



## 3-D Nautical Charts as Decision Support for Land Based Piloting

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### Abstract

In recent years attention has been brought to the possibilities of land based or remote piloting. In Sweden an official inquiry has presented its results and recommended that trials should commence in a limited scale. It then becomes necessary to pay attention to the ergonomic design of the technical facilities that will allow a pilot to safely berthing a ship from a land based position and also to the backup systems left onboard the pilotless ship.

According to van Westrenen, who published a study on Rotterdam pilots in 1999, one of the most important types of information for a pilot is the rate-of-turn of the ship. This is generally derived from the outside view. The relative shift of the bow to the environment is an accurate and reliable rate-of-turn indicator. The rate-of-turn instrument is hardly ever used and van Westrenen observes that pilots generally use the onboard instrument very sparsely and in periods of high workload spend up to 90 % of the time observing the fairway in front of the ship. This implies that allowing the land based pilot access to the same type of scenario from a 3-D egocentric view chart would be beneficial as pilots could continue to use the same skills acquired through experience.

This type of 3-D nautical chart has been developed in an information design research project at Mälardalen University, Sweden based of human-factors principles. The general idea is to allow the navigator to access chart data from an egocentric viewpoint, a bridge perspective as well as the ordinary bird's-eye perspective. By removing the need for cognitively demanding mental rotations the workload of the navigator can be decreased. This could be desirable in the conning situation in e.g. high speeds or confined waters when decision time is short. The effectiveness of the system has been clearly shown in laboratory experiments. (Porathe, 2006; Prison & Porathe, 2007)

This paper suggests using 3-D charts as a Harbor Traffic Approach Guide (HaTAG) both for the land based pilot and as a back-up system for the approaching ship. The system will allow the pilot to virtually stand on the bridge of the approaching ship. The system will also allow the port authorities to send pre-planned routes with times and courses to individual approaching or departing ships, and present them in an ergonomic way. The ships will in this way have easy to understand nautical information on board the ship as a backup.

### References

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