Transferring an educational board game to a multi-user mobile learning game to increase shared situational awareness.

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PROBLEM SITUATION IN LOGISTICS
Container terminal: complex logistic processes

Source: Voss et al. (2008)
Challenges in disruption mitigation

We need:
• Relevant information sharing
• Maintaining safe operating environment
• Satisfying customers and economics
• Fast and good decisions

We have:
• Insufficient or excessive information
• Lack of overview on interdependencies in standalone departments
• Individualistic sense of urgency and action
• Redundant and contradicting decisions
BACKGROUND:
SALOMO PROJECT
SALOMO – Situational Awareness for LOgistic Multimodal Operations

Mission:

• **Empower** the *terminals* in the Port of Rotterdam and their *hinterland connections* by facilitating better decisions and planning through increased shared situational awareness as well as better trained staff able to **flexibly** deal with dynamic circumstances.

• Develop and test 8 **innovations** to improve shared situational awareness in multi-stakeholder settings
Shared Situational Awareness: Conceptual Framework for Intermodal Transportation

**Enablers of Individual SA**
- Individual skills, training, competence, culture
  - Tracking
  - Detection
  - Response

**Individual Situational Awareness during a local disruption**

**Enablers of Shared SA**
- Shared Understanding
- Trust
- Coordination
- Common ground
- Commitment
  - Collaboration tools
  - Intelligent planning and scheduling tools, Decision support tools

**Process towards Shared Situational Awareness in a multi-actor network for disruption management**

**SSA Framework for multi-actor networks**

**Interaction**
- Communication tools
  - Relevant information sharing

**Visualization**
- Mixed reality, GIS map

**Sense Making**
- Collaboration models

**Synchronization**
- Collaboration tools
SOLUTION APPROACH:
GAME DESIGN
Disruption mitigation game

- Disruption scenarios introduced in the game
- Situation deteriorates unless appropriate decisions are taken
- Decision making to mitigate the effects of disruptions
- Information sharing and communication
- Scoring on individual and overall performance indicators
- Varying levels of information visibility, and communication options
Role description

1. Vessel planner

- Plan the unloading and loading of the ship
- Plan the mooring slot for ships
- Reduce ship waiting times

Source: Dai, Lin, Moorthy & Teo (2008)

Source: http://www.hine-consultancy.co.uk/
Role description

2. Yard planner

- Decides the storage positions for the incoming and outbound containers in the yard.
- Receiving outbound containers of a group for a vessel or unloading of inbound containers.
- The yard planner is responsible for sufficient stack capacity to maintain overall performance.

Source: sciencedirect.com
Role description

3. Control tower
   • Gives permissions for operations that are outside the existing plans.
   • Control tower keeps track of operations
Role description

4. Sales

- Responsible for the bookings and financial transactions between the clients and the terminal

- Arrange alternatives to clients during disruptions of container flow in and out of the terminal.

- They need to keep the customer informed at all time, and responsible for customer satisfaction.
Role Description

5. Resource planner

• Assign resources to each vessel planned for your terminal resources per shift planned for gangs

• Get an overview of all resources demanded for per time slot over the next days or weeks

• Equipment allocation

• Quay cranes, automated guided vehicles, gantry cranes, reach stackers

Source: arl-shipzine.com
**Game pieces**

**Boards**
- Individual game boards
- Overall game boards

**Cards**
- Information cards
- Decision cards
- Joker cards
- Game leader score cards

**Items**
- Pawns
- Rolling dice
- Stopwatch
- Communication tokens
**Basic game rules**

- Game leader orchestrates the game
- 5 rounds, 1 decision to be made each round
- Information cards can be communicated (phone, e-mail, meetings)
- Costs and chances of communication
- Choose between two decision options or use joker
- After every round the game leader announce your score based on your decision

**Scoring**

- *Individual and overall performance indicators*
- *Individual scores* for each role, contribute to overall scores
- *Overall performance indicators*
  - Safety
  - Performance
  - Customer satisfaction
An impression of game play
MOBILE GAME DESIGN
Mobile game design requirements

• Follow board game process
• Multi-role design
• Individualized event notifications
• Individual decisions causing common effects
• Cross-role dependencies
• Communication means
PLATFORM SELECTION: ARLEARN
ARLearn – A platform for multi-user, multi-role mobile learning games

Core platform:
• Event-based action model
• Support for teams and multi-players
• Dependency modelling
• Game process automation

Additional benefits:
• Authoring environment
• Event tracking for later analysis
• Available through standard app distribution channels
Game design level 1: individual decisions
Game design level 2: additional communication phase
SALOMO Game realized in ARLearn

- assemble team
- Correct
- Question
- Important Message

A message has arrived from the DO, please click the play button below to listen to the voice message.

As requested by the DO, please list the required actions to be taken if the hostage is released using maximum one sheet of flip-chart paper. You have **10 minutes** to complete this activity. When the list is complete, please take a **photograph** of the list and upload it for review by the DO.

To do this, please press the **menu** button below and select **provide answer**.
Mobile game results

- Game playable with five players / five devices per team simultaneously
- No game leader needed, game process is automated
- Realistic event notification behaviour (SMS, call): players receive information like they usually do on their phone
- Realistic isolation impression: players can be locally distributed in different rooms
Thank you!

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