

Clearstream

Business Continuity Management

Customer information

A key mitigator for availability risk

BCM solutions for:

- systems
- workspace
- staff
- suppliers

BCM arrangements implemented at Clearstream address not only the unavailability of systems and suppliers, but also the loss of workspace and significant numbers of staff in order to ensure the continuity of the most critical operations even in cases of severe disruption scenarios.

Risk prevention and management is a key element enabling financial markets to operate without disruption.



Clearstream places the highest importance on the resilience of its business to safeguard it against incidents and disasters. Because the unavailability of core processes and resources represents a substantial risk for Clearstream, and a potential systemic risk to the markets as a whole, Clearstream has implemented a comprehensive Business Continuity Management (BCM) approach as a key mitigator for availability risk.

BCM organisation at Clearstream

The Executive Management is responsible for ensuring the continuity of business at Clearstream.

This responsibility is delegated to the various organisational units, which are directly responsible

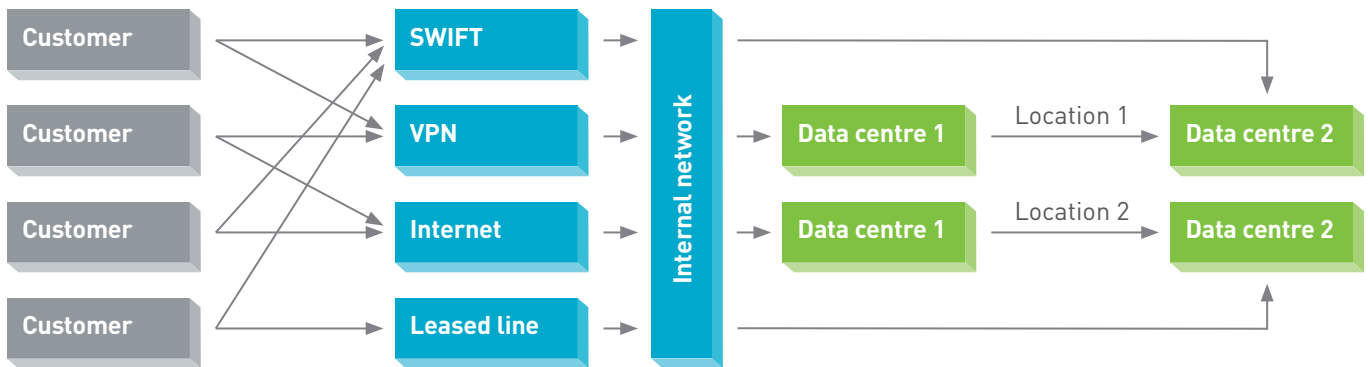
for the operational resilience of the respective business areas in case of disruptions.

Reporting to Executive Management, the Business Continuity function is responsible for the overall coordination and monitoring of Clearstream's preparedness to deal with incidents and crises.

The organisational roles and responsibilities, and the guiding principles to ensure operational resilience, are documented in a formal BCM policy. Mission critical units maintain and regularly review Unit Recovery Plans to ensure the continuation of these mission critical activities.

Technology infrastructure

Several alternate connectivity options are available to customers to ensure the resilience of their connectivity to Clearstream systems.



Systems unavailability

Data centres in the main operating locations are locally duplicated to form two active centres acting as backups of each other. These data centres are interconnected with high-speed optical data links, which are also duplicated. Data is written to multiple disks in real time across the two data centres.

All data centres are equipped with environmental protection devices including intrusion, fire and humidity detectors and fire suppression systems. Additionally, an uninterruptible power supply is able to maintain a continuous supply of power based on battery and generator backups.

BCM arrangements

- Redundant design to ensure continuous availability of operations and no loss of electronic data
- Geographically distributed dual-active data centres in the main operating locations
- Dual routing of networks
- Real time data mirroring.

Examples of incidents and crises

- Power failure
- Single or multiple systems failure.

Workspace unavailability

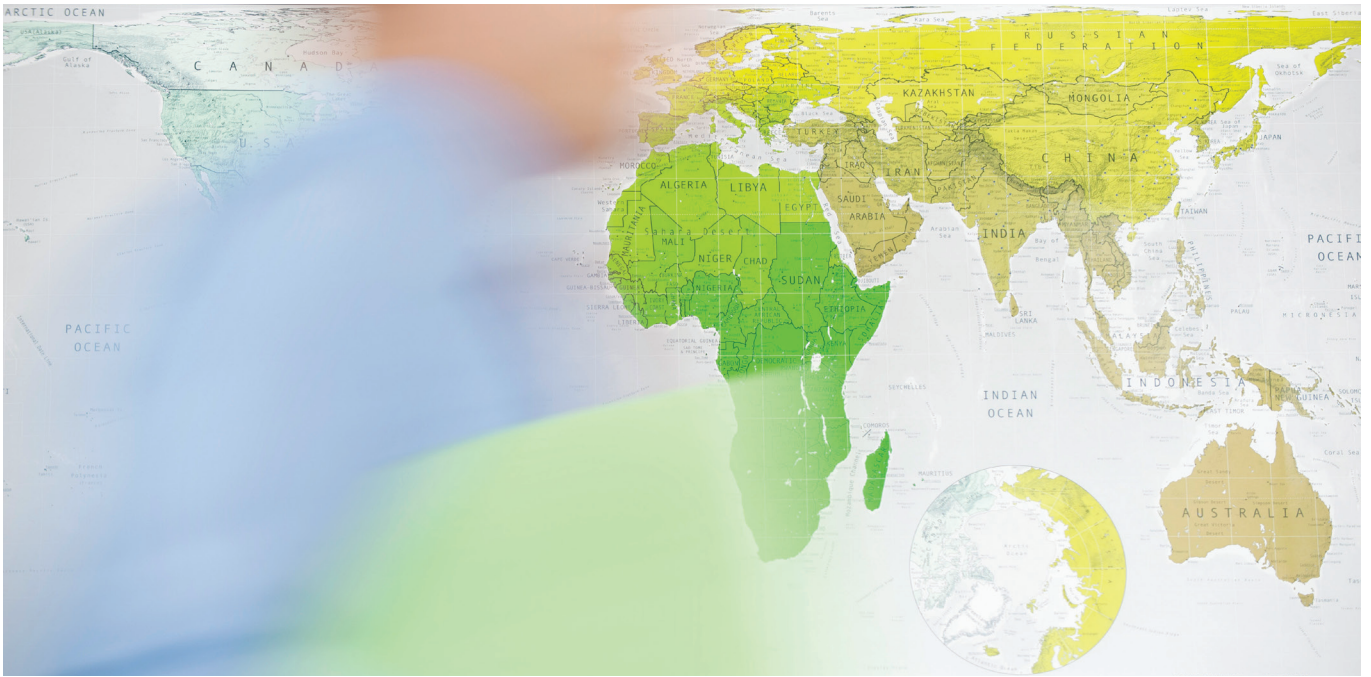
Exclusively-dedicated work facilities provide backup office space for mission critical staff in the event an office location becomes unavailable. These backup facilities are fully-equipped and networked to the distributed data centres, and are operational at all times.

BCM arrangements

- Fully-equipped, exclusively dedicated backup workspaces in the main operating locations for mission critical staff
- Networked to the distributed data centres
- Group-wide remote access (home working) facilities.

Examples of incidents and crises

- Office building unavailability, e.g. fire
- Denial of access.



Staff unavailability

Business Continuity solutions also cover the significant unavailability of staff, e.g. during a pandemic based incident. Solutions are designed to make sure that the minimum staff and skills required are available outside the impacted area, and consist, amongst others, of the following measures:

Dispersed Operations:

Pre-positioned dispersal or split of staff members, from the same department, between distant locations and on a daily basis.

Business transfer:

At the time of an incident, transfer of workload to the skilled staff members, from another department and in a distant location.

BCM arrangements

- Dispersed operations and business transfer capabilities between the main operations centres and regional offices address staff unavailability for vital functions
- Complemented by specific mitigation plan in case of pandemic outbreak.

Examples of incidents and crises

- Significant unavailability of staff, e.g. acts of terrorism, pandemic.

Supplier unavailability

Clearstream assures itself of the continuous provision of critical supplier services through a regular due diligence review of suppliers' BCM arrangements, provision of services by alternative

suppliers, if possible, and service level agreements describing the minimum service levels expected from suppliers and contingency procedure requirements.

BCM arrangements

- Service level agreements describe minimum service levels and contingency procedures
- Multiple providers, if possible
- Regular review of supplier BCM preparedness through due diligence process.

Examples of incidents and crises

- Incidents at a depository or correspondent, e.g. systems building incident, terrorism, cash failure, pandemic.

Incident & crisis management process

Clearstream has implemented a group wide incident and crisis management process, which facilitates the coordinated response and rapid reaction to an incident or crisis in a controlled and effective manner. The process aims to minimise business and market impact, as well as enable the swift return to regular business activity.

Escalation procedure

Incident Managers are appointed as the single points of contact in their respective business areas in case of incidents and crises. They also ensure the proper escalation up to the Executive Management and Executive Committee levels. In case of a crisis, a member of the Executive Management acts as the Crisis Manager.

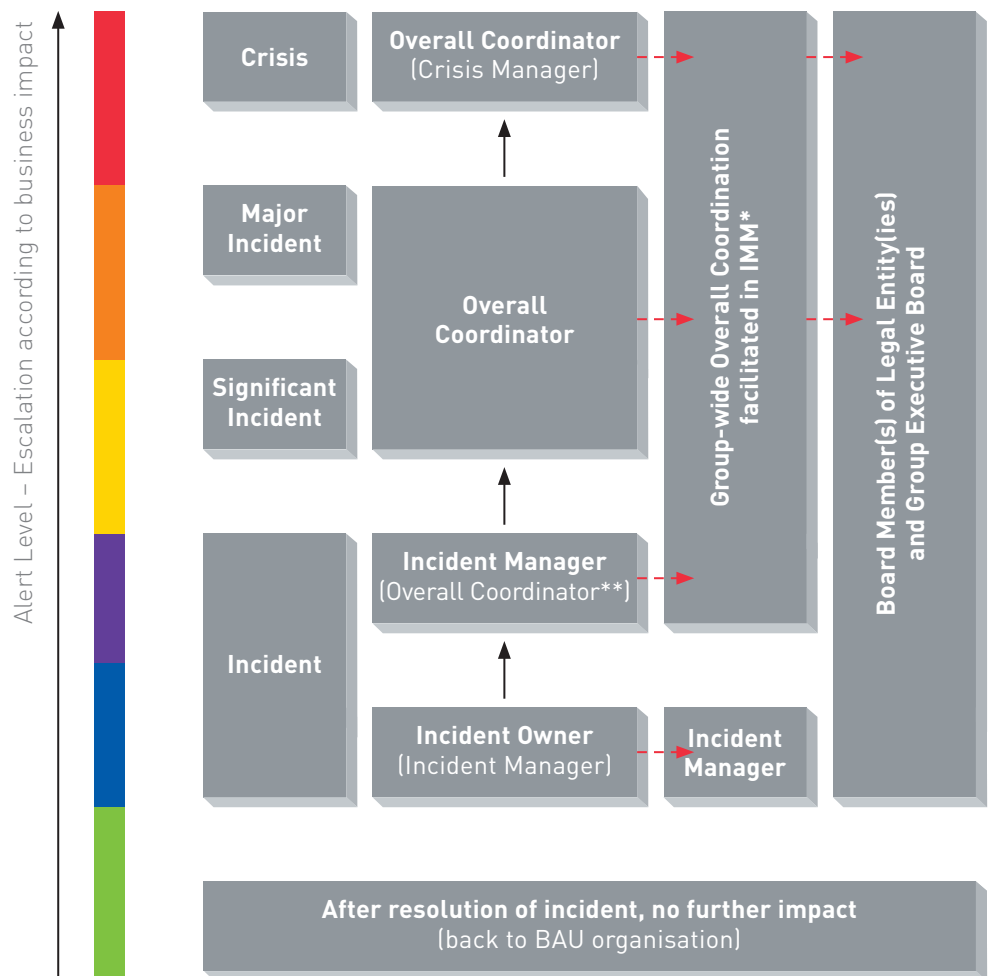
Classification system

Disruptions are classified according to colour codes relating to a respective level of business impact. The classification ensures an adequate response to incidents and crises, including the potential

activation of business continuity plans. The system also provides for the timely notification of relevant internal and external parties.

Communication to customers

Information on incidents/crises and related actions taken by Clearstream is made available to customers via the regular communication channels: direct contact with customer services and the relationship management teams, CreationOnline alerts, website and email.



* IMM = Incident Management Meeting

** Overall Coordinator takes over a coordination role in the IMM

--> Notification/reporting line

Clearstream has adopted a comprehensive and ambitious business continuity testing approach that simulates situations as close as possible to real-life.

“Real-life” simulation testing

Clearstream adopts a comprehensive and ambitious business continuity testing approach that simulates scenarios as close as possible to real life situations.

To approach “real-life” testing scenarios, Clearstream has defined a number of principles in combination with risk mitigation measures to reduce associated risks and avoid customer impacts. Testing activities are devised on the basis of these principles and the different BCM solutions.

Three criteria are applied to validate the BCM testing activities:

- **Functional effectiveness:** validates all technical functionalities
- **Execution ability:** ensures that staff are familiar with and knowledgeable in the execution of BCM procedures
- **Recovery time:** confirms that BCM plans can be executed within a defined recovery time objective.

Based on pre-defined programmes, BCM plans are tested on a regular basis and at least annually. Customers are regularly invited to participate in Clearstream’s BCM tests to validate their own BCM arrangements.

Key principles

1. Unannounced
2. During business day

3. Full scope (capacity)
4. Full process (scenario)
5. Involvement of external parties

Different test activities

1. Workspace unavailability
2. Staff unavailability
3. Systems unavailability
4. Suppliers unavailability



Preventive measures

Complementing BCM plans, preventive measures strengthen and secure daily operations at Clearstream in order to ensure that:

- Processing is appropriately scheduled according to designed controls
- Deviations are identified, mitigated, managed and resolved

- Production systems and networks are monitored in real time in order to quickly identify and resolve potential problems.

Further, a capacity management process is in place to monitor system capacity utilisation and performance and to proactively anticipate and avoid eventual future capacity issues.

Contact

Clearstream Banking S.A.
42, Avenue JF Kennedy
L-1855 Luxembourg

Phone: +352-243-0
www.clearstream.com