Digital & Technology

IT in Practice
2019-2020

RAMBØLL

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FOREWORD

Welcome to *IT in Practice* 2019-2020.

For the 24th consecutive year *IT in Practice* tracks the benefits and challenges private Danish companies encounter in their endeavour to create value through digitalisation. In the following pages, you will find inspiration regarding how companies can work with IT and digitalisation.

Ramboll Management Consulting conducted the survey in collaboration with DANSK IT. Ramboll Management Consulting is solely responsible for designing the questionnaire, conducting the survey, analysing the data and drawing the report's conclusions.

During the year, DANSK IT arranges many conferences, courses, etc., within the fields and challenges covered by *IT in Practice*. Current events are listed at www.dit.dk.

IT in Practice is assisted in designing the survey questionnaire and selecting topical themes for analysis by the *IT in Practice* Advisory Board, which consists of representatives from a range of trendsetting companies. We would like to extend our grateful thanks to the members of our Advisory Board for their good ideas and valuable, constructive criticism.

Last, but not least, our sincere thanks to the top executives of the private and public sector companies, their IT directors, CIOs and digitalisation managers who every year contribute their experience and know-how by submitting answers to *IT in Practice*.

If, after reading *IT in Practice* 2019-2020, you would like more in-depth information on the themes or strategic challenges described, please feel free to contact us. We will gladly assist with specific suggestions for how to use the report as a tool for evaluating or benchmarking your company's IT governance and management and for identifying opportunities and focus areas.

We hope you enjoy reading *IT in Practice*.

ABOUT IT IN PRACTICE

IT in Practice is acknowledged by the leading CIOs in Denmark

**Stig Lundbech,
CIO of the year 2019,
Director of Group IT, City of Copenhagen:**

'*IT in Practice* comprehensively reviews the state of digitalisation in Denmark and provides inspiration that can help IT staff and their colleagues on the business side collaborate more effectively. I have drawn on *IT in Practice* for several years, and we usually share and discuss its contents in the senior management group. For example, we use it as a tool to do a reality check on digitalisation trends. An important part of being a CIO is to listen to others' experiences before the organisation moves into new areas. In this context, *IT in Practice* is a valuable source of input and benchmarks.'

**Jesper Riis,
CIO of the Year 2018,
CIO, Global IT, DSV:**

'*IT in Practice* is a source of inspiration and reflection. It is a good place to start to gain insight into the activities of other Danish companies and an opportunity to be able to compare our own activities to them. It is also a fine source for investigating future trends and topics. Among others, which digital trends are the key focus in the various industries. It is here interesting too to read about the more hyped technologies, especially those which are storming ahead at present.'

**Torben Kjær,
CIO of the Year 2017,
While Senior Group Director IT, Digital and Innovation, Ramboll:**

'I have used *IT in Practice* through many years in my work with IT management and I have also benefitted hugely from applying selected parts of the report actively in the dialogue with the business. The report gives a completely unique insight into the themes and trends, which are currently present in other organisations in Denmark. I therefore always look forward to the publication of the annual *IT in Practice* report as it gives me a specific checklist, that assures me that our company relates to these very central topics.'

**Morten Gade Christensen,
CIO of the Year 2016,
While CIO / Vice President, Energinet:**

'*IT in Practice* has proved to be an essential tool within IT management in Denmark. For me it has several facets, for instance, it serves as a guide for key elements in similar organisations in Denmark. This supports the IT management to keep focus and provides a strong indicator of what is happening in the CxO management. Therefore, the content can be useful as basis, for example, when creating storytelling to the management. In addition, *IT in Practice* seems obvious to use as a benchmark within the identified areas. As CIO you therefore have a country-specific benchmark to refer to.'

**Torben Ruberg,
CIO of the Year 2015,
While Group CIO, Falck:**

'*IT in Practice* gives valuable insight into how Danish companies approach digital technologies and the related business support. In my experience, the underlying questionnaire always reflects topical issues, providing us with a regular opportunity to "keep abreast of trends" in the firms with which we compare ourselves. This benchmark helps us sharpen our focus and spotlight issues we may not have sufficiently addressed ourselves. Over the years, *IT in Practice* has increasingly focused on IT as an integrated part of the business. This has also made it easier for us to use results from the publication when arguing our case to colleagues in various parts of our company.'

**Claus Hagen Nielsen,
CIO of the Year 2014,
While CIO and Senior Vice President, Group IT, COWI:**

'*IT in Practice* puts a clear focus on many of the key IT management issues that we are actively working on in COWI and which I am regularly discussing with my peers. The report broadly reveals the various managerial attitudes and differences of both business and IT management, and this in particular is a good contribution to illustrate the ambitious task of establishing a comprehensive and fully integrated digital business strategy, something that I am very keen about and am sure will give us great prospective business advantages. *IT in Practice* is a good source of insight into how other major Danish companies are working with the same management problems as we are.'

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Direktør i Kultur- og Fritidsforvaltningen, Københavns Kommune

“

Digital innovation is a key driver in the development of business and society towards greater sustainability

STRATEGIC CHALLENGES

IT in Practice 2019-2020 focus on some of the strategic challenges related to digital strategy in volatile environments, obtaining benefits from digital business development, cyber security, sustainability and much more

STRATEGIC CHALLENGES

In *IT in Practice*, Ramboll shed light on contemporary challenges faced by CEOs, CIOs and organisations in general in relation to competing in the digital era and provide solutions to overcoming them. Ramboll has many years of experience in consulting the companies in their endeavour to compete in global markets. In this section, our experts provide valuable insights into best practice solutions that they apply.

Acknowledging the potentials of becoming or staying digital is an imperative for today's companies. It enables companies to overcome strategic challenges, that were not possible to overcome before. However, it also brings about new challenges, that requires companies to act in order to compete.

In *IT in Practice* 2019-2020 a number of solutions and tools for overcoming various prevailing and relevant strategic challenges in the digital era are presented.

For each strategic challenge in the following chapter, a conceptual framework is introduced to illustrate the solution.

Furthermore, action items are formulated for each strategic challenge to create an overview of the fundamental actions necessary to overcome the strategic challenge in question.

The following strategic challenges are included in *IT in Practice* 2019-2020:

- Facilitate 'fast-track' digital business development with tailored demand governance
- What business opportunities do Blockchains offer?
- A company's defence against cyber-attacks requires the active participation of its business management
- Deploy digitalisation in sustainability transition
- The success of agile projects depends on the alignment of customer and supplier expectations

Strategic challenges explored in *IT in Practice* previous years can be found on www.it-in-practice.com.

FACILITATE 'FAST-TRACK' DIGITAL BUSINESS DEVELOPMENT WITH TAILORED DEMAND GOVERNANCE

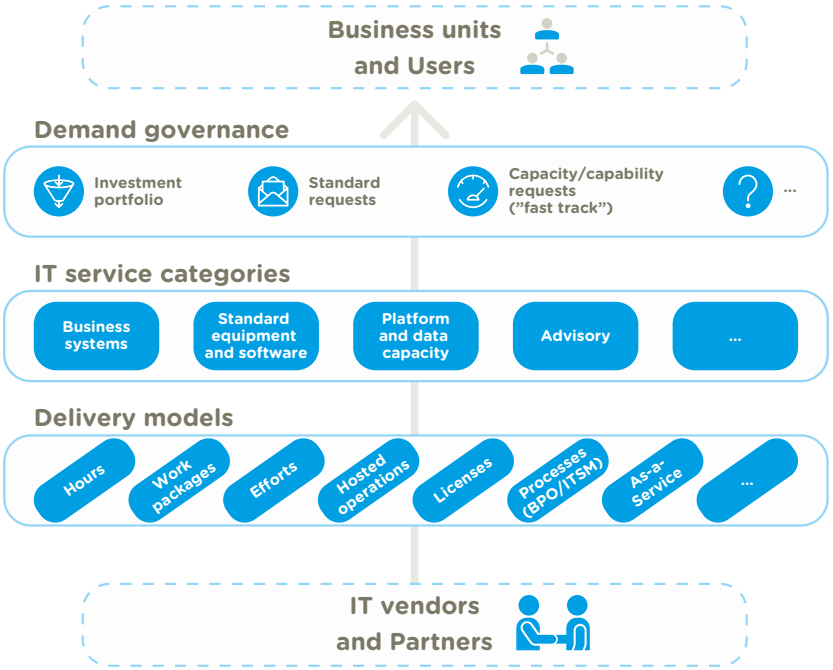
Business units gain technical capacity for their digitalisation efforts through formal or informal demand gov-ernance setups and expect to benefit from the cloud's promises of flexible, scalable and agile IT services. Demand governance must evolve to cater for fast tracking in funding, prioritisation and delivery models for IT services.

Most enterprises' IT organisations are based on established governance models for regulating funding and prioritising investment. These models are usually used in situations where business units' wish lists for IT and digitalisation efforts significantly exceed the available resources and capabilities. In response to this natural imbalance, governance and portfolio models have developed and matured over time. They often include comprehensive analyses and evaluations that need to be made before decisions about funding and/or priority level can be taken. Such decisions may be further complicated by technical funding discussions about whether the cost of a given initiative should be paid from an operations budget allotted to the IT unit, or through funding allocated to a portfolio of projects or initiatives. It is not unknown for the perceived importance of an organisation's specific IT demand to depend on which budget is assumed to be paying the cost.

The business models of enterprises' IT functions are rapidly shifting away from producing traditional IT services to sourcing various modes of integrating services from IT vendors in the marketplace. Matching and balancing business requirements and demands with the services and components from the marketplace is a key value contribution from an enterprise service integrator. This is no trivial exercise and generally entails close examination of a wide range of functional, technical and commercial parameters. Some IT

DIFFERENT TYPES OF DEMAND GOVERNANCE, IT SERVICES AND DELIVERY MODELS FOR AN ENTERPRISE IT FUNCTION

Digital services executives should take care that their legacy enterprise conventions for funding and prioritising IT and digitalisation efforts do not inadvertently prevent BUs from pursuing their own digital business efforts by using commodity IT capacity easily available from the market (ie, SaaS / PaaS / IaaS)



demands need careful analysis and design efforts to avoid clashing with existing setups, or to cater for advanced data and software integration requirements. Other types of IT demands are simpler and can quickly be matched with solutions brought in as a service from IT vendors. These include various capacity-based services such as servers, licences, storage, connections and databases. If these types of demands are routinely subjected to identical governance and evaluation procedures, two common issues may arise.

- Simpler types of demand might be overanalysed and consequently delayed unnecessarily. Or, even more unfortunate,
- Simpler demands might be stuck in a pipeline queue, subjected to an inordinate wait for swift treatment by staff occupied with more complex evaluations.

As enterprise IT functions have evolved, the level of digital competencies in other business units and functions has also grown considerably. Classic IT skills are no longer limited to the usual IT functions as business units prepare for digitalisation by developing skills in software development, data and analytics, digital marketing and many other areas. This also means that staff experienced in the technical handling of IT hardware and software are now common in most organisational units, even if IT is not these colleagues' main area of responsibility.

Business units pursuing digitalisation at an accelerated pace must ensure that IT demands are funnelled as efficiently as possible. Fast, easy access to the company's data and robust tools to work with them can be critical for business development success.

To ensure efficient demand handling, governance models must be able to differentiate between types of demand, so that unnecessary evaluations do not delay relatively simple requirements (such as units of standardised capacity). IT functions have a strong self-interest in establishing fast tracks or easy routes through the demand funnel, as business units are ever more likely to be able to source their needs directly from vendors, without even involving the IT function. This can result in complexities and unaddressed risks further along the lifecycle, for example, because of insufficient information safety or technical compatibility issues. Furthermore, it is usually attractive to bundle IT purchases across the enterprise to achieve the best prices and terms.

A practical approach to a tailored demand governance model involves initially broadly defining the various types of demand. Typically, most enterprises have at least four distinct types of IT demand, and each should be catered for by a distinct demand governance:

- Demands related to the enterprise's business systems, which are often very complex, heavily interlinked and customised to suit business processes. These demands often require considerable effort to mature from the idea stage to a prioritised and approved item in a project portfolio
- Demands related to standard IT equipment, including user-enabling devices and out-of-the-box software tools as well as physical business locations. These are easily measured, counted and managed, regardless of the chosen funding model
- Demands related to infrastructure, platform and database capacity or capability. These can be tricky, because IT function's true marginal cost for providing these services is hard to assess
- Demands related to advisory services or consultancy from the IT function.

In practice, the four types of demand will have more variations in most enterprises. For each type, interfaces and contact mechanisms between the parties should be defined, together with clear conventions for how to capture, document, validate, prioritise and fund the demands.

ACTION ITEMS

- **Make sure business units have fast, easy access to commodity IT capacity via the IT function's preferred vendors, and at an internal price reflecting the (small) actual cost**
- **Ensure the presence of a light 'fast-track' governance framework to supplement existing conventions that regulate business units' use of commodity IT capacity**
- **Where applicable, encourage business units to pursue digital business opportunities on their own, using commodity IT capacity that BU staff can manage outside the scrutiny of the detailed governance regulating the more complex enterprise IT**
- **Make sure governance and funding models cater well for all types of IT demand, and differentiate models to provide appropriate incentives for all stakeholders**

WHAT BUSINESS OPPORTUNITIES DO BLOCKCHAINS OFFER?

Blockchain technology holds great possibilities when one needs to partner with many others for the purpose of keeping incontrovertible records of assets, documentation, traces or identities, or maintaining intellectual rights, etc. However, businesses must understand the nature of their participation to ensure the desired returns on their investment.

Blockchain technology started in 2008 with the launch of bitcoins, a digital currency (cryptocurrency) where the network technology guarantees a consensus on and the incontestable truth of the ownership and organisation of bitcoin transactions. In other words, bitcoin has no trusted intermediary – a bank, for example – which reduces transaction costs. In Q2 2019, bitcoin handled approx. 350,000 transactions per day, while traditional currency transaction technologies handle roughly 400,000 transactions per minute. This illustrates the inherent scalability problem of blockchain technology, which forms the basis for bitcoin and many other cryptocurrencies.

Closer examination of bitcoin's blockchain technology shows that, along with its requiring vast resources for bitcoin consensus, its scalability issue lies in permitting the network technology to control consensus. Accordingly, if this is avoided and a different method used to handle consensus, a more effective technology emerges that still guarantees an unequivocal, immutable presentation of the truth about the content and organisation of a large number of transactions. This technology is known as Distributed Ledger Technology (DLT). The difference is illustrated in the following descriptions:

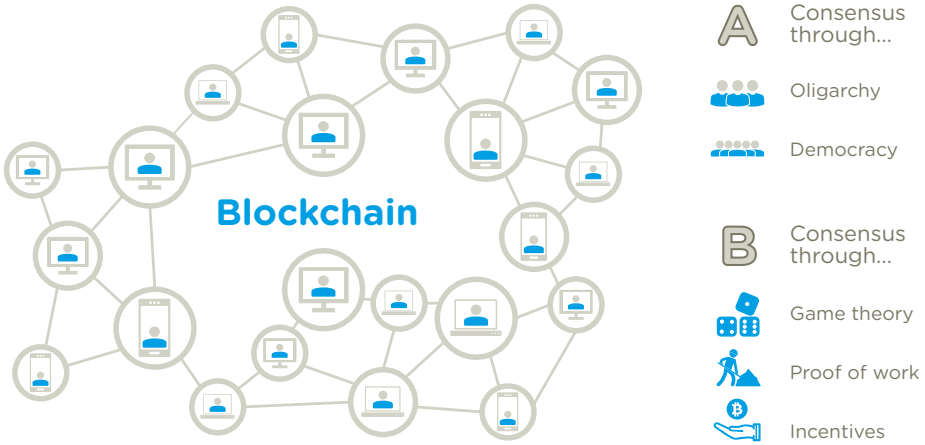
Distributed Ledger Technology
Capability – An unequivocal, immutable presentation of the truth about the content and organisation of a number of transactions not controlled by a single network participant.

Case – Documented traceability of, eg, foodstuffs, medication, art and antiques – also known as provenance. Identity certificates and personal data (contingent on trust in registration of digital identity)

How? – A distributed, inviolable and immutable transaction record that is controlled not by a single participant but by the entire network (via proof of stake or governance). This capability is called Distributed Ledger Technology (DLT).

CHOICE OF CONSENSUS FORMATION IS ABSOLUTELY CRUCIAL TO WHO CONTROLS A BLOCKCHAIN

Choice of formation of consensus is central to who has the power of a blockchain. You have to take that into account as a participant in Distributed Ledger Technology (A) or the original blockchain (B).



Blockchain
Capability – in addition, permit the network technology to secure consensus.

Case – A cryptocurrency such as bitcoin or Ether.
A decentralised file system (storage network) like Filecoin.

How? – This exploits a consensus protocol based on game theory (via proof-of-work and financial incentives). It ensures that the next block is chosen in a way that prevents anyone dominating and controlling how a blockchain develops.

In both cases, the transaction content can be:
- An asset represented by a characteristic (a token). For example, property deeds, proof of ownership of an object or proof of financial asset ownership.
- Documentation. For example, shipping a commodity. Traceability of food supply chain transactions from farm to fork.
- Program code that, with the right input, produces a result. This is called 'a smart contract'. For example, if you pay xx bitcoins, you can play this music album for a year. Another example is a bioprint of a foodstuff that is compared with the supplier's bioprint on delivery, thus verifying that its quality has been maintained during transport.

In DLT, a different method must be used to ensure that all participants can trust the organisation of the blocks in a blockchain, otherwise no guarantee exists against parties' cheating. One way is for a majority of the network participants to choose the next block. If the transaction content consists of assets, the majority is usually defined as the number of participants that own more than half of all the assets in the given blockchain. Such a form of consensus thus gives control of the next block to the owners of the largest number of assets. This can converge into an oligarchy, where those in control are those with the best relationships and the most power. In the extreme, this can end up recreating a monopoly which can handle international bank transactions as an alternative to SWIFT. An alternative to the risk of an oligarchy is a voluntarily formed network where control of the next block is administered through democratic network management. The Libra Association is trying to explore this route as a basis for Libra, a cryptocurrency initiated by Facebook.

Using DLT, Maersk Line has taken the initiative to start a blockchain that lowers the document management costs of a commodity's complicated journey through the shipping supply chain. In May 2019 Maersk succeeded in getting two other global container carriers on board the project, CMA CGM and MSC. The Danish Industry Foundation has granted DTU, the Technical University of Denmark, DKK 3.6 million for a project to examine how blockchain technology can promote growth and employment in the food industry, using, eg, traceability to document that food products are indeed 'Made in Denmark'. The Concordium Foundation has donated funding of DKK 50 million over five years to Aarhus University to carry out research into the further development of blockchain technology.

When assessing whether a blockchain can generate business returns, companies should consider some important factors:
- Blockchain is best suited to handling large transaction volumes. With a relatively small number of transactions, proven transaction technologies will probably do the job equally well. Always choose the simplest solution that entails the least risk of error.
- Companies aiming to use game theory, proof-of-work and incentives as a basis must be mindful to make it difficult for anyone to gain control of 51% or more of the participants (known as 'miners') competing for the next block. This would give such participants the power to determine a longer sequence of blocks and thus violate the consensus formed by the network technology. Companies wanting to use an oligarchy or a democratic amalgamation as a basis must take great care to protect their interests in the network.

ACTION ITEMS

- **First determine whether you have a business problem or a business opportunity that requires storing many transactions that you share with others. If not, investing in a blockchain will not be worthwhile for you.**
- **Do your transactions need joint, incontrovertible transparency, history and high accessibility? Can you accept that control is held by those who have most assets or by a form of democratic governance? If so, you can use Digital Ledger Technology (DLT).**
- **If you need to avoid power issues, democratic discussions and all the time spent on organising these aspects, you should leave consensus to the network technology.**
- **Compare blockchain with existing, proven technologies and choose the simplest solution. If you use DLT, make sure the network is managed in a way that defends your interests. If you use game theory, proof-of-work and incentives, make sure no one can gain dominance.**

A COMPANY'S DEFENCE AGAINST CYBERATTACKS REQUIRES THE ACTIVE PARTICIPATION OF ITS BUSINESS MANAGEMENT

The Danish Centre for Cyber Security reports a significant increase in cyber threats in recent years. Businesses have to take precautions. This means top and middle management must be involved in risk sensitivity assessments, risk evaluations and decisions regarding which countermeasures to take, because large sums need to be invested to ensure a high security level.

In its latest assessment of the cyber threat against Denmark, the Danish Centre for Cyber Security (CFCS) issued a clear warning that Danish authorities, businesses and citizens must be prepared for cyber espionage and cybercrime to continue posing an extremely high threat. CFCS established that states are carrying out cyber espionage against Danish authorities and businesses and found that attacks frequently come from cyber criminals seeking financial gain.

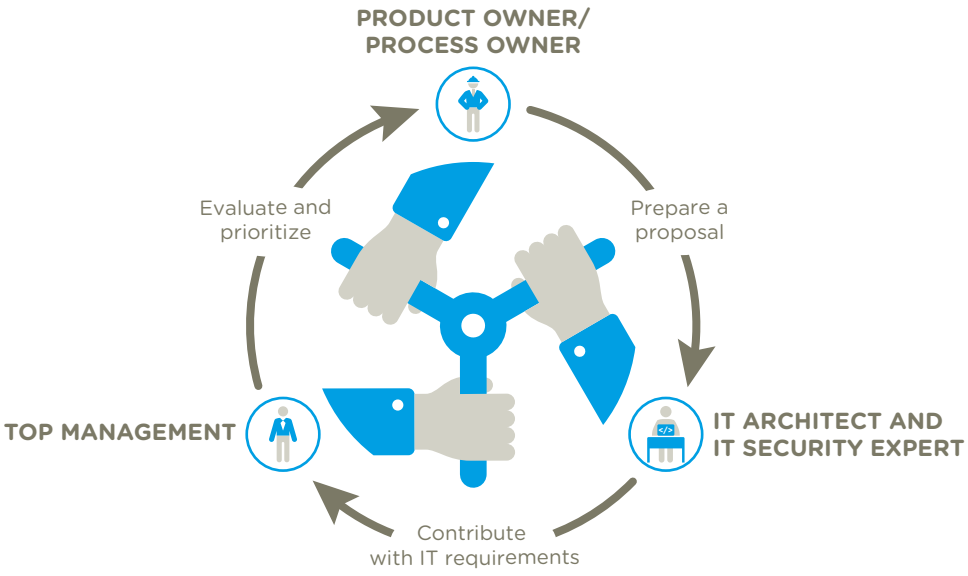
The area of information security management does not lack standards and guidelines, which are based on the international ISO 2700x series of security standards. In 2016 the standards became mandatory for central government organisations, with local and regional authorities following suit under the framework of Initiative 7.1 of the Joint Public Digital Strategy. Private businesses make their own decisions in this respect and also obtain knowhow from the ISO 2700x series.

Managers play a key role in the defence against cyberattacks. The role of middle managers is to earmark the resources necessary to develop a decision-making basis while top managers set the priorities. Note that step 1 of the guidelines 'Cyberforsvar der Virker' ('Cyber Defence that Works', in Danish only) published by CFCS and the Danish Agency for Digitisation in 2017 is called 'Forankring i topledelsen' ('Embedment in Top Management'). Top management should be involved in implementing cyber defence and assuring information security for two main reasons:

First, high security calls for a high level of investment. Accordingly, the ISO 2700x series is structured such that businesses assess the risk sensitivity of their assets, then evaluate the risk before determining the amount of resources to devote to countering the risks identified. The business's top management makes

THE TEAM REQUIRED

Adequate investment in information security is a must and can be found through strong teamwork facilitated by a person familiar with ISO 2700x standards and guidelines. The role of top and middle managers is to ensure that security investments are correctly targeted and employees are security-conscious.



the ultimate decisions as to which risks the business chooses to live with and which are to be dealt with using the resources required.

Second, attaining the security level decided on by top management is also a question of developing the requisite security awareness among employees. Top and middle managers need to clearly explain employees' role and the steps they must take to establish the desired level of information security. This is intended to motivate employees and ensure they receive the instruction required.

Those of the organisation's employees or suppliers trained in information security and the use of the ISO 2700x series of standards can help produce the decision-making basis. However, they cannot make a decision from the perspective of the business's area of responsibility about which risks can be lived with nor about those that are to be addressed with which amount of resources. Neither can they determine the risk sensitivity of the business's assets relative to the products or services from which the business is to make its living. In this context, assets comprise the data used to production or to generate information and knowledge, or assets comprise digital functionality, which is key to business earnings.

Accordingly, the groundwork for a given business unit should take place in a team consisting of both product owners or process owners, employees familiar with the IT systems' architecture and an employee with information security training from a coordinating security function, or, alternatively, an external security consultant. Such a team would be able to use the guidelines to draw up a proposal for risk sensitivity assessment, risk evaluation and countermeasures. This proposal could then be discussed with the business area's top manager, who would decide on the final assessments and activities. Every enterprise is also clearly encouraged to establish a coordinating security function that can guide these teams as well as ensure that experience is shared across the enterprise. The gain lies in ensuring the business invests in security where necessary and scales down investments in areas not deemed risky.

The assessment of asset risk sensitivity is a matter of classifying the assets according to three parameters: accessibility, reliability and confidentiality. The accessibility criterion dictates that authorised persons be able to access systems and data when necessary. Reliability is a measure of how reliable the data is. Data is reliable if they are complete, correct and updated. Confidentiality means that only authorised persons are entitled to access the information and that the information must only be accessible to authorised persons. By determine the risk sensitivity characteristics of its assets, which are enabling the organisation to deliver the products or services that constitute its source of revenue, the enterprise can act accordingly.

A risk assessment starts with a review of the potential threats to these products and services and a mapping of the vulnerabilities inherent in the organisation's activities or in the technical structure and operation of the applications used by the business area. This combination of threats and vulnerabilities provides the basis for determining the probability of a risk's being triggered. The next step is to assess the business consequences if the specific risk emerges. The combination of probability and consequence now provides a basis for ranking all the risks identified from very serious to insignificant in light of the results the business area has to deliver.

To take advantage of the digital potential of one's organisation, the organisation must have its information security and cyber defence in place. This may seem a gargantuan task, but standards and guidelines to this end are available, and the organisation as a whole can be covered in stages once top and middle management understand their tasks and deliver on their share of this work. The security priorities that management selects on the basis of the risk assessment help make implementation well-informed and manageable.

ACTION ITEMS

- **For each business area, form a security team consisting of product owners or process owners, employees familiar with the applications' IT architecture, and an employee or consultant familiar with ISO 2700x**
- **Timebox this team to prepare a proposal for assets' risk sensitivity, the threats that may affect these assets and the vulnerabilities inherent in the business area's applications and processes. Against this background, the team drafts a risk list and proposes priorities and activities for countering them**
- **Risk sensitivity, risk assessment and countermeasures are debated and established with the business area's top managers. This enables top managers to ensure resources are invested in security where necessary and scaled down in areas not deemed risky**
- **Use threat reports from CFCS, the international ISO 2700x information security standards and guidelines from security fora such as www.sikkerdigital.dk, the Agency for Digitisation and CFCS**

DEPLOY DIGITALISATION IN SUSTAINABILITY TRANSITION

Denmark's top executives are generally aware of the sustainability agenda, and many businesses are working to facilitate a more sustainable society. However, this year's *IT in Practice* shows that digitalisation as a vehicle of great change is far from fully exploited. As a leading digital nation, Denmark possesses a huge untapped potential.

Digital innovation is a key driver in the development of business and society towards greater sustainability. As part of this year's *IT in Practice* survey, we want to focus attention on how digitalisation helps create a more sustainable society. To this end, we have examined enterprises' knowledge of the UN's Sustainable Development Goals (SDGs) and whether these enterprises actively support the goals and exploit the possibilities that digitalisation affords in their endeavours.

High awareness of the UN's goals

Danish public and private sector enterprises are generally highly aware of the UN goals, with approx. 80% (four out of five) of the enterprises surveyed indicating a high degree of awareness of the UN's SDGs. In the public sector, local authorities and educational institutions are among the most highly aware, while in the private sector, companies in trade and finance are the ones most highly aware.

Many already support the UN goals

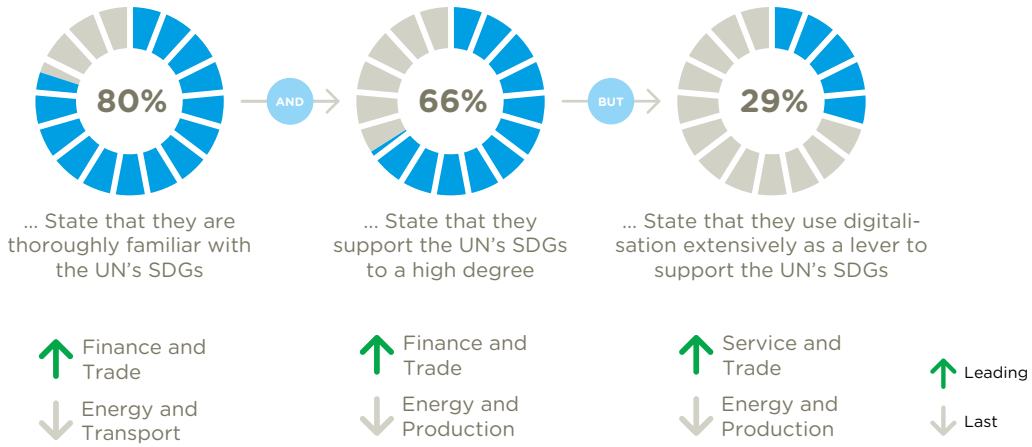
Danish enterprises are also very active when it comes to the actual work of supporting the UN goals. About 65% (two out of three) of the enterprises surveyed indicate that they strongly support the UN goals. Here too, local authorities and educational institutions lead the field in the public sector and financial and trading companies in the private.

Fewer use digitalisation as a lever to meet the UN's goals

However, in terms of using digitalisation to support the UN's goals, a slightly different picture emerges. It shows that only 25% of the public sector institutions surveyed state that they deploy the digital options available extensively and that only 29% in the private sector do. In the public sector, regional authorities

HUGE POTENTIAL IN DIGITALISATION AS A TOOL TO SUPPORT THE UN'S SDGS

The majority state that they are familiar with the UN's SDGs, but with the increasing number of digital opportunities lie ahead an almost unused potential in digitalisation as a lever to support the UN's SDGs.



and educational institutions are in the vanguard, while in the private sector the energy and production sectors are at the fore.

As such, enterprises are simply not exploiting the possibilities afforded by using the strong, transformative power of digitalisation. In the coming year, through *IT in Practice*, we will spotlight this tendency and seek to offer ideas for further initiatives.

Denmark should be in the driver's seat

Denmark should be a pioneer country in identifying and exploiting the synergies between digital innovation and the sustainability transition. Denmark's position as a digital leader makes this a self-evident ambition that would not only benefit the country's own transition but undoubtedly create a decisive parameter for competition on the global market.

Five-step rocket for the work

The figure below illustrates a simple five-step process that can usefully function as a guideline for establishing initiatives better targeted at exploiting digitalisation to support the UN's SDGs.

This five-step approach can benefit both enterprises just starting work in this area and those looking to boost their current efforts.

1) Understand the global goals. Familiarise yourselves with the 17 sustainability goals and identify which would be relevant to look into more carefully. Examples include goals within your enterprise's specific business field (eg, education, health, the environment, climate, energy) or broader goals (eg, in developing effective, responsible and transparent institutions at all levels or in creating innovation and growth).

Note that some of the goals are fairly closely linked to the use of digitalisation technology. Examples include the goals of creating sustainable economic growth; producing sustainable energy; providing clean potable water; gender equality; quality education; industry, innovation and infrastructure; responsible consumption and production; and building effective, responsible and transparent institutions.

2) Match your organisation's core values, objectives and digital strategies with the sustainability goals. Identify where you can usefully combine these elements and gain inspiration, thus ensuring that you more precisely deploy the transformative power of digitalisation. It might be good to make this an inclusive process broadly involving management and employees. Get input from both a business and a digitalisation perspective.

3) Set a level of ambition and focus areas. Assign clear responsibility for actions and results to chief executives. Establish an ambitious, yet realistic ambition level and identify specific objectives with their associated indicators. Finally, draw up an action plan with focus areas. Be sure to incorporate objectives and actions into your general business strategy as well as in your digitalisation strategy.

4) Implement. Execute the digital initiatives. Assign clear responsibility for actions and results to chief executives and chief IT officers. Incorporate this in performance contracts where relevant.

5) Follow up and report findings. Follow up on the digital initiatives and agreed actions and assess their effect through the objectives and related indicators set. Communicate the results internally within the organisation and externally to business partners and other stakeholders. Be willing to continually adjust your approach, initiatives and ambitions as you gain experience.

ACTION ITEMS

- **Familiarise yourselves with the 17 sustainability goals and identify which would be relevant to look into more carefully**
- **Match your organisation's core values, objectives and digital strategies with the sustainability goals**
- **Set a level of ambition and focus areas and assign clear responsibility for actions and results to chief executives**
- **Execute the digital initiatives. Assign clear responsibility for actions and results to chief executives and chief IT officers.**
- **Follow up on the digital initiatives and communicate the results internally within the organisation and externally to business partners and other stakeholders.**

THE SUCCESS OF AGILE PROJECTS DEPENDS ON THE ALIGNMENT OF CUSTOMER AND SUPPLIER EXPECTATIONS

Public sector IT projects that use private sector IT suppliers stand to gain a range of benefits by using methods from the agile framework. In practice, these methods are often adapted, and hybrid forms can develop, which can bring challenges if the organisations involved fail to align their expectations regarding roles, responsibility, requirement management and transparency as regards the solution's progress and completion.

Many IT suppliers use agile development methods in their project organisations so they can reap advantages like early benefit realisation by making frequent releases, rapidly identifying errors and minimising risk through ongoing mitigation. Such agile practices enable them to adjust project scope and quality as the project progresses. To profit fully from the benefits that agile methods afford, customers must be willing to meet certain resource and competency requirements.

When deciding on the development methods best suited to the characteristics of a given project, organisations should consider such factors as the clarity and stability of the requirements. Organisations that opt for agile methods rather than a full agile approach will often use an adapted form that accords with the needs and agile maturity of the organisations involved. Two different scenarios typically pose challenges for large, complex public sector IT projects:

1. Requirements fully specified in the clarification phase: In the first scenario, the customer wants to secure reliable delivery by drawing up a highly detailed requirements specification as part of the tendering process and contract with the supplier selected. Any doubts about requirements and solution are raised early in a 'clarification' phase. However, the supplier selected prefers a more agile approach in which the system is developed through a number of iterations, or 'sprints'. These iterations entail an ongoing specification of the requirements and related solution descriptions as well as regular presentations of the solutions developed to the customer.

2. Solution adapted as project progresses: In the second scenario, the customer wants to independently reap the benefits of an agile approach, for example, by having the option to adapt the solution on the basis of end-user feedback, but also wants high reliability of delivery and control points throughout the project in accordance with the Danish mandatory joint public IT project model.

The contract

To avoid major disagreements and the ensuing project delays, customer and supplier must endeavour to see the development project from the same perspective right from the point the contract is signed.

If the IT supplier wants to use agile development methods and the customer has not selected a type of contract that supports this, the supplier must bear in mind that the supplier is still responsible for ensuring that all the agreed requirements have been formulated and met (the scenario in which requirements are fully specified in the clarification phase). The supplier is responsible if anything is missing. One possible answer to this problem is to handle groups of deviations or additions to the requirements as change requests, which must be within the parameters of the budget.

However, customers desiring a more agile process must choose an appropriate type of contract, for example, the Danish K03 Standard contract for agile IT projects. The contract must also clearly describe roles and responsibilities, including outlining how the customer expects to be involved in the process. If the contract's immediate approach is deviated from, the expectations need to be re-revisited, and any new decisions must be documented so that the agreements made by the parties can be referred to later in the course of the project.

Regardless of which type of contract a customer has chosen, the supplier needs to think about how an agile development process can be adapted to harmonise with the selected contract while also taking into account the given customer's wishes and maturity and not simply transferring a framework and methods from one customer to another without effecting the relevant adaptation.

The product owner role

The key role in agile development is the product owner, who is responsible for delivering maximum business value-for-money at the agreed time. To this end, the product owner manages the work flow to the development team via items from a backlog containing what needs to be done in order of priority. The product owner is the customer's voice on the development team, and the tasks include maintaining and prioritising the backlog and ensuring the development team and other relevant stakeholders are familiar with it.

In the purest form of agile development, the customer's product owner is thus almost part of the supplier's project team. In practice, though, many forms of hybrids and adaptations of this role abound. For example, there may be a proxy product owner on the supplier side or the customer may have opted not to have an internal product owner but allow the supplier to fulfil the role. However, a customer that is not prepared to perform the product owner role or to be very close to the supplier is best served by choosing a different development method, as the advantages of an agile setup are only reaped when the product owner role is filled.

When deciding whom to appoint as a project's product owner, the customer must be aware that a successful product owner must possess certain competencies:

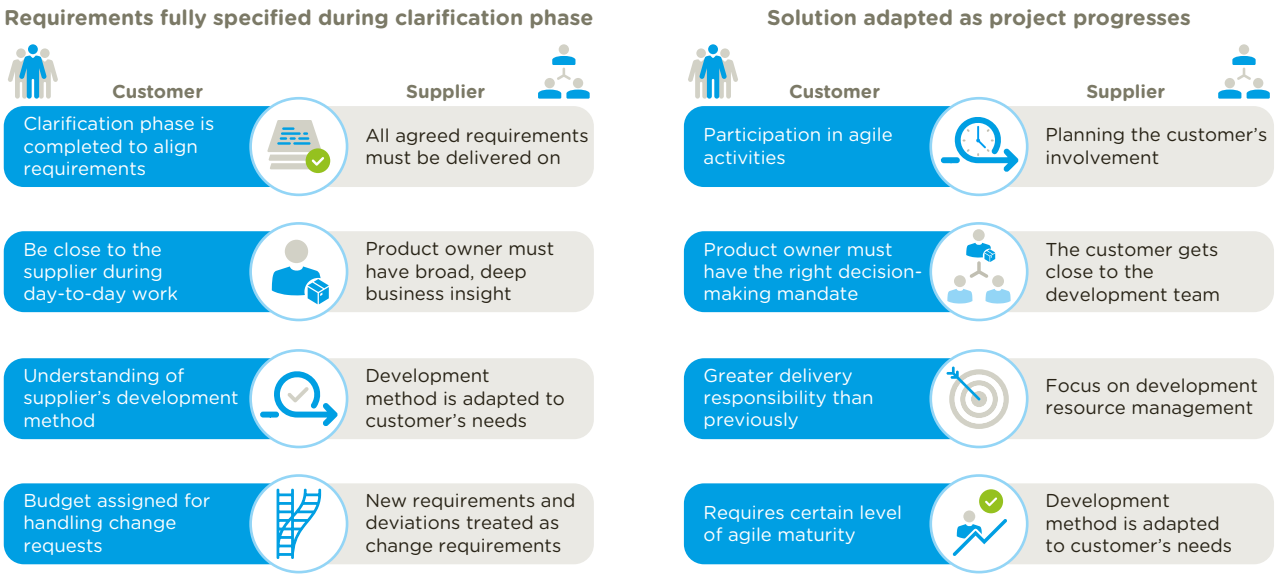
- Broad, deep business insight into the solution's business area
- Good communication skills to ensure explicit communication with all project stakeholders – executives, technicians and business people alike
- Analytical approach
- Decision-making competency
- Courage to dare make important business decisions

Involving the customer in agile work

The purpose of close customer-supplier dialogue, for example, through the product owner's work of detailing the backlog and participating in so-called demos, is to keep a constant focus on delivering the highest possible value for the customer. Big IT projects are typically long-term undertakings, and if the requirement priorities and details are not continuously and systematically addressed, the original requirements risk becoming

ATTENTION POINTS IN AGILE DEVELOPMENT PROJECTS

Different project contracts lead to different attentions points for customer and supplier during the agile development process



outdated and the business value of the deliverables reduced. The development project also risks having progressed significantly before basic misunderstandings are caught (the earlier these are spotted, the less expensive they are to rectify – in terms of both calendar time and resources).

As well as having to carve out time to take part in certain project activities, customers may also be concerned that overinvolvement in the supplier's work may entail too much responsibility. Accordingly, a healthy portion of mutual trust between the parties is needed for close involvement to work as intended. In a scenario where the customer wants a more agile approach and the solution is adapted as the project progresses, the contract should describe the framework for collaboration between the parties. Conversely, in a scenario where the requirements are fully specified in the clarification phase, expectations regarding the customer's involvement, including any contractual impact of decisions made in connection with the supplier's use of agile methods and customer involvement, should be aligned when a project is started and during its clarification phase.

The advantages of close involvement, such as fewer misunderstandings and the possibility of influencing and adjusting the original design, will almost always outweigh some of the disadvantages of having to spend more time on involvement. The time investment should preferably facilitate the project in meeting agreements on deliverables and deadlines.

ACTION ITEMS

- **Establish match between customer's chosen type of contract and supplier's development methods. Systematically and in a structured manner document deviation later in the course of the project to avoid conflicts about agreements made.**
- **Reach consensus on how to handle the project's requirement development and management in a way that makes clear what can be handled through reprioritisation and what requires a specific change request.**
- **Clearly define roles and responsibilities.**
- **As a customer, engage in close dialogue with the supplier and assume more responsibility for deliverables than you may have been accustomed to.**

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Companies late on their digitalization journey tend to follow more traditional ways and thinking

DIGITAL STRATEGY

More than ever: 'what customers think they are buying, what they consider value, is decisive – it determines what the business is, what it produces, and whether it will prosper. What the business thinks it produces is not of first importance – especially not to the future of the business and to its success'

- Peter Drucker, 1954

DIGITAL STRATEGIES ARE COMPLEMENTARY

Historically, any technology with transformational potential has been framed in an isolated, siloed strategy before embedding it into their overall business strategy. Although far more comprehensive, becoming "digital" is no different.

Digital strategy is a complementary approach to both digitisation and digitalisation efforts. The former is concerned with the application of digital technologies to form differentiating business capabilities and the latter is concerned with the utilisation of the abilities and conditions those technologies create.

Digitisation and digitalisation are fundamentally changing the way customers act and companies compete in the marketplace. It's all about winning the mind of the buyer. Furthermore, digitisation and digitalisation are blurring the lines between industries, profoundly shifting the competitive landscape to an extent unseen since the invention of the steam engine, electricity and IT.

Most now clearly see digitisation and digitalisation as two different but complementary approaches to success.

Whereas automation was the goal of the first "digital" wave, which entailed the use of IT to enable and support functions and processes, the second wave has focused much more sharply on conducting optimisation, i.e., transforming some activities and enabling others impossible without IT. In this context digitisation denotes the ongoing work of automating and optimising existing processes and business by integrating technology into them.

The third wave, digitalisation, goes further than the technologies themselves – it involves the capabilities these technologies create and how they change the conditions under which companies conduct their business processes relative to the expectations of customers, partners, and employees. Digitisation creates value by enabling companies to do business in a better, quicker and smarter manner. Achieving digitalisation that creates real value requires fundamental changes in company mentality and culture.

Some may still view digital strategy and business strategy as separate entities, but the two will merge, as happened with e-business and business over a decade ago. At its core, strategy is about setting the direction (why?), a sequence (when?), and resources (who?) and commitments (what?). "Going digital" is no different and needs to become an integral part of a company's overall business strategy.

DIGITAL READINESS INDEX

The Digital Readiness Index (DRI) allows companies and society in general to benchmark individual organisations against their industry peers and thus identify their strengths and potential weaknesses. Ramboll has developed the DRI, based on the most comprehensive study of digitalisation efforts in organisations today

In view of the ever growing strategic importance of business digitalisation, companies must be capable of tackling the challenges of digitalisation and realising its potential if they are to meet the increasingly vital competitive parameter of managing to be 'digital'.

Few companies experience instant success with digitalisation, and even fewer succeed in disrupting whole industries – although these cases are often presented as cautionary examples of the fate of companies that do nothing to digitalise. In reality, most companies are more likely to be outworked and outsmarted by adjacent competitors, national and international, than to be thwarted by pure disruption.

Being 'smart' includes recognising that digitalisation fundamentally changes how companies understand and interact with customers, partners and society, as well as alters what customers ultimately expect from products and services and the extent to which they can seamlessly mix and match deliverables to their liking and make them all interact fluently.

A company might incidentally outsmart other companies digitally, but most need to strategise, experiment with, as well as plan and organise their digitalisation to gain an edge, especially since companies generally want their results to be sustainable and repeatable. This is conscious enablement by design.

To benchmark companies' digital readiness, Ramboll has designed a framework for measuring a company's overall organisational digital preparedness – and its performance. The framework is based on advanced thinking; best practice methodologies generated from discussions with business executives and decades of broad consulting experience; many years of working with other organisational maturity assessments; and extensive academic expertise.

The framework focuses on adaptive strategic directions, collaborative and concerted efforts, learning and insightful changes, as well as enables organisational operationalisation. It incorporates all the critical, strategic and tactical themes involved in becoming 'digital' throughout the business. The result is a single, integrated model aimed at identifying what is required for a company to sustainably digitalise its business.

The DRI is aggregated from five themes across 18 key dimensions that have been identified as primary differentiators applicable to all companies, independent of industry. The following pages cover these dimensions in more detail.

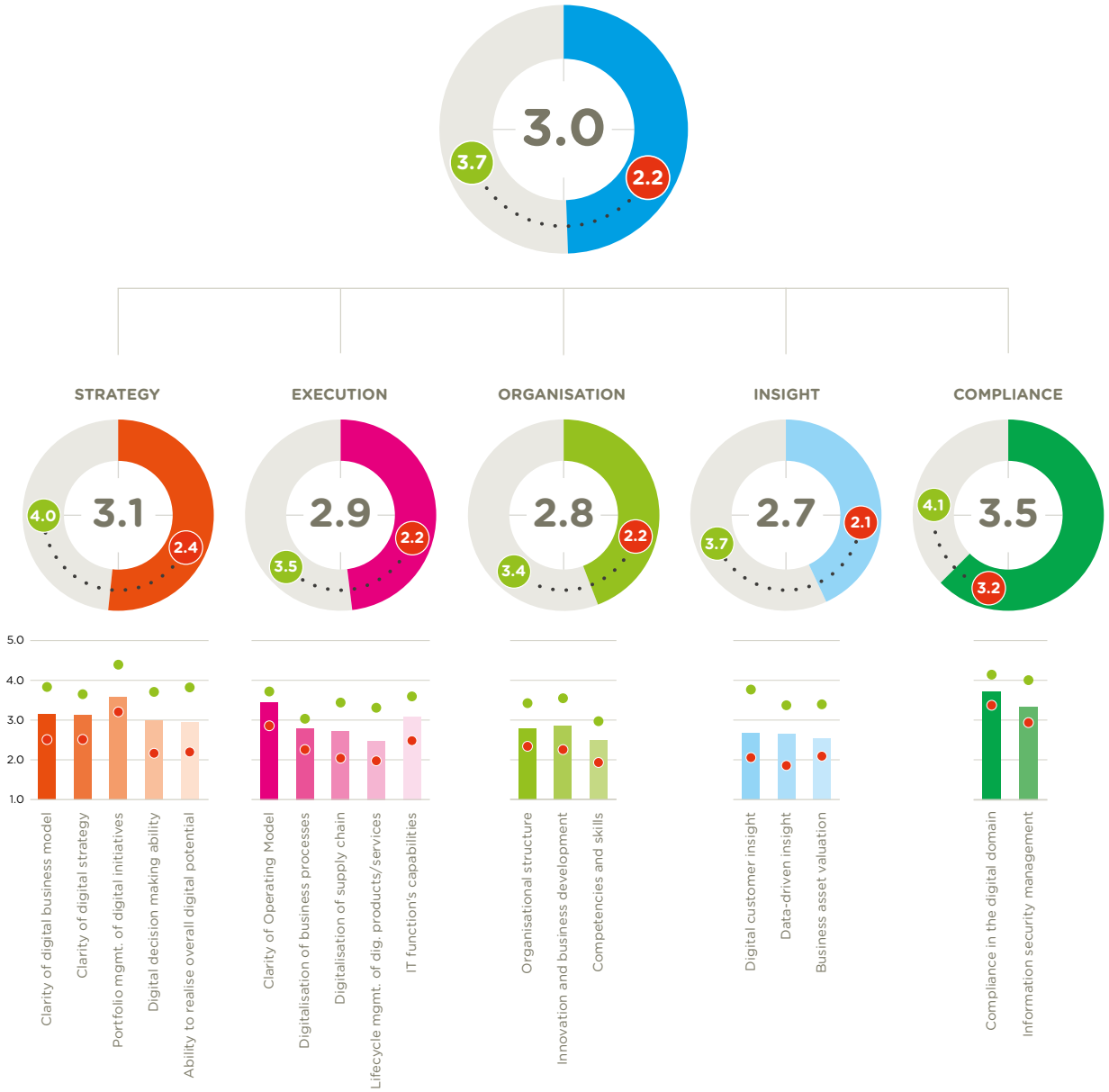
The DRI is built on advanced statistical factor analysis. Furthermore, weighted averages (annual revenue for private sector and turnover for public sector) are used to balance companies proportionally and thus produce fair cross-national representation.

A relative scale of 1 to 5 (with 3 as the average) is used, as no objective targets exist for top or bottom performers.
A best- and a worst-practice group have been identified for each key figure on the basis of each company's ability to achieve intended goals and realise expected benefits. Together, these groups represent the 25% of companies currently best and worst positioned as regards digital readiness.

This framework can be applied at both a national and an industry level (illustrated), as well as used for benchmarking individual companies against their peers or relevant company groupings.

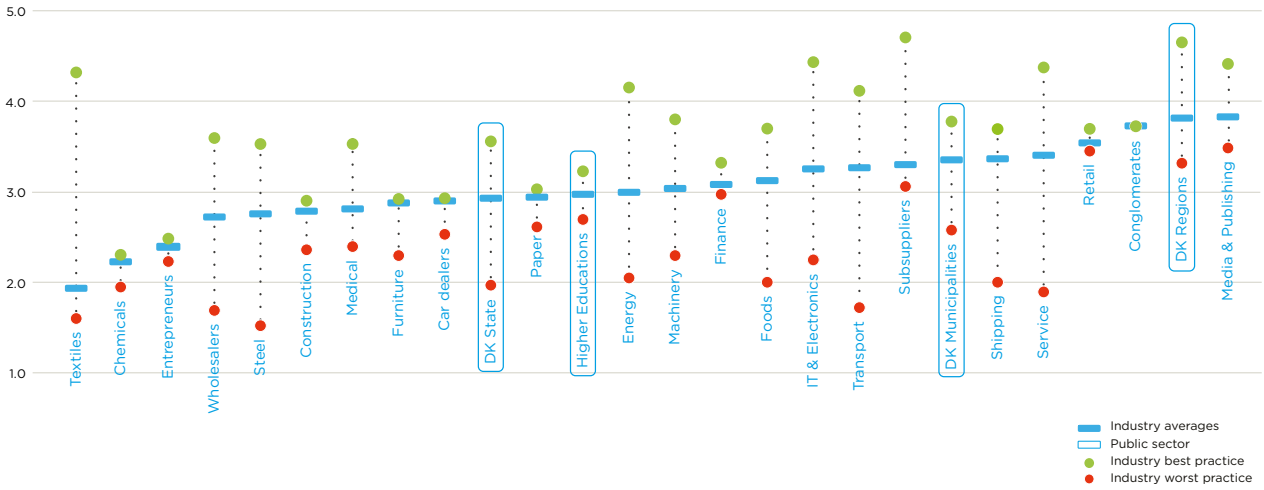
RAMBOLL DIGITAL READINESS INDEX

Based on data from the private sector



INDUSTRY OVERVIEW OF DIGITAL READINESS INDEX

Based on data from the private sector



STRATEGY

However flawless, any execution in the wrong direction can lead to extinction. Formulating a strategy with a clear direction enables an organisation to be effective, while implementing the strategy determines its efficiency. Real value creation depends on proper planning of both.

Overall in 2019 digital strategisation appears decent, but a closer look shows that companies seem to have more success with the application of 'classic' portfolio management than with realising their digital potential and thus improving their bottom lines.

Clarity of digital business model: Understanding the digital elements and enablers of the business model, where the value proposition and go-to market approach needed to earn a proper market position have been found.

Clarity of digital strategy: A clear vision and strategy for how to develop and utilise the digital elements and enablers, along with the leadership and focus to support the business model.

Digital portfolio management: The ability to balance and prioritise digitalisation investments and efforts to achieve the goals of the business model and strategy.

Digital decision-making: The ability to make well-informed decisions about the digital elements and enablers of the business model and strategy.

Realisation of digital potential: The ability to realise the overall digital intentions and ambitions of the business model and strategy, and to impact the company's bottom line positively.

EXECUTION

To execute a strategy efficiently, a company must orchestrate all levers at all organisational levels in a targeted manner. Furthermore, as offerings become more digital, execution also requires more intense, continuous management to ensure satisfying outcomes for customers and partners.

In 2019 digital execution shows that companies believe in their current operating models and in the IT function's supporting and enabling capabilities, but also that internal and external processes, and especially life cycle management of offerings, are below par.

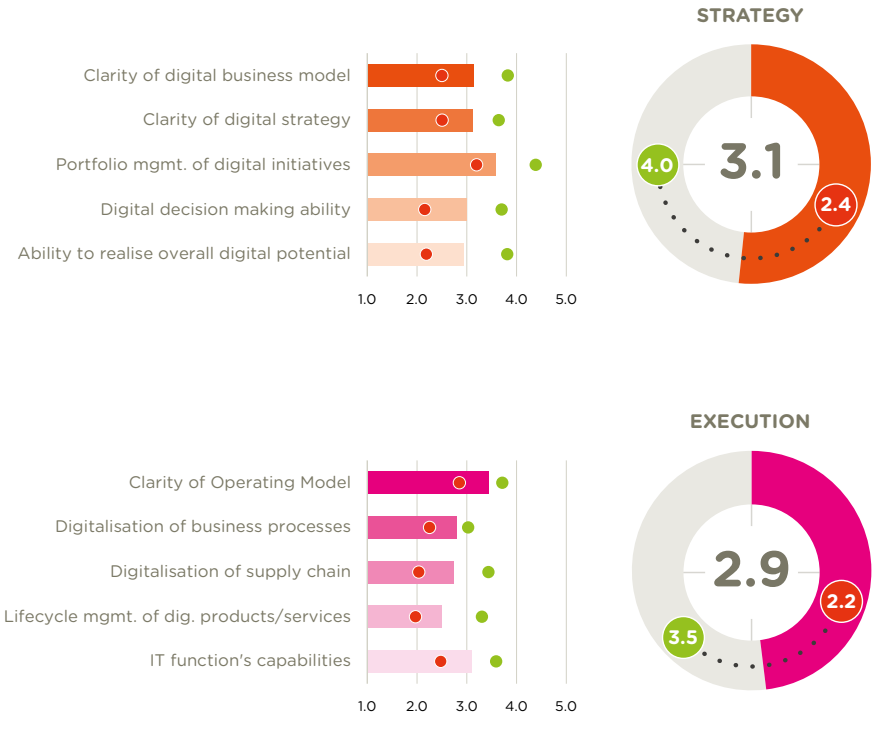
Clarity of operating model: The well-orchestrated and understood interplay between organisation, processes, capabilities, assets, support systems, etc.

Digitisation of business processes: The degree to which company business processes are digitised, i.e., have the right processes, controls and technologies to optimally support and enable operations.

Digitalisation of supply chain: The digital enablement of the company's supply chain towards partners, vendors and customers, i.e. the overall digital ecosystem, for the purpose of delivering the optimal products, services and experience.

Life cycle management of digital products/services: The ability to and quality of the development, governance and support along the full lifecycle of "digital" offerings including when in hands of customers.

IT function's capabilities: The ability of the IT function to enable the digital intentions of the company.



ORGANISATION

Effectively organising for becoming or staying 'digital' commonly requires an initial digital centre of excellence to create a set of guidelines and principles to be promoted throughout the organisation. In addition, incentivising collaboration often fosters an environment for innovation and learning. Ultimately, no digital teams exist since being "digital" is embedded everywhere. In 2019 digital organisation is closing in on a middle level, but still with many companies striving to understand what it takes.

Organisational structure: How the company's organisational structure and design fit together in order to realising digital business results.

Innovation and business development: The suitability of the company's cultural attitude and mindset with regard to the required digital innovation and business development.

Competencies and skills: The adequacy of the company's competencies and skills when it comes to fulfilling its digitalisation requirements.

INSIGHT

Corporate and organisational boundaries blur and blend with other players and customers within the business ecosystem. Insight into what happens and the understanding of why is a key competitive advantage in the digital era.

In 2019 digital insight is becoming more focused on where digitalisation ultimately matters: customers and channels, as well as becoming more data-driven.

Customer insight: The company's digital enablement of customer insight and involvement.

Data-driven approach: The suitability of the company's data instrumentation (i.e., cockpits, dashboards, reports) to provide the necessary insight required for the company to act.

Insight as business asset: The overall valuation of the company's digital business assets (customer and social media information, etc.).

COMPLIANCE

Conforming with requirements sets the foundation for transparency and accountability, and increases trust on the part of customers and partners. It also enhances and protects the company's brand and reputation by avoiding the unintended adverse effects of issues such as litigation, fines, prosecution, bad publicity and soured customer relationships.

In 2019 digital compliance shows good improvements on both the broader compliance issues (including GDPR) and of the more classic area of information security.

Digital compliance: The ability to comply with regulations and standards within the digital domain (e.g. data, processes, products, services) and to document such compliance.

Information security management: The adequacy of company security practices, capabilities and tools to safeguard information assets today (both internally and for products in customers' hands).

DIGITAL READINESS – LEARNINGS FROM THE TRENCHES

Real-world digitalization does not always abide by business school textbook ways. Ultimately, as companies mature on their digitalization journey, most learn that those ways might be more efficient, but early adopters are much more entrepreneurial in their own way. Some experiences though are worth implementing as early as possible to progress easier.

For the last three years Ramboll has measured the Digital Readiness Index (DRI) nationally as well as per industry across both the private and public sectors. On top many one-on-one dialogues have been held on a yearly basis both to assist a wide range of individual companies based on learnings from *IT in Practice*, but also for Ramboll to gain a deeper insight into individual company reasoning behind strategic digitalisation choices to better match and interpret surveyed *IT in Practice* data.

Now Ramboll is ready to publish some of the underlying learnings from the DRI data analysis: What is the impact of the individual digital readiness themes and dimensions on the overall DRI, also known as which ones are the most important to affect in order to progress most effectively on the company digitalisation journey.

To do this, a digitalisation journey from an early to a late stage has been constructed based on surveyed responses, and all companies have been given a calculated position on that journey.

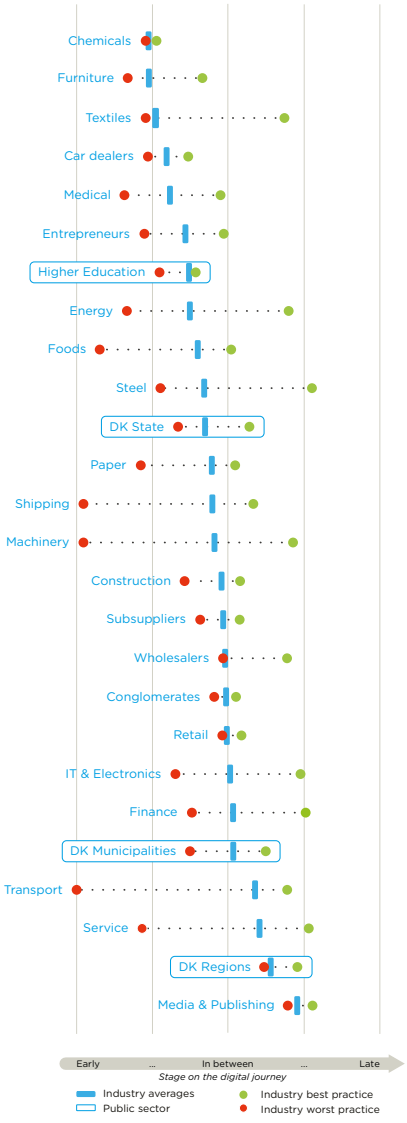
For each industry a best and worst practice group have been identified based on each included company's ability to achieve intended digital goals and realise expected benefits. The respective groups represent the 25% best- and 25% worst-positioned companies as regards digital readiness.

A visual representation of this can be seen in the graph to the right where each industry is illustrated based on member-company average stage A visual representation of this can be seen in the graph to the right where each industry is illustrated based on member-company average stage of their journey, as well as the average of stages of worst and best practice companies within that industry respectively.

At a national DK1000 level most companies are still on the earlier stages of their journey (44% of private sector companies, graph to the right) and very few reports being at the ultimate late stage (2% of private sector companies). But at an industrial level there are huge differences with just a few industries where most companies due to competitive forces need to follow each other tightly, i.e., a

THE STAGE OF THE JOURNEY FOR DIFFERENT INDUSTRIES

Average stage on the digitalization journey from an early stage to a late stage for private- and public-sector companies as surveyed per industry. As can be seen, most industries have a quite wide progression span from worst practice companies towards best practice companies, and most companies are at the earlier stages.



common digitalisation level is a sanity factor, whereas other companies in other industries are much more niche-oriented and diversified and need to find their own way.

Interestingly, what drives progress along the journey when measured in the optics of the DRI framework (see former article on page 21) is basically the same independent of industry and company size. And the impact of those drivers has now been measured for the 18 individual dimensions across the five digital readiness themes of the DRI model.

What Ramboll also discovered is that companies late on their digitalisation journey tend to follow more traditional and structured ways and thinking, i.e., business model -> strategy -> organisation -> execution -> etc., to a much higher degree than companies early on their digitalisation journey who are much more entrepreneurial and individual in their ways.

This fits very well with the DRI level of those companies (and industries), i.e., early journey stage -> low DRI level (1-2), late journey stage -> high DRI level (4-5). For an explanation of DRI levels see former article on DRI on page 21

In order to utilise these findings, learnings and insights are therefore in this article segregated and illustrated in two tempi:

- A) Companies currently moving from low DRI levels (1-2) towards a medium level (3), i.e., those going from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it in general across the organisation.
- B) Companies currently moving from the medium level (3) and into the high DRI levels (4-5), i.e., those moving further from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation.

This way Ramboll has stitched together key differences in overall approaches taken by those two company groups on their different parts of the digital journey even though IT in Practice has not been able to follow individual companies along the way.

The following is a drill down for each of the two company groups above (A and B) into how changes in key elements of company digitalisation (the 18 individual DRI dimensions, explanation in article on page 21) impacts and takes effect on the five digital readiness themes (strategy, organisation, execution, insight and compliance) and ultimately impacts the overall DRI maturity level.

The four graphs to the right are illustrative for how work on improving overall company digital readiness (and as an outcome the overall Digital Readiness Index DRI) over time in practice is impacted by company work effort on the individual digital readiness themes and the progression of that work effort and impact.

The top horizontal bar graph shows the relative work effort on the five digital readiness theme areas undertaken by companies currently moving from low DRI levels (1-2) towards a medium level (3), e.g. the A) group from before. Further-more, the lowest horizontal bar shows the resulting aggregated relative impact on the overall Digital Readiness Index (DRI).

As can clearly be seen private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it obtain a greater impact from effort on their Organisational setup (1st place) than they do from defining a clear Strategy (3rd place) or obtaining a better Customer Insight (4th place) – e.g. the initial focus is primarily on updating skillsets, experimenting, finding ways of collaboration and improving the structural setup. Impact from working on proper ways to Execute (2nd place) is also important especially since changed internal processes and ways to handle lifecycle management of digital(ised) products or services must be identified early on.

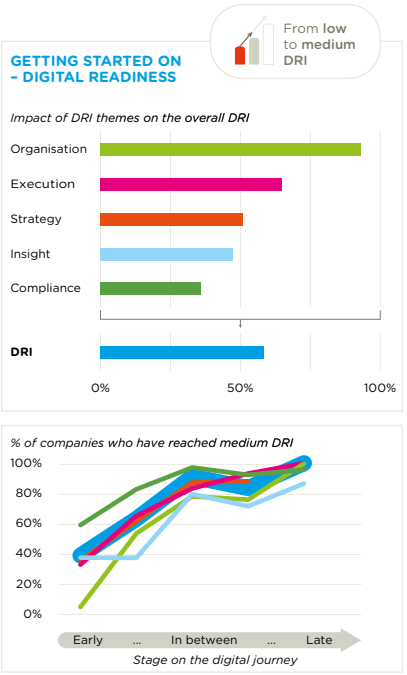
The top line-chart illustrates the progression of the relative work effort for the individual digital readiness themes along those company's digital journey (the (A) group). Additionally, the bold line indicates the resulting impact progression of overall DRI.

The first observation is that the overall progression of all curves seems to be logarithmic, e.g. most changes takes place in the first half of the digitalisation journey after which it plateaus and only little happens. This phenomenon might explain the heavy clustering of companies around a medium DRI level (i.e., level 3) as seen on page 21, i.e., companies deciding to go digital put quite a massive effort in up front, then stabilises and either find that the obtained level seems sufficient, or that it takes another massive effort to undertake the next improvement steps and therefore wait until they are fully prepared for it or feel pressured by the market forces.

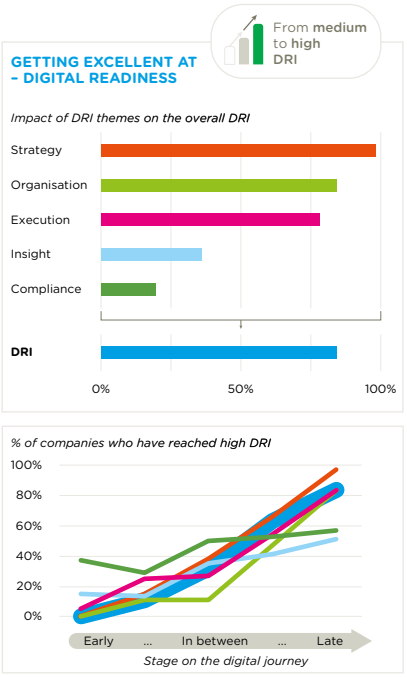
The second observation is that companies when entering on their digitalisation journey initially rates their relative preparedness levels (e.g. preparation work effort before starting) as quite high except for their Organisational Readiness, i.e., that their Strategy, Execution, Insight and Compliance is already quite well-configured for company digitalisation. Market experience shows that this in many cases might be an overestimation of own abilities and could later add to the complexity of moving further up the digitalisation ladder.

THE IMPACT FROM THE FIVE DIGITAL READI-NESS THEMES ON THE OVERALL DRI

(A) Relative work effort, progression and DRI impact from five digital readiness themes for private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it.



(B) Relative work effort, progression and DRI impact from the five digital readiness themes for private sector companies moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation.



The bottom horizontal bar graph is like the top one, but illustrates the companies currently moving from the medium DRI level (3) towards a high level (4-5), e.g. the B) group from before. Again, the lowest horizontal bar shows the resulting aggregated relative impact on the overall Digital Readiness Index (DRI).

For this group of private sector companies moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation, the prioritisation of work effort from earlier changes significantly: The work effort on defining and realising a clear Strategy (now 1st place) for company digitalisation now have the most impact on raising the overall DRI level, and now Execution is 3rd place, even though becoming relatively more important than in the early stages (length of execution bars compared across the two bar graphs). A significant Organisational effort (2nd place) though is still required. Overall progression as shown in the bottom-line chart is also of a slightly exponential character, e.g. it takes more planning effort before changes starts to take effect, but afterwards it goes faster.

It is not a surprise that Compliance (5th place throughout the whole journey for the A and B group) is not really a driver of digitalisation, but it is still a clear requirement (license to operate), and most private sector companies seem to gain the most impact from compliance effort early on their digitalisation journey (length of compliance bars compared A versus B group) – probably due to initial effects from improved (stricter) standardisation, processes and overall digital awareness.

But what is more worrisome is that the impact from better Customer Insight (4th place throughout) and related data-driven approaches is not higher – it clearly indicates that most companies have not found proper digital ways to continuously adapt to individual customer values and requirement, e.g. are still creating products and services from a somewhat internally perceived view of what their customers really want.

Many more interesting insights can be gained by drilling further down into the 18 underlying digital readiness dimensions of the five DRI themes (for details see page 21-24).

Using the same type of graphics and reading guidance, the four graphs to the right are illustrative for how work on improving Strategy Readiness over time is impacted by company work efforts on the five individual key strategy dimensions of the DRI (see page 21) and the progression of that work effort and impact.

The top horizontal bar graph shows the relative work effort on the five key strategy dimensions undertaken by private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it. The (A) group clearly obtain a greater impact from effort on their "Strategy" Realisation (1st place) than they do from their more limited work effort on both Business Models and Digital Strategy (4th and 3rd place respectively) and their ability to make Decisions (2nd place) based on those. This clearly indicate that companies initially take an entrepreneurial and experimental approach to strategic readiness where gut feeling and instinct counts more than analytical thinking.

The top line-chart illustrates the progression of the relative work effort for the individual key strategy dimensions along those companies' digital journey (the (A) group). Additionally, the bold line indicates the resulting impact progression of overall digital Strategy Readiness.

Companies, when entering on their digitalization journey, initially rates their relative preparedness levels (e.g. preparation work effort before starting) as quite high especially for Digital Portfolio Management, i.e., that their strategic capabilities are already quite well-configured for company digitalisation. Especially in an initially untried and complex area as company digitalisation this is often an overestimation of own abilities as many companies learn when they later want to move further on the digitalisation ladder.

The initial high rating of Digital Portfolio Management is also the reason why so little additional effort is put into it (top horizontal bar graph) and clearly indicates that companies see digitalisation projects just like other projects portfolio wise – which might be a gross underestimation of the unique characteristics and manners of digital activities.

Classic portfolio management primarily focused on internal aspects – e.g. a short value- and supply-chain – whereas Digital Portfolio Management is about the full end-to-end perspective from vendors through the company itself and to what fits and enjoys the customers (including applications and services, e.g. installed on their mobile phones).

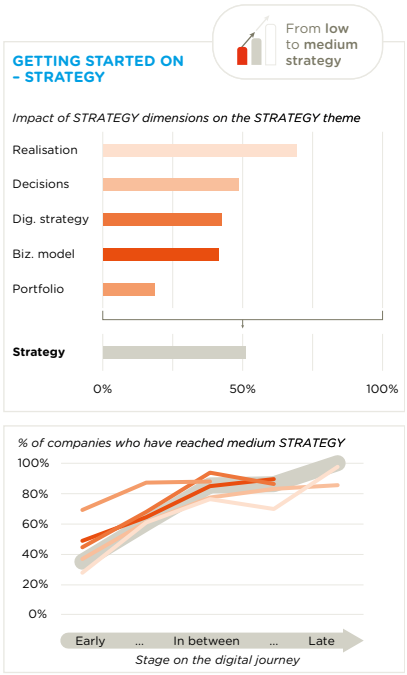
The bottom horizontal bar graph is like the top one, but illustrates the companies moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation (the (B) group).

And now the prioritisation of work effort changes significantly with companies turning away from more ad hoc ways towards a much more traditional philosophy by prioritising defining a proper Digital Business Model (1st place) before developing a Digital Strategy (2nd place), finding ways to Realise it (3rd place), then designing the framework for Decision-making (4th place) accordingly and lastly spending effort on Digital Portfolio Management – i.e., investing in understanding the full end-to-end value- and supply-chain covering both company and partner internals, as well as deep involvement with, and understanding of, the customer side.

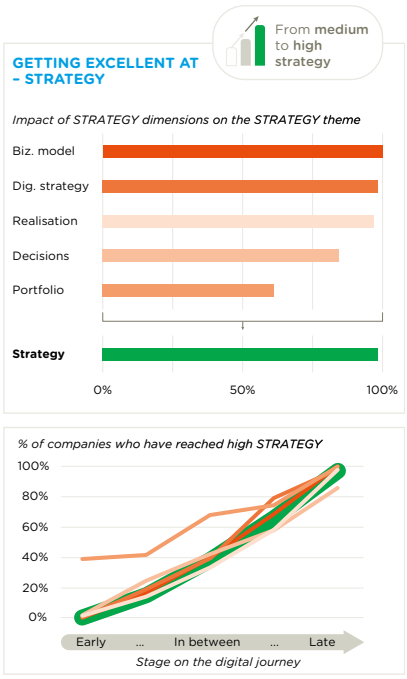
The bottom line-chart illustrates an overall recognition of "no easy solutions exist when striving for excellence". The strategic work effort starts from the bottom of the tasks – i.e. insights into the challenges of company digitalisation has eliminated the earlier discussed overestimation of own initial abilities, even though Digital Portfolio Management seems to get a more step childish treatment.

THE IMPACT FROM INDIVIDUAL KEY STRATEGY DIMENSIONS ON THE STRATEGIC READINESS

(A) Relative work effort, progression and digital strategy readiness impact from the five key strategy dimensions for private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it.



(B) Relative work effort, progression and digital strategy readiness impact from the five key strategy dimensions for private sector companies moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation.



Using the same type of graphics and reading guidance, the four graphs to the right are illustrative for how work on improving Execution Readiness over time in practice is impacted by company work effort on the five individual key execution dimensions of the DRI (for details see page 21) and the progression of that work effort and impact.

The top horizontal bar graph shows the relative work effort on the five key execution dimensions undertaken by private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it (the (A) group).

Work effort on proper management of the Digital Lifecycle is the key driver (1st place) of Execution Readiness followed by a slightly less effort on managing the Digital Supply Chain (2nd place) and instituting good (most commonly automated) Internal Processes (3rd place). These are areas where many companies seem to lean on former good experience but also where many adapt best practices from acquired process software solutions, i.e., their ERP systems or similar.

Most early adopters of digitalisation anyway have only a few digital products or services in the pipeline in parallel with their existing portfolio, so it stands to reason to build on (and modify) what already is in use. Only a few companies seem to implement radical changes or solutions initially. Lifecycle Management though differs significantly when adding digital services to existing or new products as it requires continuous maintenance and interaction with remote customer located service components (embedded in product, on customers smartphone etc), e.g. leading to a remarkedly different setup than for servicing a classic transactional sale of physical goods.

What is more worrisome is that (A) group of companies spends almost no effort (5th place) on matching their overall Operating Model to the changed digital requirements, which for good or bad underscores the entrepreneurial approach, but also leads to lack of efficiency and high operating costs. the limited effort in bringing the IT Functions (4th place) up to speed and competencies restricts the effectiveness of digitalisation initiatives.

The initial high rating of both Operating Model and IT Function (top horizontal bar graph) clearly indicates that many companies see their pre-digitalisation setup as sufficient and many will ultimately find this a (albeit common) mistake.

The bottom horizontal bar graph is like the top one, but illustrates the companies currently moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation (the (B) group).

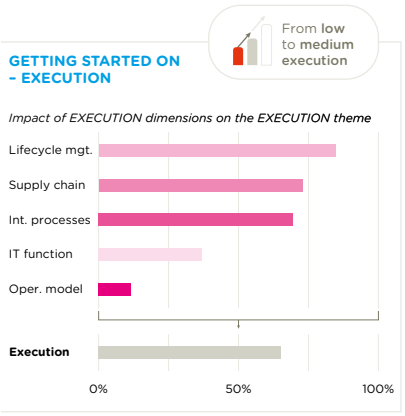
And even though the overall prioritisation of work effort does not change much (but at a much higher level) most companies now recognise the high importance of adjusting or redefining their Operating Model (4th place). A fitting operating model is key to enabling the Digital Strategy of any company, ensuring that it (only) Executes what is required and can Organise optimally around it. Starting to work on the Operating Model early on the digitalisation journey is also a clear aspirational advice.

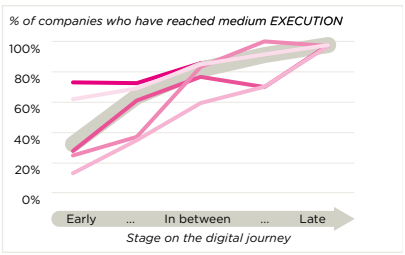
Additionally, companies striving for this level also enables a more fit and competent IT Function since IT inevitably needs to be an integral part of digitalisation and most often would be very beneficial to include in optimisation of both Internal Processes and external processes (Supply Chain) as well as overall Lifecycle Management of digital(ised) products and/or services.

Again, the bottom line-chart illustrates an overall recognition of "no easy solutions exist when striving for excellence" in that the execution work effort starts from the bottom of the tasks – i.e., insights into the real challenges of company digitalisation has eliminated the overestimation of own initial abilities.

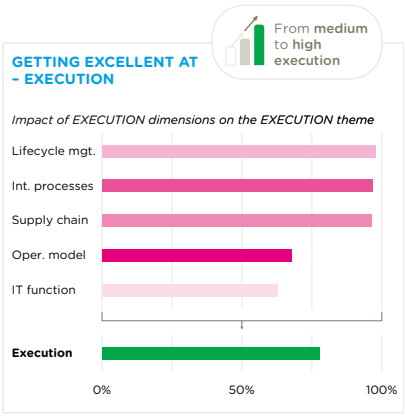
THE IMPACT FROM INDIVIDUAL KEY EXECUTION DIMENSIONS ON EXECUTION READINESS

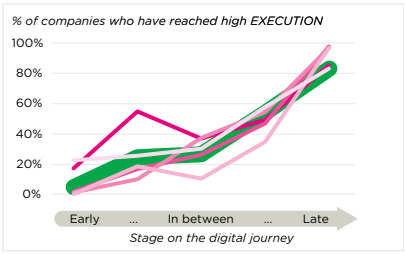
(A) Relative work effort, progression and digital execution readiness impact from the five key execution dimensions for private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it.





(B) Relative work effort, progression and digital execution readiness impact from the five key execution dimensions for private sector companies moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation.





Using the same type of graphics and reading guidance, the four graphs to the right are illustrative for how work on improving Organisation Readiness over time in practice is impacted by company work effort on the three individual key organisation dimensions of the DRI (for details see page 21) and the progression of that work effort and impact.

The top horizontal bar graph shows the relative work effort on the three key organisation dimensions undertaken by private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it (the (A) group).

Work effort to identify and establish the right Competencies is clearly of high importance initially (1st place) and a relative huge effort on establishing a proper Organisational Structure (2nd place) is commonly seen as an evident next step, but this is where the other characteristics of the (A) group on commonly lacking a good Digital Strategy and a fitting Operating Model as discussed earlier might become an issue. Without at least a good idea for a Digital Strategy it is difficult to design a fitting Operating Model and subsequently there is no way any Organisational design might match the needs in an efficient and cost-effective manner.

Consequently, if in this entrepreneurial mode - as many companies are early on their digitalisation journey - it seems better to accept a less stringent but more agile and experimental Organisational Structure instead of putting at huge effort into getting it perfect, and spending the saved effort on Innovation (3rd place) and Business Development, which might faster lead towards the proper definition of a Digital Strategy, Operating Model and subsequently a matching Organisation having the right Competencies. Simply put: Do not initially overspend effort on digitalisation Organisational Structure, but experiment and Innovate, learn from it, and later do it all properly – e.g. strategy -> execution (operating model and competencies) -> organisation.

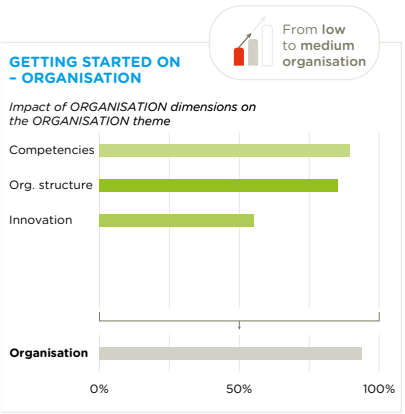
The initial high rating of Innovation (top horizontal bar graph) which for many other DRI dimensions often indicate overconfidence in own abilities is here actually a positive characteristic for many companies entering their digitalisation journey: They are already innovating, and digitalisation is often just a natural means to succeed with that. And as can be seen innovation work effort is required all along the digitalisation journey.

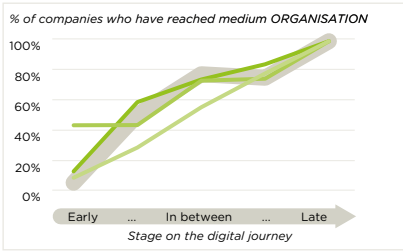
The bottom horizontal bar graph is like the top one, but illustrates the companies currently moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation (the (B) group).

And now the overall prioritisation of work effort changes: High work effort is put into Innovation (1st place) and the Organisational Structure (2nd place) becomes a change vehicle where highly agile clustering of the right competencies (3rd place), workgroups and projects becomes the norm – for the best it is not someone in the organisation who innovates, it is the innovation that constantly adapts the organisation to be the best platform for even smarter (and innovative) growth.

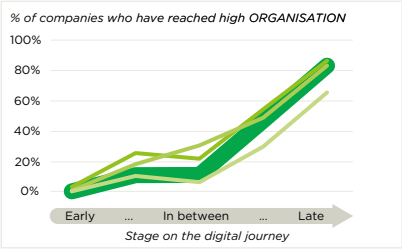
THE IMPACT FROM INDIVIDUAL KEY ORGANISATION DIMENSIONS ON ORGANISATIONAL READINESS

(A) Relative work effort, progression and digital organisation readiness impact from the three key organisation dimensions for private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it.





(B) Relative work effort, progression and digital organisation readiness impact from the three key organisation dimensions for private sector companies moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation.



Again, using the same type of graphics and reading guidance, the four graphs to the right are illustrative for how work on improving Insight Readiness over time in practice is impacted by company work effort on the three individual key insight dimensions of the DRI (for details see page 21) and the progression of that work effort and impact.

The top horizontal bar graph shows the relative work effort on the three key insight dimensions undertaken by private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it (the (A) group).

One of the expectedly important aspects of digitalisation is the massively accumulated wealth of data from e.g. instrumentation, customer interactions and social media which combined could/should lead to much deeper customer insight, data-driven products/services and fulfilment strategies, etc. But as was illustrated earlier (see page 28) the overall Insight theme came in 4th with only a limited impact on the overall Digital Readiness Index (DRI).

Even though a relative high work effort is put on Customer Insight (1st place) and becoming Data-driven (2nd place), the third item Information as Asset (3rd place) illustrates the probable cause of the limited impact: As long as company management does not clearly see, articulate, demonstrate and invest in obtaining the value of data, the overall (cultural) effect in most companies is that employees adapt the same lacking attitude. So even if many companies say they are "data driven" the reality often is that they are still (internally) process driven with data put on the backburner – they might not even be trusted over the good old gut feeling.

The initial high rating of all key insight dimensions (top horizontal bar graph) clearly indicates that many companies see their pre-digitalisation (customer) insight as quite good, and this might have been right in a pre-digitalisation context, but insight in most successful companies in a digital company context is much deeper and incredibly more detailed, so Ramboll again fears that many companies are overestimating their own initial abilities.

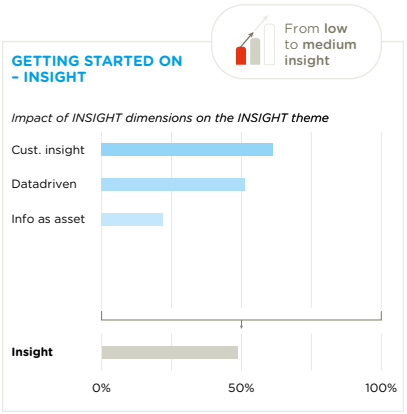
The bottom horizontal bar graph is like the top one, but illustrates the companies currently moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation (the (B) group).

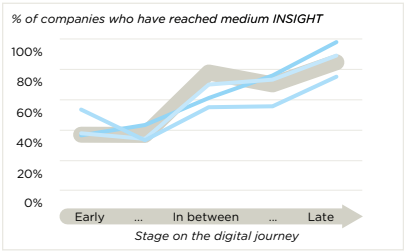
And even though the overall prioritisation of work effort changes significantly to the benefit of Information as Asset (1st place), nothing more happens to Customer Insight (2nd place) and becoming Data driven (3rd place) (same level of work effort when comparing across the 2 bar charts) and the outcome on the overall insight readiness is even less for group (B) companies.

It is worrisome that even a fundamental shift in mindset to recognise the proper corporate value of information assets does not result in a higher impact in overall insight readiness and in the Digital Readiness Index (DRI) – as stated earlier it clearly indicates that most Danish private sector companies have not yet found proper digital ways to continuously adapt to i.e., individual customer values, and e.g. are still creating products and services from a too internally perceived view of what their customers really want.

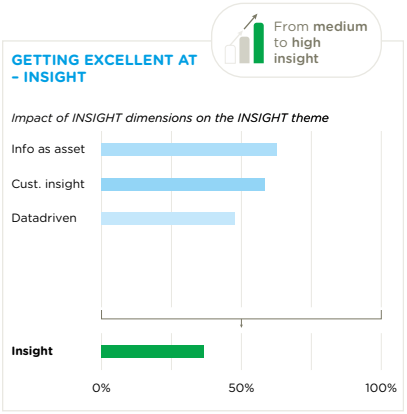
THE IMPACT FROM INDIVIDUAL KEY INSIGHT DIMENSIONS ON INSIGHT READINESS

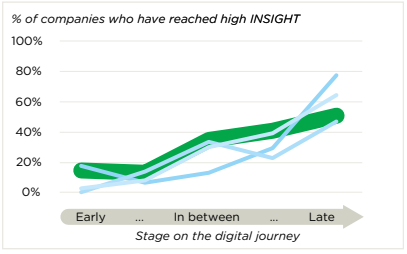
(A) Relative work effort, progression and digital insight readiness impact from the three key insight dimensions for private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it.





(B) Relative work effort, progression and digital insight readiness impact from the three key insight dimensions for private sector companies moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation.





Again, using the same type of graphics and reading guidance, the four graphs to the right are illustrative for how work on improving Compliance Readiness over time in practice is impacted by company work effort on the two individual key compliance dimensions of the DRI (for details see page 21) and the progression of that work effort and impact.

The top horizontal bar graph shows the relative work effort on the two key compliance dimensions undertaken by private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it (the (A) group).

Although Compliance is not really a driver of digitalisation, it is still a clear requirement (license to operate) with a key focus on Information Security (1st place) and secondarily Compliance (2nd place).

The initial high rating of both key compliance dimensions (top horizontal bar graph) clearly indicates that many companies see their pre-digitalisation Information Security and Compliance levels as almost fully satisfactory in a digitalised world as well.

But as stated earlier one of the expectedly important aspects of digitalisation is the massively accumulated wealth of data from e.g. (external IoT) instrumentation, customer interactions (apps and data) and social media which combined could/should lead to much deeper customer insight, etc. - i.e., for many/most companies this will both Information Security-wise and Compliance-wise (e.g.) be a whole new game – so do not expect pre-digitalisation ways to suffice along the company's digitalisation journey.

This is also an area where newspaper headlines constantly tell another story: Daily reports on massive Information security breaches and mismanagement of regulations and guidance on how to behave fully in compliance with both legal and customer expectations.

So even though there is some Compliance Readiness impact on the overall company Digital Readiness Index (DRI) – which as stated earlier is probably due to initial effects from improved (stricter) standardisation, processes and overall digital awareness – most private sector companies most probably still underestimate the importance of this area and should spend even more effort on improving on it.

Compliance in the digital domain is also certainly a huge part of sustainable brand value as failures often affect widely and reporting of it is almost instantaneous across customers, competitors and media.

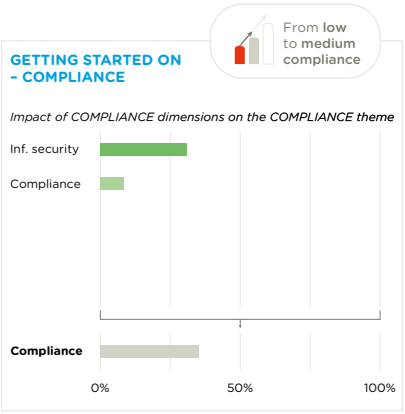
The bottom horizontal bar graph is like the top one, but illustrates the companies currently moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation (the (B) group).

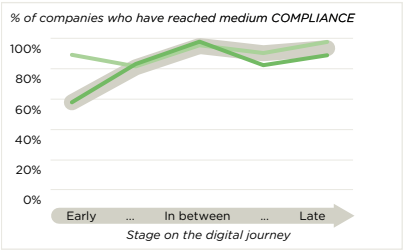
And even though the overall prioritisation of work effort switches to the benefit of Compliance (1st place) versus Information Security (2nd place) in recognition of the much more complex compliance issues resulting from the galloping amount of (confidential) customer and other proprietary data, it is not enough to address the Information Security issues.

It is worrisome that the overall picture of Information Security across Danish private sector companies – even those striving for excellence – does not seem to fully reflect the threats awaiting.

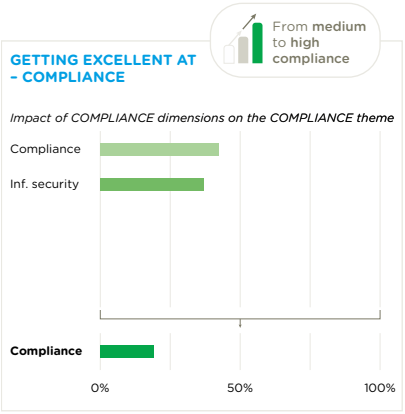
THE IMPACT FROM INDIVIDUAL KEY COMPLIANCE DIMENSIONS ON COMPLIANCE READINESS

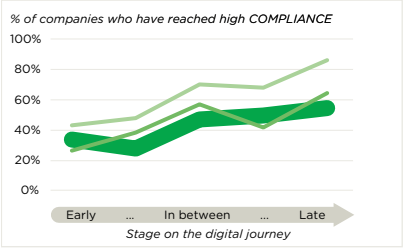
(A) Relative work effort, progression and digital compliance readiness impact from the two key compliance dimensions for private sector companies moving from experimentation and initial adoption of digitalisation towards having reasonably well-established practices around it.





(B) Relative work effort, progression and digital compliance readiness impact from the two key compliance dimensions for private sector companies moving from having reasonably well-established practices around digitalisation towards having well-understood, clearly defined and excellently managed and executed practices in place across the whole organisation.





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It is paramount that a clear, shared and articulated vision of the digital future exists

CEO AGENDA

CEOs are recognizing the need for a stronger and more well-founded digital mindset in their organizations. It's not only about competencies, but about culture, leadership, composite capabilities and mode of operating the business.

ESTABLISHING DIGITAL READINESS IS A CEO RESPONSIBILITY

Digitalization is too broad and important to be delegated to any one or several CxOs. Company owners and their boards are already, and will increasingly going forward, look to the digital savviness of CEOs and CEO candidates, to ensure a truly digital mindset is applied.

Transforming companies and organisations into entities capable of acting in a digitalized business world is not a one-off transformation exercise. In most industries, digitalization is already the main driving factor in the race for competitive advantage.

Many companies must fundamentally change their governance models to adapt to this new reality. For many this will mean rolling back on the degree of centralization in digital decision making that prevailed in the years were enterprise systems were being build up, and strong centralization was required to prevent total anarchy.

In larger companies, one-size-fits-all service from a central IT organisation or partner is likely to no longer be enough. Regardless of the proficiency of a central digital organisational unit, business units need to have their own targeted capabilities in place to navigate in the digitalization context of their specific functional area.

Digital readiness of organizations can be assessed and approached on company level as well as on business unit or even department level. Regardless of organizational level, it is paramount that a clear, shared and articulated vision of the digital future exists, in a form that is contextualized and concrete to each functional area in the organization.

CEOs must ensure that digital readyness is assessed and adressed across the CxO suite, and make sure that functional areas and departments have access to the resources and capabilities required to mature and succeed digitally.

MOST ENTERPRISES HAVE DIGITAL STRATEGIES IN PLACE, BUT APPROACHES TO DIGITAL STRATEGY WORK VARY

Most CIOs and CEOs indicate that their organisation now has a digital strategy, but their approaches and depths vary greatly. Some CIOs still think CEOs confuse digital strategy with IT strategy. A fifth of CIOs say their companies still have no digital strategy.

IT in Practice shows that executives are increasingly considering digital strategies a fully integrated part of business strategies. More than half of all the executives of the companies surveyed expect their digital strategy to be a fully integrated part of business strategy in three years' time.

At present, while 48% of CEOs consider digital strategy to be already fully integrated into their companies' business strategies, the same goes for only 22% of CIOs. CIOs are also more than twice as likely as CEOs to indicate that although the business strategy might address digital issues, it does not do it to a sufficient degree or in sufficient detail and depth.

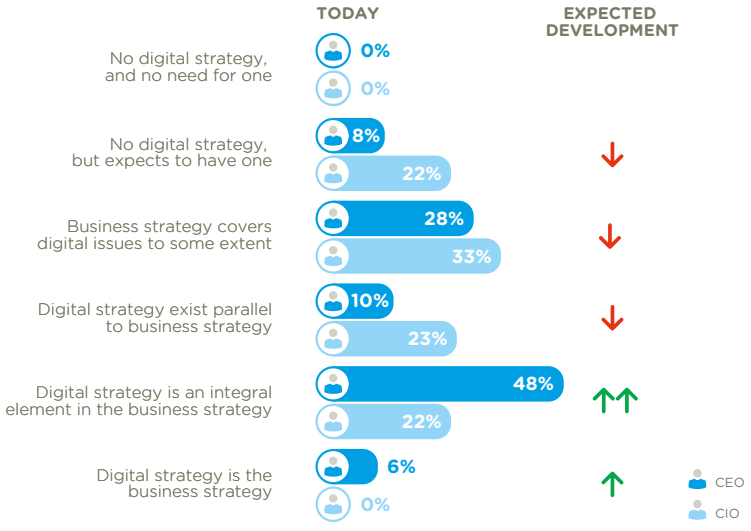
When *IT in Practice* covered the same topic in 2016, two-thirds of CEOs expected their digital strategies to be fully integrated in business strategy by 2019. This year's data shows that a large group of companies find it quite difficult to identify an approach to digital strategy work that 'fits' well with the organisation's culture, governance, legacy approaches, capabilities, etc.

More CIOs (22%) than CEOs (8%) say that a digital strategy is not yet in place. This is a tell-tell sign that many CIOs find digital issues to be insufficiently and superficially covered in strategy work. These varying perceptions of the digital strategy space confirm that a large proportion of Danish enterprises still urgently need alignment measures to 'get a grip on digital'.

A comprehensive approach is required. Digital strategy adds significant complexity to most companies' strategy work, often creating scenarios involving radical and non-linear strategic change rather than incremental improvements to existing business and operating models. At the same time, matters related to traditional IT issues (such as the implications of cloud technologies) still need to be identified and resolved. While inspirational best practices are certainly available, digital strategy approaches need to be carefully matched to the organisation's culture, maturity and legacy governance approaches. Organisations often have to start by expending resources on establishing a common language and frame of reference that enhance the maturity of the digital strategy discussions, the participants in which often have diverse backgrounds.

CEOs and CIOs alike envisage closer integration between digital strategy and business strategy in future

Existence and state of digital strategies in Danish companies, as indicated by CEOs and CIOs respectively. Arrows indicate development expectations over a three-year horizon



CIOS: IT FUNCTIONS ARE NOT YET DIGITALLY UP TO SPEED, BUT MOVING FAST

Less than half of CIOs evaluate their own organisation as mature in capability areas critical for digital transformation, and the IT functions not yet up to speed are focusing strongly on enhancing the abilities they need to support digital transformation.

The IT function's skills and capabilities are often critical to organisations' digital journeys. Historically, knowledge and experience concerning use of digital tools and technologies have been generally embedded in the IT function. Previous editions of *IT in Practice* have also shown that the IT function frequently contributes vital business knowledge (for example about business processes, reporting flows or customer interactions).

Most IT functions no longer hold a monopoly on digitalisation efforts. Business units are quickly acquiring skills and competencies previously found mainly or only within IT. However, IT organisations are by no means idle, and *IT in Practice* shows clearly that CIOs are looking seriously and realistically at the need to further develop the IT function's skills and abilities.

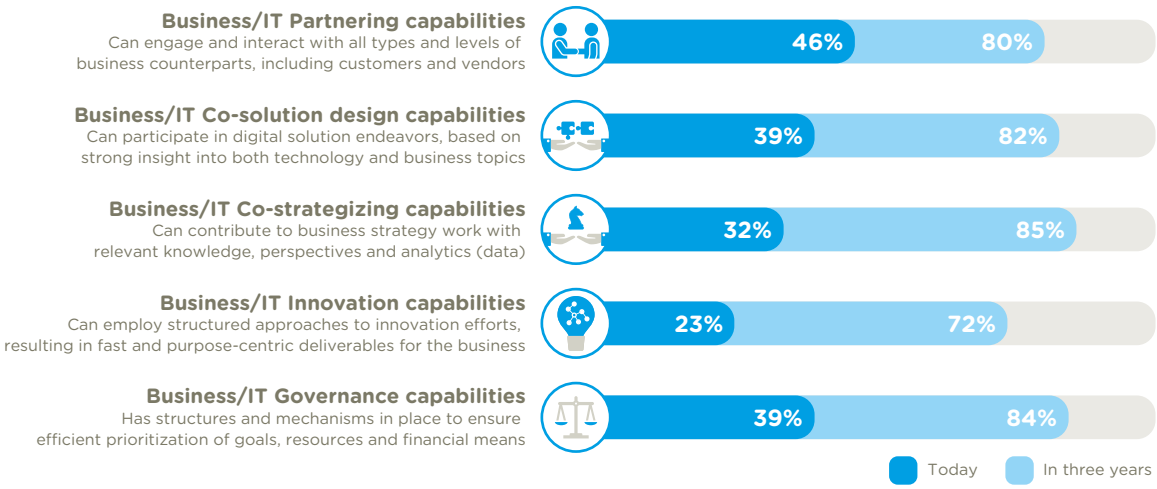
A minority of CIOs, 23%, consider their organisations mature when it comes to business/IT co-innovation capabilities. This confirms an observation frequently made by digitalisation-focused business executives, namely, that organisations rarely structure their digital innovation work or gain value from the abundance of methods and practices available, which may make this the single area most in need of targeted improvements.

Another area where IT functions are falling short of demand is in their ability to collaborate on strategy and truly contribute unique insights and perspectives to business strategy efforts.

In all the other five capabilities, CIOs indicate that attention and high priority are being given to further enhance the skills, competencies and supporting tools needed in these areas. Half of all CIOs expect their departments will develop and reach a high level of maturity within several or all areas of organisational capability. CIOs must be realistic and carefully think through and manage the organisational efforts required to achieve such an ambition. The rapidly changing nature of the technology and digital solution market spaces poses special challenges for any change programme targeting the up-skilling or competency development of a workforce.

CIOs are set on building up the organisational capabilities required to enable the company's digital journey

Percentage of CIOs indicating their organisations possess mature capabilities in key areas of ability and expertise



TRANSITION TO CLOUD CONTINUES – GROWING INTEREST IN PUBLIC CLOUD

The rapid development in cloud infrastructure technologies and accompanying market offerings is steadily changing the DNA of enterprise IT. A third of companies' infrastructure is already cloud-based, a figure expected to double in a in few years' time. Public cloud use is outpacing private cloud use.

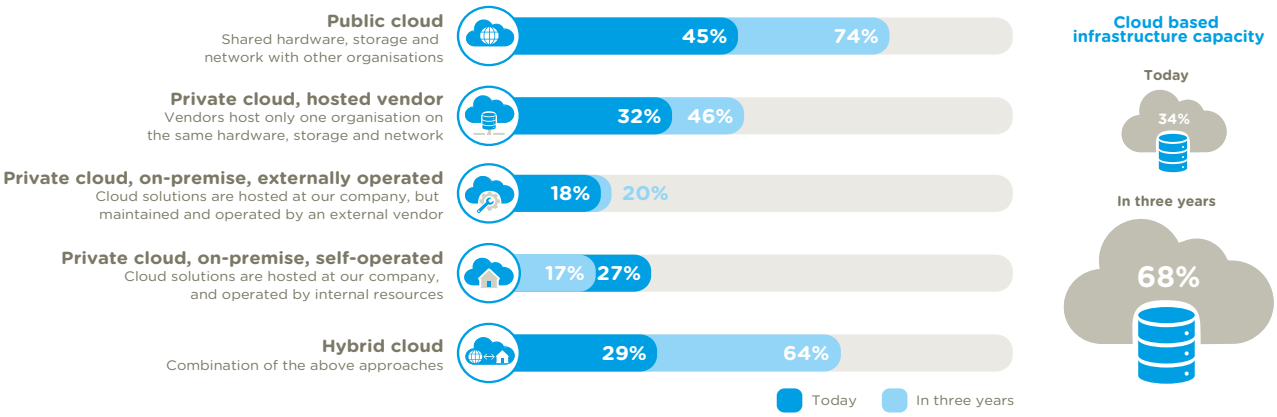
Many organisations are working towards an explicit cloud strategy or set of principles for cloud use. Many parameters need to be considered, including cost, performance, regulatory requirements, security aspects, geography, user experience, legacy limitations and intellectual property protection. The availability of cloud-based capacity or 'as-a-service' market offerings is also likely to challenge existing IT governance mechanisms, which have often been based on a de-facto monopoly of internal IT on infrastructure and capacity.

Business value from cloud computing goes far beyond simple cost savings on capacity. The ease and speed with which cloud services can be deployed and scaled boosts business agility and execution capabilities. Education is a prerequisite, though – as anyone working to any extent with digital transformation or business development must be aware of the possibilities and limitations of this practice. As with any other powerful business tool, establishing and maintaining common conventions and principles on when and how to use which cloud approaches are key.

Public cloud models, which enable organisations to share physical infrastructure capacity with each other and virtualise it to customers, will give you the most capacity for your money. However, *IT in Practice* shows that although public clouds are the most prevalent and fastest growing use scenario, companies are in no way abandoning the added advantages of various private cloud models. Up to 20% of companies expect to maintain physical assets in-house, even if partnering with an external vendor to operate them. This approach might be attractive to organisations seeking to maintain full control and ownership, but not wishing to maintain specialised technical competencies and skills.

Choice of cloud service models when implementing new IT infrastructure capacity

CIOs believe a third of infrastructure capacity is currently cloud-based today, and expect that figure to double within three years. Internally hosted and operated infrastructure capacity is expected to decline further.



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Cyber-security continues to top the agenda in many enterprises – especially within areas vital to society

DIGITAL TRENDS

Digital trends are truly starting to open up opportunities and revolutionise the way enterprises run their operations. However, one factor is slowing the pace of progress and can be a showstopper for some businesses.

GET A HANDLE ON DATA

Data is an enterprise's raw material – its basis for effecting all digitalisation and making use of technological trends. This is why having a handle on data is vital.

Create an overview of which data is key to the enterprise's operations and assess what specific improvements can potentially be gained from enhancing data quality.

Assess whether the right parameters are being measured and whether responsibility is optimally anchored.

Formulate a strategy for better deploying data and assess how to prepare for a future where data is located across organisational lines and where the enterprise's own data is integrated with that of others in the larger ecosystem.

The dominant digital trends of recent years continue to attract great attention. They generally include the usual suspects: Cloud, AI, RPA, IoT and Blockchain, and expectations for these technologies run sky-high. We are also starting to see these technologies reach considerable maturity, while substantial experimentation continues. Putting such technologies into use takes time, and this is still assessed to be particularly lengthy for Blockchain, as the technology depends on common standards and needs a strong infrastructure to build on.

5G, IoT and speech recognition

Other technological trends worth mentioning include 5G, the new generation of mobile broadband. Long under development, this technology is currently being rolled out on a large scale. 5G creates a strong infrastructure with ultra-low communication delay (latency), exactly the attribute needed to spread the use of IoT devices in, eg, cars, drones and other devices heavily dependent on robust real-time communication. Together with IoT technology, 5G offers huge perspectives for implementing Smart Cities, self-driving cars, autonomous drones, smart roads, smart utilities and so on.

Another technology long underway and now gradually becoming practicable is speech recognition. We know it from Apple's Siri, Google's Google Assistant and Amazon's Alexa. It is principally taking hold in the private segment, but there are many indications that a rise in commercial use may be around the corner. When coupled with the others, this technology has the potential to revolutionise work processes, social interaction and more. As with IoT technology, this development also relies heavily on cyber-security right down to a device itself. Such technology further requires careful consideration as regards data ethics and privacy, as it involves a biometric identifier (the voice).

Cyber-security

Cyber-security continues to top the agenda in many enterprises – especially within areas vital to society, such as those involving national security and supply interests. The ongoing technological advances, particularly in the IoT, where myriad units will be interconnected in ecosystems and exchange data, are creating a growing need for 'edge security'. The focus is on the capacity to withstand attacks at the outer perimeter, because once a unit is 'on the inside', the entire solution is in principle vulnerable.

Data ethics and privacy

In addition to the IT security issues related to data, including access management and controlling its potential uses, an ever-sharper focus is being placed on data ethics and privacy. Elements of the problem have already been highlighted by the GDPR, where the emphasis is on personal data processing. However, the new technologies broaden the issue. The problems also relate to the processing of data concerning personal behaviour, the physical location of persons and devices, preferences, the linking of identities to persons, data sale and rental and other issues.

Trading in personal data and information is not far off. Data valuation will be an independent discipline where citizens and enterprises will be able to create business models using such means as renting or selling their personal data and information to a third party. Many established IT businesses are already making enterprising attempts to invent new business models in this field.

Technologies for processing data and managing the ethical issues these developments are predicted to raise will thus become an independent domain with huge business potential.

Data quality is the limiting factor

Almost regardless of the digital trend concerned, data constitutes the all-important foundation. The capacity to create value with a given technology also depends on the adequacy of the data quality.

The enterprises and organisations that successfully translate digital trends into concrete business value are those that actively focus on building a solid data foundation and strong governance. They prioritise the formulation of a data strategy that defines which data is critical for a business, which is to be measured (KPIs) and which a company will offer in the ecosystem in order to digitalise its processes and forge partnerships in that system.

DANISH ENTERPRISES HAVE A CONSERVATIVE BUT PRAGMATIC APPROACH TO TECHNOLOGY

One of the most hyped trends at the moment is still also the least used, as enterprises continue to tread familiar ground, picking the low-hanging fruit.

General trends

Digitalisation is really taking off in enterprises around Denmark. Taking the temperature of Danish businesses and public organisations, this year's survey shows a clear pattern: great interest in new technology and intense experimentation but also a conservative approach to embracing and using it. Introducing new technologies must pay off, and enterprises prefer to identify a reasonable business case that adds value before they decide to go all in. This year's responses show that individual organisations test a broad range of technologies, indicating a less focused test process. In this in such cases, we stress that it is important for enterprises to conduct focused test and evaluation processes that allow for effectively prioritising investment options.

Focus on low-hanging fruits

By now, many enterprises have gained experience in data and process automation technologies. These include technologies for producing a process overview and optimisation as well as for process automation in particular. Many suppliers and consulting houses are now offering expertise to help enterprises implement such technologies as RPA. At the same time, enterprises find process automation a manageable project, because they can start out with a representative sub-quantity – often back-office – and build up experience from there.

Accordingly, process automation is the second-most-used technology in all sectors – with the exception of the transport sector – in 2019. Greater use of cloud technologies is also high on the lists of Danish enterprises and organisations, as described on page x. This objective can probably be attributed to the relative ease of starting cloud use, with the options for scalability and new features being a great advantage over having on-premise functionalities or storage.

Blockchain is the least used

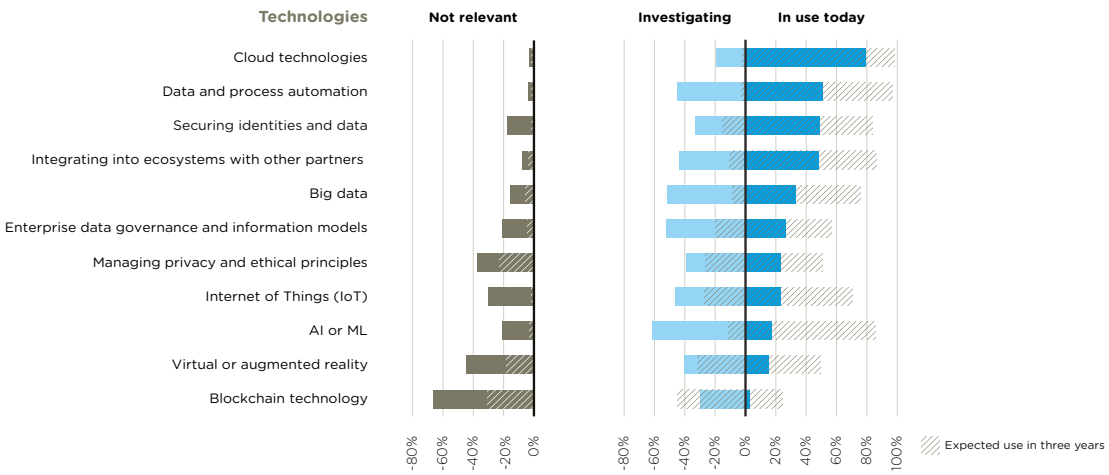
According to this year's survey, Blockchain is clearly the least-used technology – a trend entirely in keeping with last year's findings, from which the same picture emerged. In fact, the trend has dipped from last year. Thus, not only have a large number of respondents indicated that Blockchain is 'not relevant' – the number giving this response has grown! Some may find this result surprising, since Blockchain continues to be a much-hyped technology. In fairness, the perspectives are enormous, but the standardisation and infrastructure problems remain unresolved. The cautious yet still experimental approach of enterprises and organisations thus evidences a conservative and healthy scepticism towards using this technology.

Universal identity protection is important

Enterprises are clearly making great use of identity and data protection technologies. Interestingly, the public sector makes greater use of these technologies than the private sector. Conversely, the public sector is less experimental in this field than the private sector. The difference in use is about 10%.

CENTRAL DIGITAL TECHNOLOGIES

We see that many companies are conservative in their commissioning of new technologies.



This shows that enterprises consider security an important element of data and identity management.

Ethics and privacy

The data shows that technologies for handling ethical challenges and privacy are not widely used. However, these technologies are not ranked lowest.

Whistleblower schemes and systems are examples of such technologies. The implementation of this type of technology is to be expected in large organisations that have clear guidelines or ethical principles that must be followed.

As new technologies gain traction, this category is predicted to become more relevant. Companies in the financial sector are currently looking into technologies that can trace money laundering patterns, but other sectors are not assessed to have reached this level of need – yet.

IoT and cyber-security

Cyber-security focuses sharply on 'edge security', that is, protecting individual IoT units against attack. The tendency is for IT solutions to be hyper-distributed, and the security is only as strong as its weakest link. Despite the trend towards securing the perimeter, the conceptual solutions are still being matured. Security is not only about access to IT systems, services and functionality but also to a high degree about data integrity, confidentiality and non-repudiation.

In future, we will see an intense focus on protecting data that flows across ecosystems. These factors are crucial to enterprises' risk picture, and new technologies for managing this risk are still being evolved.

Technologies for interconnected ecosystems

IT in Practice recommends that enterprises involved in joint ventures and collaborative partnerships across an ecosystem should consider their own objectives and strategies in terms of the role they intend to play. Enterprises should consider not only such factors as the functions and data they can offer but also which new business models their data can be incorporated into in order to create new value propositions. Developmentally, the focus is increasingly on how to become part of the larger ecosystem and offer data and services to suppliers and business partners in both familiar and new business models and contexts. Integration standards, technologies and patterns currently abound – indicating an ongoing maturing process. Here, we recommend focusing on well-established standards, whether drawn from major suppliers like Microsoft or from Open Source and open standards. The current emphasis is on keeping one's options open for as long as possible.

However, the fact that companies will be part of more and larger ecosystems in future also puts extra pressure on them to be aware of which value propositions they each offer and who their customers or users are.

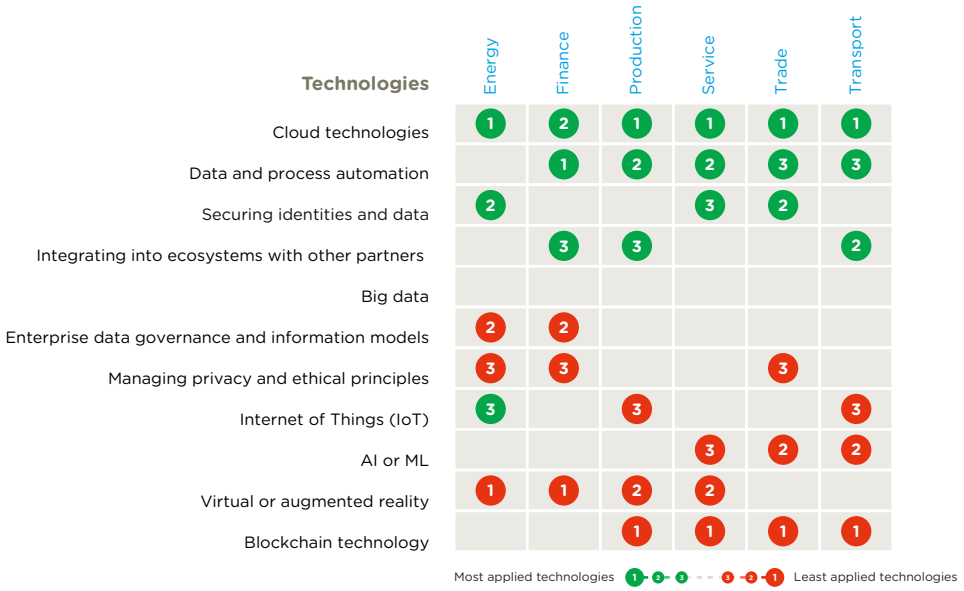
AI, augmented and virtual reality

The same picture regarding use of and experimentation with AI, augmented and virtual reality technologies emerged as last year. It shows that a few respondents deploy these types of technologies, a large number experiment with them, while most private sector businesses find them irrelevant.

Again, lack of technological maturity is the probable reason. Enterprises certainly have high expectations and expect specific benefits from the concept of 'digital' twins in which the virtual world enriches the physical one. For example, engineering houses expect great things from the possibility of creating a virtual, digital representation (twin) that enriches one's understanding of its physical counterpart, such as an offshore wind turbine or a building.
The technologies may still be maturing, but are predicted to offer interesting perspectives.

THE THREE MOST AND LEAST USED TECHNOLOGIES

Many technologies are generally relevant, but there is also a clear pattern where some technologies are very sector specific.



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IT in Practice is the largest survey of digitalisation in Denmark

METHODOLOGY AND DATA

The *IT in Practice* 2019-2020 survey is conducted among the 1,000 largest companies in Denmark, selected on the basis of turnover.

IT IN PRACTICE IN NUMBERS

IT in Practice 2019-2020 is empirically based on a survey conducted among the 1,000 largest companies in Denmark, selected on the basis of turnover. In total 132 CIOs and 79 CEOs participated in the survey, the companies of which account for 25% of the total revenue of the top 1,000 companies in Denmark.

IT in Practice 2019-20 is based on a survey of a fully representative cross-section of all 22 sectors included in the Danish newspaper Børsen's list of Denmark's 1,000 largest companies. The survey was conducted from April to May 2019.

Two questionnaires are sent to two different groups of respondents. One questionnaire is distributed to CIOs, while an adjusted and abbreviated questionnaire is distributed to CEOs.

The questionnaires are based current issues, revised to describe new trends. An advisory board of CEOs and CIOs contributed input and constructive criticism to the process of preparing and prioritising content. The advisory board is introduced in the foreword.

Public sector

The *IT in Practice* survey is also conducted among all local councils and regions in Denmark as well as government agencies, departments, etc. The results from this part of the survey are available in the Danish version of the report *IT i praksis* 2019-2020, including results from the *IT in Practice* opinion poll about citizens' views on public sector digitalisation.

Best-practice and worst-practice grouping

To compare the participating companies' ability to create results through IT usage, the respondents were grouped into three categories: best practice, a middle category and worst practice. The categorisation was based on the individual respondents' answers to questions in a range of areas such as efficiency, innovation, change readiness and service to customers, citizens and companies.

The respondents scoring in the top 25% of each respective subarea were placed in the "best practice" category. A total "best practice" group was additionally calculated on the basis of overall responses to questions in all the areas. The same method was used to categorise the "worst practice" group, which comprises the lowest-scoring 25% of respondents within each subarea as well as overall.

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ABOUT RAMBOLL MANAGEMENT CONSULTING AND THE DANISH IT SOCIETY

Ramboll Management Consulting is one of the largest management consultancies in the Nordic region and an integrated part of the Ramboll Group, which employs more than 15,500 people in 35 countries.

Ramboll Management Consulting is a trusted partner for private companies as well as a team player in helping the public sector to develop its core welfare services. Our consultants engage in strategic and analytical groundwork, provide data-driven insight and assist with determining the need for change-related processes. To ensure our customers the best solutions, we also draw on the expertise of relevant staff from our offices in six countries.

IT in Practice is compiled by Ramboll Management Consulting's Digital & Technology practice, which assists our customers in using technology to underpin strategic, analytical and implementation processes and thereby create business value. We help our customers in public and private sector enterprises to develop strategies, processes, products and services. We provide assistance in the following areas:

Digital Strategy

We help our customers develop digital strategies so they can realise the potential offered by the digital world.

IT Strategy & Governance

We help our customers develop business-based IT strategies and paths to successful execution.

IT Organisation

We help our customers develop operating models and find the best interface between internal and external practices and processes.

Business & IT Architecture

We help our customers develop their business and IT architecture in order to improve their performance and sharpen their competitive edge.

IT Procurement & Contracts

We help our clients in procuring IT solutions from the first preliminary analysis through negotiation and tendering processes to establishment of effective vendor collaboration.

IT Programme & Project Management

We help our customers implement and realise the business benefits of changes to processes, IT services and products.

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The Danish IT Society (DANSK IT) is an independent nonprofit organisation and a community for IT Professionals. You can focus on your career through continued competency development and participation in Denmark's largest network for IT Professionals. The Danish IT Society works to promote and support IT in areas where it creates value for society and the individual. To gather, strengthen and develop the skills and professionalism of IT Users and IT Professionals. And to focus on the IT interests of society and members on an independent basis.

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