

UKCM – Product Specification

OMC perspective

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Singapore, 30 August – 1 September 2016

Overview



- About OMC
- UKC management OMC approach
- Sample outputs
- Key challenges
- Conclusions

About OMC



- Maritime, Shipping and Port Consultants
- Specialise in:
 - Dynamic Under-keel Clearance (DUKC®)
 - Channel Design and Dredging Studies
 - Full Scale Vessel Measurements
 - Environmental Analysis and Forecasting
 - Mooring Design and Vessel Motion Analysis







OMC's approach to

UKC MANAGEMENT

E-Navigation



the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth to berth navigation and related services for safety and security at sea and

protection of the marine environment



http://yachtpals.com/ais-boats-4116



http://catalog.flatworldknowledge.com/bookhub/reader/3798?e=campbell_1.0-ch04_s03



https://en.wikipedia.org/wiki/Vessel_traffic_service

http://www.namecomp.com/egdw_enc.nm

http://www.saftrol.com/index.php?lay=show&ac=article&ld=538696630

Approach



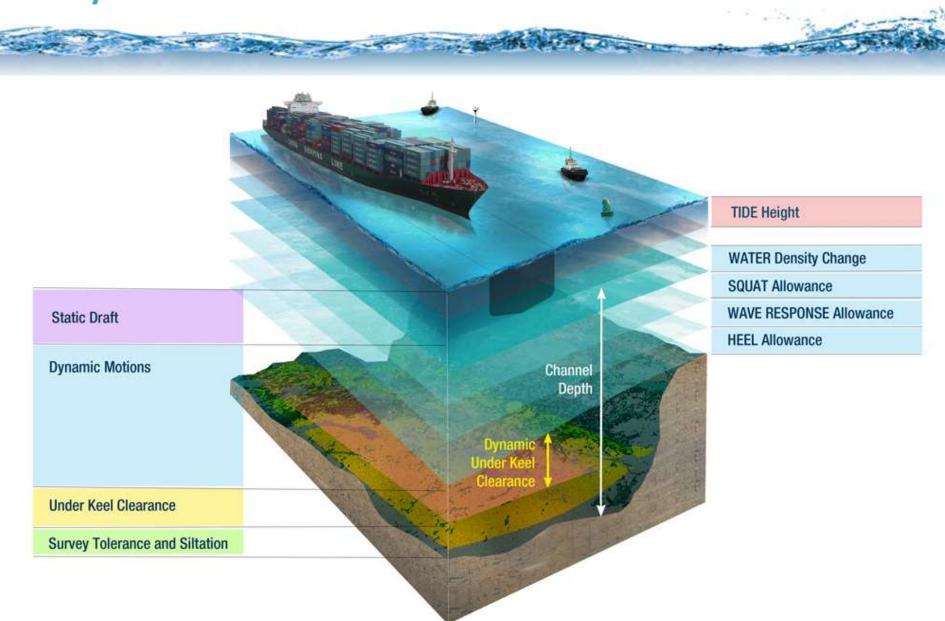
To provide a **consistent** and **scientific** approach to UKC management by integrating;

- real-time hydro/meteo data,
- high density **bathymetric** data,
- real-time AIS data, and
- advanced hydrodynamic and ship motion modelling

directly into UKC decision making.

Dynamic UKC Factors





Dispersed stakeholders













Information sharing



- Web
- Mobile
- AIS to ECS/ECDIS
- APIs (System to system)







SAMPLE OUTPUTS

Typical inputs & outputs



Inputs

- Waterway characteristics & depths
- Routing & passage information
- Vessel dimensions & drafts
- Marine weather, wave, tide & current observations & forecasts
- Traffic information
- Regulatory framework

Outputs (products)

- Detailed UKC profile
- Sailing windows
- Loading advice
- Go/no-go information
- Vessel movement optimisation
- Compliance data

Typical inputs & outputs



Inputs

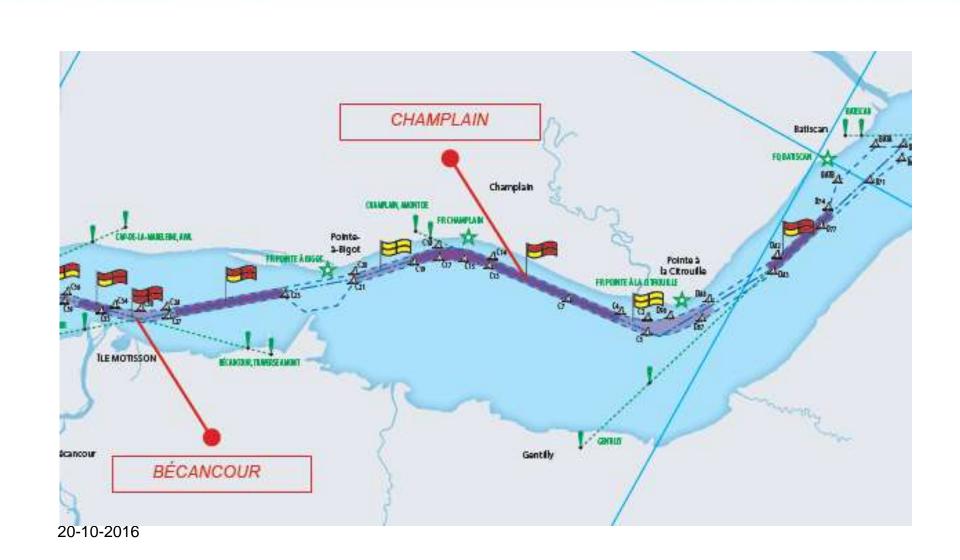
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Passing and Overtaking Areas





Load Planning







	All Windows		
Open Time	Close Time	Duration	
27May2016 0100*	02Jun2016 0100*	144 hrs 0 mins	

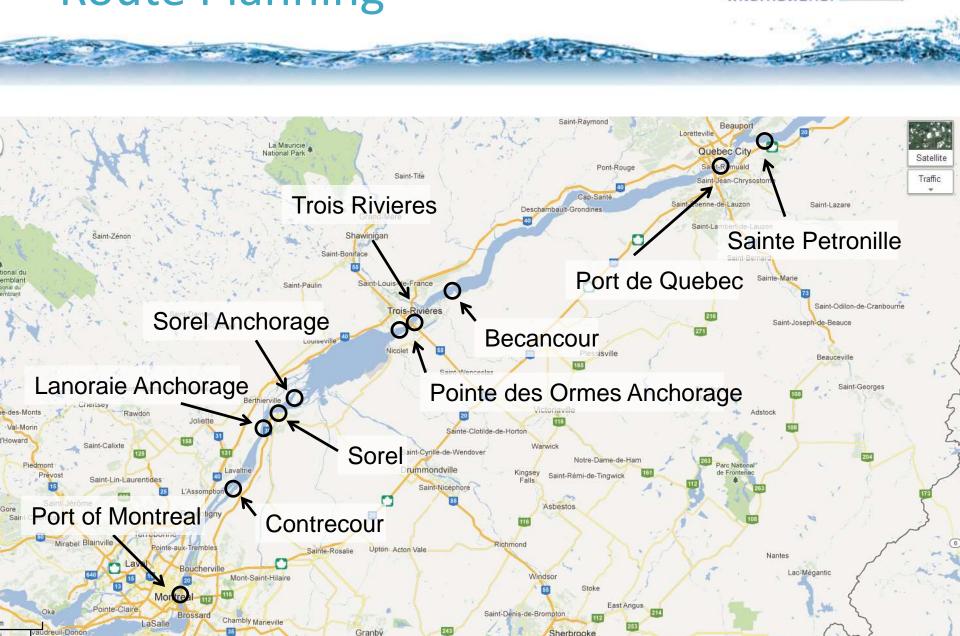
27May2016 0100* to 02Jun2016 0100*, 144 hrs 0 mins

Maximum Draft for High Waters		
Max Drafts	High Water	
27May2016 0215 12 00m	27May2016 1039 5.07m	
27May2016.1515.11.99m	27May2016 2324 4.48m	
28May2016 0315 11 98m	28May2016 1130 4.91m	

30May2016 0100 11.62m

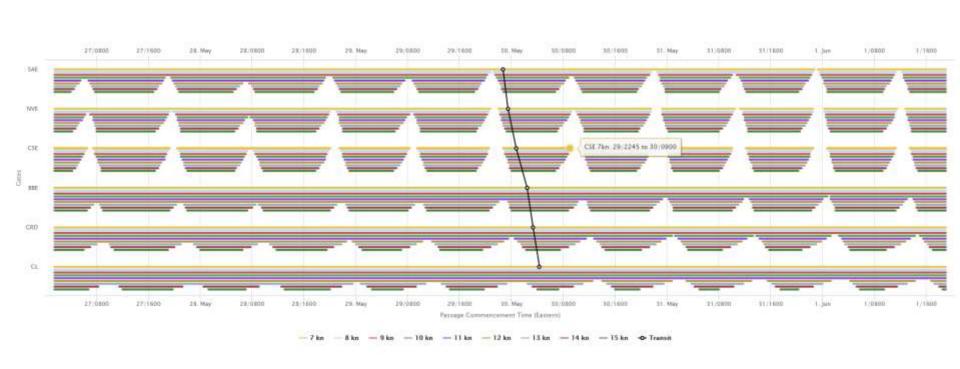
Route Planning





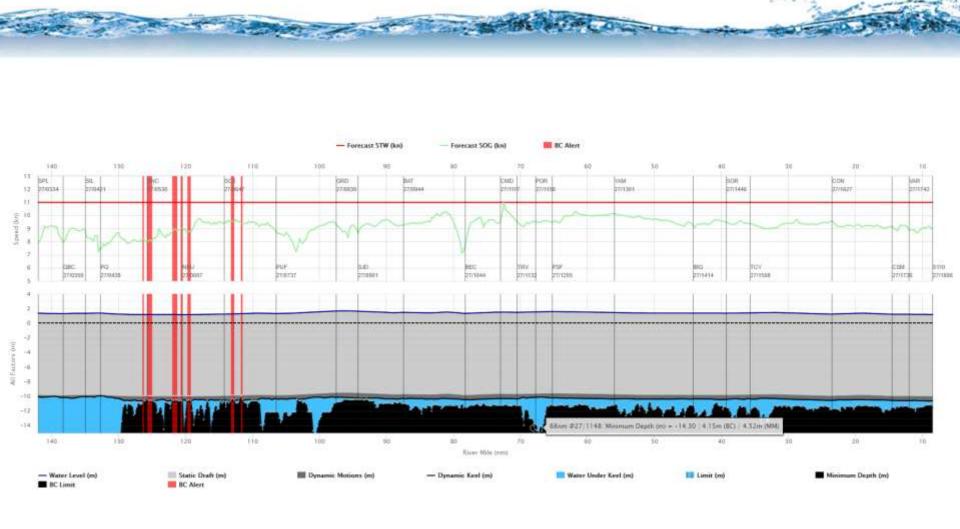
Passage Gates





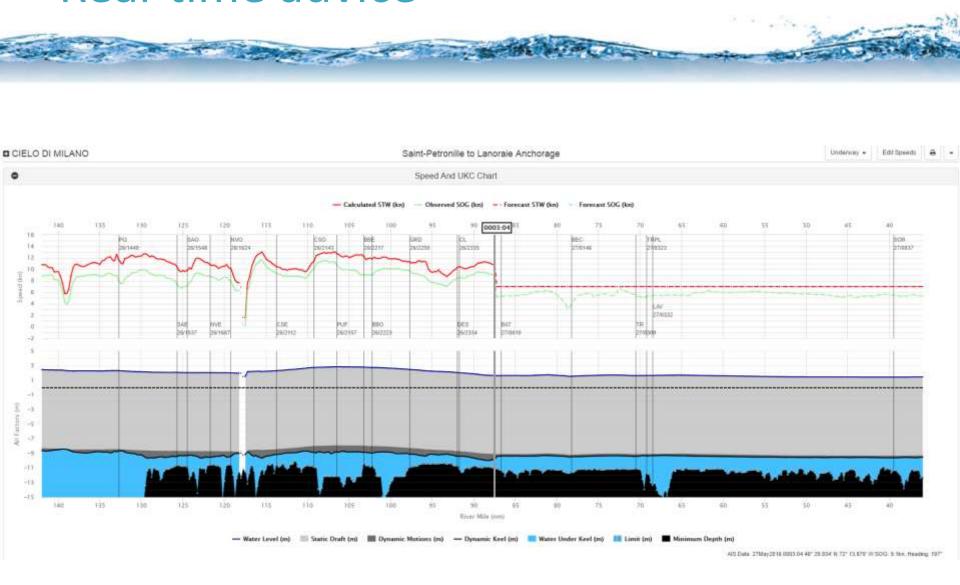
Passage Planning





Real-time advice





Predictive UKC on PPU





Now + 5 mins Draft: 12.0 m

Planned Speed: 11.0 kn Predicted Squat: 1.6 m Predicted Water Level: 1.5 m

Depth: 11.0 m

Predicted UKC: -1.1 m

Now + 15 mins Draft: 12.0 m

Planned Speed: 10.5 kn Predicted Squat: 1.3 m Predicted Water Level: 1.6 m

Depth: 12.6 m

Predicted UKC: 0.9 m

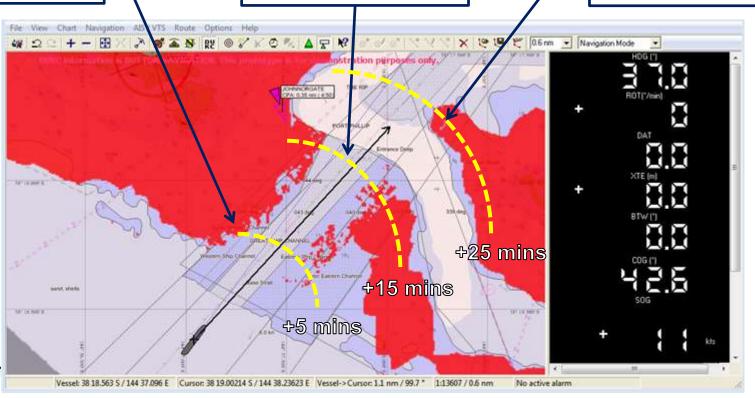
Now + 25 mins Draft: 12.0 m

Planned Speed: 10.0 kn Predicted Squat: 1.1 m

Predicted Water Level: 1.7 m

Depth: 11.5 m

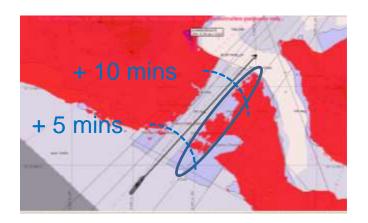
Predicted UKC: 0.1 m



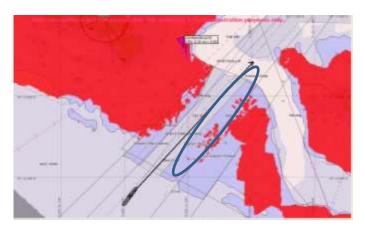
Predictive UKC on PPU







Strong wave conditions



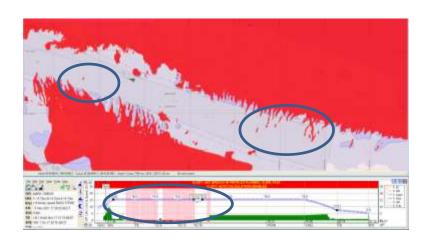
Calm conditions

Predictive UKC on PPU

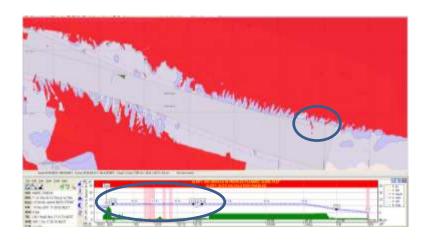




Speed control



16 knots



12 knots

UKC via AIS



Message type 12

- Addressed safety related message
- Priority 2 (1=highest)
- Sample content:

TIDAL WINDOWS @ 30/0850

OFB: 30/0900 - 30/1000

BR: 30/1305 - 30/151

Message type 6

- Binary addressed message
- Priority 4 (4 =lowest)
- Tidal windows for 2 upcoming critical UKC areas
- Sample extract:

Position1 longitude: 100.9378

Position1_latitude: 2.8146

Position1 from hour utc: 9

Position1_from_minute_utc: 0

Position1_to_hour_utc: 10

Position1 to minute utc: 0

Prototype PPU display

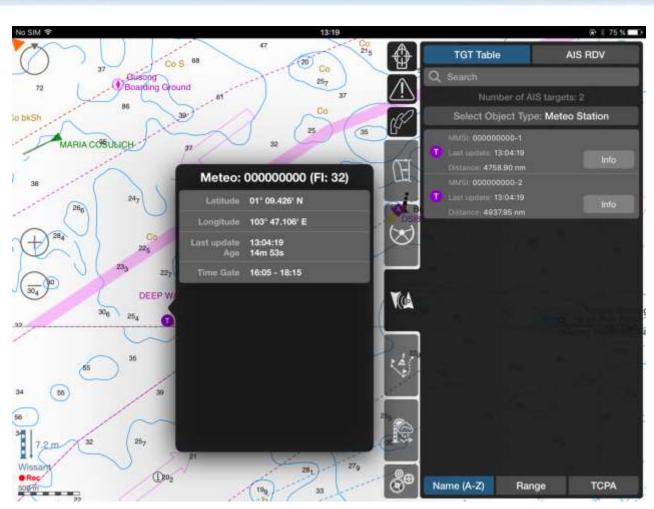




Transas Pilot Pro - courtesy of Transas

Prototype PPU display



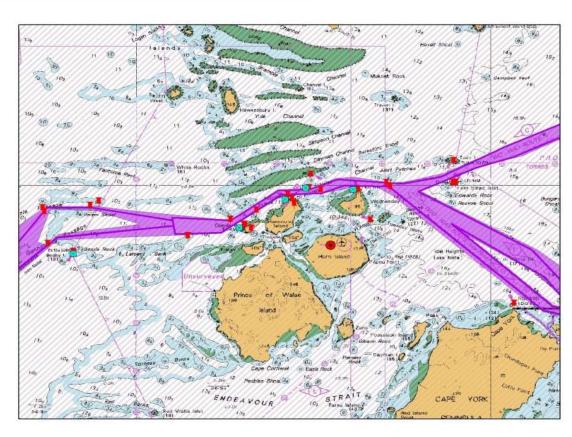


Transas Pilot Pro - courtesy of Transas

Example Application



- Torres Strait,
 Australia
- PSSA
- Complex tide and current regime
- Coordinated implementation
- 24 hour operation



Source: AMSA





CHALLENGES

Key challenges



- 1. Overcoming ship/shore comm links limitations
- 2. Promulgation of dynamic information / updates (e.g. new bathy, UKC models, new sensors, change in rules, etc).
- 3. Maintaining a clear audit trail
- 4. Matching local rules & regulations

Ship/shore communication



Possibilities:

- AIS
- 3G/4G (where available)
- Satellite
- Future: VDES

• Limitations:

- Intermittent availability
- Low bandwidth
- Available/mandated shipboard equipment

Example: AIS communication



- Transmission of UKC information via AIS
- Application Specific Messages
- Advantages
 - Infrastructure already exists
 - No to minimal equipment upgrades onboard
 - Large coverage
 - No reliance on terrestrial (mobile) or satellite data links
- Disadvantages
 - Low bandwidth
 - Congestion
 - AIS information can't always be trusted
- Stopgap measure

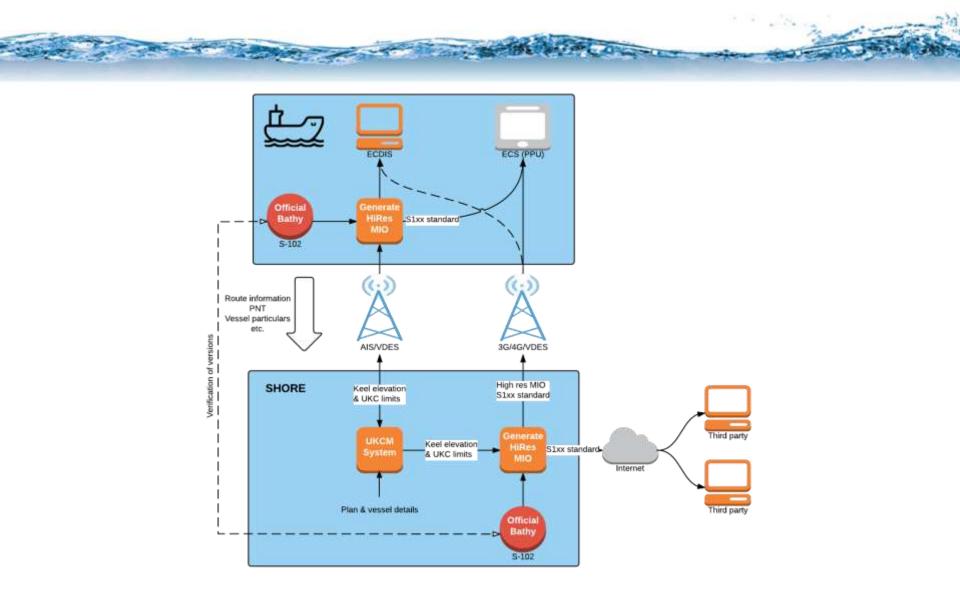
Source of UKC information



- Where is UKC info generated?
- ECDIS? PPU? Shore? All?
- Determines:
 - Required information & data flows
- How to deal with conflicting advice?
 - Need to maintaining consistency amongst UKCMS providers, their models & generated advice.

Generation & transmission of UKC overlay





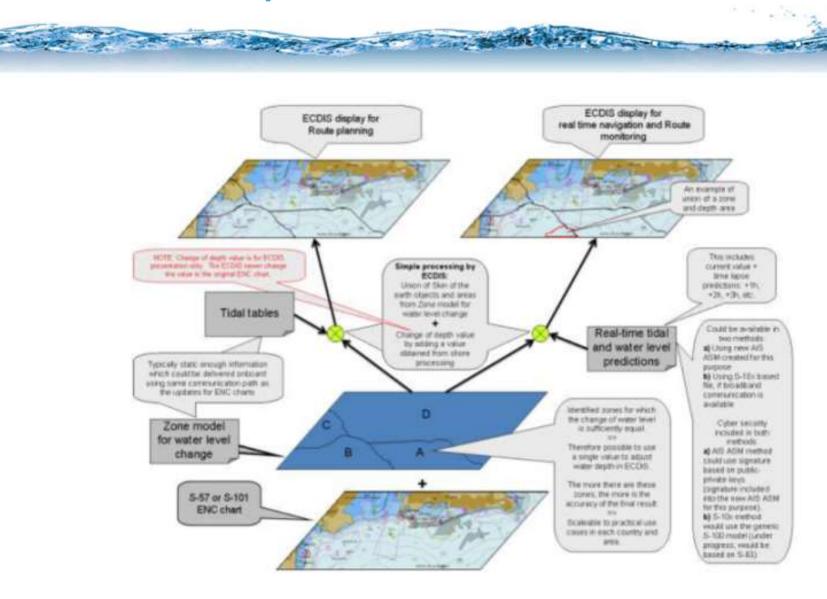
Other challenges



- Maintaining links with other S-10x projects.
- Common portrayal of UKC advice.
- Storage of UKC advice. Where this will be stored? And how will advice be audited?
- Dealing with uncertainties. How accurate is the advice provided?
- Liability! Who is liable if something goes wrong?

S-104 – dynamic tides





Other challenges

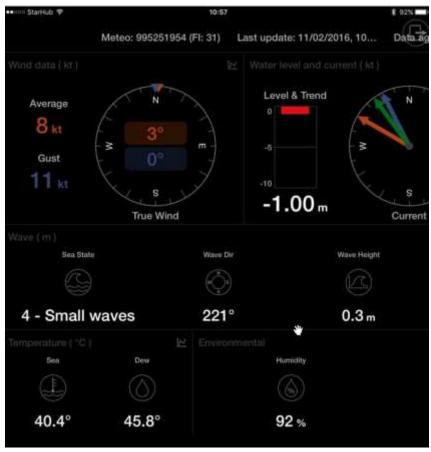


- Maintaining links with other S-10x projects.
- Common portrayal of UKC advice.

Visual vs textual display









Other challenges



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Conclusions



- UKC information can be complex
- UKC management requires a multitude of inputs
- UKC information is dynamic
- There are many geographically dispersed stakeholders
- Regulations vary geographically
- Existing communication links have limited bandwidth
- Other S-10x / standards initiatives are of interest