

# DANMARKS NATIONALBANK

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## ASSESSMENT OF KRONOS



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# ASSESSMENT OF KRONOS

## SUMMARY

The Danish system for large, time-critical payments is safe and efficient. That is the main conclusion of the assessment of Kronos performed by Danmarks Nationalbank. However, several of the underlying IT systems are ageing, so Danmarks Nationalbank is in the process of replacing the systems underlying Kronos etc. with more modern solutions in order to ensure continued efficiency and safety in terms of system operations and maintenance.

Kronos is a system for real-time gross settlement of payments in Danish kroner. The daily value of transactions between participating credit institutions settled via Kronos is almost kr. 100 billion. Furthermore, Kronos is used for the settlement of net positions from connected payment and settlement systems. Finally, Kronos plays an important role in the implementation of Danmarks Nationalbank's monetary policy.

The central position of Kronos in the Danish financial infrastructure entails high safety and efficiency requirements. Due to Kronos' position as the only real-time gross settlement, RTGS, system in Denmark, it is important that participants have confidence in the system.

In the assessment of Danmarks Nationalbank, Kronos is both safe and efficient. Thus, Kronos observes the vast majority of the requirements for payment systems laid down by authorities across countries, and the few identified areas with potential for improvement are expected to be addressed when Kronos2 goes live in April 2017.

Danmarks Nationalbank has clear lines of responsibilities, including responsibility for risk management. The risk management framework of Kronos is comprehensive, reliable and efficient. Pricing for participation in Kronos is non-discriminatory, and participation access is fair and open. All important rules and regulations, guidelines and technical descriptions are available at Danmarks Nationalbank's website.

*In its assessment of Kronos, Danmarks Nationalbank has identified the following four areas with potential for improvement:*

- Sufficiently strong collaboration has not been established in relation to addressing risks that may spread due to interdependencies between the actors in the sector. Collaboration between Danmarks Nationalbank, VP and the Danish Bankers Association to address risks arising from interdependencies was recently established.
- The agreed maximum time limit of four hours for resumption of system operations following a disruptive event is too long. When Kronos2 goes live, this time limit is scheduled to be reduced from four to two hours.
- Identified risks arising from indirect participation are not adequately covered. These risks are scheduled to be covered in the 2nd half of 2016.
- Sufficient written guidelines for discretionary decisions do not exist, for instance in relation to extended opening hours. Such guidelines are scheduled to be prepared before Kronos2 goes live.





# 1.

## INTRODUCTION

Danmarks Nationalbank operates Kronos, the only RTGS system for settlement of payments in Danish kroner. Kronos is a systemically important part of Denmark's financial infrastructure. Danmarks Nationalbank has conducted an assessment of whether Kronos observes the applicable international principles for safe and efficient financial market infrastructures, FMIs. This report presents the results of the assessment.

Section 1 describes the background to the report, i.e. the basis for the assessment and the methodology applied. Section 2 describes the scale according to which Kronos is assessed and provides an overview of how Kronos observes the principles underlying the assessment. Section 3 describes in detail how Kronos observes the principles, including identified areas with potential for improvement. Section 4 concludes the report with a plan for when Danmarks Nationalbank expects to address the areas with potential for improvement.

### **1.1 SETTLEMENT OF LARGE, TIME-CRITICAL PAYMENTS IN DENMARK**

Kronos is the Danish system for settlement of large and/or time-critical payments. The system is also used for reservation and exchange of liquidity in relation to settlement in connected payment and settlement systems and for the implementation of monetary policy. Kronos has the following characteristics:

- Kronos is the only RTGS system for settlement of large or time-critical payments in Danish kroner. Each payment is settled individually in real time.

- Kronos has 94 participants, mainly Danish banks.
- In 2015, the average daily payments settled between participants amounted to kr. 99 billion.
- In 2015, the average daily monetary policy operations conducted in Kronos amounted to kr. 38 billion.
- The systemically important payment and settlement systems all exchange krone liquidity through Kronos. These systems exchanged krone liquidity through Kronos totalling kr. 28 billion daily on average in 2015.
- In April 2017, Kronos will be replaced by a new RTGS system: Kronos2.

The extent of payments settled directly between participants in Kronos, combined with the system's key role as a settlement bank for the connected systems, highlights Kronos' systemically important role as a hub of the financial infrastructure. In the worst case, major errors and disruptions in Kronos could jeopardise financial stability or weaken confidence in the financial system. Consequently, it is important for Kronos to observe international safety and efficiency standards.

### **1.2 THE ROLE OF DANMARKS NATIONALBANK**

Danmarks Nationalbank's overall role in relation to payment and settlement systems is defined in section 1 of the Danmarks Nationalbank Act, which states that the objective of Danmarks Nationalbank is to "maintain a safe and secure currency system in this country, and to facilitate

and regulate the traffic in money and the extension of credit”.

Against this backdrop, Danmarks Nationalbank operates the Kronos payment system, ensuring that Danish credit institutions have access to safe and efficient settlement of payments in Danish kroner.

Danmarks Nationalbank's responsibility for oversight of payment systems is defined in the same section of the Danmarks Nationalbank Act and was also enshrined in the Danish Securities Trading Act in 2006.<sup>1</sup> The framework for oversight is described in more detail in Danmarks Nationalbank's oversight policy.<sup>2</sup>

At Danmarks Nationalbank, a clear separation of duties has been established between the oversight authority and the operation of Kronos up to Board of Governors level. A similar structure is found in many other countries where the central bank both operates and oversees parts of the payments infrastructure.

### 1.3 INTERNATIONAL PRINCIPLES FOR FINANCIAL MARKET INFRASTRUCTURES

The assessment of Kronos is based on international principles for FMIs.<sup>3</sup>

In April 2012, the Bank for International Settlements, BIS, and the International Organization of Securities Commissions, IOSCO, published the report “Principles for financial market infrastructures”, listing 24 principles for FMIs. These principles are known as the CPMI-IOSCO principles, the Committee on Payment and Market Infrastructures, CPMI, being the BIS committee that contributed to formulating the principles. Members of the CPMI include representatives of a large number of central banks such as the ECB, the Federal Reserve and the Bank of England.

The CPMI-IOSCO principles include requirements for the general organisation of FMIs, including a well-founded legal basis, a clear and transparent organisational and governance structure and a sound risk management framework.

Furthermore, the principles stipulate requirements for the management of all potential risks associated with clearing and settlement of financial transactions. A number of requirements are aimed at addressing efficiency aspects, including fair and open access, practicality and cost-efficiency for all relevant parties. Finally, the principles include transparency requirements.

Box 1 presents an overview of the 24 principles.

Following the publication of the principles, CPMI-IOSCO has elaborated on how specific requirements of the principles should be observed. As a case in point, in November 2015, CPMI-IOSCO released a consultative report with guidance on cyber resilience for FMIs.<sup>4</sup> New guidelines are regularly incorporated into the measures taken to observe the relevant CPMI-IOSCO principles.

### 1.4 DELINEATION AND METHOD

The assessment of Kronos takes into account that special Danish circumstances and system-specific conditions may apply. This practice is in accordance with the CPMI-IOSCO guidance on the principles, which states that the authorities' application of the principles may vary depending on the country and the system.<sup>5</sup> For example, a risk may have been addressed in another satisfactory manner than that envisaged in the principles.

Moreover, the assessment takes into account that the observance of the principles must not be in conflict with Danmarks Nationalbank's efficient monetary policy implementation. This is in accordance with the CPMI-IOSCO guidance on central bank-owned systems.<sup>6</sup>

The assessment is based on a number of sources. The primary source is a thorough review of Kronos, which has been prepared with a view to supporting the assessment. The review is based on a number of questions formulated by CPMI-IOSCO relating to how Kronos observes the specific requirements of the CPMI-IOSCO principles.

1 Under section 86(2) of the Act, Danmarks Nationalbank has a duty to oversee systemically important payment systems.

2 Danmarks Nationalbank's oversight policy ([link](#)).

3 In 2001, 2002, 2007 ([link](#)) and 2012 ([link](#)) Danmarks Nationalbank assessed Kronos in relation to the international standards for systemically important payment systems applicable at the time. The 2007 assessment report was published by the IMF on the basis of responses from Danmarks Nationalbank.

4 CPMI-IOSCO, *Consultative report, Guidance on cyber resilience for financial market infrastructures*, November 2015 ([link](#)).

5 Cf. Responsibility D in *Principles for financial market infrastructures*, CPMI-IOSCO, April 2012.

6 See CPMI-IOSCO's *Application of the Principles for financial market infrastructures to central bank FMIs* ([link](#)).

## The CPMI-IOSCO Principles

Box 1

### General organisation

- Principle 1 – Legal basis
- Principle 2 – Governance
- Principle 3 – Framework for the comprehensive management of risks

### Credit and liquidity risk management

- Principle 4 – Credit risk
- Principle 5 – Collateral
- Principle 6 – Margin
- Principle 7 – Liquidity risk

### Settlement

- Principle 8 – Settlement finality
- Principle 9 – Money settlements
- Principle 10 – Physical deliveries

### Central securities depositories and exchange-of-value settlement systems

- Principle 11 – Central securities depositories
- Principle 12 – Exchange-of-value settlement systems

### Default management

- Principle 13 – Participant-default rules and procedures
- Principle 14 – Segregation and portability

### General business risk management

- Principle 15 – General business risk
- Principle 16 – Custody and investment risks

### Operational risk management

- Principle 17 – Operational risk

### Access

- Principle 18 – Access and participation requirements
- Principle 19 – Tiered participation arrangements
- Principle 20 – FMI links

### Efficiency

- Principle 21 – Efficiency and effectiveness
- Principle 22 – Communication procedures and standards

### Transparency

- Principle 23 – Disclosure of rules, key procedures, and market data
- Principle 24 – Disclosure of market data by trade repositories

ples.<sup>7</sup> Furthermore, rules and regulations, organisational plans, procedures, risk assessments, descriptions of control and security measures, etc. have been reviewed as documentation for the answers.

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<sup>7</sup> The questions answered can be found in the report; *Principles for financial market infrastructures: Disclosure framework and assessment methodology*, December 2012 ([link](#)). A detailed description of Kronos is available in *Description of Kronos in relation to international principles* ([link](#)).



## 2.

# ASSESSMENT OF OBSERVANCE

Table 1 shows the rating of Kronos in relation to the individual principles. The rating scale consists of five categories: observed, broadly observed, partly observed, not observed and not applicable. In the assessment of each principle, the following guidelines have been applied:

- *Observed* is used when any identified gaps and shortcomings are not issues of concern and are minor, manageable and of a nature that the FMI could consider taking them up in the normal course of its business.
- *Broadly observed* is used when one or more issues of concern has been identified, which the FMI should address and follow up on in a defined timeline.
- *Partly observed* is used when one or more issues of concern that could become serious if not addressed promptly has been identified. The FMI should accord a high priority to addressing these issues.

- *Not observed* is used when one or more serious issues of concern that warrant immediate action has been identified. Therefore, the FMI should accord the highest priority to addressing these issues.
- *Not applicable* is used when the principle does not apply to the type of FMI being assessed because of the particular legal, institutional, structural or other characteristics of the FMI.

Kronos observes all of the principles without material issues of concern.

In relation to four principles, Danmarks Nationalbank has identified areas with potential for improvement, cf. Table 1, which should be addressed within a defined timeline. For each principle, a specific plan has been prepared for measures that are expected to be implemented. The areas with potential for improvement and measures are described in section 3 and a time

**Rating of Kronos' observance of the CPMI-IOSCO principles**

Table 1

Category	Principles
Observed	1, 2, 4, 5, 7, 8, 9, 13, 15, 16, 18, 21, 22
Broadly observed	3, 17, 19, 23
Partly observed	-
Not observed	-
Not applicable	6, 10, 11, 12, 14, 20, 24

schedule for observance of the principles is presented in section 4.

In addition, Danmarks Nationalbank has remarked eight minor issues of concern in relation to five different principles. Such principles are assigned the rating "observed". The remarks are also described in section 3.

# 3.

## ASSESSMENT

The assessment by Danmarks Nationalbank of Kronos' observance of the principles, including areas with potential for improvement and remarks, is presented below. The descriptions are grouped according to main categories so that e.g. Principles 1-3, which relate to Kronos' legal basis, governance structure and risk management framework, are grouped under the heading of "general organisation". The main categories can also be found in Box 1 in section 1.

### 3.1 GENERAL ORGANISATION

Kronos' organisation has been assessed in relation to Principles 1-3, which concern Kronos' legal basis, governance structure and comprehensive risk management framework. Kronos observes Principles 1 and 2, while an area with potential for improvement relating to principle 3 has been identified.

Principle 1 – Legal basis; observed  
Principle 2 – Governance; observed  
Principle 3 – Framework for the comprehensive management of risks; broadly observed

#### Explanation

Kronos has a well-founded, clear and transparent legal framework that can be enforced in all relevant jurisdictions. All activities are governed by Danish law. The participants' accounts are

governed by "Danmarks Nationalbank Terms and Conditions for Accounts"<sup>8</sup>, which are publicly available.

Kronos is owned by Danmarks Nationalbank, which is a self-governing institution. The division of responsibilities at the top management level is defined in the Danmarks Nationalbank Act<sup>9</sup>. Internally in the organisation, guidelines have been established for the division of responsibilities at various levels.

The responsibility for managing risks is assigned to the organisational units having authority for the area. Moreover, a central security function at Danmarks Nationalbank ensures that overall frameworks and policies are observed. Finally, an internal audit function has been established.

#### Potential for improvement re Principle 3

The requirements of Principle 3 are not observed in the management of risks arising from interdependencies between FMIs. Danmarks Nationalbank, in collaboration with VP and the Danish Bankers Association, has initiated work to strengthen the efforts to identify and manage risks arising from interdependencies across systems. Danmarks Nationalbank plays a key role in the financial infrastructure and thus, by agreement with VP and the Danish Bankers Association, has taken the initiative in the establishment of the cross-sectoral collaboration.

<sup>8</sup> Cf. Danmarks Nationalbank's website ([link](#)).

<sup>9</sup> See the Danmarks Nationalbank Act ([link](#)).

### 3.2 CREDIT AND LIQUIDITY RISK MANAGEMENT

Principles 4-7 relate to credit and liquidity risk management. Principle 4 on credit risk and Principle 5 on collateral are applicable to Kronos, which gives participants access to intraday credit against pledging of collateral. Principle 6 is not applicable to Kronos; this principle is applicable only to central counterparties, CCPs. Principle 7 is applicable to Kronos, given that liquidity risk may arise between participants. Kronos observes Principles 4, 5 and 7 with a few remarks.

Principle 4 – Credit risk; observed  
Principle 5 – Collateral; observed  
Principle 6 – Margin; not applicable  
Principle 7 – Liquidity risk; observed

#### Explanation

Danmarks Nationalbank incurs a credit risk on Kronos participants as participants are offered access to credit against pledging of collateral. This credit risk is minimised by primarily accepting bonds with high ratings, government guarantees or covered bonds as collateral and by applying suitable haircuts in the calculation of the collateral value and by restricting the use of own issuances as collateral. The collateral value is calculated on a daily basis, based on updated market prices, and if a security has not been traded, a synthetic price is calculated. Risks are managed within a defined framework; for example, a risk assessment has been performed, which is updated regularly.

In an RTGS system, in which each payment is settled individually in real time, participants do not incur credit risk from each other. On the other hand, participants incur liquidity risk from each other and thus need ample liquidity for the settlement. Therefore, Kronos offers participants a number of tools to support their liquidity management, including free access to collateralised intraday credit, possibility of real-time monitoring of entries and balances, liquidity queue, value date queue and a gridlock resolution mechanism. Kronos also has a stress testing programme in which regular stress tests are performed of the liquidity consequences of a critical participant being unable to settle payments, for instance following an operational disruption at the participant's end.

#### Remark re Principle 5 (1)

The current collateral management systems are difficult to adapt to new collateral measures, and the possibilities of changing system parameters are limited. This was noted in an earlier assessment of the collateral management systems, and a new and more flexible system will be implemented with Kronos2 in April 2017.

#### Remark re Principle 5 (2)

Tests of haircuts do not allow for changes in liquidity in relevant markets. Allowing for such changes should be considered.

#### Remark re Principle 7

In its current form, the Kronos stress testing programme is very simple. It should be expanded to include more scenarios for testing potential impacts of more types of incidents.

### 3.3 SETTLEMENT

Principles 8 and 9 relating to settlement finality and money settlements are applicable to Kronos, whereas principle 10 relating to physical deliveries is applicable only to central securities depositories, securities settlement systems and CCPs. Kronos observes Principles 8 and 9.

Principle 8 – Settlement finality; observed  
Principle 9 – Money settlements; observed  
Principle 10 – Physical deliveries; not applicable

#### Explanation

Kronos has clearly defined rules ensuring settlement finality. A payment in Kronos is final and irrevocable when the remitter's account has been debited and the recipient's credited. The time of settlement finality is defined in the terms and conditions for accounts, and finality is acknowledged in Danish law.

Payments in Kronos are settled in central bank money through accounts at Danmarks Nationalbank.

### 3.4 CENTRAL SECURITIES DEPOSITORIES AND EXCHANGE-OF-VALUE SETTLEMENT SYSTEMS

Principles 11 and 12 contain requirements regarding issuance, safekeeping and exchange of securities against money for participants in secu-



rities settlement systems. These principles are not applicable to Kronos.

Principle 11 – Central securities depositories; not applicable  
Principle 12 – Exchange-of-value settlement systems; not applicable

### 3.5 DEFAULT MANAGEMENT

Principle 13 relates to management of a participant's default, resolution or operational failure, while Principle 14 on segregation and portability is applicable only to CCPs and hence not to Kronos, which is a payment system. Kronos observes Principle 13 with a single remark.

Principle 13 – Participant-default rules and procedures; observed  
Principle 14 – Segregation and portability; not applicable

#### Explanation

Kronos has clear internal procedures for handling a participant's default, resolution/restructuring<sup>10</sup> or operational failure. These procedures have been formalised as routines that also include procedures for communication with other authorities and participants not subject to default.

In future, distressed banks and mortgage banks will – in the vast majority of cases – be subject to resolution/restructuring rather than default. This entails e.g. continuation of the institution, so that it also continues as a payment system participant.

In Kronos, a participant's operational failure is handled through contingency procedures based on settlement of payments via fax forms. The Kronos business continuity plan can also be activated if broader coordination is required.

Contingency procedures for participants with operational failures are tested several times each year, and a testing programme for handling participants subject to resolution or default has been launched.

Rules for the use of contingency procedures and for realisation of collateral have been published in Danmarks Nationalbank's terms and conditions for accounts. Rules and procedures for handling a participant subject to resolution or default have not been published.

#### Remark re Principle 13

The most important aspects of rules and procedures for handling a participant subject to resolution or default should be published in general guidelines at Danmarks Nationalbank's website. These guidelines should describe the likely sequence of actions in the event of a participant's resolution or default. The disclosure of the most important aspects should help to ensure that participants are well equipped to handle the resolution or default of other participants.

### 3.6 GENERAL BUSINESS RISK

Principle 15 relates to general business risk, i.e. risk that may jeopardise Danmarks Nationalbank's ability to sustain losses in connection with the operation of Kronos. Principle 16 is applicable to Kronos' depositing of securities in safe-custody accounts with VP. Kronos observes Principles 15 and 16.

Principle 15 – General business risk; observed  
Principle 16 – Custody and investment risks; observed

#### Explanation

In the risk assessments of Kronos, a number of risks that could lead to financial losses have been identified and assessed. Kronos also includes an invoicing model in which the price for participating in Kronos is adjusted to ensure that revenue matches the expenses of operating the system. As Kronos is a central-bank-owned payment system, there is no need for Kronos to hold liquid net assets specifically to cover business risks and support recovery and resolution plans.

For safekeeping of securities pledged by Kronos participants as collateral for intraday

<sup>10</sup> Recovery and resolution is subject to the new EU framework on recovery and resolution of credit institutions, the BRRD, (Bank Recovery and Resolution Directive). The BRRD has been implemented into Danish law, partly by amendment to the Financial Business Act and to the Financial Stability Act, partly by a new Act on restructuring and resolution of certain financial corporations, which entered into force on 1 June 2015.

credit, VP is used as custodian bank. VP is a safe custodian bank. This is ascertained by Danmarks Nationalbank e.g. through the Danish Financial Supervisory Authority's supervision and Danmarks Nationalbank's oversight of VP.<sup>11</sup>

Danmarks Nationalbank has immediate access to assets in custody, also in the event of a participant's default or resolution, given that Danmarks Nationalbank has entered into agreements with the participants entitling Danmarks Nationalbank to immediately realise securities pledged as collateral.

Risks related to the use of custodian bank services from VP are reviewed regularly in risk assessments.

### 3.7 OPERATIONAL RISK

Principle 17 relates to Kronos' handling of operational risk. An area with potential for improvement relating to principle 17 has been identified. Moreover, there are a few remarks in relation to the principle.

Principle 17 – Operational risk; broadly observed

#### Explanation

Danmarks Nationalbank has a clear framework for operational risk management, which has been approved by the Board of Governors. The framework defines roles and responsibilities for operational risk management as well as practical aspects of business procedures and risk assessments. Risk assessments are available for all significant operational risks.

Formalised procedures for incident and change management have been established. These procedures ensure that all changes are documented and tested before being implemented.

The operation of Kronos is currently not isolated from that of other customers of the operations service provider. Consequently, Kronos may be affected by incidents and capacity pressures from other customers. With the implementation of Kronos2, the system will be migrated to a new, isolated operating platform.

Risk assessments covering both physical security and information security are prepared for Kronos. Measures include physical access control measures such as access cards and logging of system access.

Business continuity plans have been established for Kronos, covering all significant elements needed to manage crisis situations in the operation of Kronos. It has been agreed that Kronos operations must be resumed within a maximum of four hours after an operational failure.

Robust and satisfactory outsourcing agreements are in place with Kronos service providers, including with Bankernes EDB Central, BEC, the operations service provider.

#### Potential for improvement re Principle 17

The stricter requirements of Principle 17 are not observed with the agreed time limit for resumption of Kronos operations following operational disruptions or failures. When Kronos2 is implemented on the isolated operating platform in April 2017, the agreed time limit for resumption of operations is scheduled to be reduced from four hours to a maximum of two hours.

#### Remark re Principle 17 (1)

Conversion of security guidelines to an ISO-compliant standard should be completed to observe best practice in this area. It should also be ensured that these are adopted by significant providers. Finally, a framework should be established to check on a regular basis that the guidelines are followed, both internally and by the operations service provider.

#### Remark re Principle 17 (2)

It should be considered to enter into a dialogue with the operations service provider on how to ensure that sufficient human resources and skills are continuously available to ensure that Kronos is operated consistently and safely.

### 3.8 ACCESS

Principles 18 and 19, relating to access and participation requirements and tiered participation arrangements, respectively, are applicable to Kronos. Principle 20, relating to FMI links (links to

<sup>11</sup> Cf. *Assessment of VP Securities*, Danmarks Nationalbank and the Danish Financial Supervisory Authority, February 2016 ([link](#)).

central securities depositories and CCPs), is not applicable to Kronos. Kronos observes Principle 18, while an area with potential for improvement relating to principle 19 has been identified.

Principle 18 – Access and participation requirements; observed  
Principle 19 – Tiered participation arrangements; broadly observed  
Principle 20 – FMI links; not applicable

### Explanation

There is fair and open access for participation in Kronos for credit institutions and investment firms that are subject to supervision as well as other entities which, in the evaluation of Danmarks Nationalbank, are of significance to the settlement of payments. Foreign participants from countries outside the EU must document their legal capacity as well as their home country's legal recognition of the finality and irrevocability of payments, even in the event of insolvency proceedings against the participant. Kronos has the least restrictive access requirements appropriate when taking the Kronos risk management into account.

The access requirements are publicly available in Danmarks Nationalbank's terms and conditions for accounts in which rules for exit from Kronos are also described. The terms and conditions for accounts are available at Danmarks Nationalbank's website. It is monitored on an ongoing basis that the participants in Kronos still comply with the access requirements, i.e. that they are still subject to supervision by the Danish Financial Supervisory Authority or a relevant foreign supervisory authority.

Kronos generally has many direct participants, i.e. participants with an account at Danmarks Nationalbank and access to settle their own payments in Kronos. Kronos does not register indirect participants, i.e. participants that enter into an agreement with a direct participant on the settlement of the indirect participant's payments through the direct participant. Recently, regular collection of data on indirect participants' settlement in Kronos was initiated, and on this basis risks associated with indirect participation can be identified.

### Potential for improvement re Principle 19

Indirect participants' settlement through direct Kronos participants has been mapped. It needs to be analysed further whether there are risks associated with this and whether measures are needed to address such risks.

## 3.9 EFFICIENCY

Principle 21 relates to Kronos' efficiency and effectiveness, while Principle 22 is about communication standards. Kronos observes Principles 21 and 22.

Principle 21 – Efficiency and effectiveness; observed  
Principle 22 – Communication procedures and standards; observed

### Explanation

There is a high degree of user involvement in the development of Kronos. User group meetings are held, and users are continuously involved in connection with major changes, for instance in the development of new liquidity management tools derived from the implementation of the Straks-clearing and in the development of Kronos2.

Emphasis is placed on ensuring that the pricing structure is non-discriminatory, does not restrict the use of the system and is transparent.

Tenders were invited in connection with the development of Kronos2 to ensure a competitive solution for the delivery of a new RTGS system.

Kronos has clearly defined service level objectives, defined in a Service Level Agreement with BEC, the operations service provider.

Kronos observes internationally accepted communication procedures and standards. The messaging format complies with the ISO15022 standard, and Kronos also allows smooth exchange of messages and payments between participants that use SWIFT and participants that do not use SWIFT.

On the implementation of Kronos2, the system will also be compatible with the more recent ISO20022 standard. However, in consultation with the market, it has been decided to continue with the ISO15022 standard.

## 3.10 TRANSPARENCY

Principle 23 relates to disclosure of information, while Principle 24 is applicable only to trade

repositories. An area with potential for improvement relating to principle 23 has been identified. Moreover, there are a few remarks.

Principle 23 – Disclosure of rules, key procedures, and market data; broadly observed  
Principle 24 – Disclosure of market data by trade repositories; not applicable

### Explanation

Kronos has clear and detailed rules and procedures in place, for instance in the terms and conditions for accounts in which contingency procedures are also described. The terms and conditions for accounts are supplemented by a number of documents on prices, collateral and the tier list of eligible securities. The terms and conditions for accounts and other relevant documents are available in Danish and English at Danmarks Nationalbank's website.

A detailed user manual is available, and participants in need of further guidance can contact a helpdesk at Danmarks Nationalbank during the Kronos opening hours.

The pricing structure and prices for participation in Kronos are published at Danmarks Nationalbank's website, and the terms and conditions for accounts also have a section on prices and fees.

Danmarks Nationalbank publishes a detailed description of Kronos' observance of the principles as set out in the CPMI-IOSCO disclosure framework. Data for the number and value of transactions is published in Danmarks Nationalbank's annual oversight publication<sup>12</sup>.

There is a common, internal understanding of the considerations to be prioritised and to form the basis of discretionary decisions, such as decisions to extraordinarily extend the Kronos opening hours. This is supplemented by internal, written considerations about extending the Kronos opening hours as a result of specific incidents as well as about implications for the settlement of securities and retail payments.

### Potential for improvement re Principle 23

There are no clear, written internal guidelines for the considerations to be prioritised in connection

with discretionary decisions, including circumstances that may result in extended opening hours and how conflicts of interest arising from discretionary decisions are to be handled. Danmarks Nationalbank has planned to introduce such written guidelines for Kronos2, which will be implemented in April 2017. Relevant aspects will be shared with the participants, including situations in which discretionary action may be expected.

### Remark re Principle 23 (1)

It should be considered how key elements of business continuity plans are best shared with participants and relevant stakeholders. It is important that there is sufficient openness about recovery and resolution plans so that relevant stakeholders are aware of their roles in extreme situations where such plans are activated.

### Remark re Principle 23 (2)

Published data for Kronos transactions could be more easily accessible to stakeholders, and it may be considered to publish further data for Kronos, e.g. operational status, and to increase the frequency.

<sup>12</sup> Cf. Danmarks Nationalbank, *Oversight of the Financial Infrastructure* ([link](#)).

## 4.

# AREAS WITH POTENTIAL FOR IMPROVEMENT AND FOLLOW-UP PLAN

Table 2 provides a list of the principles where areas with potential for improvement have been identified.

The table also includes a plan for when Danmarks Nationalbank expects to follow up on these.

Areas with potential for improvement in terms of Kronos' observance of the principles			Table 1
Principle	Potential for improvement	Follow-up	
3	The requirements of Principle 3 are not observed in the management of risks arising from interdependencies between FMIs. Danmarks Nationalbank, in collaboration with VP and the Danish Bankers Association, has initiated work to strengthen the efforts to identify and manage risks arising from interdependencies across systems. Danmarks Nationalbank plays a key role in the financial infrastructure and thus, by agreement with VP and the Danish Bankers Association, has taken the initiative in the establishment of the cross-sectoral collaboration.	Formal sector collaboration is established by the end of 2016. Danmarks Nationalbank is the driving force in the establishment of this collaboration and participates actively. Under the auspices of the collaboration, a joint risk assessment will be prepared before Kronos2 goes live in April 2017.	
17	The stricter requirements of Principle 17 are not observed with the agreed time limit for resumption of Kronos operations following operational disruptions or failures. When Kronos2 is implemented on the isolated operating platform in April 2017, the agreed time limit for resumption of operations is scheduled to be reduced from four hours to a maximum of two hours.	The time limit for resumption of operations will be reduced to a maximum of two hours when Kronos2 and the isolated operating platform goes live in April 2017.	
19	Indirect participants' settlement through direct Kronos participants has been mapped. It needs to be analysed further whether there are risks associated with this and whether measures are needed to address such risks.	Risks will be addressed by the end of 2016.	
23	There are no clear, written internal guidelines for the considerations to be prioritised in connection with discretionary decisions, including circumstances that may result in extended opening hours and how conflicts of interest arising from discretionary decisions are to be handled. Danmarks Nationalbank has planned to introduce such written guidelines for Kronos2, which will be implemented in April 2017. Relevant aspects will be shared with the participants, including situations in which discretionary action may be expected.	The guidelines will be prepared before Kronos2 goes live in April 2017.	

