# DATEX II User Forum
# 20/21 March 2012 - Stockholm

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## Management of VMS in Emergency Situation by Motorway operators in Italy

# Overview

- **User Requirements**
  - Information in Emergency Situation
  - Rules for Automatic Management of VMS
  - TMP Management
- **Operating Levels and Workflows**
  - Information Exchange
  - VMS Management
- **Requirements and Technological Hints**
  - UML modeling
  - WS technology
  - Future development

# Information Management in Emergency Situation

- **High Impact Emergency Situation**
  - Risk of long delays in queues and traffic disruption
  - Prevent inconveniences and discomfort
  - Give feasible alternative routes to drivers



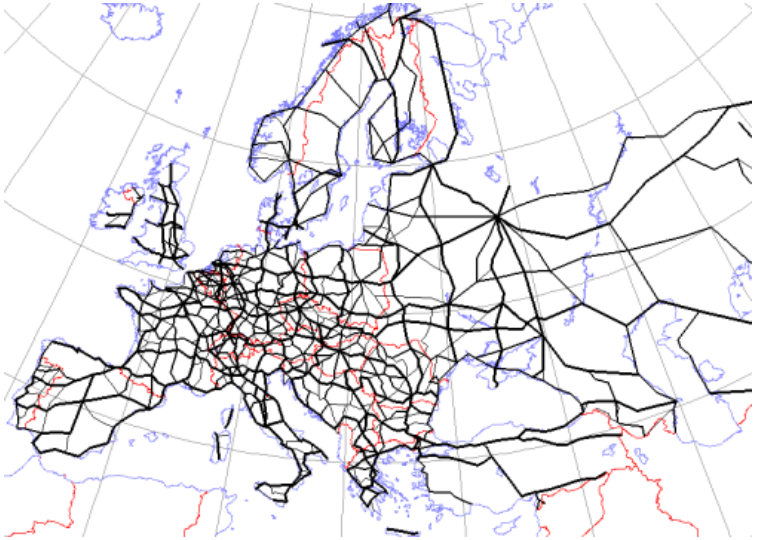
- **Information provided**
  - Timely
  - Reliable
  - Consistent


# VMS Management in Emergency Situation

- **VMS from Drivers perspective**
  - **Close to drivers**
    - Besides Radio VMS are the device that can reach most of users on Road
  - **Available, Visible**
    - Many VMS are along motorways at each Junction
  - **Easy to understand (Mare Nostrum ESG4 Studies)**
    - Pictogram information
    - Message format
      - *Queue lenght in Traffic disruption*
      - *Danger situation immediatly recognizable*
  - **Information on VMS**
    - **Intrisecally Timely**
    - **has to be Reliable**
    - **Shall be Consistent**

# Information Consistency on media and VMS

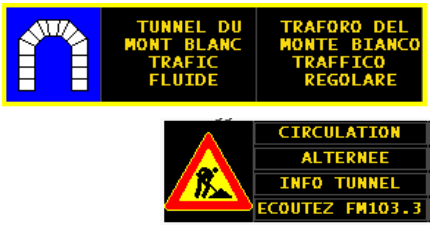
- **VMS are managed by different TCC**
  - **Several Road Operators**
    - National and International
    - Different Languages
    - Different Management Systems
    - Different Rules



  - **Automatic Information Exchange**
    - A MUST to grant **Reliable** and **Timely** information

  - **Harmonization of Delivery Rules and Messages**
    - Messagese based on common interpretation of information exchanged
    - Data Dictionary:

***A MUST to grant Messages are understood***
***so that a similar behaviour is run by drivers***
***for road operatore measures to achieve a maximum benefit***




    - A must for **Consistency** requirements

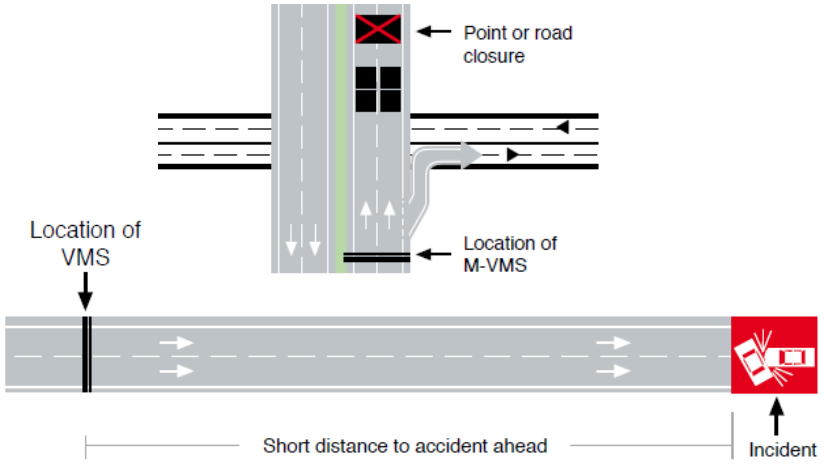
# Messaging Rules

- **Information provided to VMS**
  - Situation Information
    - Road Condition, Wheather, Incidents
    - Non Road Information
  - Travel Times
  - Campaign (security, services)



# Management of VMS
# Rules and Contingencies

- **Automatic Situation Management**
  - Format of Messages
    - Danger / Informative
    - Affected Location
    - Measures
  - Coverage of Information
  - Priority Rules
    - Concurrent Situations


Agreement on general Rules enables
**Automatic VMS Management based on Data Exchange**

- **Non Standard Messages**
  - Non Road Event
  - Campaign
  - Emergency Situation for High Impact Incident
    - Rerouting


    - Text to be arranged at best to give all important details
    - To be understood by drivers
    - To be managed by all TCCs

# TMP management: Programming and Contingencies

- **High impact incident ( Accident, Heavy Snowfall.. )**
  - **Operation are predefined and agreed among operators of Different Region, Countries and nationalities/languages**
    - Road Operators
    - Authorities: Police, Rescue Organization

  - **VMS Rerouting Messages need several information to be understood: date /time /rerouting Points**
    - Predefined format to be agreed and shared
    - CANNOT BE Automatic Messages generated on rules

  - **Unpredictable Situation**
    - **New VMS Messages text**
      - *To be proposed and published*
        *when approved by TCC operators within a short amount of time*

# Operating Levels

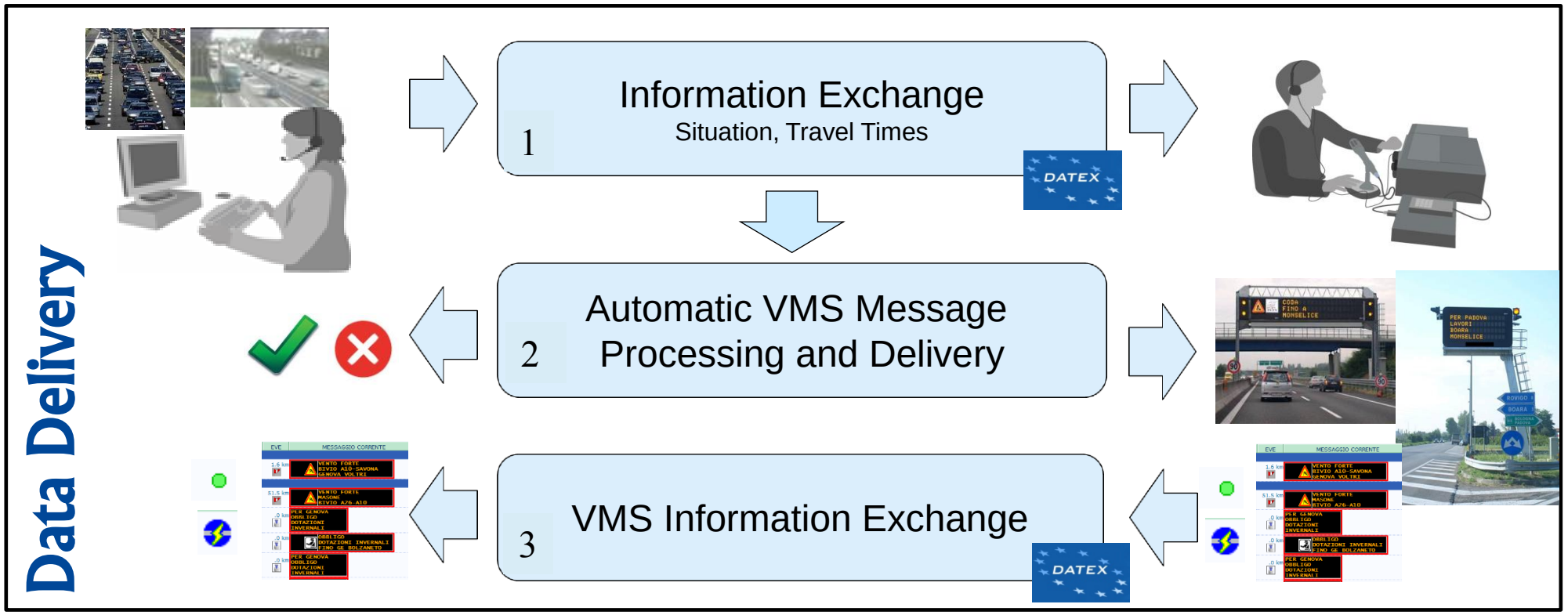
## Information Exchange

- **Informative**
  - Amongst TCCs and/or Services Providers to deliver to final users
    - *Radio*
    - *Mobile / web*
- **Operational**
  - Amongst TCCs
    - *Internal information among Operator to coordinate managament*
    - ***Intended for VMS Management***

## Operating Levels for VMS Management

- **Message Processing**
  - Manual
  - Automatic
  - Message Proposal and Approval

# Information Exchange Operational Levels

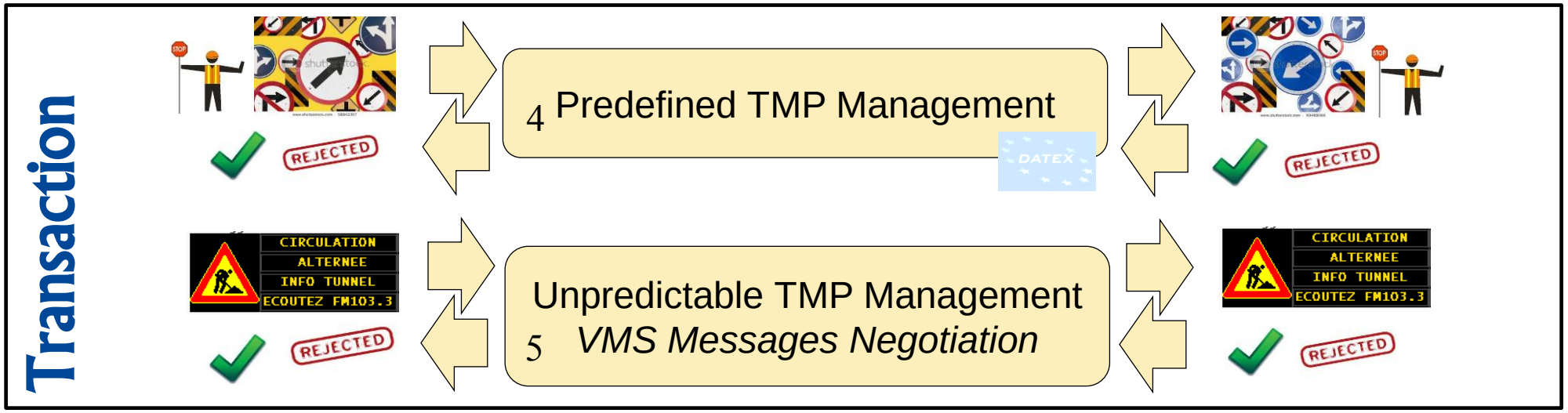



**One way Data Delivery** may be used for

- Information delivery
- TCC, TIC, Authorities, SP Information Exchange
- **FULL VMS Management by manual/ semi-automatic / automatic rules**

**Data Delivery Exchange**

# Transactional Exchange Levels




Transactions Exchange

**Bilateral Exchange of Information needed to**

- Agree and Implement predefined Measures and Actions in TMP management
- Manage unforecast Scenarios with Situation Taylored Messages

# Exchange and Management Requirements and Modeling

# TCC Operation Business Model

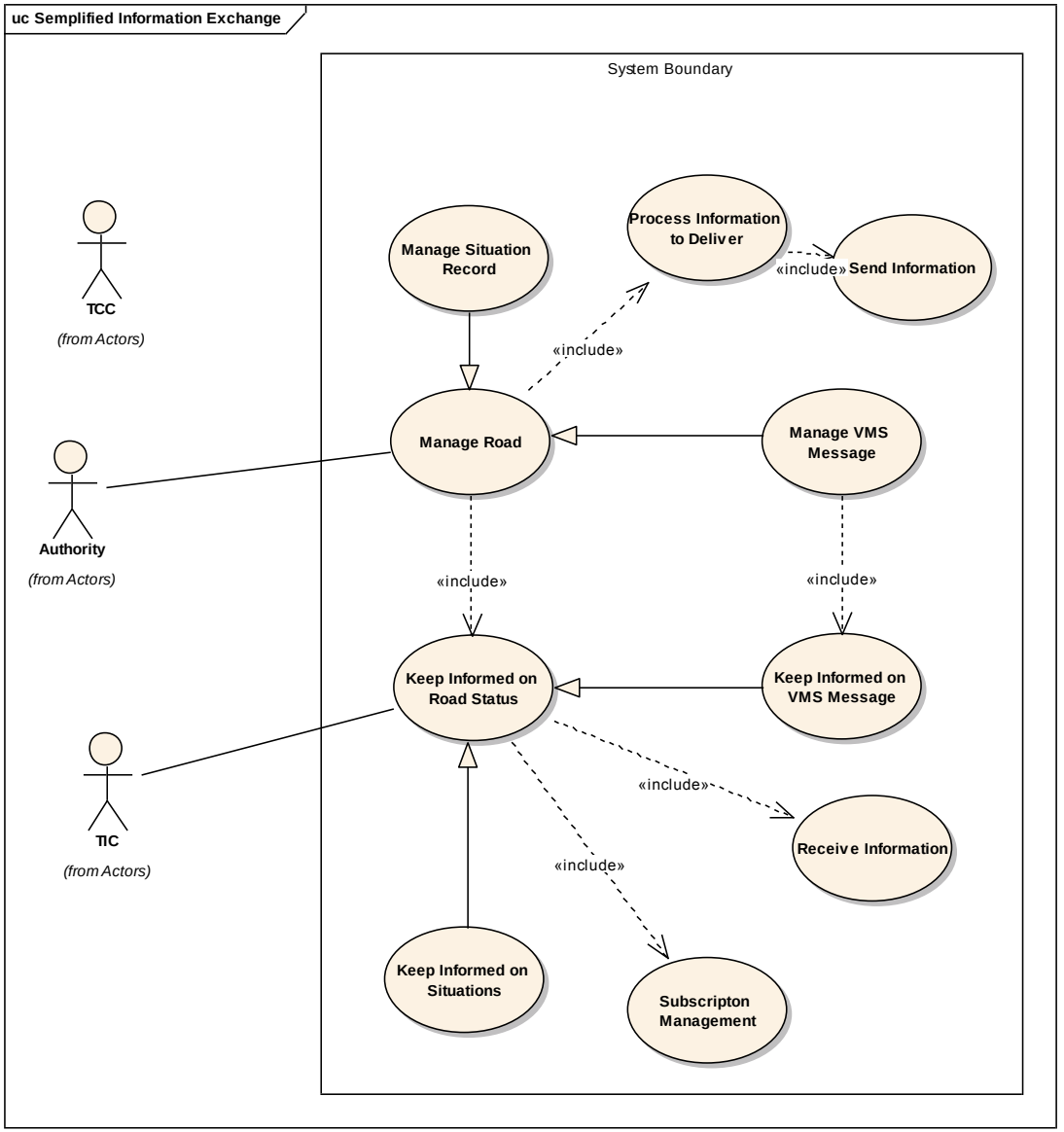
- Fits in DATEX Model Paradigm
  - **DATEX Supplier and Clients are intermediate DATEX NODES acting both as Supplier and Client of Information**

- «Operation Exchange and Agree» :
  - **Needs to take into account the TCC OPERATOR**
  - **TCC decision making application and processes to be considered**

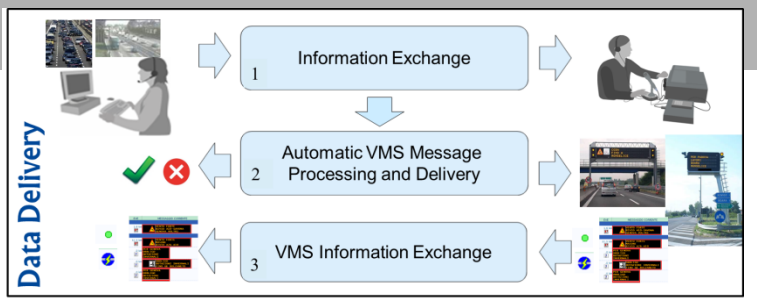
- **UML Modeling**
  - Use Case Diagrams
  - Sequence Diagrams

# Data Delivery: Business Process

- **Actors**
  - TCC
  - Authority
  - TIC
- **Use Cases**
  - Manage Road
    - Keep Informed on Road
      - *by Road Operator TCC own infrastracture*
      - *By other operator and Service providers based on exchanged information*
    - Manage Road
      - *Create / Update Situation Record*
      - *Manage VMS*
      - *Send appropriate Information (manually or automatically)*



# Exchange Model

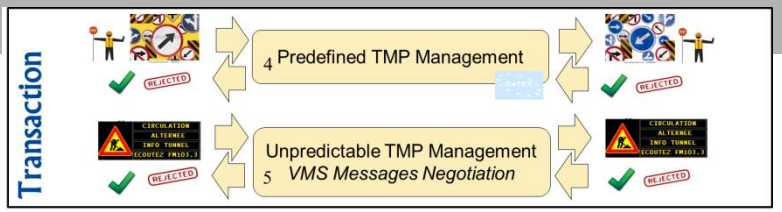



- **DATEX2 Data Delivery Exchange**
  - Information is Exchanged «one way»

- **TCC Operation Business Requirements**
  - Link Monitoring
    - To be informed about lack of information in case of Network or System disruption
  - Exchange Feedback
    - ACK when Information is received from the Client Node
    - Manual Management Action to be intraprended in case of failure

- **New Feature**
  - Feedback on Information Processing
    - Exchanged Information have been processed based on agreed rules
    - Manual Management Action to be intraprended in case of failure

# Transaction Management Requirements

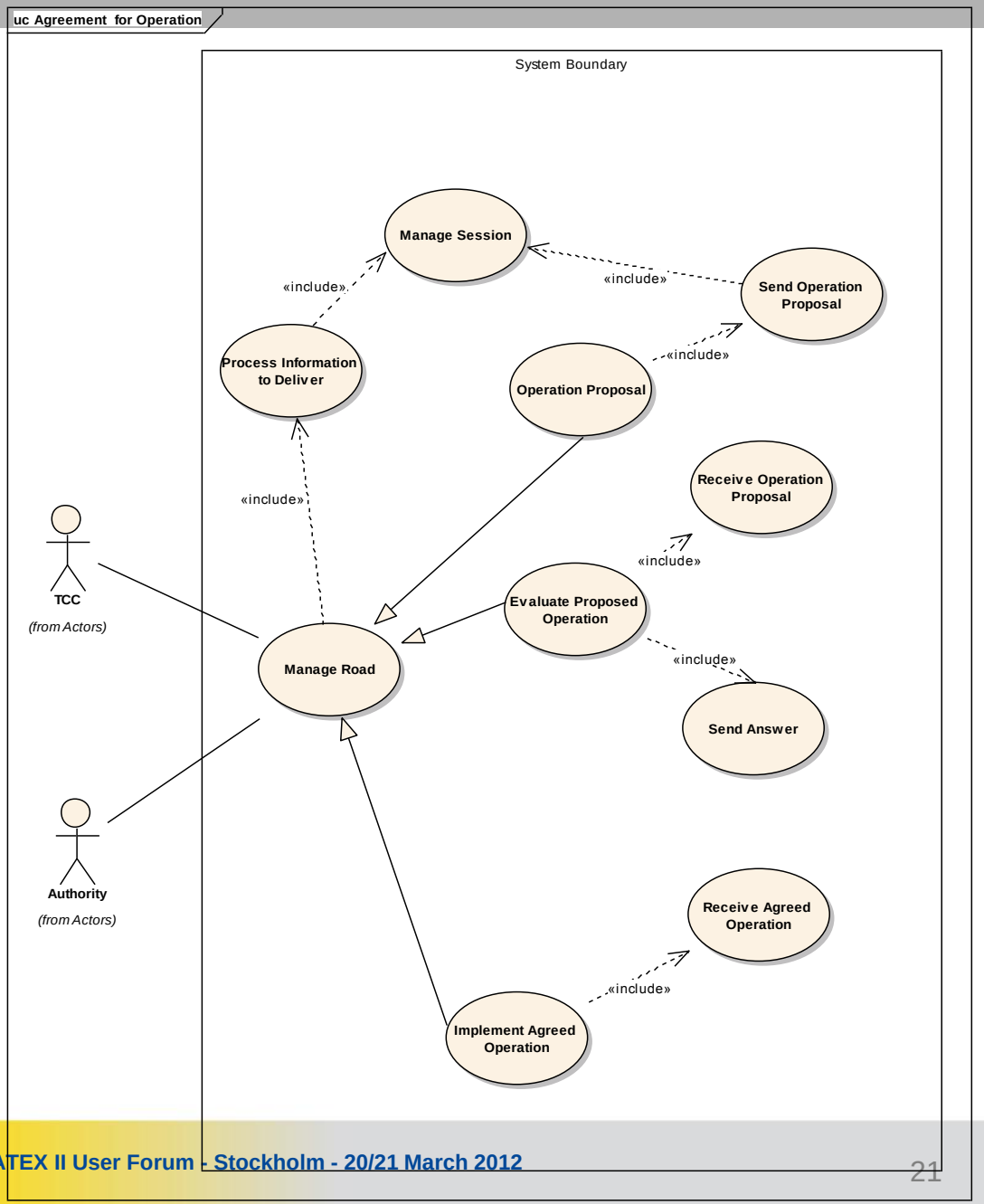



- **Requirements**
  - Grant all Actors resources are available
  - Feedback when agreed measures are implemented

- **Features**
  - Measure Proposal Coordinator
    - The TCC or Road Operator Node which starts the TMP Request
      - *Exchange Measure Action Request*
      - *Collect Disposable Resource*
        - *Agreement on Predefined Measures which can be implemented by Road Operators*
        - *Agreement on Messages do be implemented among all involved nodes*
      - *Manage in case of unavailability of resources*
        - *Change Scenario*
  - Two Phases
    - Dispacth «all agreed» message / Ready to Implement
    - Dispatch «Implement» message
      - *manage timeout in case of lack of «Implement» message after «all agreed»*
  - Manages Failures
    - Later Resources Unavailability
      - *Manage a new Scenario*

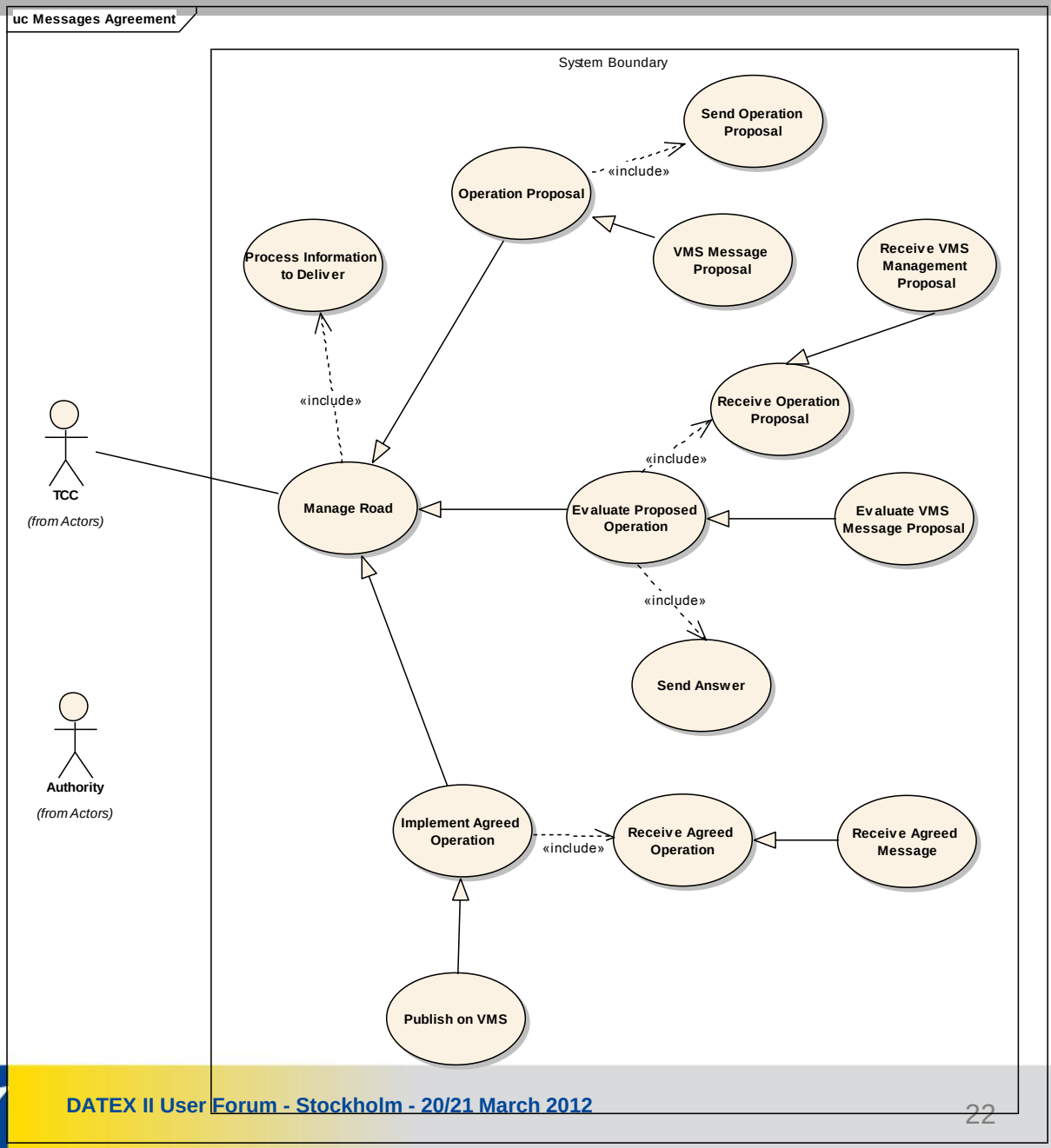
# Agreement on Operation: Transactions

- **Actors**
  - TCC
  - Authority
- **Standard Data Exchange**
  - on Operation Proposal
  - on Acknowledge on Operation
- **Transaction Cohordination**
  - For Operation Implementation
  - Recovery Procedures
    - for lack of acknowledge
    - system/ network failures

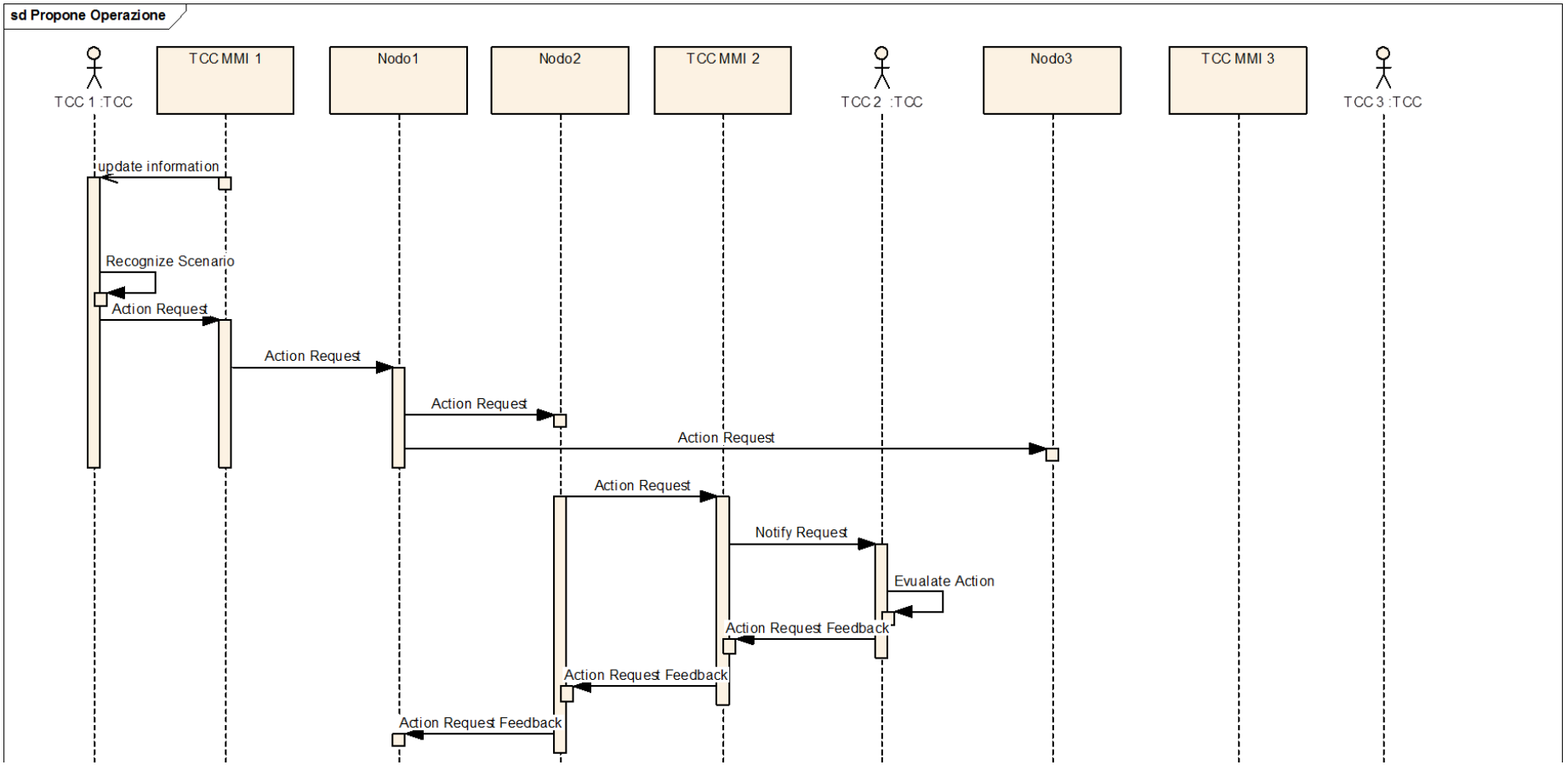


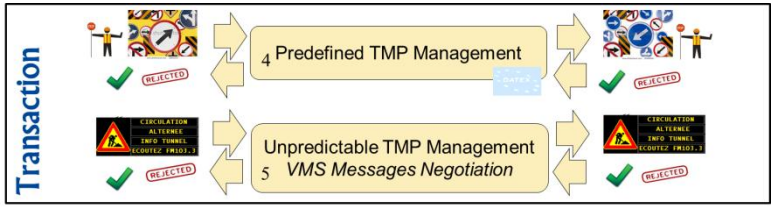
# VMS Message Proposal Management

- **VMS Messages Use Cases**
  - VMS Message Proposal
  - Receive VMS Message Proposal
  - Evaluate VMS Message Proposal
  - Implement Agreed Message
  - Publish on VMS

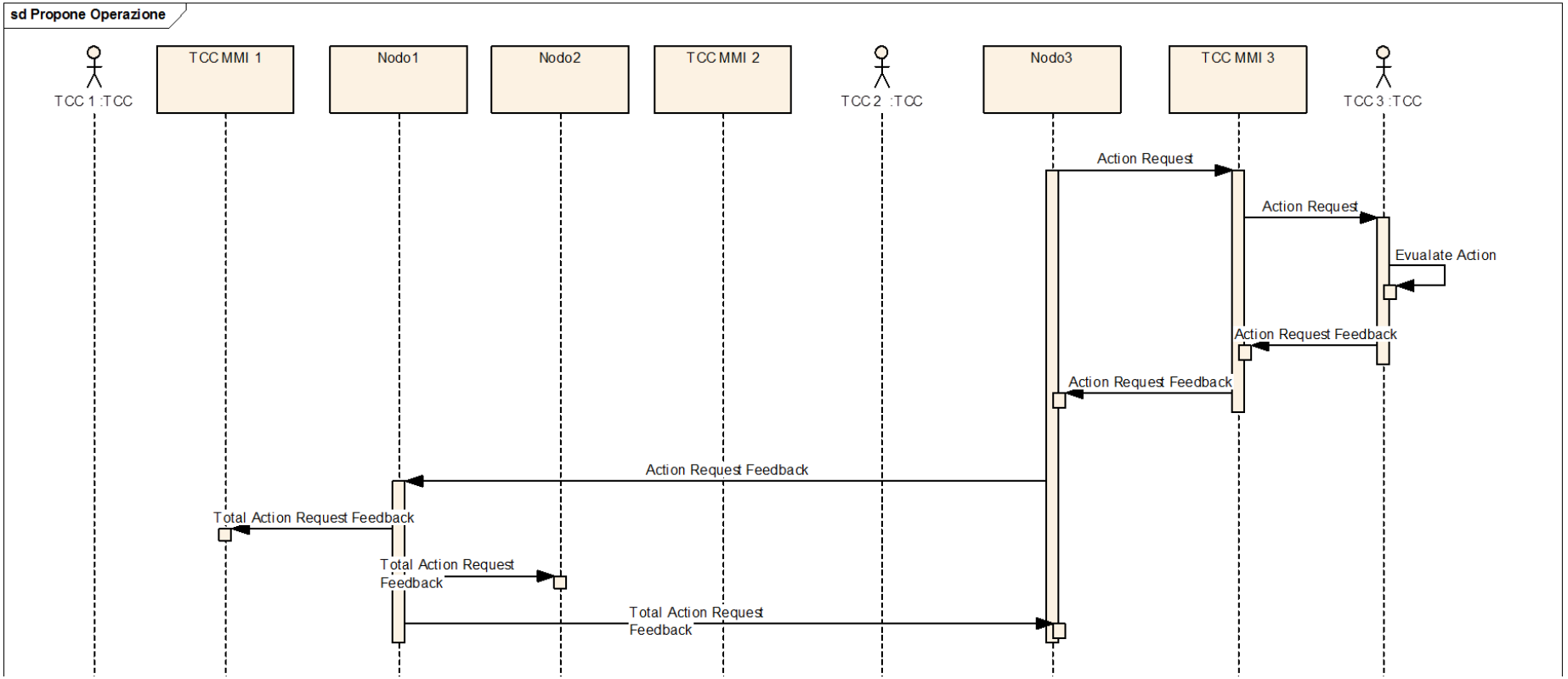


# Transactions Workflow / 1

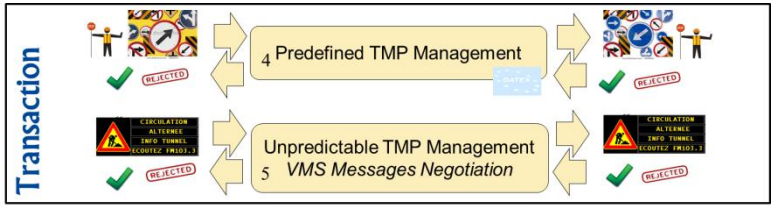


# Transactions Workflow / 2

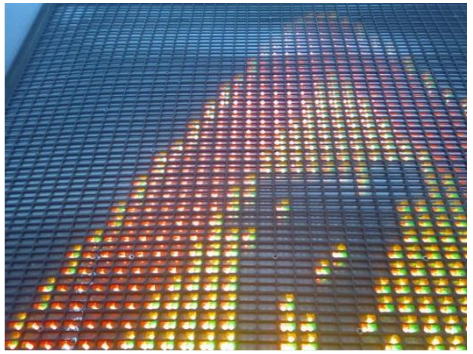



- **After informing of agreed Operation launch Implement Operation**
- **TCC Operator is in charge of managing**
  - failures in Delivery
  - New Upcoming Scenarios



# Web Services implementation

- **Some specification available to implement these scenarios in Web Services Architecture:**
  - *Transaction WS Specification (WS-TXM )*
  - *Long Running Transaction (TX-LRA)*
  - *Business Process Transaction (TX-BP)*
  - *OASIS-BTP*
  - *WS-C/T*
- **A new challenge for DATEX development from 2012 on**
- **Technical Study to be launched**




# thanks for your attention

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