

# Capacity Restricted Transport Corridors

## Considering the Entrance Lanes of Shanghai's Port

Dr. Xiaoning Shi und Prof. Stefan Voß UHH Institut für Wirtschaftsinformatik, Von-Melle-Park 5, 20146 Hamburg

**Inevitably**, the trend of deploying **mega-ships** challenges the **performance** of the **entrance lanes** of Shanghai Port. **Maintaining this performance** is getting more **challenging** disregarding the types of vessels since **March 2010** when container turnover made a leap to **650 mt** and when the **number of vessels** within the port experienced a **considerable increase**.



There are two points of view when considering such a traffic congestion:

Observing the complete traffic system and, thus, focussing on the total delay caused by the congestion. There are several perspectives to take into account in order to find an optimal solution:

FEASIBILITY ANALYSIS

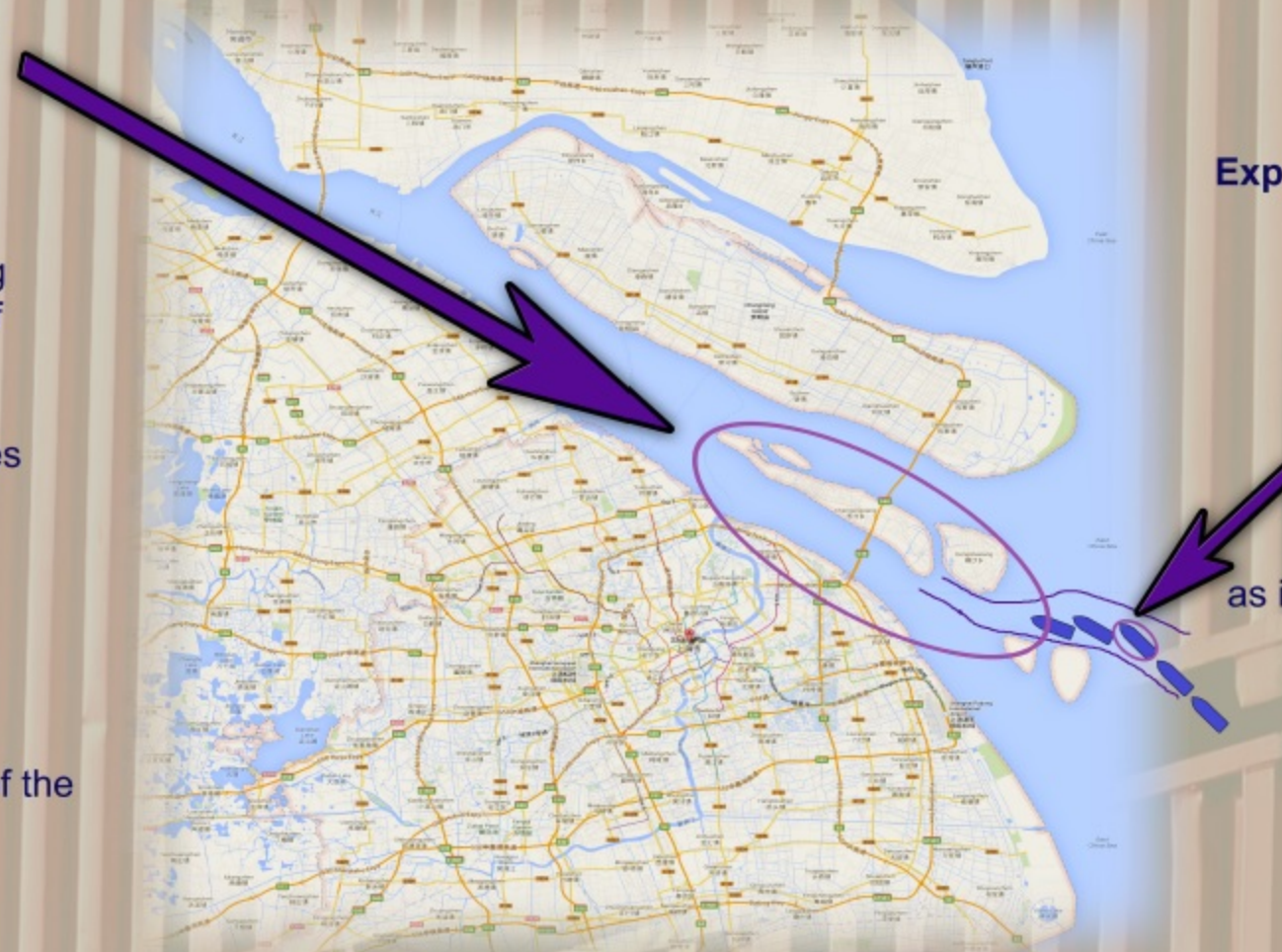
From the perspective of economies decision making processes, knowledge transfer and the increment of entrance lane usage need improvement

From the perspective of technologies the possibilities of applying Internet of Things-technology like Radio-Frequency Identification (RFID) or Automatic Identification Systems (AIS) need to be amplified.

From the perspective of legal frameworks it is necessary to take into account the regulations of the China Maritime Safety Administration as well as intellectual property protection.

Experiencing mainly the delay in your own travel time: the major incentive is to minimize your own travel time no matter which effect this has on the overall traffic system.

Allowing such a decentralized, selfish behaviour leads to unsatisfactory solutions as it increases the overall traffic time for all participants and is, therefore, not furtherly pursued.



### DEMAND ANALYSIS

#### Modules in the Dedicated MIS

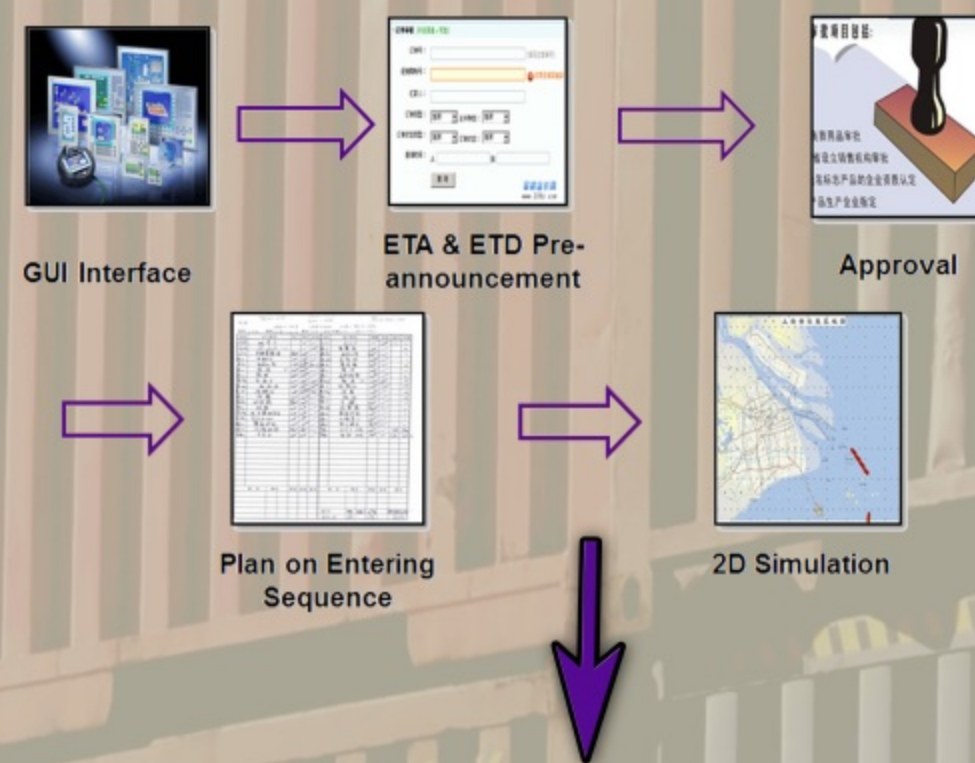
According to the categories of functions, the dedicated management information system of Berth/Departure (B/D) Service so far contains the following 5 modules:

- (1) B/D Registration Module
- (2) B/D Cancellation Module
- (3) Planning for B/D Service
- (4) Simulation on Expected B/D
- (5) Maintenance

Constraints to Points 1-5 are:

- the draft, breadth and tide
- spontaneous restriction of the Maritime Safety Administration
- handling procedure's efficiency

### EXPECTED DECISION MAKING PROCESS



### FURTHER RESEARCH

#### Short term

- time (date), the latitude and longitude degrees, and tides

#### Long term

- centralized > decentralized decision making process
- auction on the entering sequence

### TESTING & EVALUATION

船名	船类	吃水	船宽	ETA	ETD	泊位	备注
光通海科	2000	12.8	240	2012-08-21 12:00	0001-01-01 09:00	1	检查码头吃水是否满足
光通海科	2000	12.1	240	2012-08-21 12:00	0001-01-01 09:00	1	检查码头吃水是否满足
光通海科	2000	12.0	210	2012-08-21 12:00	0001-01-01 09:00	1	检查通过
长同	944	6.2	140	0001-01-01 09:00	2012-08-21 01:30	1	检查通过
星海宽	12118	6.6	140	0001-01-01 09:00	2012-08-21 17:00	1	检查吃水 - 港口、吃水不足
科隆特	1216	6.9	220	2012-08-21 11:00	0001-01-01 09:00	1	检查吃水 - 港口、吃水不足
同德江舟	201	6.8	270	0001-01-01 09:00	2012-08-21 09:01	1	检查船宽是否满足
同德	12258	6.1	240	2012-08-21 09:10	0001-01-01 09:00	1	检查船宽是否满足
同德	12258	6.1	240	2012-08-21 22:10	0001-01-01 09:00	1	检查船宽是否满足

Reasons are identified.

### INCORPORATING CATEGORIES OF CONSTRAINTS

```
private bool IsCheckDraft(VesselEntity ve)
{
    //检查码头吃水
    if (!IsCheckTerminalDeep(ve))
    {
        FindMain.CheckFail.SetErr(ScheduleCheckResultTypes.IsCheckTerminalDeep, "检查码头吃水出错");
        return false;
    }
    return true;
}

private bool IsCheckBreadth(VesselEntity ve, List<VesselEntity> velist)
{
    #region 检查船宽
    if (ve.NSChannel == NSChannel.SChannel) return true;
    //得到反向最大船宽
    double maxBreadth = DataProvider.GetMaxOverlapVesselBreadth(ve, velist);
    bool rt = (ve.Breadth + maxBreadth) <= 80;
    if (!rt)
    {
        FindMain.CheckFail.SetErr(ScheduleCheckResultTypes.IsCheckBreadth, "检查船宽出错");
        return rt;
    }
    #endregion
}

private bool IsCheckHeight(VesselEntity ve)
{
    if (ve.ShipType != ShipTypes.GillTender
        && ve.ShipType != ShipTypes.BulkCarrier)
    {
        return true;
    }
    return false;
}
```