

Artificial Intelligence

Case Studies

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Our Expertise

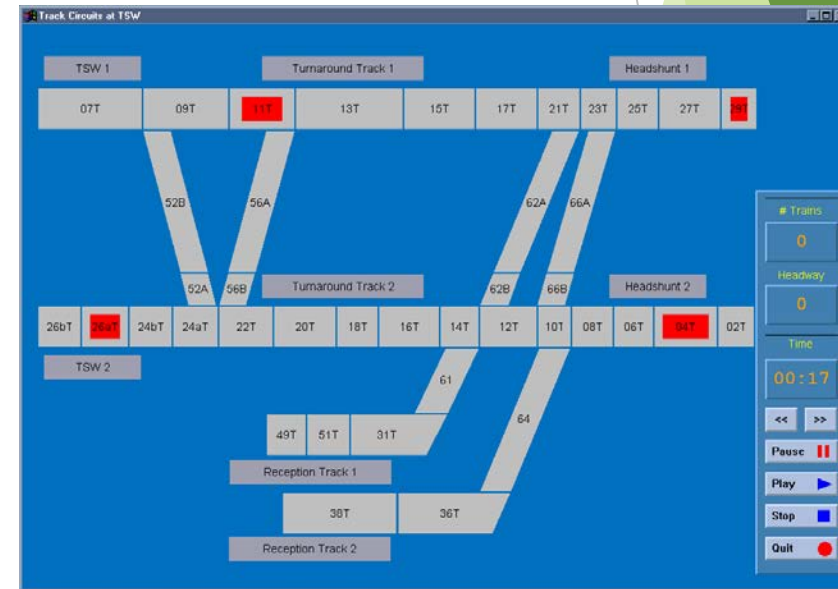
- ▶ Enterprise optimization
 - ▶ Scheduling, rostering, timetabling, allocation...
- ▶ Business intelligence
 - ▶ business rules, decision support
- ▶ Knowledge management, data mining, text mining
- ▶ Machine learning

AI Case Studies



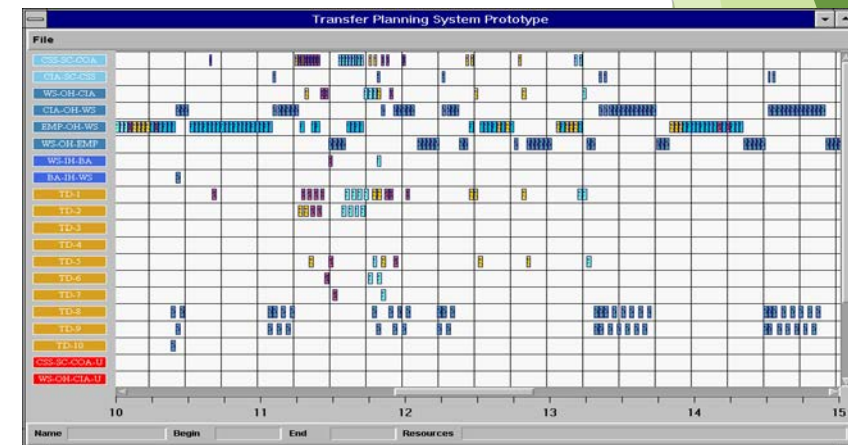
MTR: Train Dispatching (1995)

- ▶ Schedule dispatch of trains at TSW line
- ▶ Complexity too difficult for humans
- ▶ Increased number of tracks during rush hours



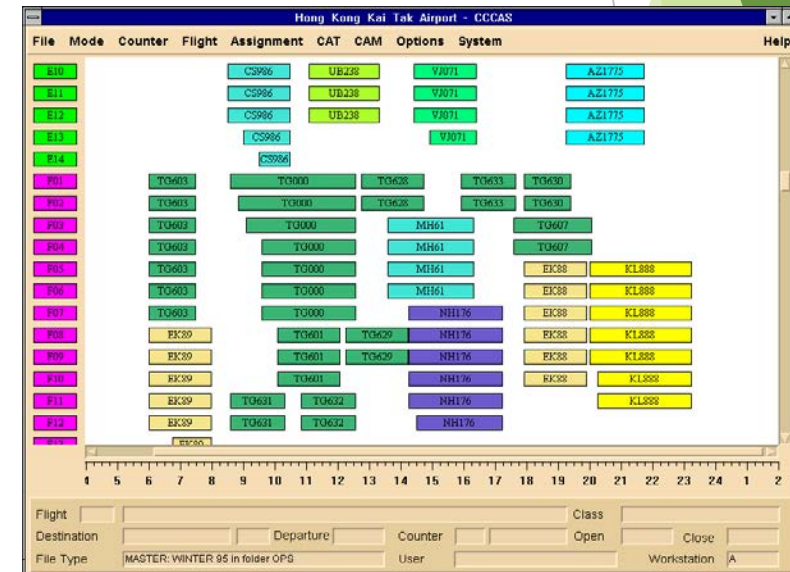
HACTL: Resource Allocation (1995)

- ▶ Allocation of equipment, schedule ULD movement, allocation of work space, rostering of workers
- ▶ Increased efficient and flexibility to cope with dynamic changes
- ▶ Technology transfer



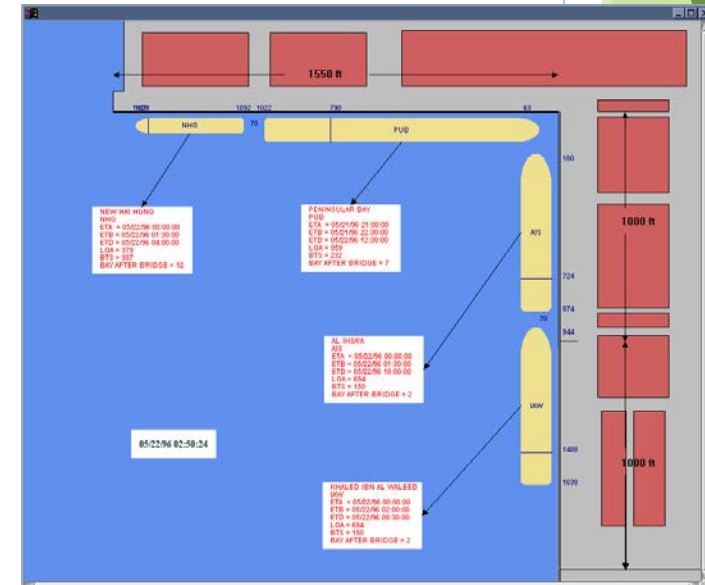
CAD: Check-in Counter Allocation (1996)

- ▶ Combine simulation with constraint-based scheduling
- ▶ Increase traffic, while maintaining service levels
- ▶ +8,700 flights in 1996; +6,360 flights in 1997



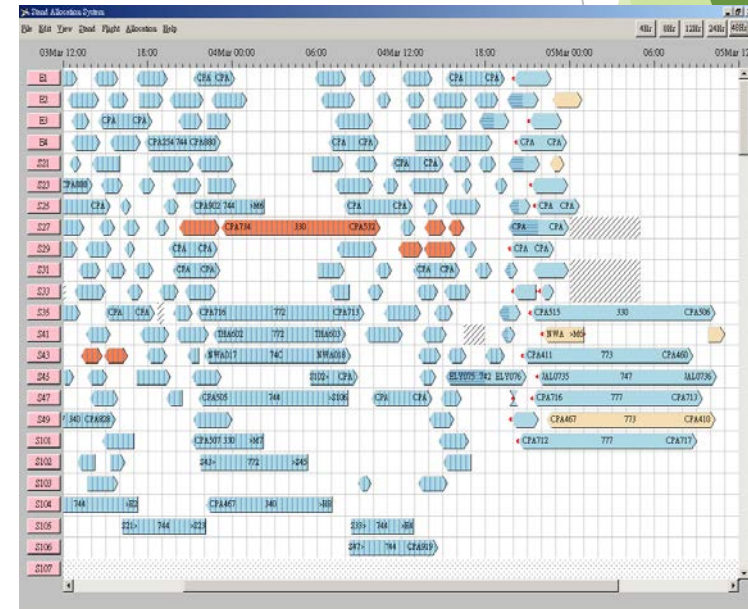
MTL: Berth Allocation & Rostering (1996)

- ▶ Container vessel berth allocation, rostering for equipment operators
- ▶ Increase number of vessel berthing, efficiency in manpower usage
- ▶ Prototype in 1996



AA: Stand Allocation (1998)

- ▶ 24x7 real-time stand allocation
- ▶ Multi-user system used in control tower
- ▶ In use for over a decade



KMB: Bus Timetabling (1998)

- ▶ Timetabling requirements - service freq, travel times, operational needs, bus types + driver duty requirements - meal breaks, rest breaks, working hours
- ▶ Dead runs, interworkings, home depot constraint, supplementary buses,
- ▶ Prototype in 1998



Time Table

Kowloon Motor Bus Company

Route No.: 2
Start From: ABEDEN
End At: AD MTR

25 April 1997

Single Both Overall

	0	1	2	3	4	5		0	1	2	3	4	5
Route no: 1	6:00	6:10	6:20	6:30	6:40	6:50		6:30	6:40	6:50	7:00	7:10	7:20
Route no: 2	7:00	7:10	7:20	7:30	7:40	7:50		7:30	7:40	7:50	8:00	8:10	8:20
Route no: 3	8:00	8:10	8:20	8:30	8:40	8:50		8:30	8:40	8:50	9:00	9:10	9:20
Route no: 4	9:00	9:10	9:20	9:30	9:40	9:50		9:30	9:40	9:50	10:00	10:10	10:20
	10:00	10:10	10:20	10:30	10:40	10:50		10:30	10:40	10:50	11:00	11:10	11:20
	11:30	11:40	11:50	12:00	12:10	12:20		12:00	12:10	12:20	12:30	12:40	12:50
	13:00	13:10	13:20	13:30	13:40	13:50		13:00	13:10	13:20	13:30	13:40	13:50
	14:00	14:10	14:20	14:30	14:40	14:50		14:00	14:10	14:20	14:30	14:40	14:50
	15:00	15:10	15:20	15:30	15:40	15:50		15:00	15:10	15:20	15:30	15:40	15:50
	16:00	16:10	16:20	16:30	16:40	16:50		16:00	16:10	16:20	16:30	16:40	16:50
	17:00	17:10	17:20	17:30	17:40	17:50		17:00	17:10	17:20	17:30	17:40	17:50
	18:00	18:10	18:20	18:30	18:40	18:50		18:00	18:10	18:20	18:30	18:40	18:50
	19:00	19:10	19:20	19:30	19:40	19:50		19:00	19:10	19:20	19:30	19:40	19:50
	20:00	20:10	20:20	20:30	20:40	20:50		20:00	20:10	20:20	20:30	20:40	20:50
	21:00	21:10	21:20	21:30	21:40	21:50		21:00	21:10	21:20	21:30	21:40	21:50
	22:00	22:10	22:20	22:30	22:40	22:50		22:00	22:10	22:20	22:30	22:40	22:50
	23:00	23:10	23:20	23:30	x	x		23:00	23:10	23:20	23:30	x	x
	17	17	17	17	16	16		17	17	17	17	16	16

Unfreeze Print Schedule OK

Café de Coral: Lunch Box Ordering (2000)

- ▶ School lunch box order processing system; interfaced to optical mark reader
- ▶ Handle over 10,000 lunch box orders weekly
- ▶ Produce production orders, delivery schedules, & EIS reports



MTR: Engineering Works (2004)

- ▶ Engineering Works and Traffic Management System (ETMS)
- ▶ Over 1,000 engineering tasks, at over 50 stations
- ▶ Increased capacity for engineering tasks by 200%
- ▶ 2005 APICT Award - Best Industrial Application - 1st Prize



Tunnel lining strengthening



Railway extension interfacing



Track support replacement



EMU / signalling testing



Rail replacement



Ultrasonic testing

ImmD: APPLIES (2005)

- ▶ Application and Investigation Easy System (APPLIES)
- ▶ >100 types of application forms, >4 million submissions yearly
 - ▶ Time consuming to process, need thorough knowledge of HK laws and regulations, need experience to make discretionary judgment on “special” cases



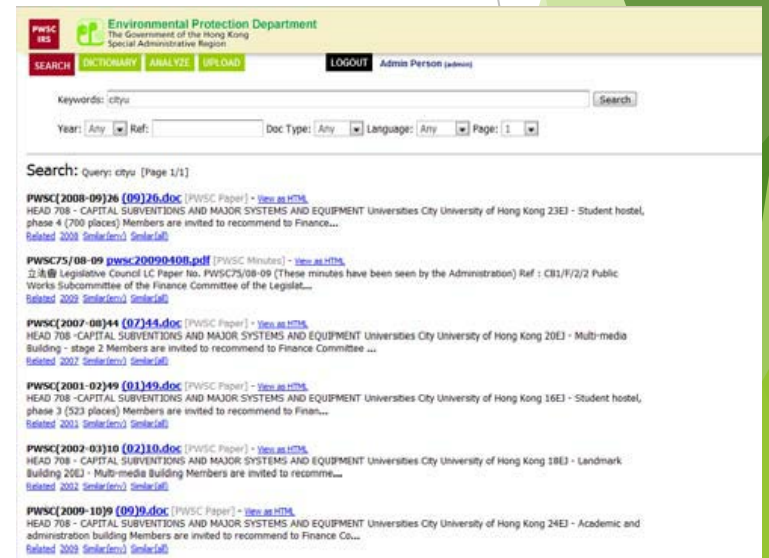
Olympics: Volunteer Rostering (2007)

- ▶ Used in the “Good Luck Beijing” games
- ▶ Ensure adequate staff level for all functions
- ▶ Constraints - max hr, skill sets, vicinity, availability, home division

A screenshot of the Workforce Management System interface. The browser window title is 'Equestrian Events (HK) - Workforce Management System'. The page has a header with the system name and a search bar. Below the header, there is a 'COMPETITION' section with a table. The table has columns for 'name' and dates from 28 to 15. The rows list various equestrian events and participants, with colored squares indicating their participation or availability for each day. On the left side of the page, there are navigation links like 'Home', 'Master', 'Directory', and 'Send Message'. There is also an 'IMPORTANT' section with a sign-out link and 'Official Websites' listed at the bottom left.

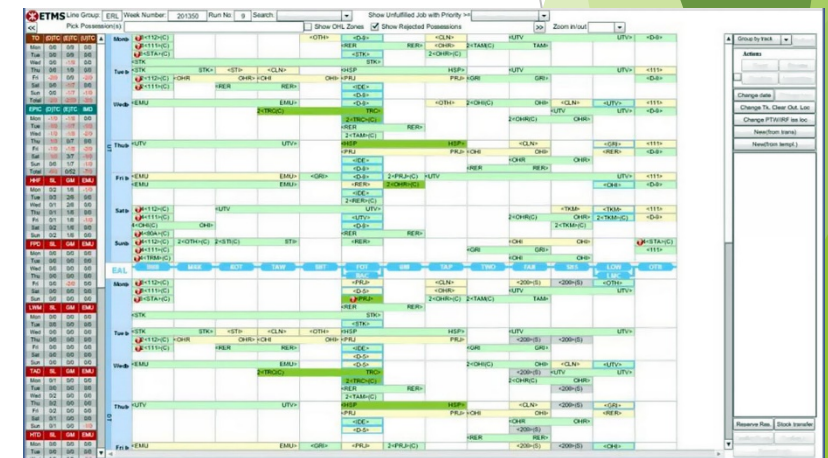
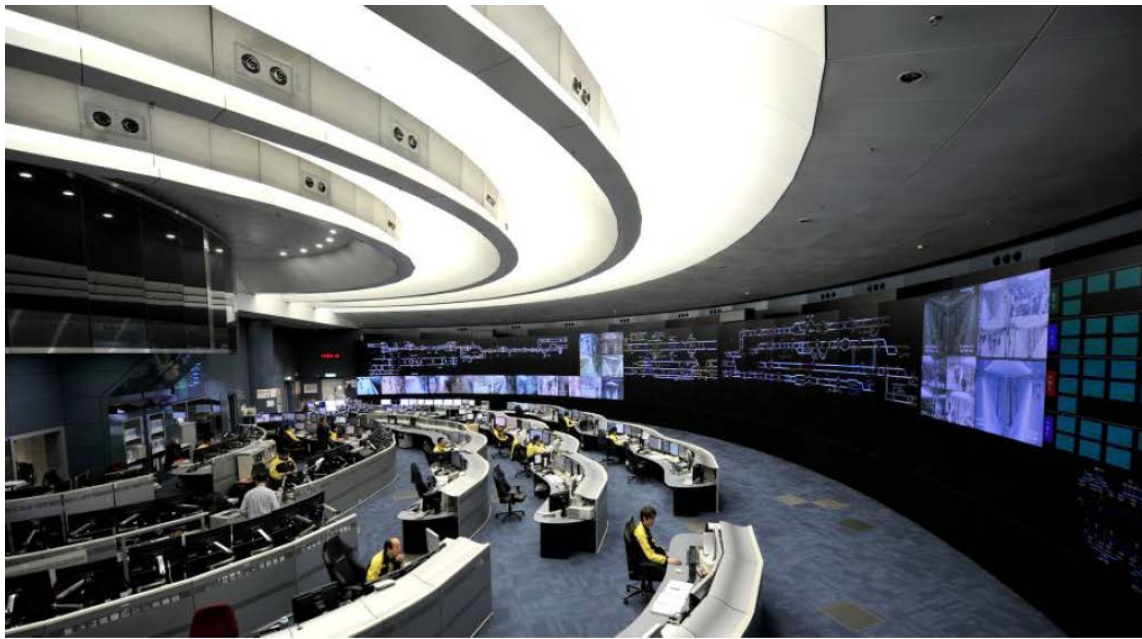
EPD: Info Retrieval System (2010)

- ▶ Legislative Council's Finance Committee
 - ▶ Public Works Subcommittee - Information Retrieval System (PWSC-IRS)
- ▶ Text-mining, environmental-specific search



MTR: Engineering Works (2013)

- ▶ Support all railway lines - 10 heavy rail, and 12 light rail lines
 - ▶ >2,600 weekly works; >10,000 maintenance personnel
 - ▶ >3,000 users (MTR staff and contractors)
- ▶ 2014 HKICT Award - Best Business Application (Grand Award)



Questions?