



EUROPEAN CENTRAL BANK

EUROSYSTEM

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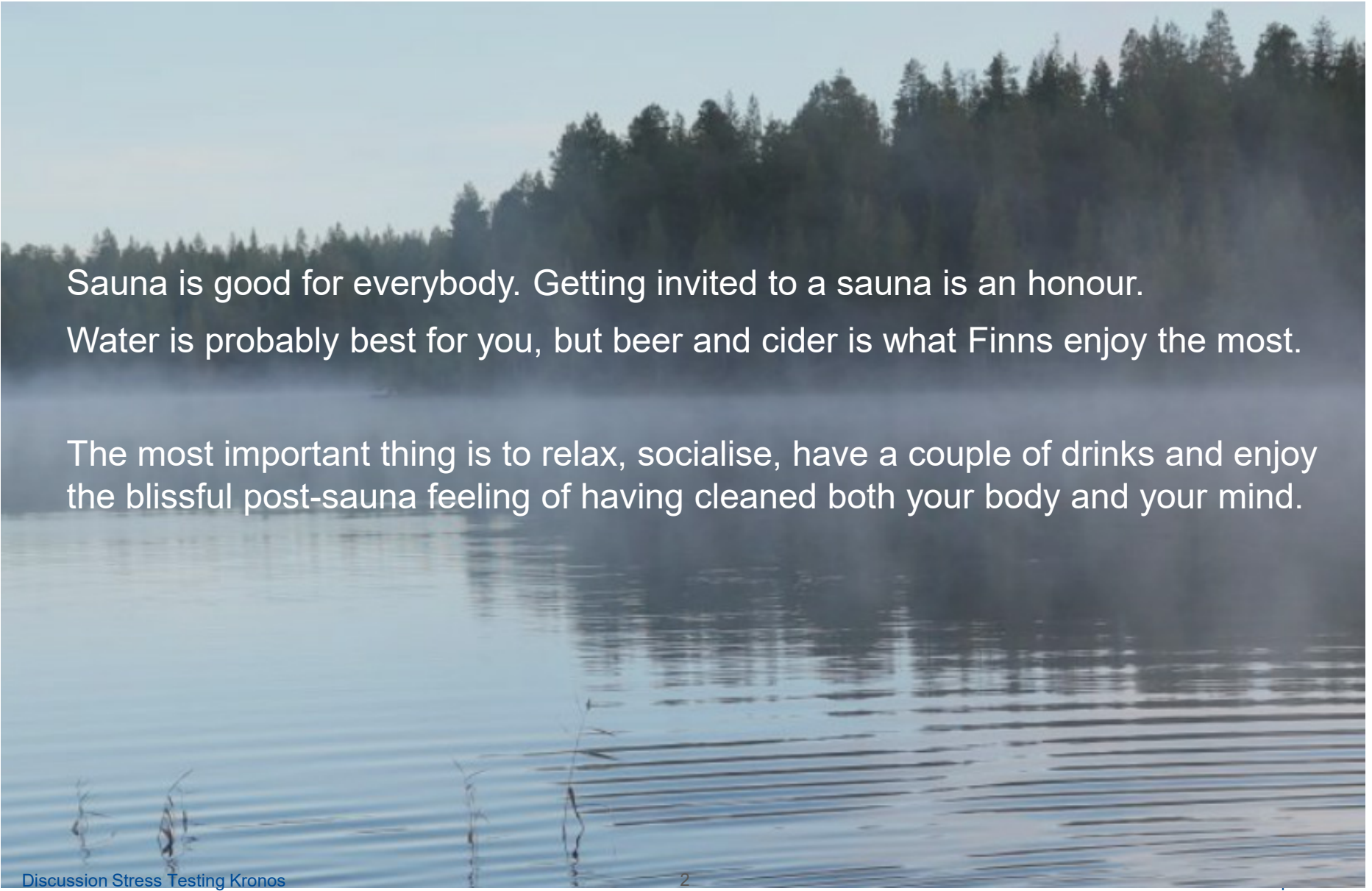
**Discussion of**  
***“Stress Testing Kronos, the Danish RTGS system, in a historical perspective” by Thomas Nilsson***

16<sup>th</sup> Payment and Settlement System  
Simulation Seminar

Helsinki, 31 August 2018

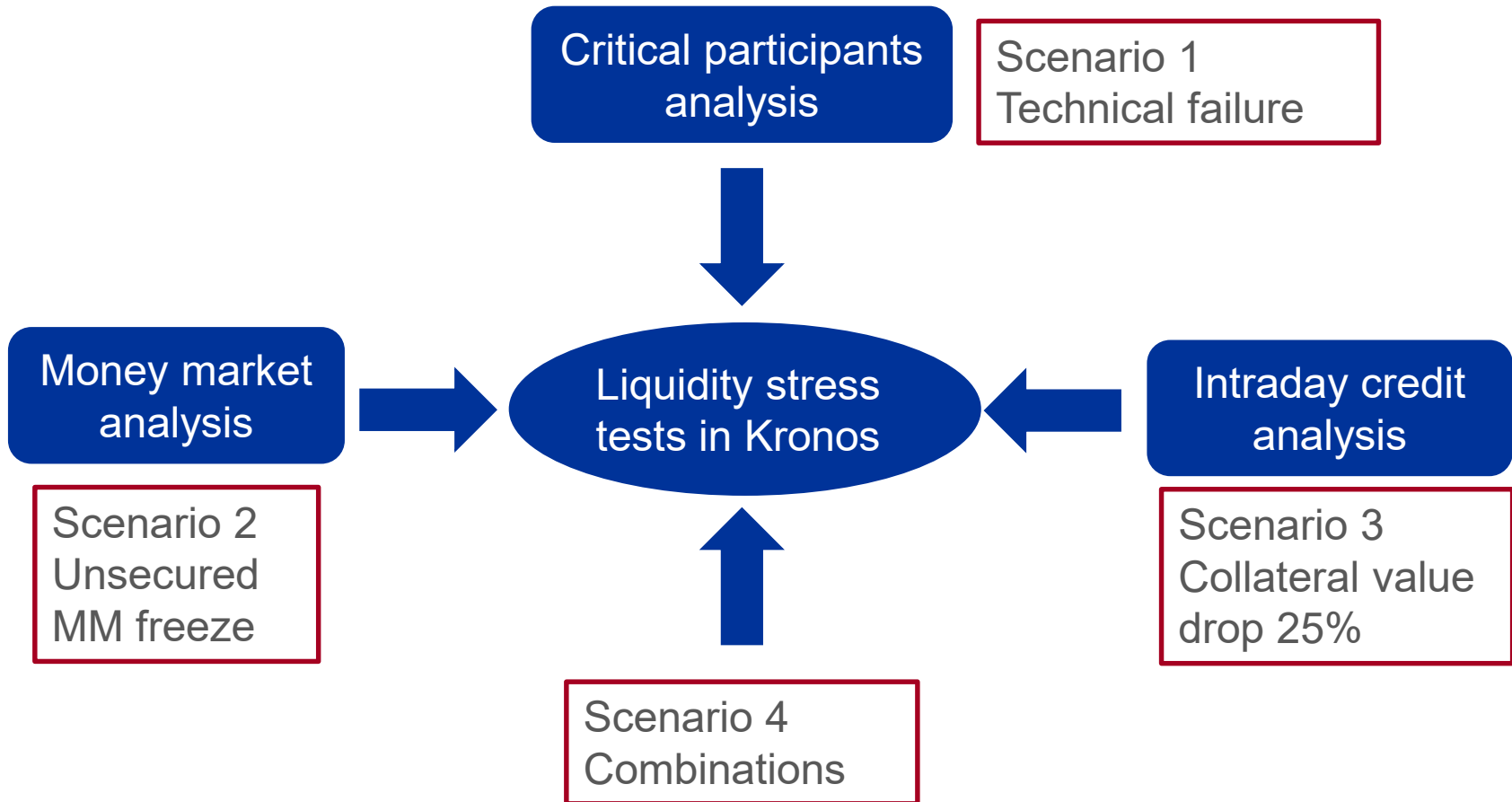
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<https://www.visitfinland.com/article/10-sauna-tips-for-beginners/>



Sauna is good for everybody. Getting invited to a sauna is an honour.  
Water is probably best for you, but beer and cider is what Finns enjoy the most.

The most important thing is to relax, socialise, have a couple of drinks and enjoy the blissful post-sauna feeling of having cleaned both your body and your mind.



- Simulations 2007 to 2017 ! (single days?)
- Note: RTGS itself not exposed to risk but its participants
- Benchmark: simulation undisturbed day excludes queues

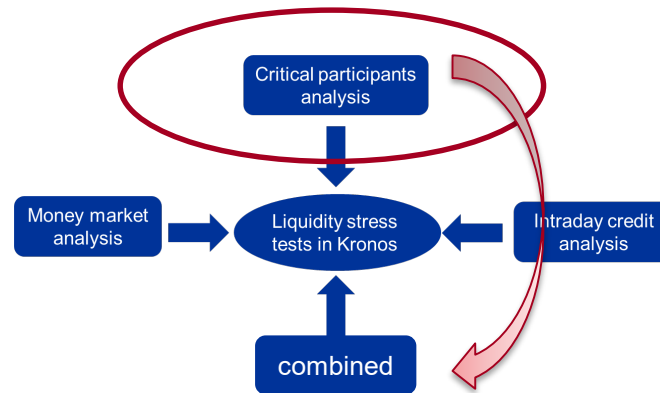
### 5 indicators to measure implications across stress scenarios

- 1) Direct effect** = first round effect, a participant does not send its payments to Kronos (e.g. due to technical failure, no unsecured lending)
- 2) Indirect effect** = second/third (...) round effects, a participant cannot make its payments at all (unsettled) due to missing incoming liquidity
- 3) Multiplier effect** = relation between indirect (2<sup>nd</sup> round) and direct (1<sup>st</sup> round) impact
- 4) Liquidity usage** = use of available liquidity (balance + IDC) to make payments. Here use of received payments to fund outgoing payments. (net receiver, net sender, neutral)
- 5) Settlement delay** = time a payment stays in the queue until being settled/rejected as ratio to max possible queueing time

- Each analysis is in itself rich and shows power of simulations

(e.g. Stress-Testing of liquidity risk in TARGET2, ECB Occasional Paper No 183, 2017; also Mueller 14<sup>th</sup> BoF seminar; Critical Participants in TARGET2, Mueller-Papsdorf-Polo-Friz, 15<sup>th</sup> BoF seminar).

- **Results**



## Kronos

- Failure of participant with highest (in)direct effect also for combined sc.
- MM freeze with limited and decreasing effect.
- Collateral shock with lowest effect.

Why do more severe scenarios show milder effects sometimes?

## TARGET2

- ~5 - 6% of T2 value unsettled due to CP operational failure (both effects) (2016)
- MM unsecured ON with low turnover
- Collateral shock 30% (2013) median ~6% unsettled payments in T2 in value terms

- **Combined scenarios:** justification, extreme but plausible?
- **Over/underestimations:** ancillary system impact, ABM (Hellqvist-Kahros, 2015), margin calls
- **Information** on indicators: distribution, volume, value, benchmark comparisons, breakdown per participants, payment category
- **Overall**, >94% settled payments in worst stress scenario, >98% in worst scenario in recent years... however, high first round effect of single **participant failure** and high impact on liquidity usage (strong difference to collateral and MM shock) .

**Suggestions to author:**

- How to operationalise indicators
- Consider intraday liquidity implications
- Kronos: DKK and EUR (contagion aspects)

Kiitos!