HSSC
DQWG Update

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Outline

- Data Quality Working Group study into the Mariners' perception of data quality representation

- A specification for developing new methods of representing data quality

- S-101 Chapter 6 and Data Quality UML model

- Draft Data Quality Indicator Architecture

- USM Research proposal

DQWG Study into the Mariners' Current Perception of Data Quality

Aims of the study:

- Gain an informed understanding of how the professional mariner uses data quality information

- Understand what can be done to improve current methods

- Identify preferences for data quality representation and develop a specification for new methods

DQWG Study into the Mariners' Current Perception of Data Quality

Questionnaire Sections:

1. Demographic information

2. Existing methods of representing data quality

3. Wider data quality issues

4. Future methods of representing data quality

- **Mixed methods approach**

- **In total 60 multi part questions**

- **Analysis is based upon 574 responses**

Results – Demographic Information

Number of Years Experience

65
12%

78
14%

357
63%

64
11%

Legend:
- 0 - 5
- 5 - 10
- 10 - 15
- 15+
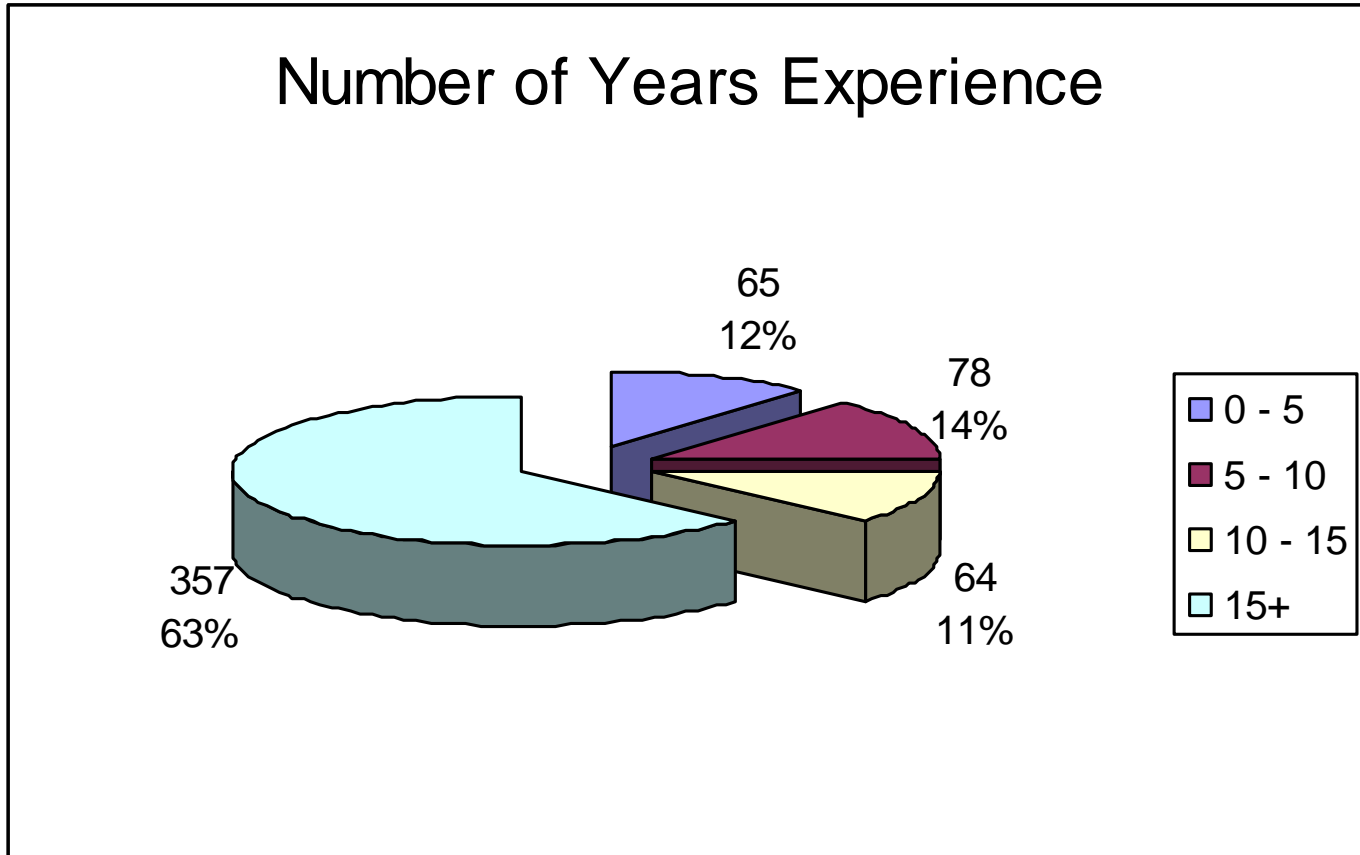
74% of respondents have over 10 years experience

Results – Demographic Information

Summary of Survey Population

- Vast majority (74%) of respondents have over 10 years navigation experience
- Very good range of shipping sectors represented
- 499 respondents use paper charts whilst 323 of them use ENCs as well. 39 respondents use solely ENCs
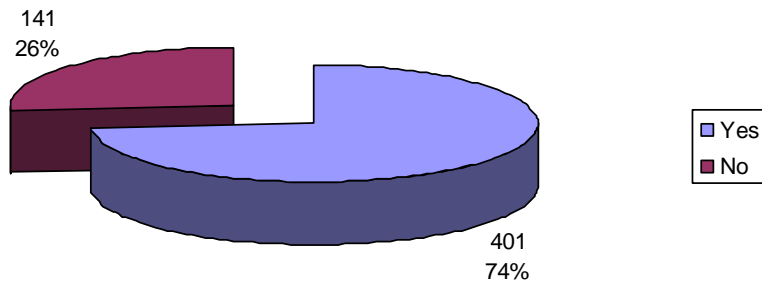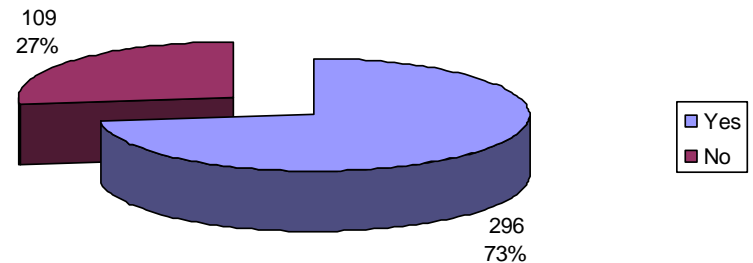
Results – Existing methods

Paper Charts

Source diagram

Do the charts you use have a source diagram?

141
26%

401
74%

- Yes
- No

Do you use the information in the source diagram?

109
27%

296
73%

- Yes
- No

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Results – Existing methods

Themes and ranks for why respondents do not use the source or reliability diagram

Theme	Rank
"I trust that the charts are correct"	1
"We are restricted by the Pilots limited area of operation and bow to their local knowledge"	2
"We rely upon experience and instruments instead"	3

Results – Existing methods

ENCs

Do you use the CATZOC display?
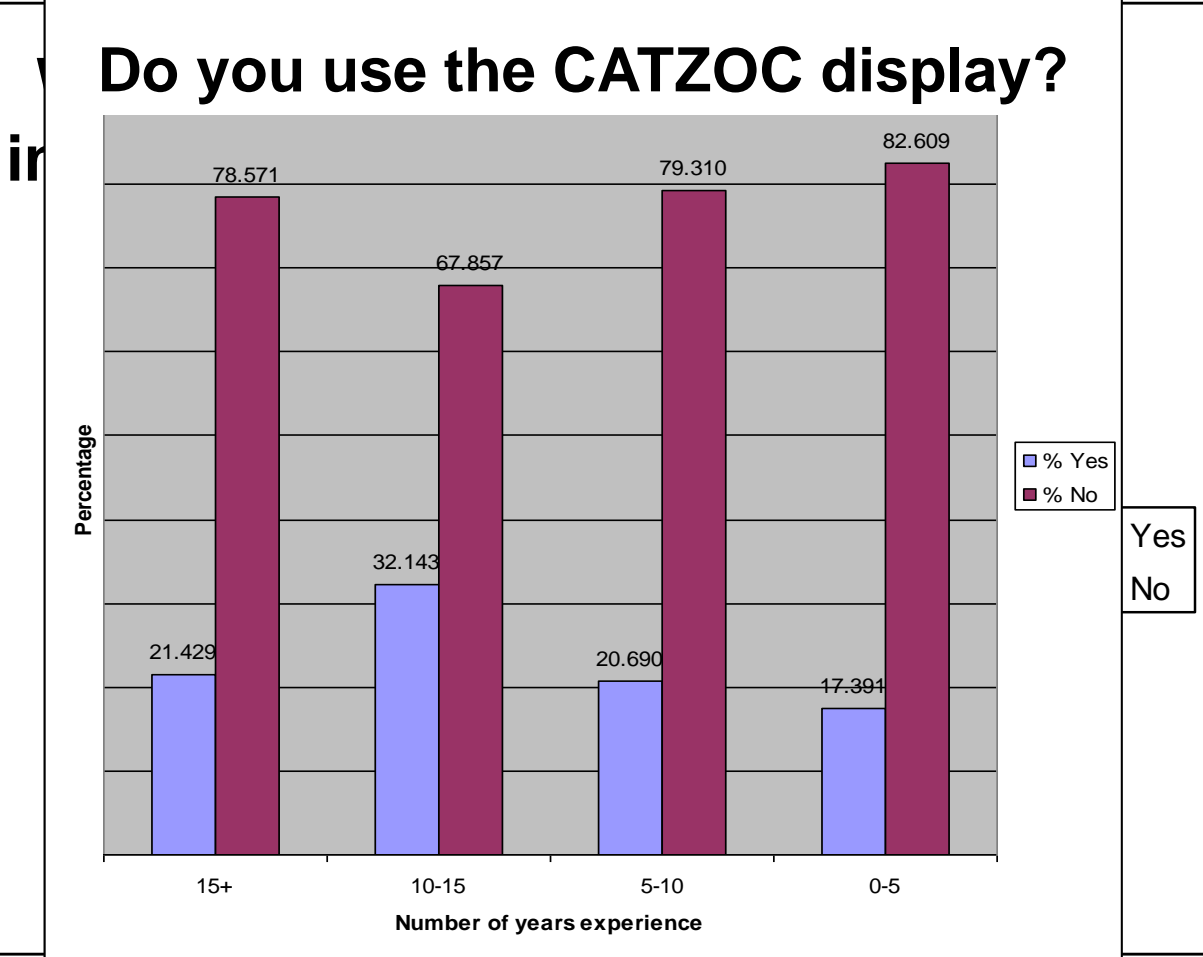
Results – Existing methods

Mariner's awareness of existing data quality indicators (paper charts)

DQI	Do you understand the meaning of…?		Of those who answered yes, how many were correct?	
	Yes (%)	No (%)	Correct (%)	Incorrect (%)
Broken depth contour symbol	56	44	73	27
Broken coastline symbol	66	34	69	31
Dotted danger line symbol	76	24	44	56
Discontinuity between surveys note	53	47	55	45
Unsurveyed note	88	12	94	6
Depths note	88	12	74	26
PA	62	38	98	2
PD	62	38	90	10
ED	62	38	82	18
SD	62	38	79	21
Rep'd (1999)	62	38	36	64
Sounding in an upright font	44	56	36	64
Discolored water note	59	41	corrupted	corrupted
Sandwave symbol	64	36	91	9
Dredged to note	98	2	98	2
Potentially dangerous wreck symbol	98	2	76	24
Bar above a dangerous wreck symbol	75	25	57	43
Works in progress legend	93	7	100	0

Results – Existing methods

Mariner's awareness of existing data quality indicators (ENCs)

DQI	Do you understand the meaning of…?		Of those who answered yes, how many were correct?	
	Yes	No	Correct	Incorrect
HORACC	24	76	57	43
POSACC	29	71	60	40
SOUACC	31	69	91	9
VERACC	22	78	78	22
SURATH	42	58	91	9
SURSTA	32	80	94	6
SUREND	21	79	94	6
TECSOU	43	57	96	4
QUASOU	31	69	78	22
QUAPOS	27	73	79	21

Sample was filtered to show answers from respondents that stated that they used ENCs and that they used them to navigate
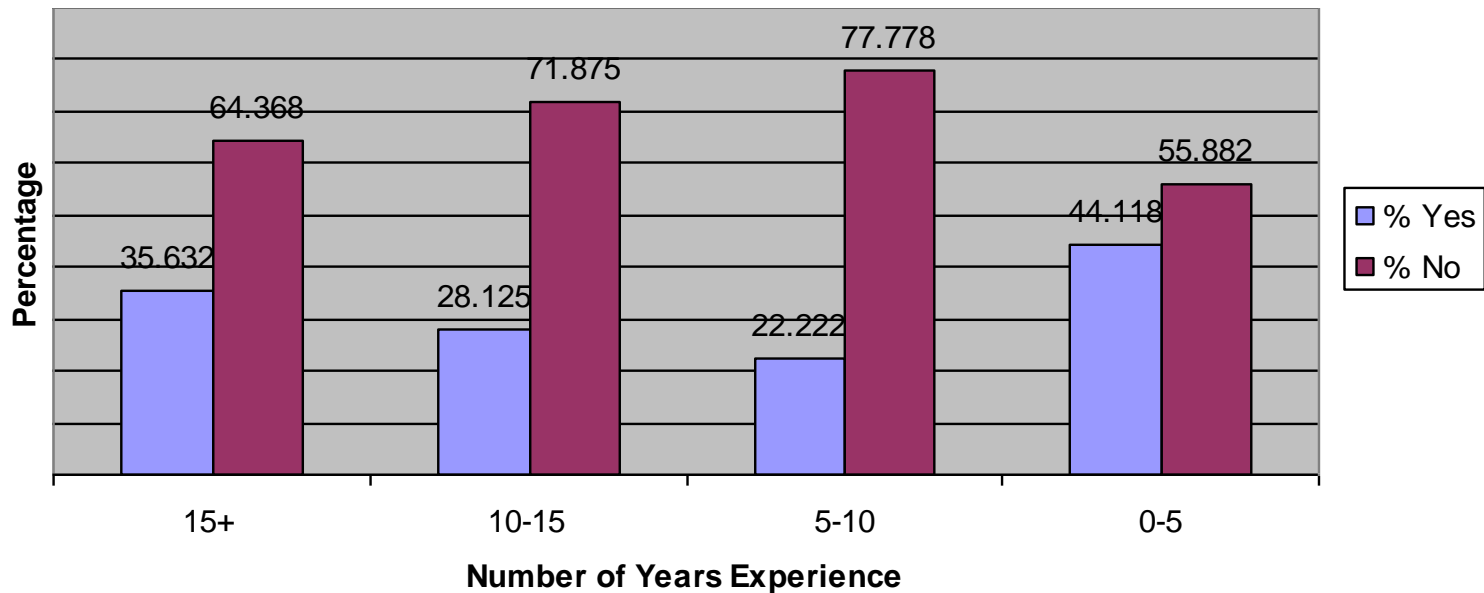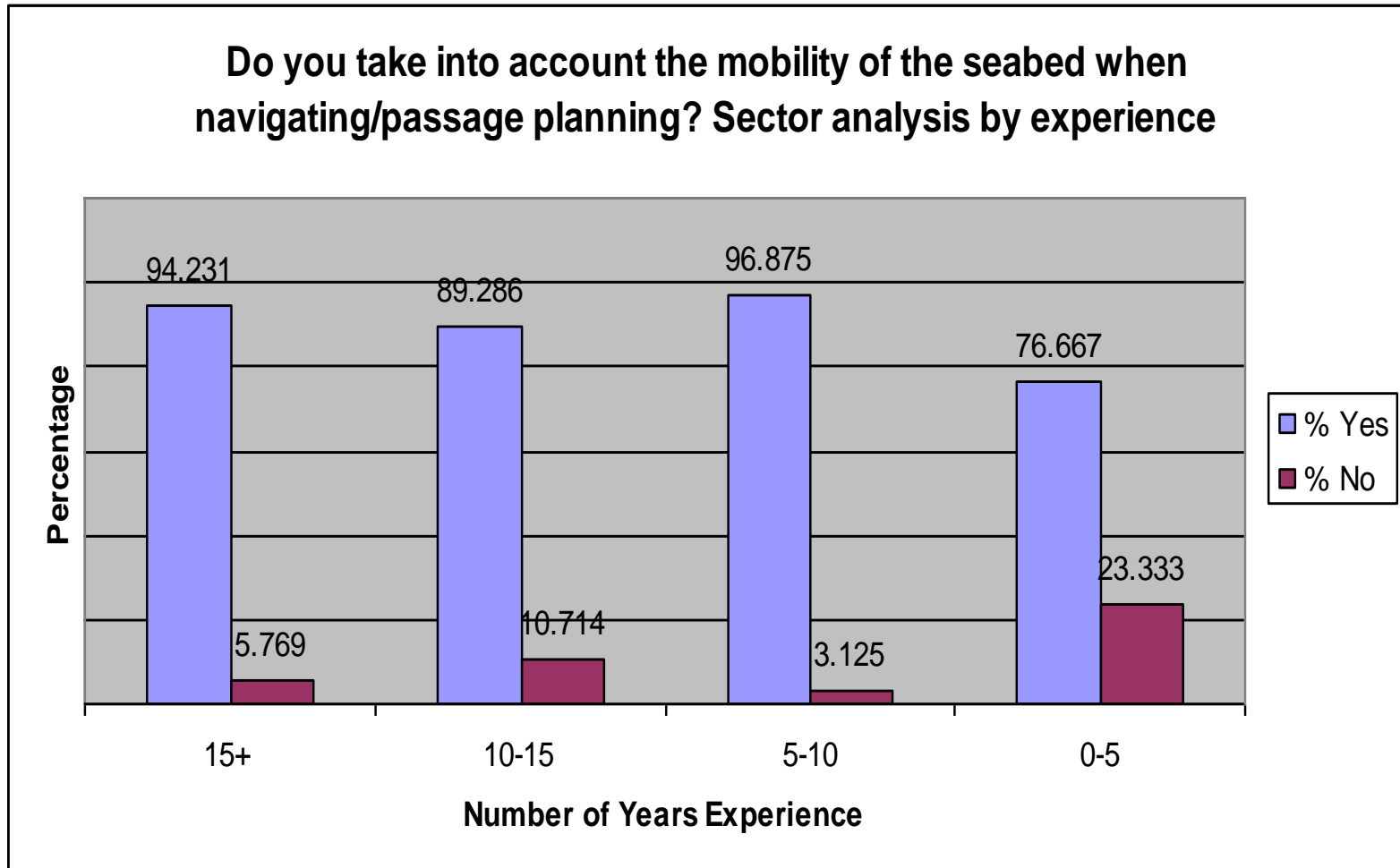
Results – Wider Data Quality Issues

Training

Do you feel you have received

Do you feel you have received enough training on data quality?

Results – Wider Data Quality Issues

Do you take into account the mobility of the seabed when navigating/passage planning? Sector analysis by experience

Results – Wider Data Quality Issues

Themes and ranks for how respondents judge the mobility of the seabed

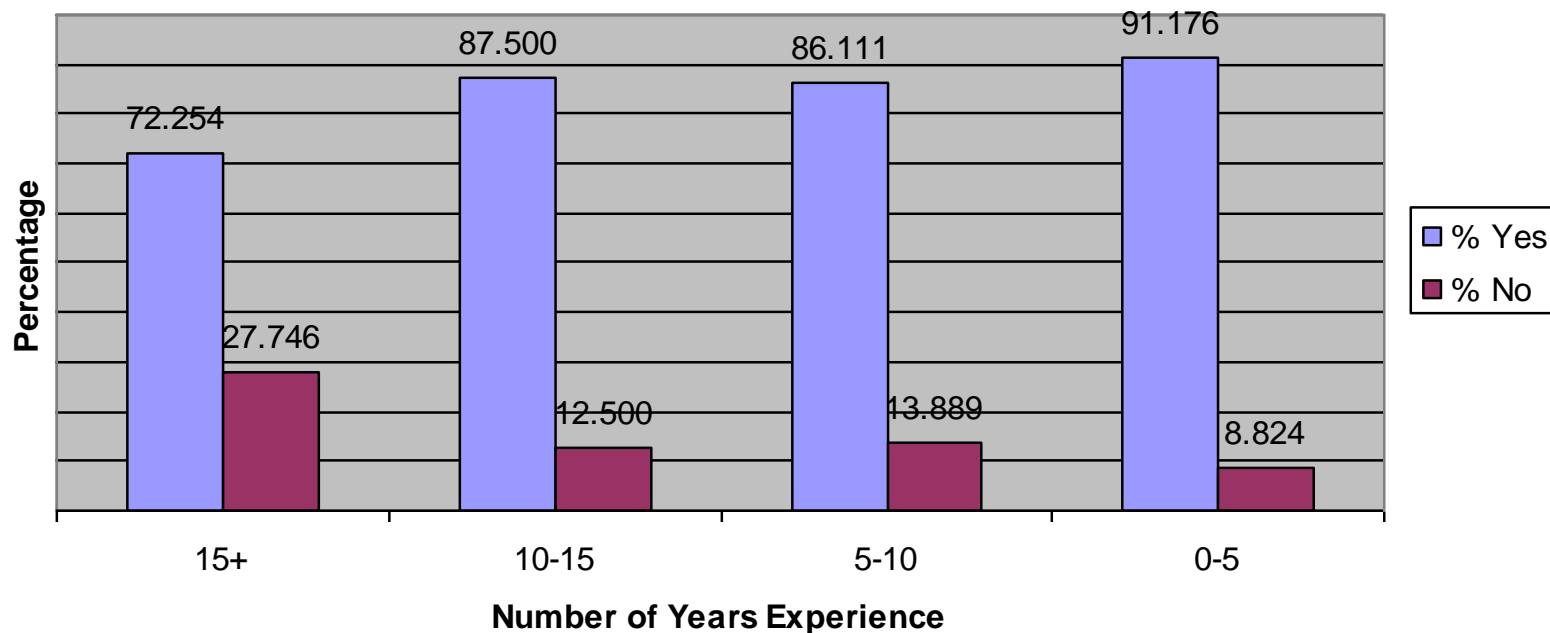| Themes	Rank
By comparing echo sounder information, date of survey and charted depth	1
Local factors and tidal strength	2
From sailing directions	2

Results – Wider Data Quality Issues

Training

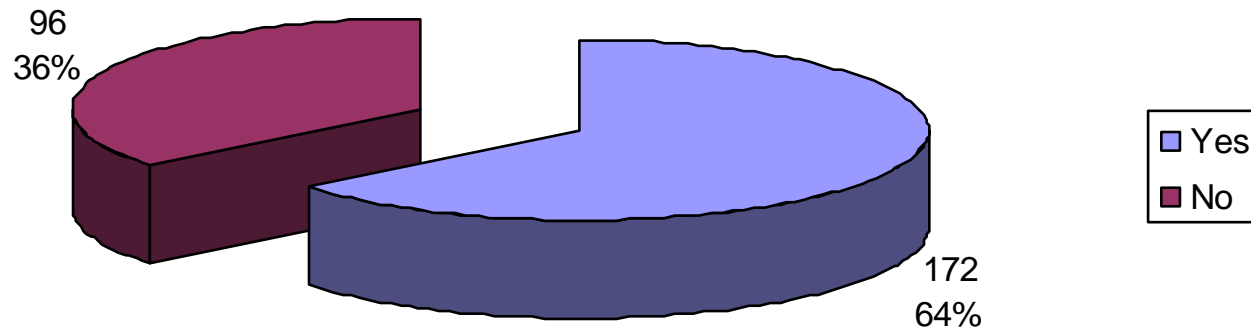**Would you like to receive further**

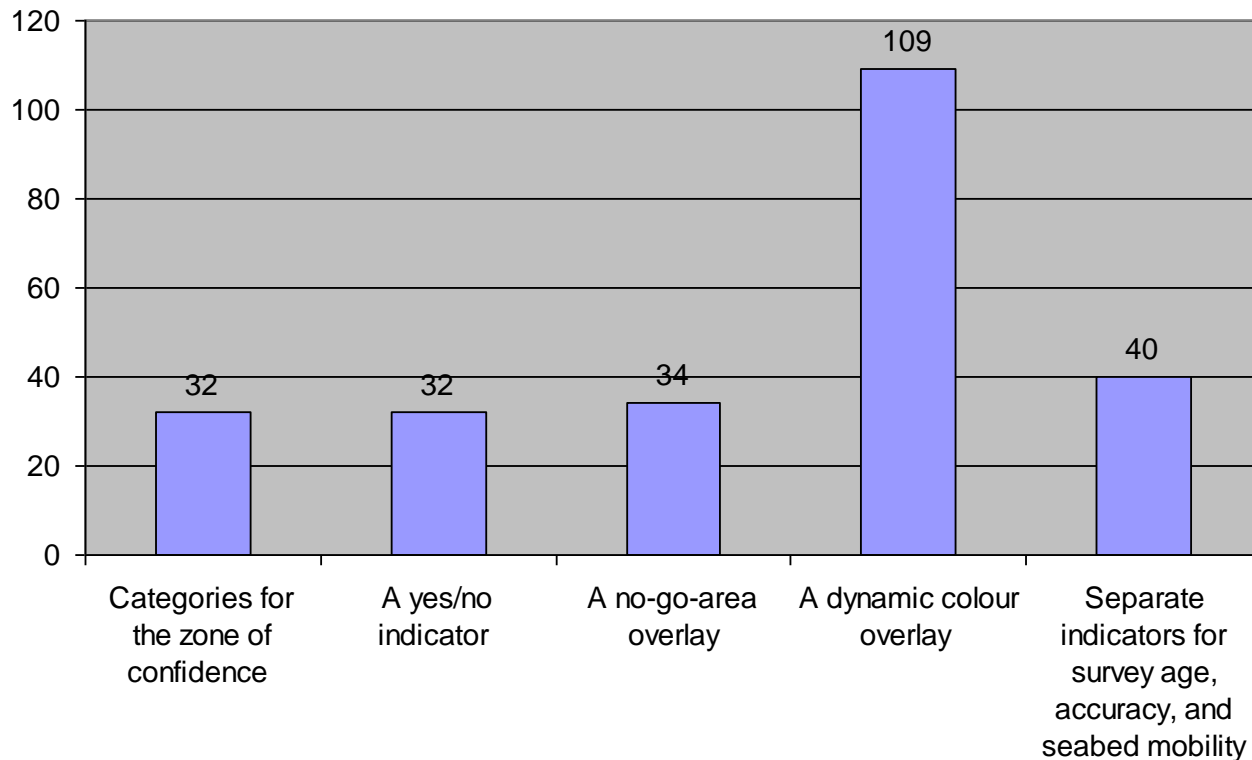**Would you like to receive further training/information on data quality?**

Results – Future Methods

Would you like any new method to take into account vessel specific parameters e.g. draught, beam, under-keel clearance?

96
36%

172
64%

Yes
No

Results – Future Methods

Which of the following concepts do you prefer?

Concept	Value
Categories for the zone of confidence	32
A yes/no indicator	32
A no-go-area overlay	34
A dynamic colour overlay	109
Separate indicators for survey age, accuracy, and seabed mobility	40

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Specification for Developing Future Methods

1. All data quality information should be discoverable

2. A minimum of the constituent elements of CATZOC should be encoded in ENCs for depth areas

3. Temporal degradation of data quality should be indicated

Specification for Developing Future Methods

4. New representation methods should be able to accommodate dynamic inputs from new developments such as dynamic tides, UKC and vessel specific parameters

5. Visualisation should take advantage of the mariner's preference for a on demand colour overlay

6. Any new representation method should be accompanied by an appropriate education strategy

S-101 Chapter 6 Data Quality
&
UML Model
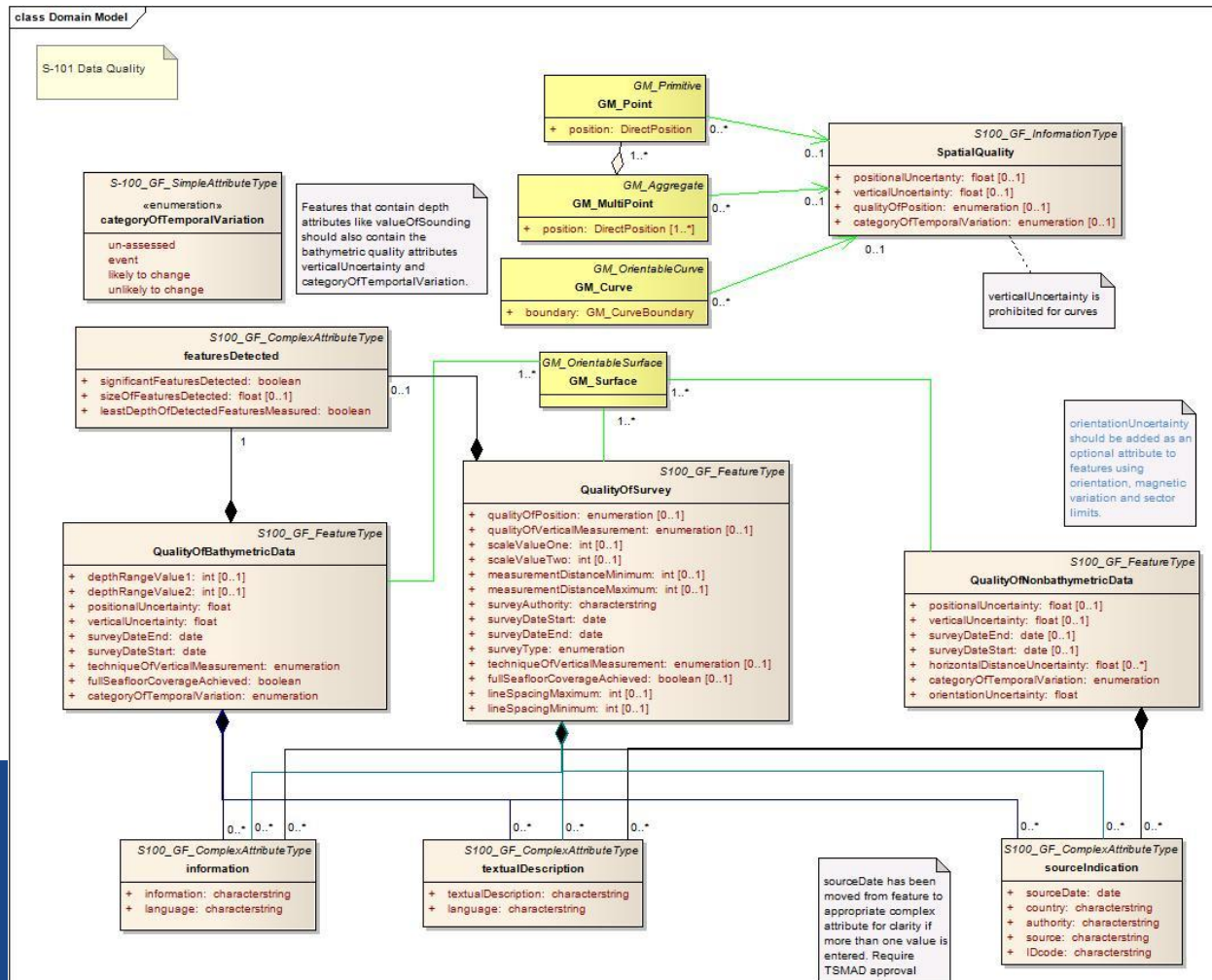
Population of S-101 Data Quality Attributes

- Automated population from S-57 data quality attributes possible for most S-101 attributes.

M_QUAL (S-57)		QualityOfBathymetricData (S-101)		Category of zone of confidence in data					
CATQUA									
CATZOC	ZOC			A1	A2	B	C	D	U
	Position Accuracy	positionalUncertainty	UncertaintyFixed	5	20	50	500	empty	empty
			UncertaintyVariable	0	0	0	0	empty	empty
	Depth Accuracy	verticalUncertainty	UncertaintyFixed	0.5	1	1	2	empty	empty
			UncertaintyVariable	1	2	2	5	empty	empty
	Typical Survey Characteristics	techniqueOfVerticalMeasurement		From TECSOU if populated otherwise empty					
		featuresDetected	significantFeaturesDetected	yes	yes	no	no	no	empty
			sizeOfFeaturesDetected	2	2	empty	empty	empty	empty
			leastDepthOfDetectedFeaturesMeasured	yes	yes	no	no	no	empty
	Seafloor Coverage	fullSeafloorCoverageAchieved		yes	yes	no	no	no	empty

Draft Data Quality Indicator Architecture

Devillers et al. (2002) – Model for representing data quality in a GIS environment
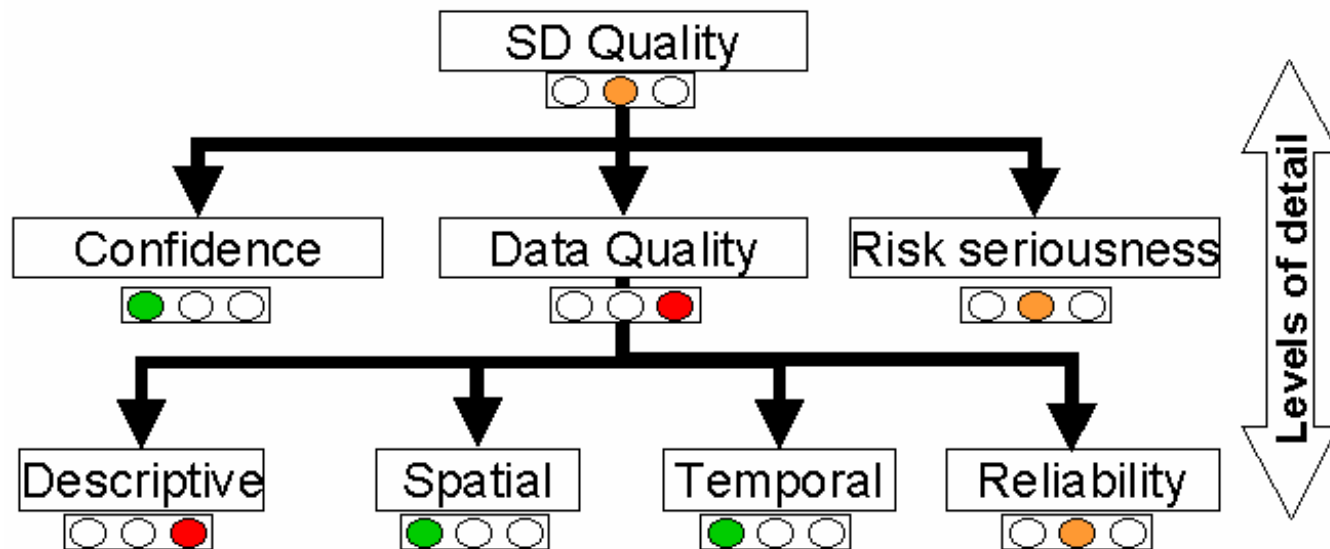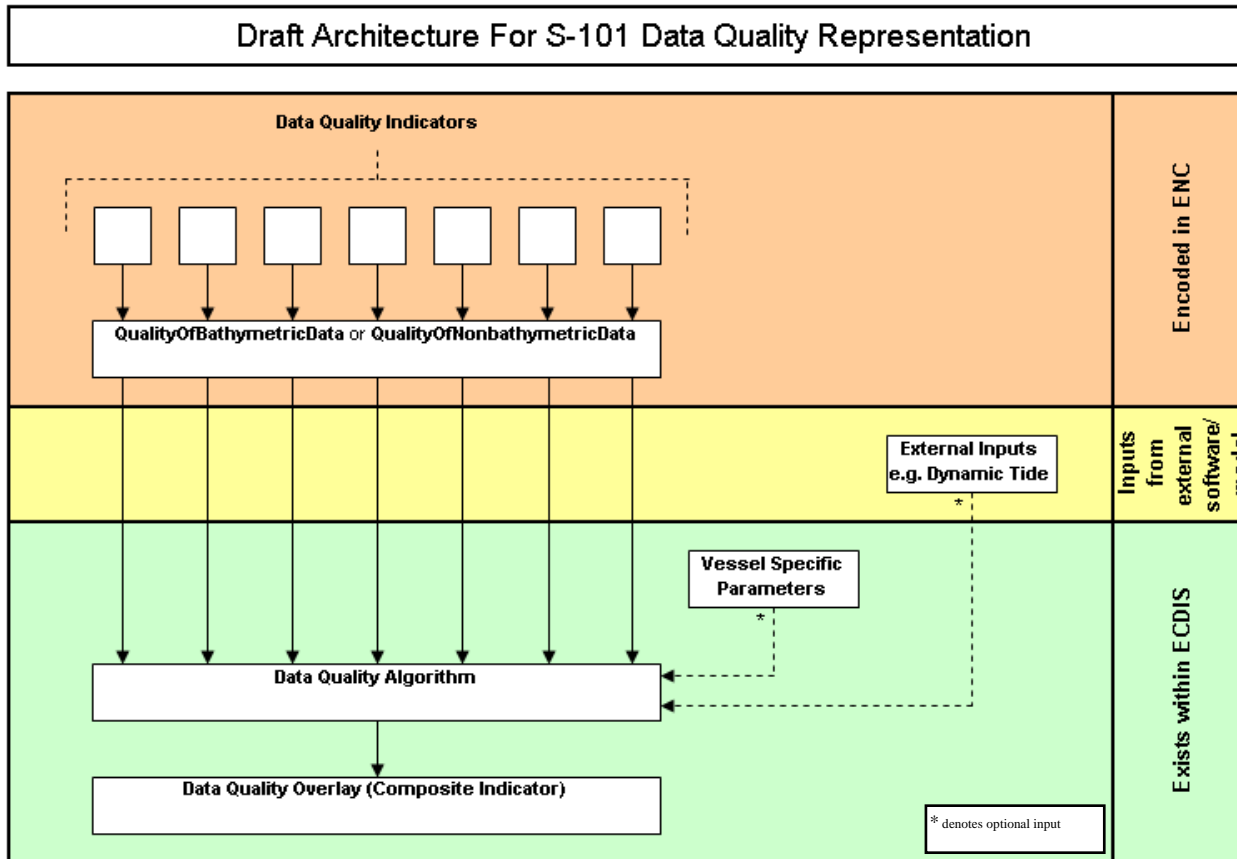
Draft Data Quality Indicator Architecture

Figure 1

USM Research Proposal

Principle objectives of the research:

• Using the DQWG's Specification, design and investigate possible methods of portraying data quality information. For example, symbology, colour overlays and safety contours

• Using the IHO Data Quality Working Group's draft S-101 UML quality model, consider how a data quality hierarchy could be utilised to aid the mining of data

• Investigate the mariners' preferences regarding the various portrayal methods, and how these methods affect the decision making of users

USM Research Proposal

Timescale of the research:

Jul 2012 to Nov 2012 – USM implements methodologies

Nov 2012 – USM provides DQWG with an update on work to date

Nov 2012 to Jul 2013 – USM completes work and prepares report for DQWG7