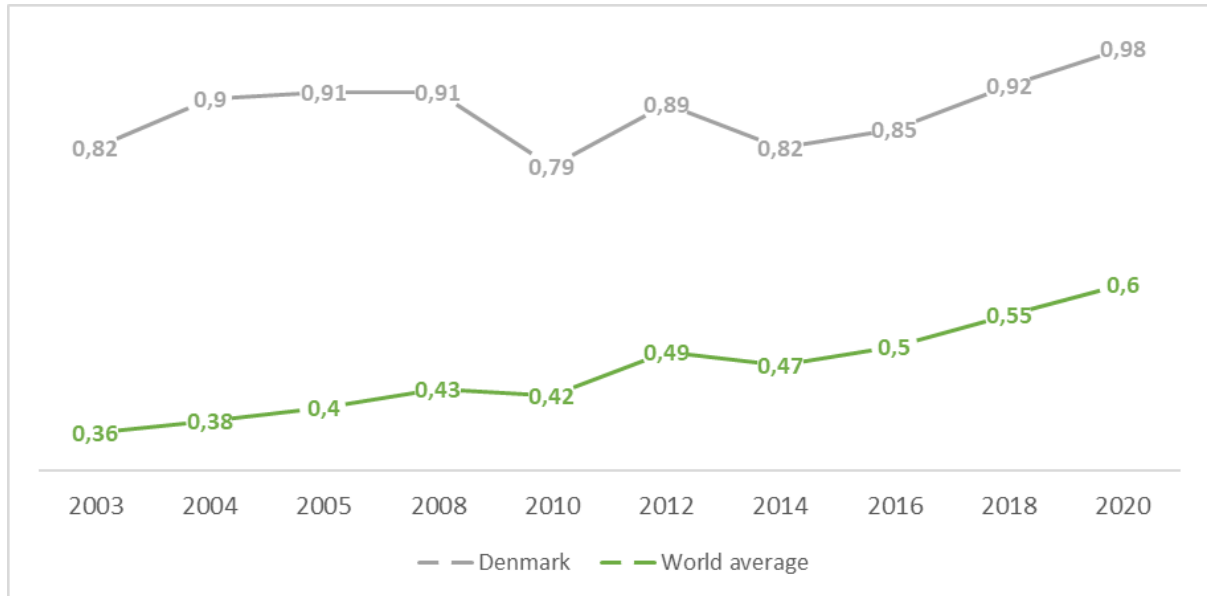
Figure 1: EGDI scores from 2003 to 2020 for Denmark and the World average (UNDESA, 2021)

While Denmark observed significant drops in their OSI scores between 2010 and 2014, it has consistently high OSI scores, as shown in Figure 2.
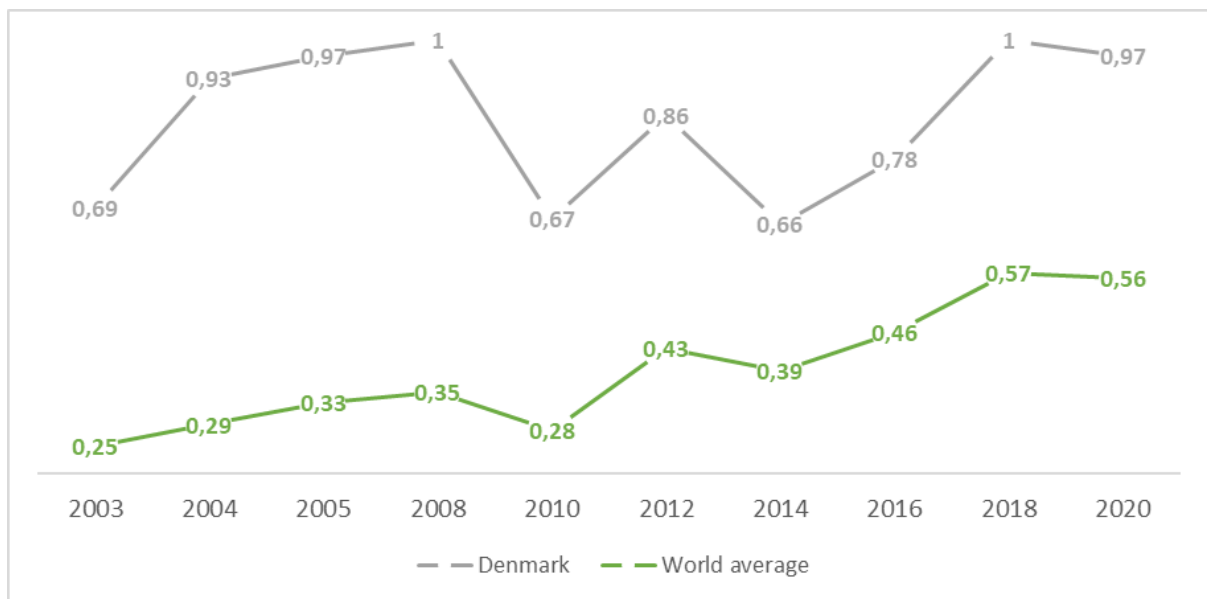
Figure 2: OSI scores from 2003 to 2020 for Denmark and the World average (UNDESA, 2021)

Digital transformation of social security in Denmark has evolved over time, but specifically. The potential of technology in service production and service delivery is closely linked to productivity and cost efficiency in the Danish context, not least with respect to social security, welfare and health care provisions. This has been especially evident as a result of an ageing population since the early 2000's, and the financial crisis of 2008. While the primary driver has been to drive efficiency within the public sector, service effectiveness and quality are key considerations (DIGST, 2010, Meyerhoff Nielsen, 2019; DK1; DK2; DK3; DK4).

There is a broad political and administrative consensus on the need, benefits and limitations of digital transformation and ICT as an enabling tool for public sector innovation. The use of technology is predominantly a non-political issue and to a large extent is driven by the public sector itself, with a high degree of strategic guidance by DIGST [*or Agency for Digital Government*] (DK1; D2; DK3; DK4; Meyerhoff Nielsen, 2020). With the strategic drive for digital-by-default and to eliminate "paper" channels during the 2011-2015 strategic period (DIGST, 20112), the political discourse centred around digital inclusion to ensure universal access to public services by potentially marginalised users, seniors and other end-users with no or limited digital skills. The levels of concern with respect to social security and welfare services were particularly profound. Close stakeholder consultation and collaboration with representatives of seniors, persons with disabilities, minority and immigrant communities, and local authorities expanded and strengthened communication and reinforced initiatives to raise awareness, digital skills activities etc. These were driven by local authorities, public libraries, run in retirement homes and the like. Entities such as ATP, UDK, STAR and job centers were also key drivers, with the first two of these also driving the online useability agenda ahead, including the first Danish usability standards in 2012. Over the last decade, primary political concerns were related to privacy and cyber security issues, although digital inclusion continues to be discussed and of interest, often in the context of unintended consequences of policy decisions or specific IT solutions or consequences (DK1; DK3; Meyerhoff Nielsen, 2021; Meyerhoff Nielsen 2020).

Denmark is an early mover for application of ICTs and coordination of eGovernment development, with a continuous and consistent focus on ICT investments in the public sector. Digital strategies have followed a trajectory similar to that of global leaders: starting with implementation of the base infrastructure (internal digitalisation and digital signature), the development phase of shared infrastructure, such as national portals borger.dk for citizens and virk.dk for businesses, as the digital entrance to the public sector), eID solutions, and communication platforms (Digital Post) (Ozols & Meyerhoff Nielsen, 2018b). The 2011-2015 strategy period focused on digital-by-default – termed mandatory online self-service for pedagogical and communicative purposes, to realise the potential benefits of digital infrastructures and the channels created. The cross-governmental strategy kicked off phased transition to digital self-service and communication, with a strategic goal of 80% of Danish citizens, and 100% of entrepreneurs' communication with public authorities moving to digitally based by 2015. More than one hundred central and local government procedures are now more or less mandatory as online provisions, 90+ per cent of all communication with citizens and businesses is now electronic – including for most social security services such as pensions, unemployment benefit, maternity/parental leave, child and family support which are now essentially completely digital (Ozols & Meyerhoff Nielsen, 2018c).

The fifth strategy "A stronger and more secure Digital Denmark", builds on past strategy and continues to focus on public sector productivity and efficiency, user-friendliness, and security. Themes include: automation of public administrative procedures; improved usability; welfare and primary care; data sharing and reuse (incl. the once only principle); a more coherent eGovernment framework (i.e. fewer silos); maintaining and improving the IT infrastructure; privacy and data protection (incl. cybersecurity); and improving the management of IT projects and common public programmes and efforts (incl. minimising the risk of failed IT projects, joint development and use of common infrastructures, components and data) (Meyerhoff

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Nielsen, 2016). The sixth strategy, launched on 5 May 2022, builds on past strategies with nine strategic objectives including: Enhanced cyber and information security; Developing coherent services for citizens and companies; Increased productivity to enable more time for the core task through increased use of technology; Increased growth and creating digital SMEs and addressing skills and labour shortages; Building a digital healthcare system of the future; Accelerating green transition through digital solutions; Creating a strong, ethical and responsible digital foundation; Putting Denmark at the centre of international digitisation, and; Equipping Danes for a digital future (DIGST, 2022).

The sixth strategy for 2022-2025 continues to focus on the efficiency and effectiveness of the public and private sectors and society at large. The challenges of the global climate crisis and the role of Denmark in supporting and setting standards for digital transformation globally are emphasised for the first time, but also optimising the country's global position and competitive advantage in technology and services for green and digital transitions. A unique feature of the Danish strategies and action plans is the cross-governmental focus, i.e. the focus on central, regional and local government, and its continued strategic focus on inter-governmental cooperation and efficient management. The Danish approach and business case following the digital-by-default and once-only principle to reduce administrative burdens are widely recognised, and have become the basis for many EU and OECD countries.

3. GOVERNANCE

Denmark has a three-tier public sector consisting of five regions and 98 municipalities, with a high level of local government autonomy, decision-making, and service delivery responsibilities (Ozols & Meyerhoff Nielsen, 2018c). To strengthen regional and local government capabilities, the 15 counties and 274 municipalities were merged into the current five regions and 98 municipalities as of 1 January 2007. Service responsibilities were decentralised with this structural reform. The regions are now responsible for hospitals, emergency services and some infrastructure projects (e.g. highways), whilst municipalities have responsibility for approximately 70-80% of the citizen services they deliver, including primary care, most primary services, primary and secondary care, urban planning and maintenance services, and act as service access points for central authorities, e.g. for obtaining passports, driving licences, national health insurance cards, for issuing eID's etc. A degree of central control is exercised via annual budget negotiations between the Ministry of Finance and ministries, the Danish Regions (DR), the umbrella organisation representing all five regions, and Local Government Denmark (LGDK) representing all 98 municipalities (Meyerhoff Nielsen, 2016).

Two key factors drove the digital transformation of social insurance administration and services in Denmark: First, an ageing population, and second the push for increased productivity within the public sector, including social security.

Central government is responsible for setting most of the parameters for social security and welfare services such as assisted living. Actual delivery is often distributed to either specialized shared service centres or the local authorities as summarised in Table 4.

Social Programs	Governance and mandated level	Service production and delivery
Healthcare	Central government Ministry of Health Hospitals implemented by regions	Hospitals implemented by regions Primary care by local authorities
Education	Central government Ministry of Education and associated agencies	Tertiary education delivered by self-governing bodies. Student grants and loans managed by specialised agency but managed by ATP/UDK Secondary and primary education managed by local authorities
Social Housing	Central government, local authorities	Public and private providers within the national framework. Social security payments related services such as rent and heating subsidies managed by ATP/UDK. Non-financial home assistance managed by local authorities in cooperation with ATP/UDK
Unemployment benefits	Central government (SM) and specialised agency (STAR)	Unemployment benefits and non-financial support managed by STAR, Job Centers and local authorities. Payments centralised in ATP/UDK. Job support for persons with disabilities etc managed in a similar way.
Low-income support	Central government (SM) and specialised agencies.	Social security payments related services such as rent, heating subsidies, income and pension supplements, child support, family support are

		managed by ATP/UDK. Non-financial home assistance is managed by local authorities in cooperation with ATP/UDK
Seniors	Central government and specialist agencies.	Various pension (senior, early retirement, disability etc) payments managed by ATP/UDK.
Children and families	Central government (SM) and specialised agencies.	Social security payments related services such as rent, heating subsidies, income and pension supplement, child support, family support are managed by ATP/UDK. Non-financial home assistance managed by local authorities in cooperation with ATP/UDK
Disabilities	Central government and specialised agencies.	Social security payments to people with disabilities are managed by ATP/UDK. Non-financial home assistance managed by local authorities in cooperation with ATP/UDK

Table 4: Governance of social service programmes (Sources: atp.dk, sm.dk, star.dk)

With respect to key social security payments, two key actors dominate. The ATP Group is Denmark's largest pension and processing company, and administers the national public pensions systems and its investment portfolio. ATP acts as the pension provider, investor and administrator of welfare benefits for almost all citizens and companies in Denmark. In short, ATP manages Denmark's universal Lifelong Pension system, also managing the investment portfolio to maximise returns on pension funds (including investments in bonds, equities, property and infrastructure). As a result, a public procurement process led to the establishment of a new centralized service entity (ATP, 2022; DK1; DK2).

Between 1 October 2012 and 1 March 2013, Udbetaling Danmark (Payment Denmark, or UDK) managed by the ATP Processing Business, assumed responsibility for five municipal areas: Family benefits (for low-income families), maternity/paternity benefits, lifelong state pension, disability pensions and housing benefit (for low-income households). The responsibility for international pensions and social security tasks transferred from the former Danish Pensions Agency to UDK on 1 June 2013. On 1 May 2015, five additional social security areas were transferred from the municipalities to UDK, including labour market exit benefits and international health tasks (i.e. the European health insurance card). As of 1 October 2016, UDK has managed the administration of repayment of student loans (or Statens Uddannelsesstøtte og lån), payment of civil service pensions, sickness benefit insurance as well as a number of government subsidies, loans and guarantees which were previously the responsibility of the State Administration's Financial Services Center (ATP, 2021b). As a shared services centre concept, municipalities and central government agencies pay the costs incurred by ATP for running UDK – although these are capped as per the agreement for each contractual cycle. The consolidation of financial social security and welfare benefits is anchored in a cost-benefit and outcomes analysis highlighting that unit costs and decisions varied substantially in municipalities, despite operating within the same legal and regulatory framework, but also with vastly different operating costs (i.e. unit costs). Currently, two-thirds of all welfare payments (by volume and amount) are conducted by ATP and UDK [2]. (DK1; DK2)

Local government is generally responsible for non-financial welfare and assisted living (DK2; D4). Similarly, the national network of Job Centers are responsible for promoting work and employment, and vocational training associated with unemployment or underemployment (DK3; D4). In practice this means there are formal processes for collaboration, coordination, and data sharing between both specialized national agencies such as STAR with Job Centers and local authorities (DK2; DK3; DK4). Similarly, between the centralised payment authorities of ATP and UDK with local authorities managing the non-financial welfare and assisted living services (DK1; DK2).

The digital transformation of social security is governed by the national strategic focus. Social security is viewed as services on a par with any other public sector service. Social security organisations must align their initiatives to the national strategic focus, comply with national standards and reuse key infrastructure components. The key enabler of digital transformation nationally is the Danish Agency for Digitization (DIGST, or Digitaliseringsstyrelsen in Danish). Since 2010, DIGST has been responsible for the Danish vision, associated strategies and action plans for eGovernment and digital transformation, including daily coordination of strategic initiatives. In practice this includes setting the overall strategic direction of digital transformation social security, e.g. digital-by-default, use of common standards and components. DIGST's mandate included initiating and ensuring benefit realization not just with the strategic success criteria and key performance indicators, but also compliance with national vision and objectives and also with standards (e.g. interoperability, usability, web accessibility, data protection, privacy, security), and reusing key infrastructure components (e.g. eID, single sign-on, service bus, national portals, digital post, single bank account, single sms notification system, single registries) [9], [13].

DIGST was created by a merger of key government players, including the Digital Taskforce (est. in 2005) in the Ministry of Finance, the Agency for Governmental Management, and the National IT and Telcom Agency departments responsible for standards, infrastructure and platforms relating to eGovernment. Policy documents and past research highlighted that the aim was to improve the efficiency and effectiveness of the governance model [10], [13], [14]. The merger also appears to be linked to the OECD 2010 recommendations, to strengthen the strategic focus to ensure a higher level of ambition and a more clearly defined driver and leader of Danish digitisation efforts, including defined mandates and responsibilities [15].

Between 2010 and 2015, decision making was primarily carried out at the Steering Committee for eGovernment strategy (SC). To strengthen the mandate, the new Portfolio Steering Committee (PSC) (i.e. Portføljestyregruppe in Danish) replaced the SC in 2016. The overall responsibility for executing the eGovernment strategy and its initiatives, previously held by the Joint Committee for Cross-Government Cooperation (STS), was incorporated in

the mandate of PCS [13].[2] This means that the PSC is also responsible for realigning the strategic direction of joint government use of ICT and digitisation, e.g. due to technological developments. The PCS members include key agencies responsible for social security, specifically ATP / UDK, but also STAR and Local Government Denmark (LGDK) and Region Denmark (RD), which represent the 98 municipalities and 5 regions respectively [13] (DK1; DK3).

Compared to its predecessors, the mandate of DIGST has been strengthened and enjoys wider recognition, in part helped by being an agency within the Ministry of Finance, hosting and chairing the joint, cross-governmental steering committee. The strength and recognition of the responsibility and mandate of DIGST are important when collaboration breaks down, or consensus cannot be reached either on a strategic or on an operational level [9], [17].

For each eGovernment action plan initiative, a programme or project steering committee or workgroup is established by PSC to ensure successful implementation. The aim is to ensure proper coordination of individual elements in a given programme or project, ensuring ownership across partners, and minimising the risk of unsuccessful completion through decentralised decision-making [9], [13]. The official organigram of the eGovernment strategy and action plan set up is illustrated in Figure 3.
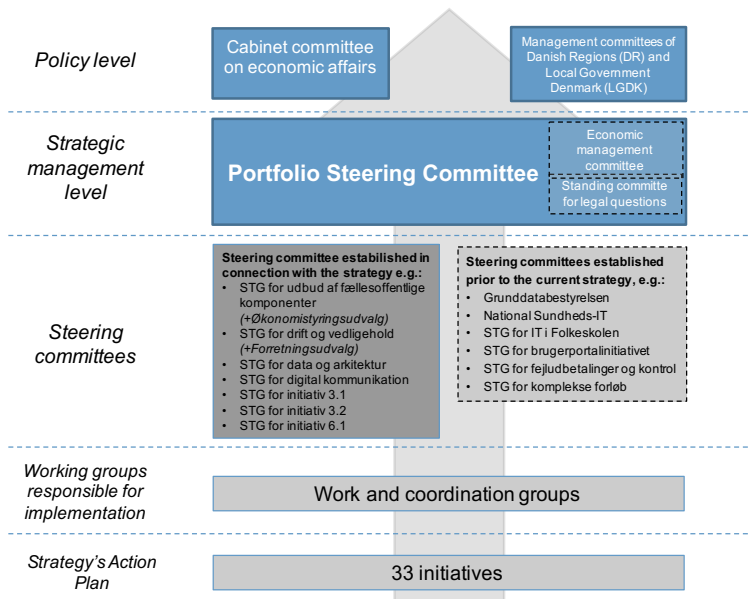
Figure 3: Organigram of the eGovernment strategy, Portfolio Steering Committee and project steering committee in Denmark 2016-2020 [11], [13]

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[2] The Joint Committee for Cross Government Cooperation (STS) operated from 2010-2015, when its mandate was incorporated into the PSC DIGST (Digitaliseringsstyrelsen, 2016). Chaired by the Ministry of Finance, the STS met ca. four times annually and consisted of permanent secretaries sitting in cabinet committees for coordination and economic affairs and management committees of Danish Regions (DR) and Local Government Denmark (LGDK). The STS advised individual ministers in the cabinet before eGovernment strategy was presented to parliament for approval by the Minister of Finance, on behalf of the government.

In practice, quarterly and annual status reports on progress, effect, and agreed goals for the digitisation strategy are prepared by individual initiatives and submitted to the PSC for approval. Like its predecessor, the PSC conven 10-12 times annually. The changes are seen to strengthen operational and daily coordination and efficiency of the governance model [9], [13]. The role of DIGST to set the strategic direction and of the PSC as an operational coordination forum is considered as being a key driver of digital transformation by social security stakeholders, and of great benefit to their own initiatives, not least establishing and maintaining key standards and enabling the infrastructure of electronic identity management, data exchange, digitisation-ready-legislation (DK1; DK2; DK3; DK4).

The collaborative and consensus-seeking approach can be time-consuming and resource-intensive. For instance, the greater frequency of steering group meetings may be positive, but the increasing number of meetings and reporting requirements may become disproportionally resource intensive. To balance the need for daily and strategic management, individual programme and project steering committees and working groups report to PSC monthly and escalate issues to the forum if needed. That change is a continuous process is illustrated by the ex-ante, ex post-assessment at the end of each strategic cycle to establish what to focus on next. Notably, improved governance, intergovernmental cooperation, and management of ICT initiatives is a recurrent strategic theme now, in over two decades of Danish eGovernment strategies [9], [33] – and emphasised as positive by a number of social security actors (DK2; DK3).

For horizontal and whole-of-strategy issues, the PSC is supported by two standing committees: One for legal matters (i.e. Stående udvalg om juridisk spørgsmål in Danish), and one for financial and budgetary (i.e. Økonomiudvalg) issues. The legal committee provides suggestions for regulatory and legal realignment to facilitate increased value creation of increased use of ICT solutions and data within the public sector and society. The financial and budgetary committee is tasked with overall financial management of the eGovernment strategy and action plan, including management of underspending and over-spending at the initiative level and spending proposals – in part underpinned by use of the joint-governmental IT programme and project model. The committees are generally asked to provide input by the PSC, often proposed by individual initiatives or identified as potential holistic issues to be addressed [9], [13], [15], [16].

In addition to the whole-of-government approach to governance and eGovernment strategies, there is the Danish tradition for broad parliamentary support for a national strategy and reform programmes. This includes support from both sides of the parliament to ensure continuity in the strategic direction of the country and prevents stop-starts and major zig-zag's in the strategic vision of digital transformation [9], [10], [14], [17]. With respect to social security services, these are regarded as being part of the larger public sector ecosystem by other the government and social security actors (DK2; DK3; DK4). The Danish governance

model's decision-making flow structure is illustrated in Figure 4 and is summarized in Table 5.

Figure 4. Denmark's eGovernance and coordination model since 2016 (Meyerhoff Nielsen & Jordanoski, 2020)
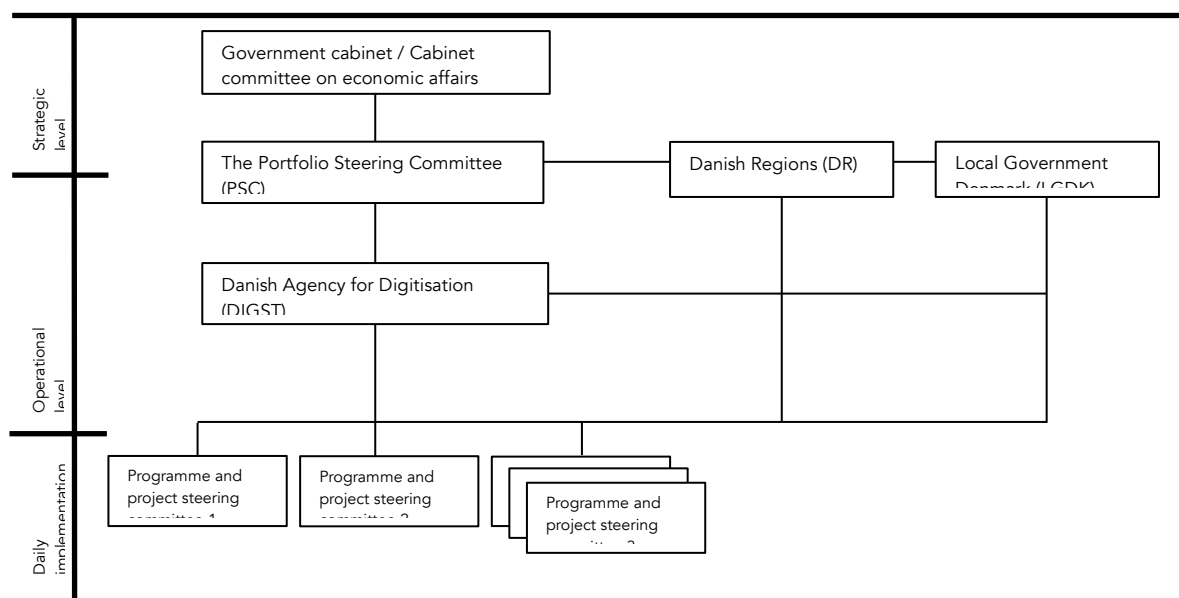
	Co-ordination of strategy implementation	Wider co-ordination for the development of information society
Vision	DIGST and the PSC	DIGST facilitated consultation
Strategy	DIGST and the PSC	DIGST facilitated consultation
Implementation of action plans	DIGST Programme and project steering committees PSC for escalation	DIGST Programme and project steering committees
Implementation of individual initiatives	Programme and project steering committees Individual Ministries and authorities	Programme and project steering committees
Monitoring and measurement	Individual Ministries and authorities but reporting to DIGST and the PSC on key operational and strategic objectives and pre-defined key performance indicators.	Individual Ministries and authorities but reporting to DIGST and the PSC on key operational and strategic objectives and pre-defined key performance indicators.

Table 5. Denmark's eGovernance and coordination model since 2016 (Meyerhoff Nielsen, 2017a)

Like a majority of countries, key Danish central government actors are responsible for social security services (incl. ATP / UDK), tax, interior, education, health, core registers, cadastral data and contribute to a central eGovernment decision-making body, i.e. the PSC. A unique feature of the Danish approach is the inclusion of management committees of umbrella organisations of DR and LGDK in the PSC [17], [35]. Umbrella organisations representing local and regional governments exist in multiple countries worldwide. Many of these local and regional stakeholder organisations have eGovernment strategies for the specific level of

government, such as the Association of Netherlands Municipalities [36] and Sveriges Kommuner och Landsting (*in Sweden*) [37].

Local government is particularly interesting in relation to the strategic direction as it is close to citizens and businesses and often provides more than just public services. Danish municipalities are no different and provide roughly 80% of all citizen and business services (including passports, health insurance cards and drivers' licences, e.g. national authorities). What is unique, is neither the LGDK nor the LGDK and 98 Danish municipalities adopted a local government eGovernment Strategy and action plan, but that they did this prior to consultation on a national equivalent. While ATP / UDK took over a number of social security areas from municipalities and central government agencies, this has not changed the significance of local authorities in relation to digitisation. Combined with direct representation in the PSC, this enables local authorities to directly influence the country's strategic direction in a number of areas. For instance, municipalities spearheaded active channel strategies and digital-by-default initiatives prior to national authorities, setting the tone for the national eGovernment strategy in 2012-2015, including the national business case for this. Local authorities have actively pushed for new legal frameworks for application of disruptive technologies, eliminating paper in favour of online delivery, adjusting regulatory frameworks for user-centric life events as well as smart cities initiatives, but also improving usability of existing infrastructure components such as eID and digital post as they are the front line for complaints and feedback [9]. Similarly, individual social security organisations have their internal strategies, but these are guided by the national strategic focus with respect to ICT and digital transformation. Generally, these individual social security strategies incorporate the targets set by DIGST and PSC, and complementary targets relating to the individual organisations mandate and priorities (DK1; DK2; DK3).

The creation of UDK, led ATP to take a more proactive role in relation to digitisation, including strengthening the role of single one-stop portals, as the existing borger.dk and virk.dk actively support a more ambitious approach to user-centric standards for service design and usability, and promote online service channels to increase the quality of online service offerings and technology-enabled productivity through data exchange and automation (Meyerhoff Nielsen, n.d.) (DK1). In short, Danish government levels are coordinated and integrate spheres forming a whole (rather than isolated strategic spheres), with municipality-level initiatives being elevated to national strategy and at times expended to regional and central government actors, and vice-versa (Meyerhoff Nielsen, 2019; Meyerhoff Nielsen & Jordanoski, 2020), with similar observations being made by social security actors (DK1; DK2; DK3; DK4).

Confirmed by policy documents [11]–[13] and previous research [10], [15], [17], [18], citizens, businesses or academia are nonetheless not directly represented in any aspects of the formal governance model. That said, DIGST carries out formal and informal consultation prior to each new eGovernment strategy. Both the IT sector (e.g. *Dansk ITs politiske udvalg for IT i*

den offentlige sector and the Danish IT industry's political committee for IT in the public sector), the private sector (e.g. Danish Industry), and citizen groups (e.g. senior citizen representatives) are allowed to provide suggestions and comments. Similarly, private vendors contracted to implement individual initiatives generally participate in relevant programme and project steering committees and working groups and indirectly provide input [9].

4. LEGAL AND REGULATORY FRAMEWORK, STANDARDS

In Denmark, central government is responsible for enacting relevant legal parameters, regulations and standards. Denmark's EU membership means that central government is required to enact relevant EU laws and regulations. EU level recommendations and rules influence the Denmark's legal and regulatory framework with respect to digitisation. For instance eIDAS for eID, EIF for IOP, once-only for date reuse plus TOOP pilot for cross-border services, GDPR for privacy, WCAG AA for web accessibility. However, Denmark may adopt its own model and approach as long as it is aligned to EU recommendations. In terms of standards, the Danish Government integrates international standards. Laws, regulations and standards are applicable at all levels of government and for all service areas including social security (DK1; DK3; DK4).

Denmark deviates from many of its European and global peers by having a strong focus on whole-of-government approaches to key infrastructure and components, also shared with the private sector (e.g. eID/eSignature, digital post, data sharing). This focus has benefitted social security actors in a number of ways. Specifically, the legal and regulatory framework establishes a common reference context for all public sector actors and associated services. Internal standards do not need to be maintained, as national standards are adopted. For instance, common usability, EA and IOP standards means that challenges with respect to front-end design are minimised for end-users as there is a common look-and-feel across government websites and online services (incl. style of communication and language use), that technical, semantic and organisational interoperability is streamlined, therefore minimising the complexity of systems integration and data exchange and reuse (DK2; DK3). The value of the consolidated and coordinated approach is acknowledged by the majority of social security actors (DK1; DK2; DK3; DK4). The table provides more details on Danish legal and regulatory frameworks.

	yes/no	Name of acts and regulations	Description
General eGovernment legislation	no	n/a	There is no general eGovernment legislation. However, there are several acts and regulations for *digital-by-default* foundations, such as: • **Mandatory digital self-service Regulation (2012)** The first piece of legislation for digital self-service was adopted In June 2012, which made the first set of digital self-service solutions mandatory. Since then, additional legislation has been passed to make second and third sets of solutions mandatory. A fourth and final set of digital self-service solutions became mandatory in December 2015, resulting in more than 100 different service areas that must only be used in an online context (eGovernment in Denmark, 2018). • **Public Digital Post Act (2012)** The Act was adopted in 2012 and requires citizens and businesses to have a digital mailbox to receive digital messages, letters, documents, etc., from public sector authorities, rather than paper-based letters by traditional post. The act also states that digital messages transmitted via the Digital Post solution have equal status and validity as paper-based letters,

			messages, documents, etc. The act covers all citizens over the age of 15, and all businesses. The act came into effect for citizens on 1 November 2014, while it became effective for businesses on 1 November 2013 (eGovernment in Denmark, 2018).
eID and PKI legislation	yes	• EU Regulation No. 910/2014 on electronic identification and trust services for electronic transactions in the internal market (eIDAS Regulation) 2014 • Act on Electronic Signature (2000)	• **EU Regulation 910/2014** Regulation (EU) No. 910/2014 on electronic identification and trust services for electronic transactions in the internal market (eIDAS Regulation) is a legal framework providing mandatory unified legal rules within the EU for electronic identification (eID) and for electronic trust services (such as electronic signatures, seals, time stamping, delivery services and website authentication). • **Act on Electronic Signature (2000)** This act regulates issuing and validity of digital signatures and their functional equivalence with handwritten signatures. The Danish Government launched an official digital signature scheme - NemID, which can receive free software-based digital signatures.
Access to Public Sector Information	yes	• Access to Public Administration Documents Act (2014)	• **Access to Public Administration Documents Act (2014)** The Act applies to central, regional and municipal authorities and companies in which the government has a substantial interest in ownership, for companies making decisions on behalf of the government, for Local Government ('KL' the association of municipalities) and Danish Regions ('Danske Regioner', the association of regions) and allows any person to request documents for administrative files (eGovernment in Denmark, 2018).
Security, Data Protection and Privacy legislation	yes	• General Data Protection Regulation (EU) 2016/679 • Act on Processing of Personal Data (2018) • Public Administration Act (1985) • Publicity and Freedom of Information Act (1985) • Public Records Act of (1992) • National Registers Act of (2000) • Act on Electronic Communications Networks and Services (2014) • Act on Marketing Practices (2013)	• **General Data Protection Regulation (EU) 2016/679** GDPR replaces the Data Protection Directive 95/46/EC, and its goal is to harmonize data privacy rules in the EU, protecting EU citizens' privacy and to harbour a new approach to data privacy and impose new rules and standards, relating especially to the territorial scope, data subjects' rights, consent standards, fines, etc. Notably, the GDPR strengthens data subjects' rights by establishing clear rules and standards, such as the rights to information, access, rectification, to withdraw consent, to object (in general), to object to automated processing, to erasure (Right to be forgotten) and data portability. Also, notification of breaches is one of the new aspects but is a key improvement to this regulation. • **Act on Processing of Personal Data (2018)** The Act is a complementary law and provides provisions for the sections and areas that the Regulation leaves up to countries, to adopt specific national rules.
Re-use of Public Sector Information	yes	• Act on the re-use of public sector information (2014)	• **Act on the re-use of public sector information (2014)** The Act established uniform rules for using and re-using public sector information. The Act fully replaces Directive /2013/37/EU of 26 June 2013, which amends Directive 2003/98/EC on the re-use of public sector information.
eCommerce legislation	yes	• Act on Information Society Services and Electronic Commerce (2002)	• **Act on Information Society Services and Electronic Commerce (2002)** The Act implements Directive 2000/31/EC of 8 June 2000 on certain legal aspects of information society services, in particular, electronic commerce in the Internal Market (also known as the "eCommerce Act") (eGovernment in Denmark, 2018).

	yes/no	Solution	Description
eCommunication legislation	yes	• Act on Electronic Communications Networks and Services (2011) • Public Digital Post Act (2012)	• **Act on Electronic Communications Networks and Services (2011)** The Act came into force on 25 May 2011, and it replaces most of the EU regulatory framework for electronic communications, namely: Directive 2002/21/EC ('Framework' Directive); 2002/20/EC ('Authorisation' Directive); 2002/19/EC (Access and Interconnection Directive); 2002/22/EC ('Universal service and user's rights Directive); and 2002/58/EC ('ePrivacy' Directive).

Table 6: Denmark eGovernment related legal acts

	yes/no	Solution	Description
Electronic ID	yes	NemID	Denmark has had a common eID solution since 2003 called NemID (EasyID), used by public and private sectors alike. While physical picture and image identification is not legally mandatory in Denmark, and no national ID-card exists, eID and digital signatures (i.e. NemID) have been mandatory since 2012 for companies and since 2013 for citizens and residents for interactions with the public sector. The model is based on mandatory specifications, active opt-out, a model used for online service provision.
Public Key Infrastructure (PKI)	yes	NemLog-in	The Danish scheme was developed and is being used across the public and private sectors alike, thereby providing a unified user-experience for citizens, and boosting take-up levels as a result. Since 2013, all Danes are, by default, issued a digital identity.
Single Sign-On (SSO)	yes	NemLog-in	NemLog-in has a central role in the digital infrastructure, including the SSO for all government platforms and portals.
National data exchange platform	yes	Danish Basic Data Programme	The Danish Basic Data Programme has established a centralised data distributor to facilitate the once-only principle.
Once-only principle	yes	Danish Basic Data Programme	The once-only principle is realised through the Basic Data Programme
Digital post	yes	Digital Mail Box	All government entities must be able to send and receive digital posts via the national infrastructure, but may divert away from digital communications. Where physical letters are issued, this happens through a remote print and post shared service solution allowing for a digital back-office and cost-savings, even if the end-user a should receive a paper-based message. This enables businesses and citizens to access their electronic posts from both private companies and public authorities in a single digital mailbox on borger.dk and virk.dk (eGovernment in Denmark, 2018). The digital mailbox became mandatory for businesses in 2012 and for citizens in 2013. Like the eID, there is an opt-out for the digital post if a user is in a unique position, lacks access to the internet or digital skills and competency.
Usability service standards	yes	Usability Guide (Udviklingsvejledning for god selvbetjening)	Denmark developed a usability guide titled Udviklingsvejledning for god selvbetjening, loosely translated as 'the development guide for good online self-service'. The guide contains 25 measurable minimum requirements and is mandatory for the approximately 70 high-frequency, high-volume government websites and eServices created in the digital-by-default initiative; but remains voluntary for other service areas. Guidelines include process recommendations, usability criteria, coding examples, tools and templates; there is also a practitioners' community, including vendors. Stylesheets, wireframes and code are developed in open HTML code and bootstrap, APIs to call up stylesheets for visual integration to citizen and business portals are available to unify the service experience, even if an eService is relevant for both businesses and citizens. All relevant central, regional and local authorities are responsible for ensuring compliance, but the portals have a screening and escalation process in place to Identify and action cases of non-compliance. Where non-compliance remains challenging, portals may escalate these issues to the PSC. Currently, Denmark is developing a new usability guide, but published the new mandatory design for the business portal virk.dk and the citizen portal borger.dk requirements in April 2019.
Personalized and proactive services	yes	Through borger.dk, virk.dk and any other specialized portal	The national one-stop platforms allow for increasing levels of personalization through the "my page" sections.

Table 7: Availability of the major key enablers and standards in Denmark

5. BACK-END SERVICE PRODUCTION ECOSYSTEM

In the Danish context, each public sector entity is responsible for its own service portfolio. While regional and local authorities enjoy a large degree of local autonomy and decision making power, this must be conducted within the framework and parameters defined by the relevant central government ministry or agency. This includes legal and regulatory framework, strategic direction and performance objectives etc. including in the areas of digitisation, social security and welfare services managed (by regional and local authorities or sub-contractors and partners from the private sector).

Denmark has established an ecosystem of specialized portals and complimentary service or entity-specific websites. Key here for government services, including social security, are:

- Borger.dk, the citizen portal covering all levels of government. All relevant content, data and transactional services must be accessible from the portal and must comply with relevant technical, usability and web-accessible standards, including visual integration and single sign-on. Still, they may also be accessible from other websites.
- Virk.dk, the business portal covering all levels of government. All relevant content, data and transactional services must be accessible from the portal and must comply with relevant technical, usability and web-accessible standards, including visual integration and single sign-on. Still, they may also be accessible from other websites.

Both portals are based on similar conceptual and technical approaches: a content management system, a common information architecture, design and style guides for language use, form and functionality, reuse of standards and components, and web accessibility compliance and responsive web design. This is supported by service catalogues containing all information, data and transactional services. Meta tagging is applied for service area, responsible authority, vendor, single contact points, target audience, etc. This is based on the unique meta tag taxonomy of unique service, authority, vendor and service IDs for management and mashing up content on the portals.

Interestingly, with the creation of UDK, ATP chose a channel strategy, meaning that their service portfolio is only available from the national portals and nowhere else. The channel strategic decision by ATP / UDK has been a key driver for both portals becoming actual national one-stop portals, thus indicating the strategic role social security service providers may play in driving digital transformation of the entire public sector service portfolio (DK1; Meyerhoff Nielsen 2017; Meyerhoff Nielsen, 2020). A number of common national standards and infrastructure components underpin the portals.

Digital design and web-accessible guides, requirements and toolkits plus "digital user journey guides" for the eleven most common life events for citizens, and ten for businesses as well as a **reference architecture** for implementation published in December 2018 as part of the White Paper on a Common Public-Sector Digital Architecture (https://arkitektur.digst.dk/sites/default/files/white_paper_on_a_common_public-sector_digital_architecture_pdfa.pdf) published in June 2017. ATP and UDK were both key

stakeholders involved in the development process, but also in the subsequent updates (DK1). Social security actors in Denmark actively apply the design and web-accessibility guide across their websites, apps, and online services (DK1; DK2; DK3). Similarly, co-creation, user testing and feedback principles recommended by the guide (DK2; DK3)

The **eID and digital signatures infrastructure** are key for identity management, including validation, security, trust, privacy and fraud prevention. Since 1 July 2010, **NemID** (https://www.nemid.nu/dk-da/), the national digital identity and digital signature, has provided easy and safe access to a wide range of public and private self-service solutions on the web, including eBanking, tax forms, insurance and pension funds. With this digital signature, citizens use the same user ID and password for online banking, government websites and a wide range of private services online. NemID resulted from collaboration between the state, municipalities and regions, the financial sector, and a private contractor. Some 5.4 million personal NemIDs have been issued to citizens from the age of 15 upwards, and are actively used by some 95% of the eligible population, with an average of some 50 million monthly transactions being conducted with the public sector alone (similarly in future for banking) in 2021 (up from an average 40 million per month for banking and 25-30 million for public services in 2018-2019)[3]. In addition, NemID can now be used by business owners in more than half a million companies as a way to log in to digital self-service solutions (for example, borger.dk, virk.dk and Digital Post) on behalf of the business entity, making reporting to the public sector easier, especially for SMEs. Previously, a NemID Employee Certificate was the only electronic key to digital self-service solutions. In cooperation with the Danish Association of the Blind, a special solution was also developed for blind and partially sighted people. The Agency for Digitisation is responsible for developing an efficient and secure infrastructure for digital signatures, continuously supporting the demand for a safe and leading knowledge society in Denmark. The replacement of NemID was launched as MitID (MyID) in October 2021, following some delays (approximately two months). As a soft launch, the roll-out will be completed by the middle of 2022[4]. All public sector social security providers use the national IDM infrastructure for end-users identity management and digital signatures (DK1; DK2; DK3; DK4), including as employee signatures for internal processes (DK2; DK3).

NemLog-in is a central part of the public infrastructure, and consists of different components. First, NemLog-in[5] ensures that users can access all public self-service solutions across all levels of the Danish public sector with a single login (WebSSO). When logging in to a public website such as borger.dk, users will be redirected to the NemLog-in login page and returned to the website after login. NemLog-in also enables citizens and employees to sign legally binding documents by digital means. Furthermore, NemLog-in ensures that organisations can delegate rights to their employees and powers of attorney to external users, to ensure that the right people can access digital public self-service solutions. In addition, if help is needed in digital self-service solutions, e.g., accessing digital health information or changing address digitally, citizens can also give a power of attorney to, for example, a relative. Lastly, NemLog-

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[3] https://digst.dk/it-loesninger/nemid/tal-og-statistik-om-nemid/

[4] https://itwatch.dk/article13108987.ece, https://digst.dk/it-loesninger/mitid/

[5] https://en.digst.dk/digitisation/nemlog-in/

in includes a component where public authorities and their IT vendors can manage the connection of self-service solutions to NemLog-in.

The **Danish eIDAS infrastructure**, also known as the eID-Gateway, went into production on 28 August 2019. The eID-Gateway consists of the DK eIDAS Connector and the DK eIDAS Service. Currently, 69 eServices are connected to the DK eIDAS Connector, integrating other notified eIDs. Five countries by the end of 2019, but more are being integrated (status unknown at present). In January 2020, Denmark finished notifying the Danish eID, NemID, in accordance with Article 9 of Regulation (EU) No 910/2014 on electronic identification and trust services for electronic transactions in the internal market. Once the Official Journal of the European Union (OJEU) has published the official opinion, and Denmark has finalised implementation of the technical changes required for the NemID infrastructure, EU Member States will start work to integrate NemID into their respective eIDAS nodes. Like other key joint-governmental infrastructures, social security organisations make active use of the data distributor. It is a key enabler for organisations like ATP, UDK and STAR to access data from core registries but also to exchange data with other government partners (at all levels). Plugging in to a shared trusted service infrastructure helps minimize costs for social security organisations and partners. Similarly, a broader base of IT vendors have the skills to provide assistance, as a single national standard and technical set-up exists (DK1; DK2; DK3).

Electronic payments (ePayment) are based on two components. First, DIGST is responsible for the **NemKonto**[6] (EasyAccount) solution, supporting secure payments from public authorities to citizens and businesses. That is, all citizens, residents and organisations must have a single bank account registered with the NemKonto (domestic or foreign accounts are allowed). This is maintained in a single register, with the end-user able to change the details at any given time however, on the personal pages of borger.dk, virk.dk or the tax agency portal skat.dk (single solution accessible from all three portals). All public entities making a payment will use the registered NemKonto account as a shared service. Second, as the majority of government services do not have a service fee, payments to/from the government rely on the commercial banking system. Service fees for passports, social security cards, tax and social security contributions are made by the end-user through their commercial bank accounts, including single or automatic payments, or by using debit and credit cards, mobile pay etc. Income tax and social security contributions by individual employees or employers are made by similar means. All employers make tax and social security contributions for permanent and long-term employees. Self-employed individuals (incl. the gig economy) and seasonal workers do so directly. All social security organisations responsible for financial transfers make use of the NemKonto infrastructure. By mandating all individuals and all organisations (public and private) to register and maintain an account number lowers the administrative burden, and increases the cost efficiency and productivity of organisations such as ATP, UDK and STAR, as a single shared and trusted source of bank account information can be accessed (DK1; DK2; DK3).

Coordination of Interoperability is the responsibility of DIGST. Various initiatives exist to improve coordination of interoperability in different fields related to digitisation-. As a result

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[6] https://en.digst.dk/digitisation/nemkonto/

of the Digitisation Strategy and Digitisation Pact, DIGST hosts three specific steering committees for Digital Infrastructure, Digital Communication, and Technology and Data. The steering committees, including different authorities (central, regional and local government), ensure interoperability and coherence in public digitisation. The three main committees are complemented by different topic-specific steering committees, e.g., cyber and information security, basic data, etc. As DIGST is represented in all these steering committees, the agency works to ensure efficiency and interoperability across all sectors. Social security entities partake in relevant steering committee meetings, and is particularly active is ATP and UDK as well as LGDK and DR (DK2). Coordination and collaboration is also occurs on a sectorial and service level. For instance, STAR coordinates formally with its local government partners and Job Centers. Similarly ATP and UDK coordinate with their local government and regional partners, although LGDK and DR often coordinate on the strategic level, and for operational issues with individual entities. (DK1; DK2; DK3).

Base registry coordination is completed through the central **Data Distributor**[7]**,** to distribute core data. Basic Data (i.e. the centralized service bus and data exchange infrastructure)[8]was established as part of the Basic Data Programme. While the **Basic Data Programme** covers the most frequently used data required for service production and delivery, at present no government-wide data network exists in Denmark. In practice, processes for quality assurance and data governance are applied by most government entities, when it comes to data received from base registries. That is, that formal data quality assurance and analysis exists on an internal level and when potential errors or incorrect data is identified, this is communicated to the base registries for clarification. For example, ATP, UDK and STAR all have formalized internal process for quality assurance and for communicating with base registries.

The national **Reference Architecture** facilitates data and documents electronically for data exchange. The reference architecture revolves around describing the disclosure of data by transmission. Disclosure by transmission focuses on the actual action of passing on data. By contrast, the interpretation of sharing of data is broader and includes making data available for potential reuse, even if data may never be accessed. The main purpose of this reference architecture is to provide guidance, and assist in the choice between two fundamental business patterns for the disclosure of data by transmission:

- Transmission on request: typically, system-to-system integrations using an API, and;
- Transmission by message: typically, legally binding communication of data (possibly in the form of documents) from public authorities to citizens and businesses, but also a classic pattern in the system-to-system integrations.

The fundamental difference between these two scenarios is the actor transmitting data or the actor receiving data being responsible for concrete data process flow. The national **Guidelines and Rules for Data Modelling** ensure that concepts and data are thoroughly and correctly described and documented. Guidelines on REST-based Webservices and APIs

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[7] Datafordeler, https://datafordeler.dk/
[8] https://digst.dk/data/grunddata/

describe best practices for designing, specifying and documenting web services in public sector IT solutions. These standards are applied across social security entities, with a majority confirming that national guidelines are of value to the efficiency and effectiveness of internal data governance processes. Still, the national guidelines are complimented by internal processes. A number of social security entities also highlighted that the combination of legal and regulatory frameworks, standards and guidelines, the quality of base registries and shared infrastructure are key enablers for digital transformation of social security and the public sector as such (DK1; DK2; DK3; DK4).

The **Data Distributor and reference architecture**, guidelines, and rules for data modelling are complemented by the **Catalogue of Base Registries**. DIGST established a Dataset Catalogue to facilitate a consistent manner in dataset descriptions and metadata while providing an overview of public sector datasets and base registries. The two catalogues do not distribute the datasets themselves but contain links, contact information, etc. Data users can contact the data custodians for additional information. The data contained in any public dataset can be shared through the Data Distributor if this is in line with national legislation (e.g. for security, data protection, privacy) and complement the interoperability standards, reference architecture, data modelling guidelines and rules. **Base Registry Data** from the following base registries have been made available via the Data Distributor: the Danish Address Register (DAR), the Central Business Register (CVR), Danish Place Names Register (Danske Stednavne), Danish Administrative Geographical Division (DAGI) Register, the Civil Registry of Personal Data (CPR), the Register of Buildings and Dwellings (BBR), the Cadastral Register, GeoDanmark, the Register of Property Valuation (VUR), the Register of Owners of Real Property (EJF) and the Register of Property Location (EBR). The existence of core base registries since the 1960's has been emphasized as a key enabler of efficient and effective data governance, and digital transformation of both back-end and front-end ecosystems – both by social security organisations, the public sector, international experts and organisations such as the EU, OECD, UNDESA and the World Bank – the value created by base registries has been furthered by the data distributor, but also allows social security organisations to take advantage of big data analytics and reduces the barriers obstructing application of AI and Machine Learning technologies, as large volumes of high quality and trustworthy data exist (DK1; DK2; DK3; Ozlos & Meyerhoff Nielsen, 2017). Key enabling factors, particularly with respect to data include the quality of individual datasets and registries. Still, quality assurance is considered essential, not least semantic IOP (esp. key terms in legal and regulatory issues) and alignment of legal concepts and data. IOP and sematic alignment allow for data-based automatization of key decisions, including calculations based on changing circumstances of individual beneficiaries and legislation, but mainly for objective criteria and where the legal and regulatory framework is digitisation-ready (DK1).

STAR's DATA GOVERNANCE MODEL

For improved productivity, efficiency of decision making, and more predictive, proactive and personalised services, the ability to merge and mash quality data is key! Appropriate legal limitations, such as GDPR exist, to ensure privacy and facilitate public trust in the public sector use and management of sensitive data.

Following the creation of UDK, in 2021, more data sharing and merging was allowed. Digitisation-ready legislation was helpful in creating more binary legislation and processes. For STAR and its beneficiaries. this means that end-users are no longer required to "self-report". This improved the administrative burden faced by both individuals and employers. It increased productivity in STAR by errors and minimised the risk of fraud.

STARs data governance model consists of three levels:
- Level 1 of "control" (kontroltrin 1) focuses on automated processes to avoid fraud, minimise error, and ensure standardised and objective processes for assessment and decision making. Legislation plays a key role here.
- Level 2 (kontroltrin 2) consists of the automated exchange of data (e.g. income changes, marital status, children). In practice this captures changes to circumstances on an individual level. Internal systems provide pop-up advice to cases handlers. This also allows STAR to share and exchange patters with partners like UDK or the Job Centers, but also data. Similarly, it allows STAR to act as a data distributer with its local government and Job Center partners, that is distributing and sharing base registry data enriched with data collected and managed by STAR.
- Level 3 (kontroltrin 3) focus on the analysis of operational trends and patterns (e.g. claim benefit back, fine, legal case). Level 3 is the least digital level and have more manual process to as it encompasses both subjective assessment criteria but also strategic decision making.

All levels are based on standardised processes but are regularly assessed for optimisation.

Source: STAR, 2022.

UDK SERVICE IMPROVEMENT PROCESSES

UDK has established a set of well-functioning functional processes and collaborative partnerships with data providers, including base registries. Internal support functions are established support dialogue with key data provision to agencies, covering interoperability, reporting and action process when dirty or corrupt practice is suspected or identified. A specialised data unit under UDK further supports data governance and continuous improvement and innovation processes.

UDK focuses on two key improvement areas: Internal efficiency and quality improvement for end-users. In doing so UDK takes an the whole-of-government and user-centric approach. The larger the number of service areas covered, the greater the improvement potential is found to be (as a result of scale and complexity).

Data use is governed by legal limitations in existence. Data may only be combined within the parameters of the GDPR, legal, and ethical restrictions. Benefits and challenges with respect to use of technology and data persist. Legal limitations help build trust but can lead to constraints or more expensive innovations. Any requests for new ways of using data for service delivery and decision making must be holistic, i.e. consider security, privacy, ethics, benefits, challenges. For instance, the use of personal data results must be anonymised, which increases costs, before data is used to identify patterns for decision making, fraud or error detection.

In addition to data, internal feedback loops between service delivery channels are key as insights on end-user preferences, their behaviour and pain points can be identified and addressed. It allows UDK to identify what to subject for automatization, and also cases where this is not possible e.g. due to missing data, information info, end-user behaviour, or legal and regulatory limitations.

The focus in on business and end-user understanding and comprehension, rather than the technology itself! Centralisation, continuous improvement have allowed UDK to rationalised 33% of all service areas and increase cost efficiency though automation since 2012. Over the last decade, UDK has completely replaced all internal systems, while lowing operational costs by 30% (compared to 2012) after financing the new systems. Key success factors and enablers are the centralised registers established over the last 50 years, plus the centralised approach to data distribution and the once-only principle. UDK will continue to focus on joint-collaboration around data quality and data capture as these can always be strengthened and should form the key future focus.

Source: ATP / UDK, 2022.

6. FRONT-END SERVICE DELIVERY ECOSYSTEM

'The digital transformation of the front-end service delivery ecosystem in Denmark is centred on a number of specialized national portals and standards. Social security is part of this national ecosystem and is not treated any differently than other service areas. While the mandated social security organisations are responsible for their own service portfolio at both the strategic, organisational and operational level, they must do so within the national strategic framework for digital transformation managed by DIGST. This implies that their service delivery choices must also operate within the parameters specified. This includes digital-by-default, service design and aligning with national portals. The national portals in Denmark cover all levels of government. These are in turn interlinked, creating a digital ecosystem which in turn links out to non-digital channels such as call centres and physical service centres. Key for social security and welfare services are the citizen (borger.dk) and business (virk.dk) portals, as well as the specialized health portal (sundhed.dk for users and health professionals) and the public sector job portal (jobnet.dk) (DK2; DK3). Table 8 summarises key service delivery portals.

	yes/no	Portal
Citizen and business portal(s)	yes	https://www.borger.dk https://virk.dk
Health	yes	https://www.sundhed.dk https://lifeindenmark.borger.dk
Jobs and vacancies	yes	https://job.jobnet.dk
Legal repository, consultation, government gazette	yes	https://hoeringsportalen.dk http://statstidne.dk
Participation, engagement, consultation portal	yes	https://hoeringsportalen.dk

Table 8: Specialised portal ecosystem in Denmark

Similar to the general governance model, the national portals are managed by specialised agencies, but with a cross-governmental steering committee, ATP/UDK, DR and LGDK are generally all members. The portals are funded by all three levels of government and from the national budget (i.e. specialized budget items for e.g. borger.dk, virk.dk and sundhed.dk). The portals are considered critical infrastructure.

With respect to social security benefits, these are accessed through the national citizen and business portals, borger.dk and virk.dk. Although the portals have been successful in terms of unique and repeat visitor numbers, the creation of UDK in 2012 and the digital-by-default strategy in 2011-2025 was a marked shift. ATP and UDK took the strategic decision to host their service portals on the national portals and only on national portals in 2011. Together with the strategic targets of all high-frequency, high-volume services being digital-by default and used by 80% of all end-users for 80% of all service requests, this led to a dramatic increase of online service usage. Social security, due to the number of services and frequency of use, in practice has been a key driver of behavioural change in Denmark. As a first mover, ATP/UDK have played a key role by inspiring other service providers – also within social

security. By consolidating all the information and self-service functions on portals, ease of use, and digital inclusion have improved (DK1; DK2; DK3; DK4, Meyerhoff Nielsen, 2021).

DIGITAL BY DEFAULT 2011-2015

When it comes to the digital-by-default principle, Denmark is a frontrunner. As a part of the Danish eGovernment Strategy for 2011-2015, 80% of all written communication between citizens and the public sector must be completed via the digital channel, Digital Post. By end of 2015, some 88.9% of all Danes had signed up for Digital Post.

As part of the digital-by-default strategy, Denmark has made the "Mandatory Self-Service" obligatory and enforceable by law. For instance, applications for state pensions, housing support and payments, building permits, child support and applications for divorce are now all being handled via online self-service solutions. These online services have been available for many years, but have now become mandatory. UDK alone is responsible for collecting disbursement, and control of a number of social benefits. Some €30 billion, for some 2.2 million beneficiaries are handled annually.

According to research carried out by Boston Consulting Group, it is expected that net benefits will reach over €120 million by 2017.

Source: DIGST.

The portals concepts and structures build on similar principles and standards (incl. technical, usability and legal standards), as illustrated by the citizen portal borger.dk in Figure 4 below. It includes the incorporation of key infrastructure components such as digital post, national eID and identity management infrastructure and single sign-on (SSO) for all public websites and online services, in order to improve the user-journey. The result is a federated ecosystem based on a common look-and-feel, across all levels of government and all service areas, including social security.

Figure 4. Borger.dk portal concept and structure (Source: adapted by the authors from borger.dk)

User interface management components

Editing
Design
User support (canceller)
Marketing
Documentation
CMS (technical platform)

USER INTERFACE

A portal, a website, a kiosk, an app.

Public standards and common guidelines

Common components

Workflow

Power of attorney

Workflow

Mobile

Single account

Service catalogue

Authentication and SSO

MyPage

Cadastral and address register

Forms Server

Article import Local content

Authorisation and consent

Maps

Single sms and telephone number

Public standards and common guidelines

Self-service solutions

Public Authority A

Public Authority B

Public Authority C

Public Authority D

Public Authority E

Data exchange, standards and common guidelines

For service design, continual, ongoing analysis of user-experience and user-journeys identifies pain points (based on indirect feedback loops and statistics). User interviews, focus groups and user testing is conducted by many social security agencies in Denmark including ATP, UDK and STAR. Agile development principles and continual improvement cycles are applied to various extents and direct user-engagements are often applied (more so, during design and development, or where pain points are identified). Service design is based on individual subjects and parsonas, use-cases, and service situations. These in turn are linked to the internal business objectives. Some co-creation and co-design (with end-users) prior to testing is seen across social security services, and makes use of the national design guides and tools managed by DIGST (DK1; DK2; DK3; DK4).

7. SKILLS AND CAPABILITIES

The Danish government continues to invest in development of civil servants' skills and capabilities, including for social security. One significant challenge the government faces, remains the public sector's ability to attract and retain talented workers. It was necessary to mimic private sector practices and establish an innovation culture, as pertains to personal development. In this sense, several activities were established for the government, and the social security organisation and staff:

Activity	Description
Attracting and retaining ICT professionals	A challenge, as they are in short supply. Flexible contractual practices aligned to private sector principles applied across the public sector, i.e. no guarantee of lifetime employment – you can be fired, demoted, promoted, rewarded. Annual performance assessments linked to annual salary, career development and training. Note, many specialists are on "consultancy" type contracts within the public sector, top management can receive bonuses.
Establishing a culture of innovation	Innovation and continuous improvement have been in focus over the last two decades, not least linked to improvements of productivity, cost efficiency and the use of technology as an enabler. Ensuring multi-disciplinary teams within organisations has been a key factor. MindLab was the first public sector innovation lab globally in 2002. Closed in 2018, as most entities by now had internal innovation capacities or had enough awareness to contract specialists for innovation tasks when required.
Involving the ecosystem	Denmark has unique collaboration between local governments, regions, central government, voluntary organisations, and increasingly also the business community. All these players are strongly committed to improving IT competences of the population. This collaboration will continue and expand.
Providing Digital skills for children and young people	The Government conducts Information campaigns about competent and safe navigation in the digital society, and developing Teaching programs and material for pupils in primary and lower secondary schools and in upper secondary education will provide them with digital skills to interact digitally with society.
Improving awareness of information security	Information campaigns and initiatives are launched concerning good digital behaviour. This campaign and initiatives will generate knowledge about threats and prepare individuals and businesses for exploiting digital possibilities safely and securely.
Informing and helping citizens	Initiatives aimed at targeted groups are launched on a regular basis to ensure that as many people as possible benefit from the digital opportunities. This includes young people, elderly people, people from non-western countries and businesses.

Table 9: Specialised portal ecosystem in Denmark

In relation to social security, ATP / UDK have a more diverse and more private sector inspired approach to service production and service delivery, by way of comparison to the majority of Danish central government authority. Their approach to process optimisation and service innovation is different and is heavily influenced by ATPs six decades of managing the national lifelong pension scheme. ATP is amongst the most professionally managed pension investment portfolios globally, with pre-tax returns exceeding 22% annually over the last five years.[9]

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[9] https://view.news.eu.nasdaq.com/view?id=b266e40bee77f21170e35825403807ef4&lang=da

Social security organisations emphasise the need for multi-competence sets, to successfully apply technology and data in the back-end and front-end. Key here are understanding technology and processes. In particular, the link between business processes, the legal and regulatory framework, as well as subjective vs. objective decision-making criteria are important in social security, welfare and health services. Similarly, an understanding of, and ability to identify and proactively address end-user and internal pain points is key. The focus must be on value creation for the end-user and the organisation as such, not just on internal optimisation, individual service silo or on technology as such. With respect to innovation, there are still some organisations which are regarded as being too risk averse, too "siloed" or too focused on existing business processes, services and organisational settings. For instance, the personalisation of services and data overviews (e.g. MyPage and MyOverview) initiatives have been considered since 2010, but have not as yet lived up to their conceptual potential. The role of DIGST and organisational leadership is therefore key to further embracing the potential of digital transformation of social security and other government services (DK1; DK2; DK3; DK4; Krimmer & Meyerhoff Nielsen, 2014; Meyerhoff Nielsen; 2011).

On an operational level, public procurement requirements require both specialized skills including a degree of technical understanding. In the Danish context (incl. social security), cooperation and collaboration with private sector vendors is essential. Skills and capacities in contract and ongoing management, technical requirements of SSO, IOP, GDPR, usability etc. is needed internally, but also the expertise vendors must possess, for optimising the value-added by innovation, technology, data while minimising problems and risks. When ICT projects failed in the past, it was often due to a lack of constructive cooperation with vendors or lack of an optimal balance between technology and internal and external end-users – e.g. utilising the wrong technology in the wrong situation. It is key, to have a sound business understanding and not digitise, where this is not beneficial to the organisation and/or the end-users (DK1; DK2; DK3).

ATP and UDK have driven the level of ambition of both borger.dk and virk.dk through active contribution and collaboration in co-design, co-production, user testing. Both by contributing with in-house expertise, externally sourced skills and financial contributions to strategic initiatives, through daily operation, but also as an integral part of multiple steering committees and working groups. The competences and skills mix of ATP/UDK staff is highlighted by experts and has apparently influenced other agencies informally, including DIGST, as to their approach to technology-enabled innovation (DK1; DK2).

8. EXPANDING INCLUSION AND COVERAGE

Denmark essentially has universal coverage with respect to social security and welfare services, both financial and non-financial. As a rule, citizens and permanent residents are eligible for social security benefits. but additional qualifying conditions may apply. Citizens and residents with permanent residency status are covered, as are individuals from the European Economic Area, Greenland and the Faroe Islands. Specific rules and criteria apply to the length of residency (including for citizens) and minimum number of years of contributions to social security and this varies for pensions, child and family support, maternity and parental leave. Contributions are usually made though employee and employer contributions, and are topped up by the government (e.g. from income tax). Special rules (preferential) apply to Nordic and EU citizens.

The reduction of social expenditure, in particular since the 1980's has led to an increased number of social challenges in Denmark. This included the growth of relative poverty amongst marginalised socio-economic groups such as low-income seniors, single unemployed or underemployed individuals, single parents, people on disability pensions etc. The ageing population requires more assistance and care. Consequently, an increasing need to expand old age security adds financial pressures to the government and public sector.

The Covid-19 pandemic has added a layer of complexities and challenges to the current social security assistance as an initial result of the lockdown, access to health and educational services, and a depressed economy. This contrasts 2022 which has seen full employment, labour shortages and excess demand for housing.

Digital transformation of public sector services in general and social security in particular have also led to specific challenges around digital inclusion (and exclusion). While digital inclusion and digital divides have been a strategic focus in Denmark since the 1990's, past policies and initiatives have resulted in highly connected and a digitally literate population. Since the strategic shift to digital-by-default in 2011-2015, the public sector and social security organisations differentiate between three broad groups of end-users:

1. Individuals who can, but do not want to.
2. Individuals who want to, but cannot
3. Individuals who do not want to, and who cannot.

For all three groups a combination of communication, usability and "force" is applied though mandatory self-service, channel strategic tools and incentives, in particular for the first group. Communication, usability, assistance and free digital literacy training is offered for the second group. Call centres, and municipal service centres are key alternatives to online self-service, but also for help and assistance providing digital skills training. As are municipal libraries and Job Centers. The availability of training for senior citizens and free IT and internet access is rapidly decreasing, as most seniors are now online on a regular basis. For the third group, communication and help to access social security and government services via call centres and physical service centres are being promoted, as are power-of-attorney so family or trusted third-party agents may act on their behalf (DIGST, 2011; DK1; DK3).

As the majority of financial social security benefits are consolidated in specialist agencies (e.g. ATP, UDK or STAR) and are largely based on objective eligibility and assessment criteria, these are now only available online and with call centre support. These are also increasingly automated. By way of contrast, most non-financial social security and welfare services are based on subjective assessment criteria and anchored in holistic decision-making process. This also permits entities such as ATP, UDK and STAR to collaborate with municipalities or Job Centers, which provide specific support to municipalities to help and guide individual beneficiaries on their behalf – i.e. acting as a first level hotline for joint provision and tailoring of services. Similarly, ATP and UDK work with social housing associations, seniors, disability organisations. By way of comparison, STAR works with Job Centers, disability, employer and employee organisations etc. The result is an increasingly whole-of-government and user-centric approach (DK1; DK3; DK4).

9. LESSONS LEARNED

Denmark is a strong welfare state where digital transformation is driven by an ageing population, and pressure on efficiency and productivity. It is defined by a specific model based on a central government component, but remains open to participation of the ecosystem including the private sector.

Denmark is a leader in government and public service IT adoption, and digital transformation. The country has successfully implemented electronic and digital government and continuously ranked among the Top-10 in the EGDI ranking. It is also considered as an innovator for digital service delivery and citizen participation.

Social service digital transformation is formulated at state level, in the national digital transformation strategy. In the most recent strategy, the government is working on consolidating social services and increasing transparency for citizens. It also establishes the foundation of data sharing and collaboration through sectors. This evident across central government, the regional and municipality levels.

The advanced state and globally leading position of Denmark is in part due to early take-up of digital transformation, but more importantly it is the result of a coordinated and cross-governmental, coordinated approach, including a high degree of specialisation and consolidation of key functions and services areas – including both financial and non-financial social security and welfare services. A key enabling factor is the adoption of relevant tools for monitoring, compliance, troubleshooting/escalation, solving cross-sectorial challenges through steering committees and working groups.

At legal and regulatory level, Denmark is also more advanced with its early implementation of relevant standards and digital services regulations. These regulations are strongly influenced by EU recommendations and regulations (e.g. eIDAS for eID, EIF for IOP, once-only for data reuse plus TOOP pilot for cross-border services, GDPR for privacy, WCAG AA for web accessibility), but also aligned to the international standards (e.g. IOP, WCAG AA) and UN charter. Denmark also focuses strongly on whole-of-government approaches to key infrastructure, and components are shared with the private sector (e.g. eID/eSignature, digital post, data sharing).

Regarding back-end services and front-end services, all services including social security are centred on a centralised approach. This includes IDM with single national identifiers for citizens/residents, businesses, base registries, data distributors, service portals, standards etc. The state also proposes basic registers more consolidated around single source and once-only principles. Social security as a service area is not regarded as unique, but as an integral part of the service production and delivery ecosystem. Similarly, social security organisations align with both strategic objectives set by DIGST and actively use and contribute key enabling and shared infrastructures and standards, including those for usability, portals, data distribution, digital post, eID etc. Internal solid data governance and quality assurance processes are in place. Denmark has successfully adopted a real cross-government

implementation to date, with mandated shared enablers (e.g. eID), platforms (portals), strategies, standards. It also recently looked at cross-border relationships within the EU context. The Danish government is implementing a centralised approach concerning data distribution and shared expansion of it to new datasets. At the front desk level, Denmark's approach is a unique model of the whole-of-government case with design and web accessibility standards (WCAG AA), including indirect co-creation, but has mandated user-tests and integrated user-journeys. Denmark has historically discouraged apps while promoting responsive web-design for cost efficiency and minimising the need for downloads. This has nonetheless changed since early 2019, when apps for the national driver's licence, health insurance card, Covid-19 track-and-trace, testing and vaccinations were launched – although based on the same back-end infrastructure and standards. The Danish approach has had a significant impact with its pedagogically "compulsory" active opt-out approach to eID/eSignature, digital post, online self-service for those who can, which led to greater usage, take-up and return on investment and for specific services (e.g. social security, taxation, business services).

Finally, the Denmark case illustrates that an innovation culture can be facilitated though strategic pilot-projects, partnerships (e.g. in strategies), and shared innovation facilities (e.g. innovation labs) or teams. Skill and capacity developments imbed as a focal area in both digital and non-digital strategies across the public sector. This is further supported by a mixed-method approach toward internal and external end-users, including starting with primary school children receiving digital education, but also continuing and vocational education being promoted by employers (public and private), as well as through job centres for the unemployed, and by civil society and social security organisations working with seniors and people with disabilities.

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