Euroclear Group

Data Centre Strategy

Agenda

- Euroclear, Strategic Objectives
- Business Continuity at Euroclear
- Data Centre Strategy
- What Keeps Me Awake?

Euroclear Group

World’s leading provider of settlement for domestic and international securities

Market Infrastructure: Settlement Systems

Central Securities Depository (CSD)

Euroclear UK & Ireland, France, Netherlands, Belgium

Settlement of a trade:

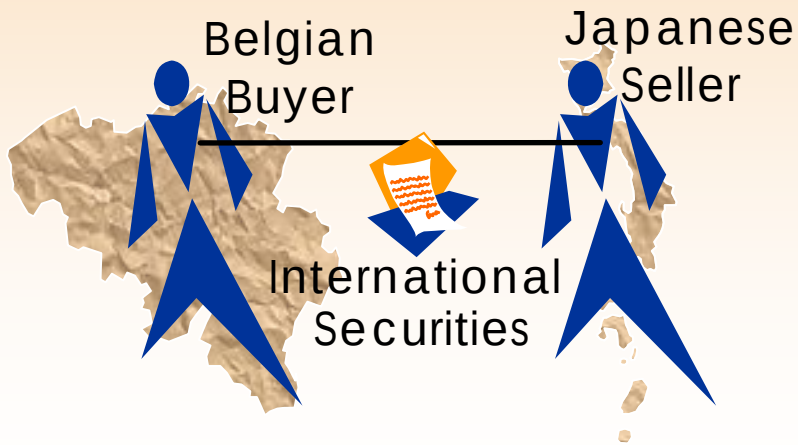
- local buyer and local seller
- in a domestic security
- payment in the domestic currency

International CSD

Euroclear Bank

Settlement of a trade:

- Wherever the counterparties are present
- in any international security
- payment in any currency



Company Profile

- User owned, User governed
- Euroclear UK &Ireland, formerly CRESTCo, operates the UK settlement service CREST
- Value of daily securities movement in CREST: GBP 1.2 trillion
- Value of daily cash movement in CREST: GBP 790 billion
- Group turnover: GBP 450 trillion
- Value of securities held (Depot): GBP 14 trillion
- Annual transactions: 155 million

Strategic Objectives

- Delivering a domestic market for Europe
- Reduce cost of cross-border securities settlement
- Consolidate core settlement services into a single pan-European settlement system.
- Achieve strategic objectives whilst maintaining resilient settlement services to national and international financial markets

The Requirement for Business Continuity

- Euroclear is identified as Critical National Infrastructure in Europe
- Subject to oversight and regulation by authorities in all territories
- Core to EU financial market operations
- Failure immediately impacts operation of settlement, clearing, Central Bank Money operations (Bank of England Open Market Operations), registration and issuance of securities, and corporate actions

- Thus, there is a requirement for Euroclear to maintain robust and resilient business continuity measures

Business Continuity at Euroclear

- In 2003 Euroclear embarked on a multi-year investment program with the objective of raising the standard of business continuity across the Euroclear group
- Three core components: People, Premises, and IT
- People and Premises
  - Dual Office
    - Business Operations centres have implemented active-active office infrastructure
    - Secondary offices located outside metropolitan areas
    - Resilient office IT and telecommunications infrastructure
  - Cross Border
    - Support functions operate in dual-office, and cross-border
    - 2 IT Control Centres provide 24x7x365 support
  - Remote Access
    - Critical Business Operations and IT staff equipped for remote working
- IT – Data Centre Strategy…

The Objectives of DCS

Data Centre Strategy (DCS) for Euroclear Group

- Enhance all Euroclear entities data centre and IT infrastructure
- Deliver Local Disaster Recovery (LDR) and Regional Disaster Recovery (RDR)
- Recovery times set at the current best of the group
- The risk of data loss must be limited to only extreme scenarios
- Recovery capability must be proven frequently without operational disruption
- Consolidate and reduce the cost of the infrastructure by reducing the total number of data centres
- Where opportunities present, take tactical measures to harmonise
- Prepare an environment to strategically reduce the cost of operating infrastructure through harmonisation

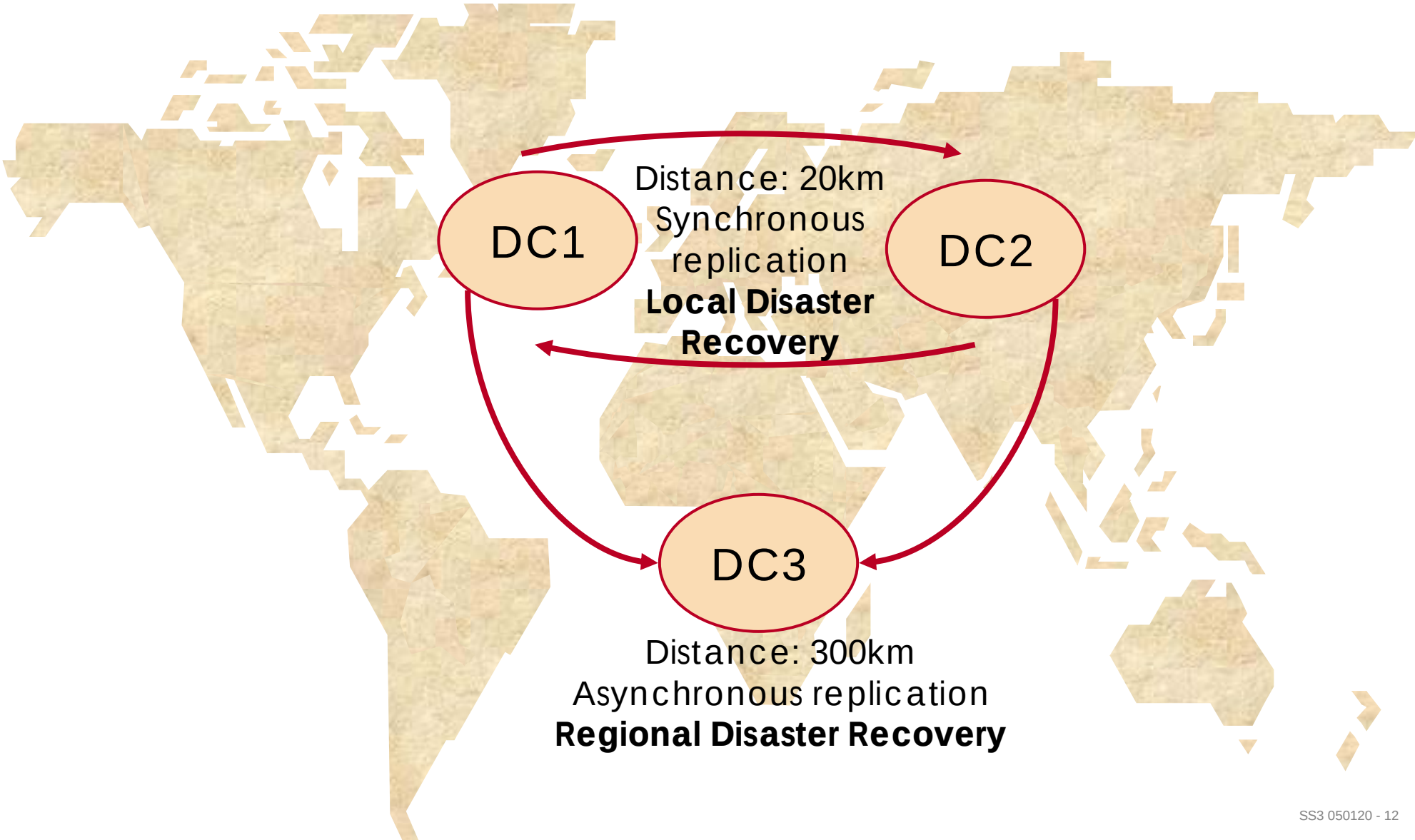
Initial situation

	6 Data Centres	7 Offices
Euroclear Bank	• 2 locations in Belgium	• 2 locations in Belgium
Euroclear France	• 2 locations in France	• 2 locations in France
Euroclear Netherlands	• (shared with Belgium)	• 1 location in the Netherlands
Euroclear UK &Ireland	• 2 locations in the UK	• 2 locations in the UK

Post DCS

	3 Data Centres	7 Offices
Euroclear Bank	• 3 locations: 2 based in France and 1 in Belgium ⌫DC1 - France ⌫DC2 - France ⌫DC3 - Belgium	• 2 locations in Belgium
Euroclear France		• 2 locations in France
Euroclear Netherlands		• 1 location in the Netherlands
Euroclear UK &Ireland		• 2 locations in the UK

Data Centre Configuration



Why Three Data Centres?

Provide a contingency infrastructure that delivers a rapid local recovery capability with zero data loss

- DC1 & DC2 are 20 km apart. Designed to be fully redundant data centre and IT infrastructure. Data is synchronously replicated between sites.

Provide a contingency infrastructure that delivers a regional recovery capability and assured same day resumption with low risk of data loss

- DC3 is 300 km distant from DC1 and DC2. Designed to be fully redundant. Due to distance data is asynchronously replicated

It is not (currently) technically feasible to combine significant distance and fully synchronous replication AND maintain acceptable performance

Roles of DC1-DC2

- DC1 and DC2 provide a mirrored environment for critical applications
- Provide a Local Disaster Recovery (LDR) capability.
- DC1 and DC2 are considered the primary and secondary data centres
- Roles as primary and secondary are exchanged periodically
- The distance (20km) allows for synchronous replication, ensuring zero data loss in all conditions
- The sites are connected by redundant fibre optic links
- The LDR provides a recovery time objective of one hour following a local disaster
  - Does not include crisis management decision time or processing of backlog.
- DC1 and DC2 hosts development and test environments
  - Development and test data replicated between DC1 and DC2, hardware only in DC2

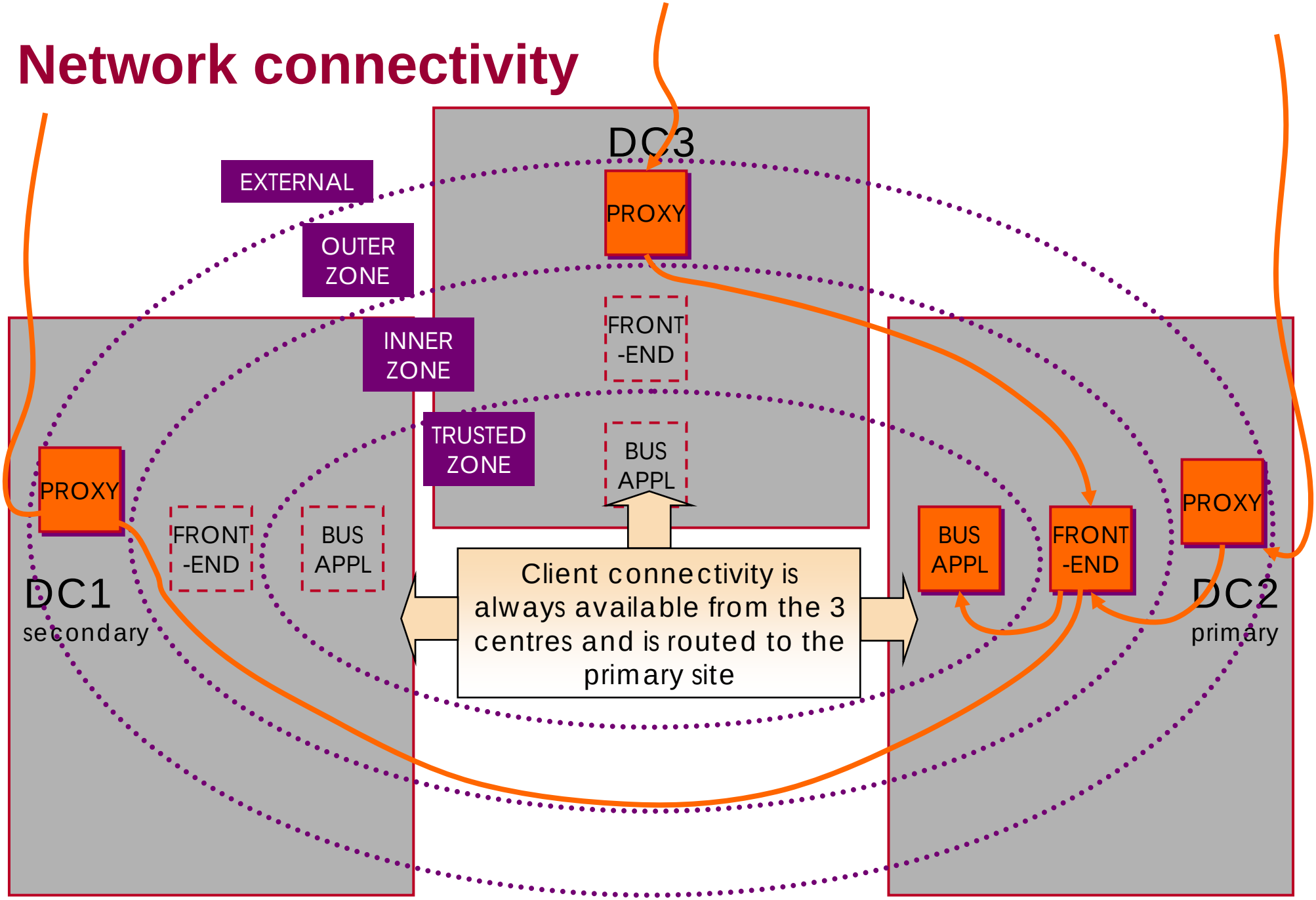
DC1 - DC2 – Proven Capability

- Frequent system recovery activity on this scale requires automated stop/start facility.
- All critical applications a switched between sites monthly
- Demonstrates a capability to run and operate the production from the secondary data centre
- Demonstrates a capability to switch data centre in the case of a controlled stop/start scenario
  - Testing of an uncontrolled stop/start scenario is performed in a dedicated testing environment.
- Provides assurance of our change control processes and general system status

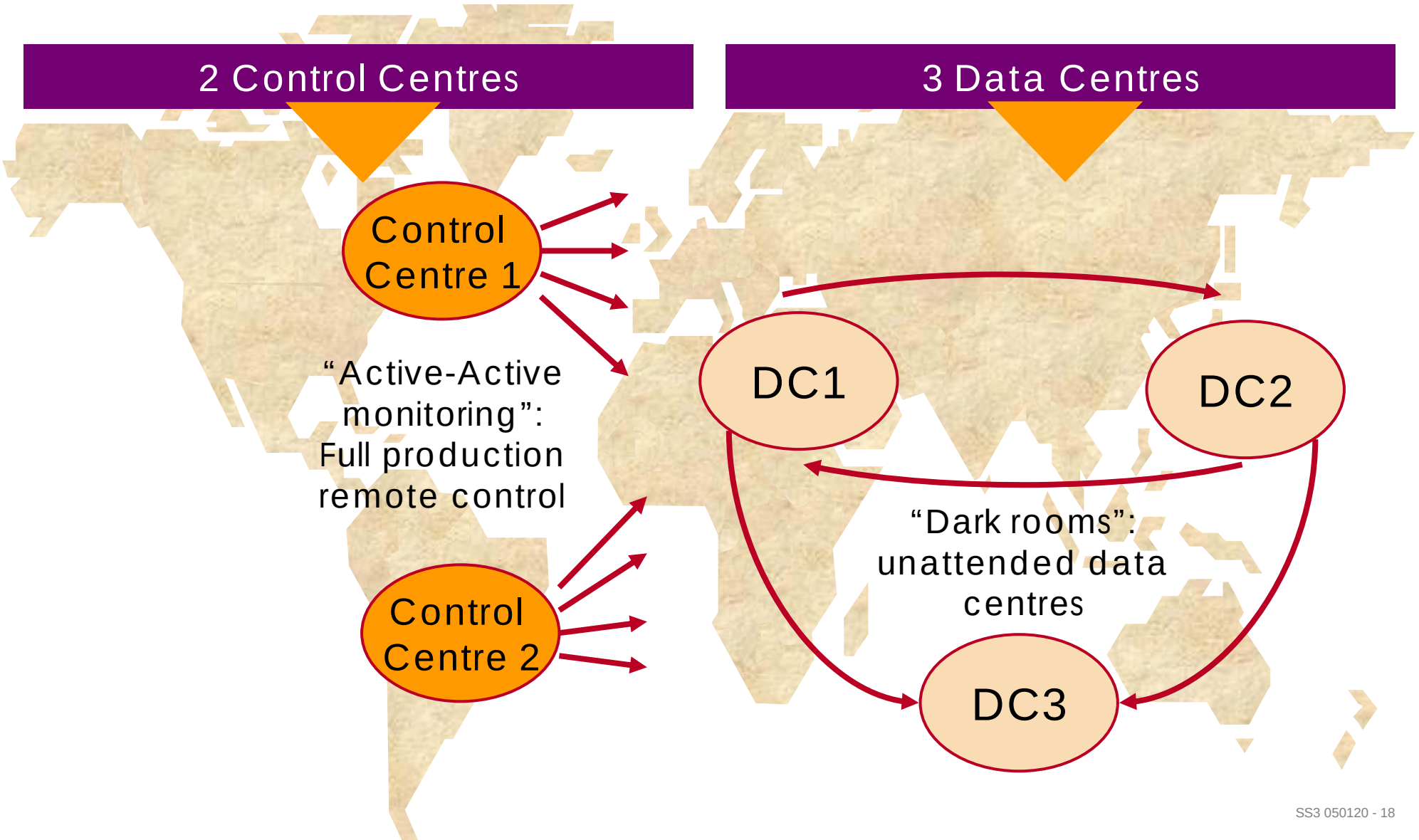
Role of DC3

- DC3 provides the third instance of critical applications and data.
- DC3 delivers Regional Disaster Capability (RDR)
- Due to distance (300 km), data is asynchronously replicated from the primary centre. Confirmed “writes” latent by typically less than 1 min.
- DC3 is connected by redundant fibre optic links to DC1 and DC2
- DC3 is tested annually.
- It is designed to support a recovery time objective of three hours following the loss of DC1 **and** DC2.
  - Does not include the time for crisis management decision time business reconciliation activities if required.
- Note: A controlled recovery from DC1/DC2 to DC3 will result in zero data loss.

Network connectivity



IT Support Infrastructure



What Keeps Me Awake?

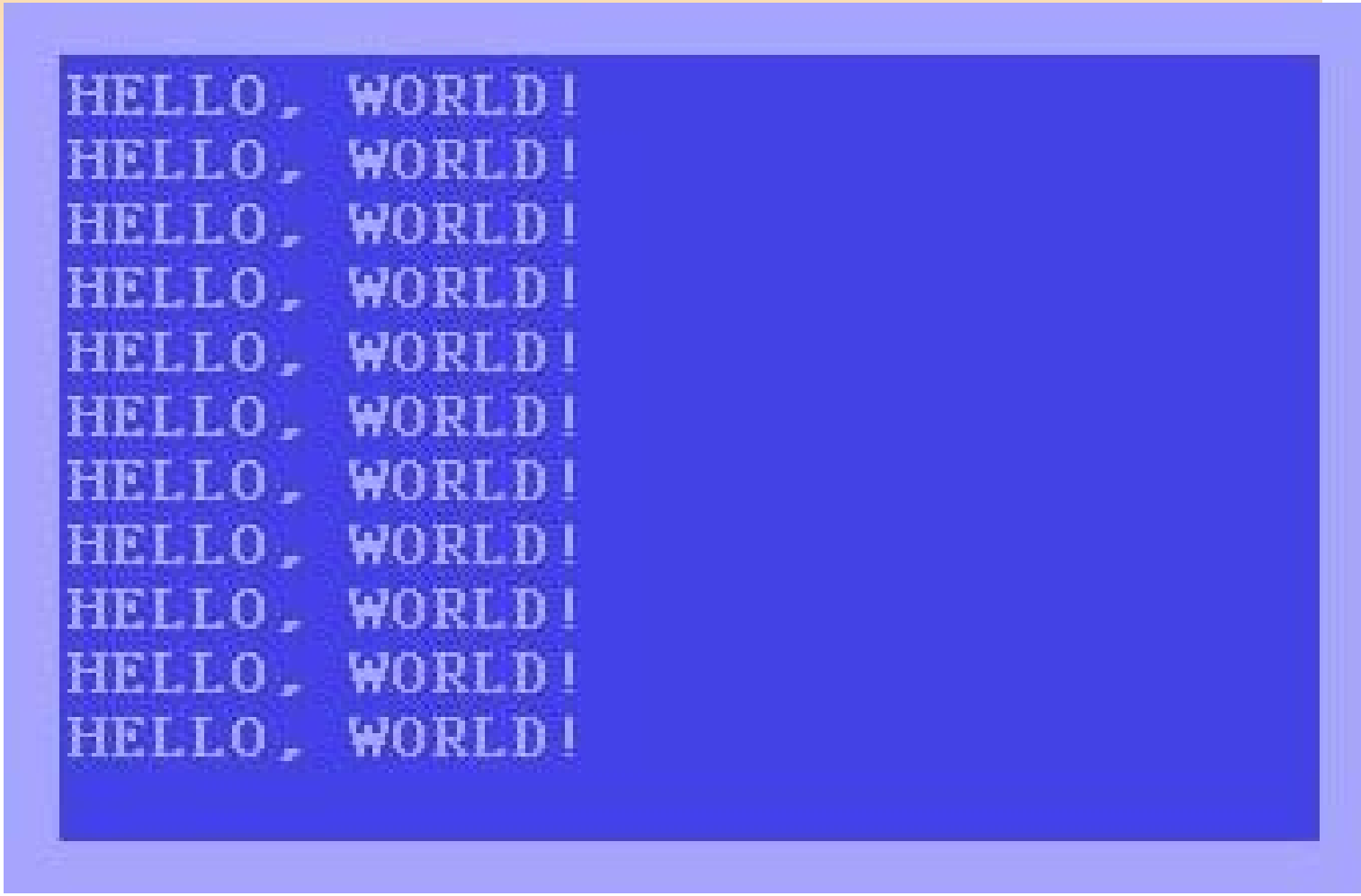
- Diggers

What Keeps Me Awake?

- Robbers

What Keeps Me Awake?

- Badly Written Code



Thank you for your attention

euroclear