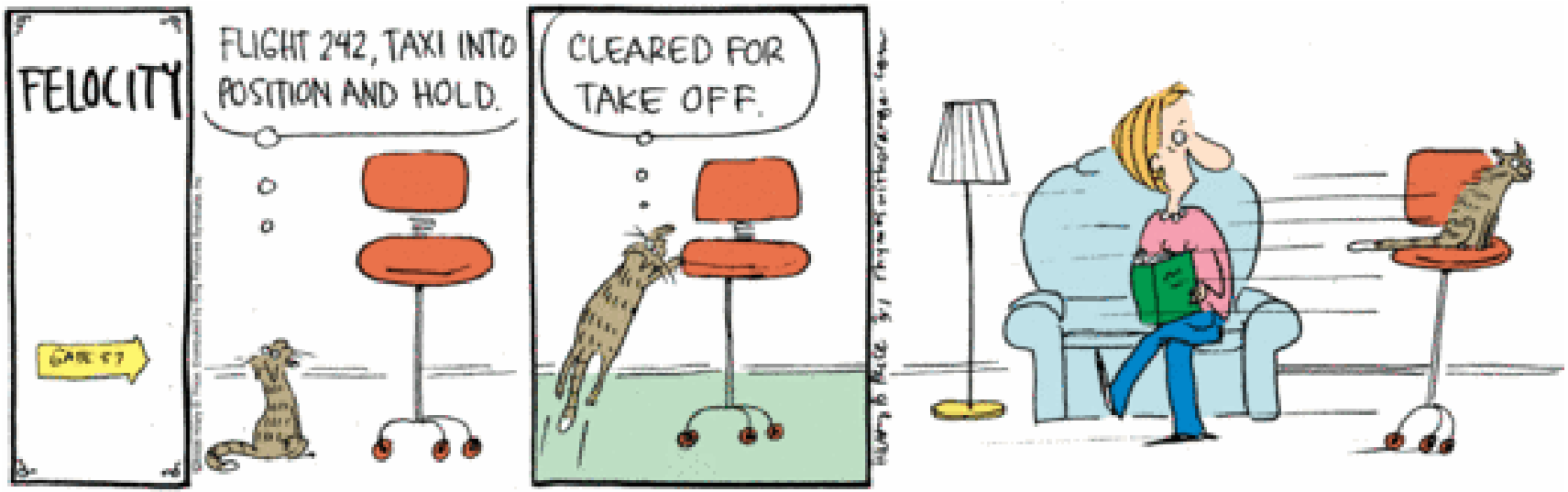
ICNS Conference 2008
Improved Airspace Efficiency Using Integrated Airport Management Tools

Rich Challen
Barco, Inc
Duluth, Georgia

and

Frank Köhne
Barco Orthogon, Gmbh
Bremen, Germany

Departure Sequencing ?



BARCO
Visibly yours

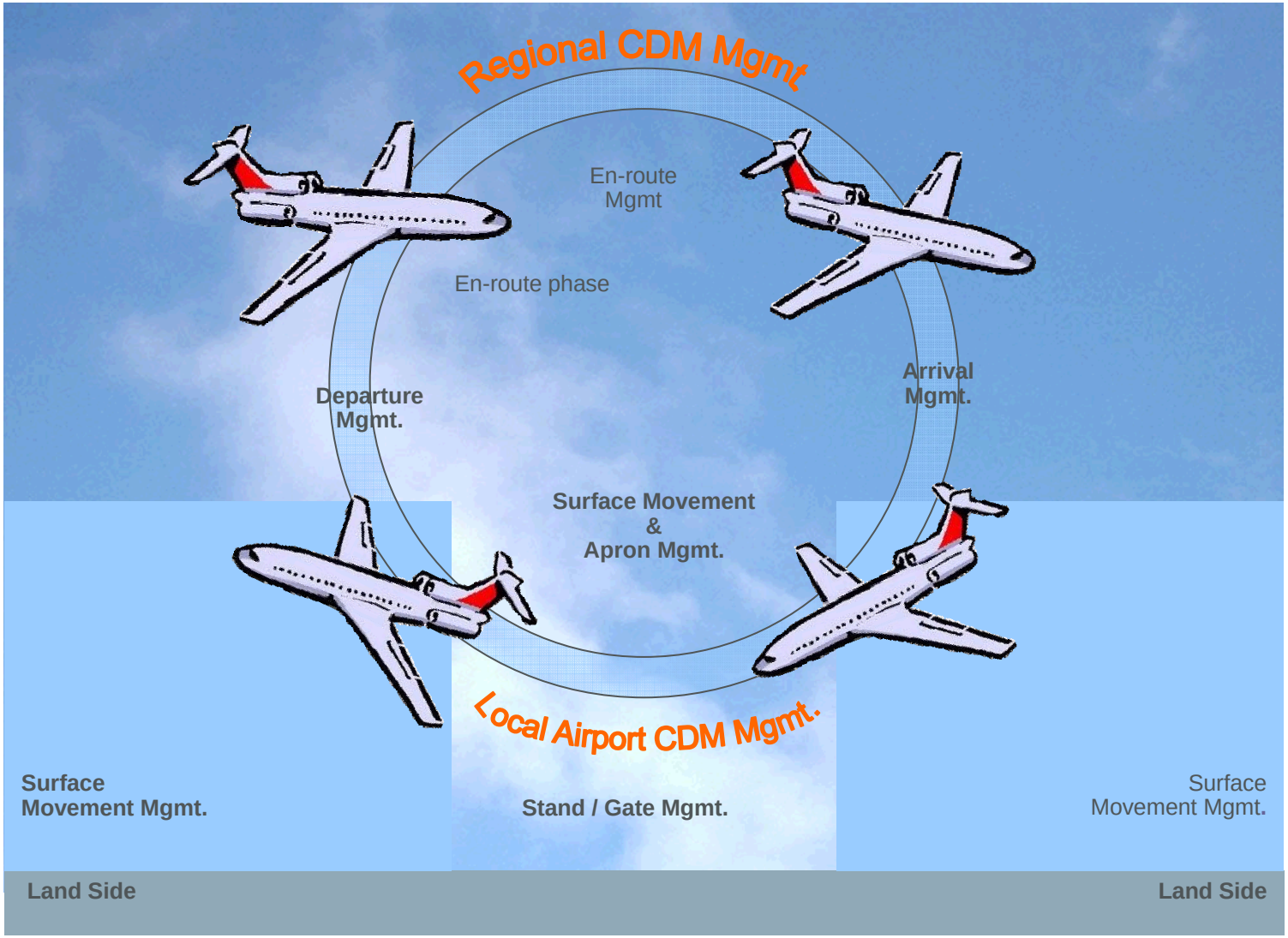
Airspace and Airport Efficiency

- A major NextGen/SESAR emphasis is on increasing airspace traffic efficiency to meet the need for 2-3X capacity demand by circa 2025

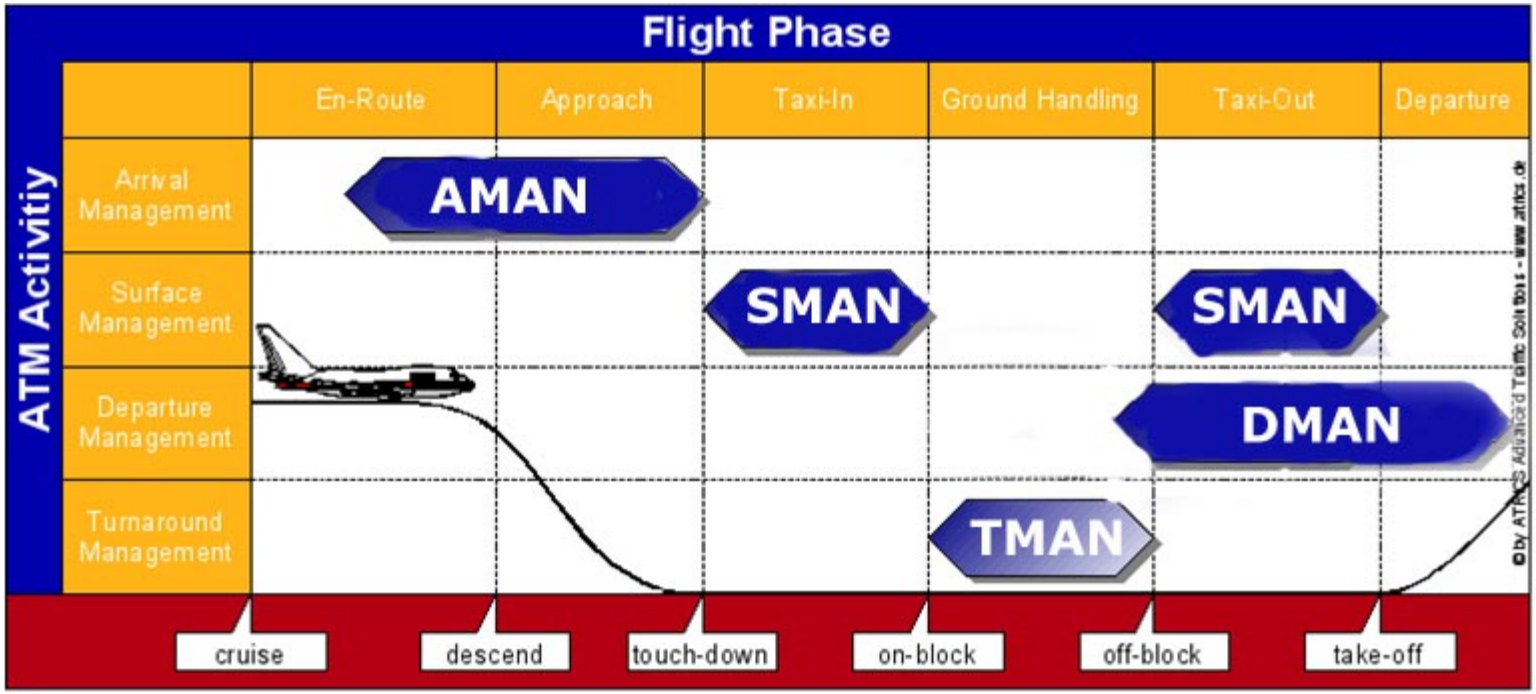
- The **terminal airspace and airport surface** movements are prime areas to improve efficiency because of higher aircraft density and current bottlenecks at high-density airports.

- Integrated Airport Management depends on decision making with cooperative tools for arrival, surface, ground, and departure operations.

Local and Regional CDM Make for Optimum Performance



Airspace / AirPortal Decision Support Tools (DST)



BARCO
Visibly yours

Decision Support Tools for ATC

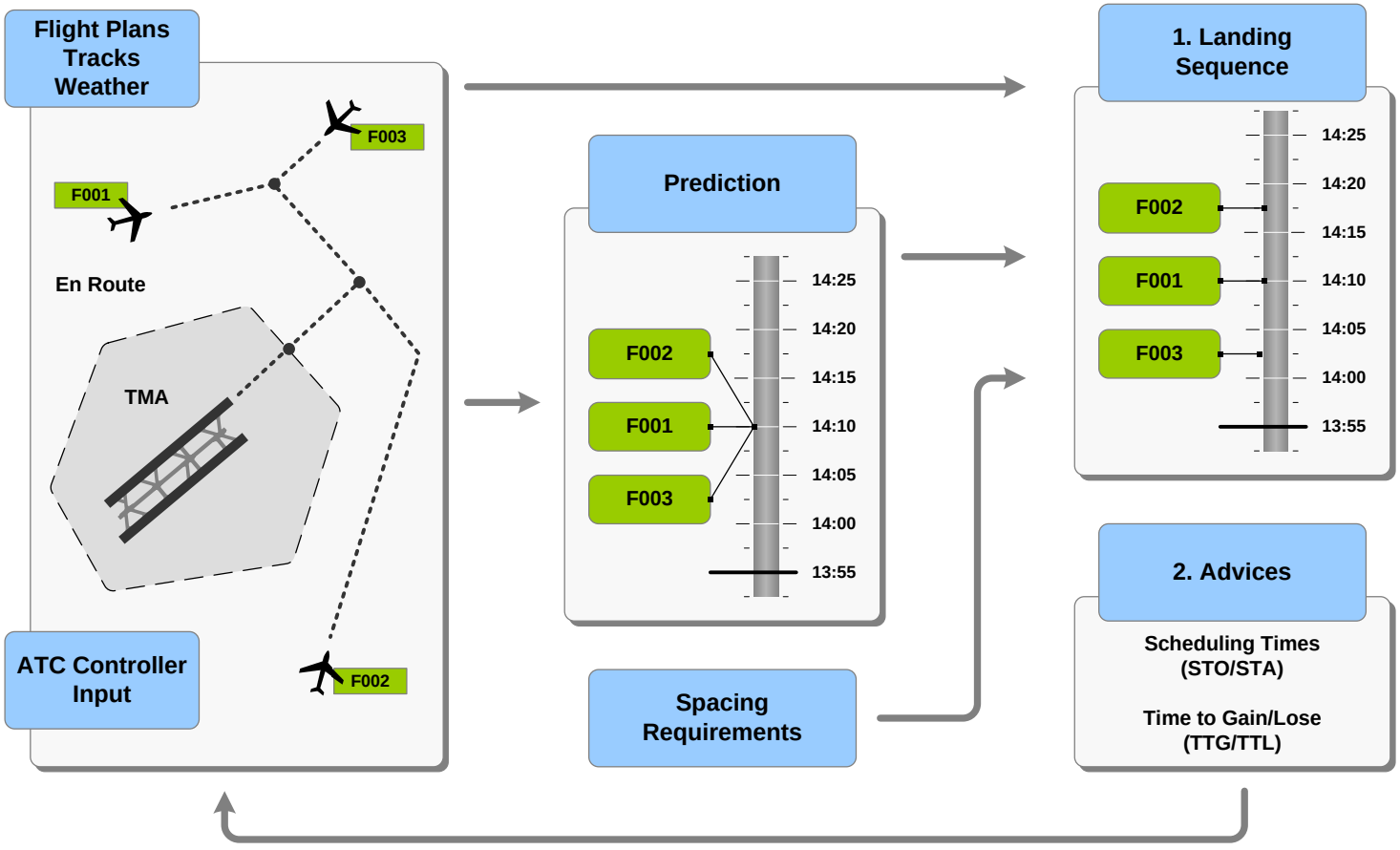
- Input
  - **Surveillance data**
  - **Flight Plans / Gate Assignments**
  - **Model data for predictions**
  - **Rules of operation (separation)**
  - **Environmental (runways available , way points, etc)**
  - **Weather (current and future)**
  - **Preferences / optimization criteria / strategies / requests**
  - **Predicted parameters from other DSTs**

- Output
  - **Predicted Results (sequence, time off block, etc)**
  - **Suggest operations to yield different results.**

Arrival Management DST

- An Arrival Manager (AMAN) is an advanced ATC tool intended to help the ATC controller to access the airspace situation correctly and make decisions that implement a safe and efficient traffic flow within his sector and at the interface to surrounding sector(s).
- The AMAN automatically adapts the established inbound traffic sequence to the actual traffic evolution as well as to controller decisions deemed necessary to meet exceptional cases.
- The AMAN function considers:
  - **Wake turbulence categories**
  - **Airspace and Runway conditions**
  - **Runway acceptance rate (at a Fix or Runway)**
- AMAN generates advisories to the ATC controller in order to meet the planned arrival sequence.

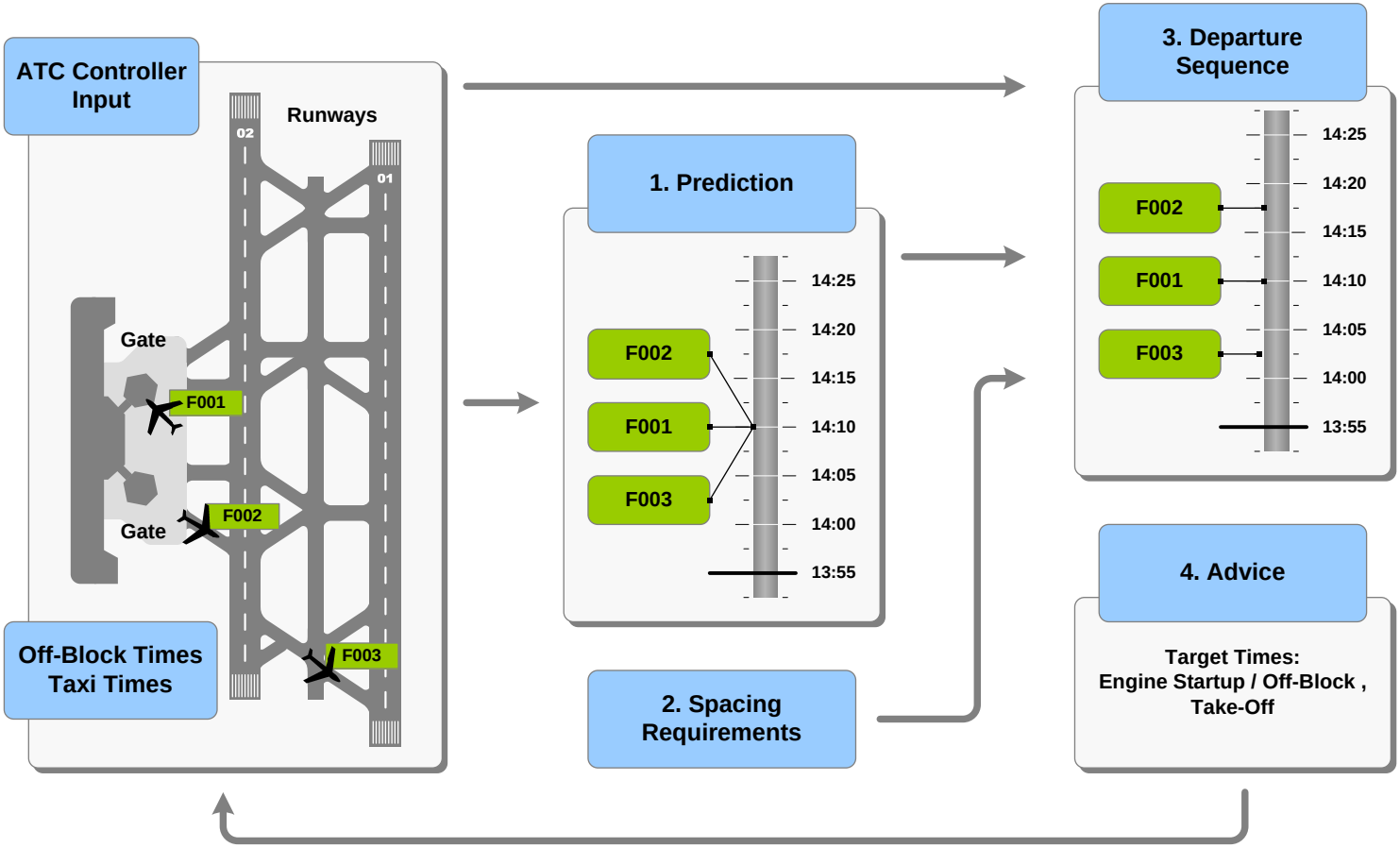
Example of AMAN



Departure Manager DST

- A Departure Manager (DMAN) supports controllers in planning and implementing optimal departure schedules.
- The DMAN considers:
  - **available capacities of runways, de-icing facilities, surrounding sectors**
  - **required separations between aircraft**
    - wake vortex
    - miles in trail (along the standard instrument departure)
  - **actual traffic situation (position on ground, landing A/C)**
  - **operational constraints, like TMU slots**
  - **optimization criteria for**
    - Maximize throughput
    - Maximize punctuality and TMU slot compliance
    - Minimize taxi-out delays
    - Maximize planning stability
  - **Coordination of departures from different airports**

Example of a DMAN DST



Co-operative AMAN and DMAN

- Runways in mixed mode operation
  - **AMAN creates gaps in arrival stream to accommodate departures**

- AMAN and DMAN exchange slot information
  - **Master-Slave configuration**
    - AMAN provide slots with preferred arrival times DMAN shifts arrival slot if necessary (DMAN master)
    - DMAN provide slots with preferred departure times AMAN shifts departure slots if necessary (AMAN Master)
  - **Cooperative planning**
    - DMAN provides anonymous departure slots in advance (~1h)
    - AMAN creates optimal arrival sequence (maybe shift anonymous slots) (~1h - 30min)
    - DMAN assigns departures to reserved slots without shifting arrival sequence (~30min – 20min)

Surface Manager DST

- A Surface Manager (SMAN) DST
  - **Provides for the planning and management of all aircraft and authorized vehicles in the movement area while interfacing with the ATM system (ICAO).**
  - **Services Provided**
    - Control (Conflict monitoring and alerting)
    - Taxi Routing (individual and collective)
    - Guidance (Airfield Ground Lighting)

Terminal Manager DST

- A Terminal Manager (TMAN) DST monitors the ground operation from a general perspective (per inbound / outbound flight)
  - **Early Warning System for Irregularities, Capacity Check and Evaluation of Possible Shortfalls**
  - **Monitors the ground services operation at the hub**
  - **Provision of status per-flight and gate or stand status of all the ground operations and services related to the specific flight in real-time**
  - **TMAN indicates a new Target Offblock Time (TOBD), a calculated, new predicted time of departure for the flight in question**

Co-operative SMAN / TMAN /DMAN / AMAN

- Variable Taxi Time Calculation (VTTC) to DMAN
- Provide earliest off block times to DMAN
- Predicted Arrival/Departure times for SMAN allocation of taxi routes
- Predicting de-icing times for DMAN
- Arrival/Departure coordination to prevent gridlock on surface movements
- Reduce TAT (turn-around-times) via accurate gate arrival predictions to TMAN

Summary

- DST provides optimization of ATC and ground movement based on available data and predictions.
- These DSTs are available and continue to evolve
- Coordination between DSTs of each type is needed for maximum benefit.
- DSTs must earn the confidence and respect of air traffic controllers.

- Total Airport Management means decision making with cooperative tools for arrival, surface, ground, and departure operations.


What did he say…?
Questions…?
ICNS
CONFERENCE
BARCO
Visibly yours