S-100 PROPOSAL FOR ONLINE DATA EXCHANGE

Why do we need it?

How do we achieve it?

Streaming Data vs. Static Data

Static Data

- Collect all Information first -> Build a dataset
- Process data as a whole
- Mostly **PULL**

© Walter Siegmund
License: https://creativecommons.org/licenses/by-sa/3.0/
Link to photo: https://de.wikipedia.org/wiki/Townsend-Streifenh%C3%B6rnchen#/media/File:Tamias_townsendii_4516.JPG

Streaming Data

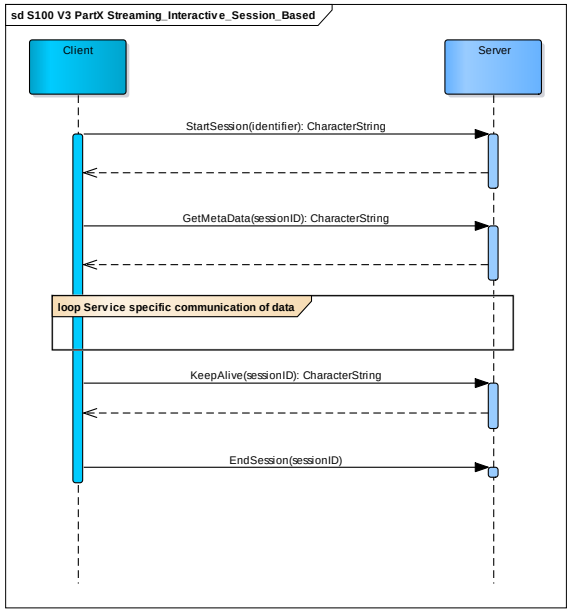
- Continuously get new information
- Process only new data
  - Eventually combine with some static data or historical data
  - Continuously integrate new little data into a dataset
  - Mostly **PUSH**

© Christoph Strässler
License: https://creativecommons.org/licenses/by-sa/2.0/
Link to photo: https://www.flickr.com/photos/christoph_straessler/10142017736

Streaming Data vs. Static Data

Static Data

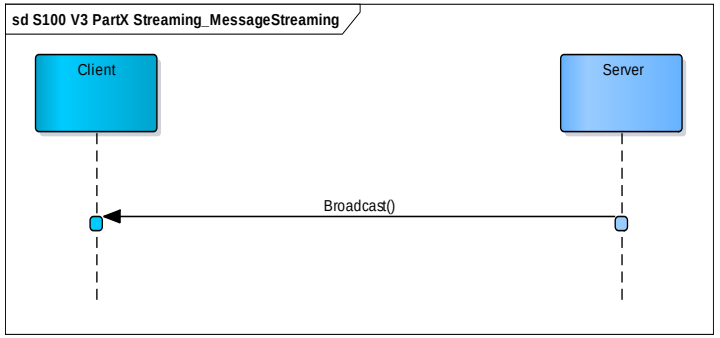
- Collect all Information first -> Build a dataset
- Process data as a whole
- Mostly **PULL**



Example of session interaction model

Streaming Data

- Continuously get new information
- Process only new data
  - Eventually combine with some static data or historical data
  - Continuously integrate new little data into a dataset
  - Mostly **PUSH**



Message stream

Maritime Service Portfolios

Defined by IMO (NCSR 1/28 Annex 7)

16 Maritime Service Portfolios (MSP) defined for improved provision of services

MSP 1: VTS Information Service
MSP 2: Navigational Assistance Service
MSP 3: Traffic Organization Service
MSP 4: Local Port Service
MSP 5: Maritime Safety Information Service
MSP 6: Pilotage Service
MSP 7: Tugs Service
MSP 8: Vessel Shore Reporting
MSP 9: Tele medical Assistance Service
MSP 10: Maritime Assistance Service
MSP 11: Nautical Chart Service
MSP 12: Nautical Publications Service
MSP 13: Ice Navigation Service
MSP 14: Meteorological Information Service
MSP 15: Real-time Hydrographic and Environment Information Service
MSP 16: Search and Rescue Service

(MSP 17: Aids to Navigation Services)
(MSP 18: Communication Services)
(MSP 19: PNT and Augmentation Services)
(MSP 20: Anti-piracy information)

It should be a goal to enable S-100 so that all MSPs can make use of S-100

Maritime Service Portfolios

MSP 1: VTS Information Service

- The 'VTS IS' is defined by IMO as “a service to ensure that essential information becomes available in time for on-board navigational decision-making” (Res. A857(20)).
- The information service is provided by broadcasting information at fixed times and intervals or when deemed necessary by the VTS or at the request of a vessel, and may include for example reports on the position, identity and intentions of other traffic; waterway conditions; weather; hazards; or any other factors that may influence the vessel's transit.

Streaming Data needed

MSP 2: Navigational Assistance Service

- The NAS is defined by IMO as “a service to assist on-board navigational decision-making and to monitor its effects” (IMO Res.A857(20)).
- The navigational assistance service is especially important in difficult navigational or meteorological circumstances or in case of defects or deficiencies. This service is normally rendered at the request of a vessel or by the VTS when deemed necessary.

Streaming Data needed

Maritime Service Portfolios

MSP 3: Traffic Organisation Service

- The TOS is defined by IMO as “a service to prevent the development of dangerous maritime traffic situations and to provide for the safe and efficient movement of vessel traffic within the VTS area” (IMO Res.A857(20)).
- The traffic organization service concerns the operational management of traffic and the forward planning of vessel movements to prevent congestion and dangerous situations, and is particularly relevant in times of high traffic density or when the movement of special transports may effect the flow of other traffic. The service may also include establishing and operating a system of traffic clearances or VTS sailing plans or both in relation to priority of movements, allocation of space, mandatory reporting of movements in the VTS area, routes to be followed, speed limits to be observed or other appropriate measures which are considered necessary by the VTS authority.

Streaming Data probably needed

Maritime Service Portfolios

MSP 4: Local Port Service

- Provision of Port Service Information (berthing, port services, shipping schedules, hydrological data…)

Streaming Data probably needed

MSP 5: Maritime Safety Information Service

- Provision of maritime safety information (in time)

Streaming Data needed

MSP 6: Pilotage Services

- Provision of pilotage experience
- Pilots need information like hydrological data, traffic information, …

Streaming Data needed

Maritime Service Portfolios

MSP 7: Tugs Services

- Provision of tug boat service
- If digital systems are included, digital real-time information would be helpful

Streaming Data probably needed

MSP 8: Vessel Shore Reporting

- Automatic Ship Reporting
- Depending on data to be transmitted, frequent updates may be needed

Streaming Data probably needed

MSP 9: Telemedical Assistance Service

- Provision of a service for telemedical assistance
- Real-time data yes, but not S-100 relevant

Streaming Data likely not needed

MSP 10: Maritime Assistance Service

- Handle communication between Coastal State, ship‘s officers and other -> e. g. in emergencies

Streaming Data probably needed

Maritime Service Portfolios

MSP 11: Nautical Chart Service

- Provision of Nautical Charts and Updates
- No streaming, because updates can be done using datasets
- However smaller updates would safe bandwidth

Streaming Data likely not needed

MSP 12: Nautical Publications Service

- Maintenance of nautical publications -> processing S-100 data, but on in real-time

Streaming Data likely not needed

MSP 13: Ice Navigation Service

- The ice navigation service is critical to safeguard the ship navigation in ice-conditions, given how quickly the ice maps become outdated in the rapid changing conditions of the ice-covered navigational regions.
- Today: Higher frequency than MSP 11, however datasets still suitable
- Future: Real-time streaming for autonomous vessels, etc.

Streaming Data probably needed

Maritime Service Portfolios

MSP 14: Meteorological Information Service

- Provision of meteorological data
- Streaming updates e. g. on wind speed and direction

Streaming Data needed

MSP 15: Real-time Hydrographic and Environmental Information Services

- Streaming essential, otherwise no real-time

Streaming Data needed

MSP 16: Search and Rescue Service

- Provision of situational awareness to all parties involved in SAR operations
- Real-time information needed

Streaming Data needed

More Applications in Future

Ship to ship data exchange

- Radar data, machine data for collision avoidance

Highly automated vessels and autonomous vessels

- Continuous data exchange between ships and infrastructure (ports, shore based systems, buoys, etc.)

The IALA proposal

Does not change the existing standard

- It‘s really good.

Add a section on ‘online data exchange‘

- Proposal is structured as a framework for defining an online data exchange
- Will be an option to the current exchange set-based data distribution
- Exchange of metadata on session level
  - Allowing applications to define how to handle metadata
- Requiring product specifications to define serialization of data (files, session based services, …)
  - Giving hints on how to do so
- E. g. using the ISO/OSI reference model
  - Be backwards compatible
- Makes S-100 ready for AIS-like data exchange