Faculty of Design

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A morphological analysis tool for complex future-oriented scenario researches

Mozuni, Mehdi and Jonas, Wolfgang

HOW MANY SOLUTIONS?

A Morphological Analysis Tool for Complex Future-Oriented Scenario Research

Mehdi Mozuni - Wolfgang Jonas

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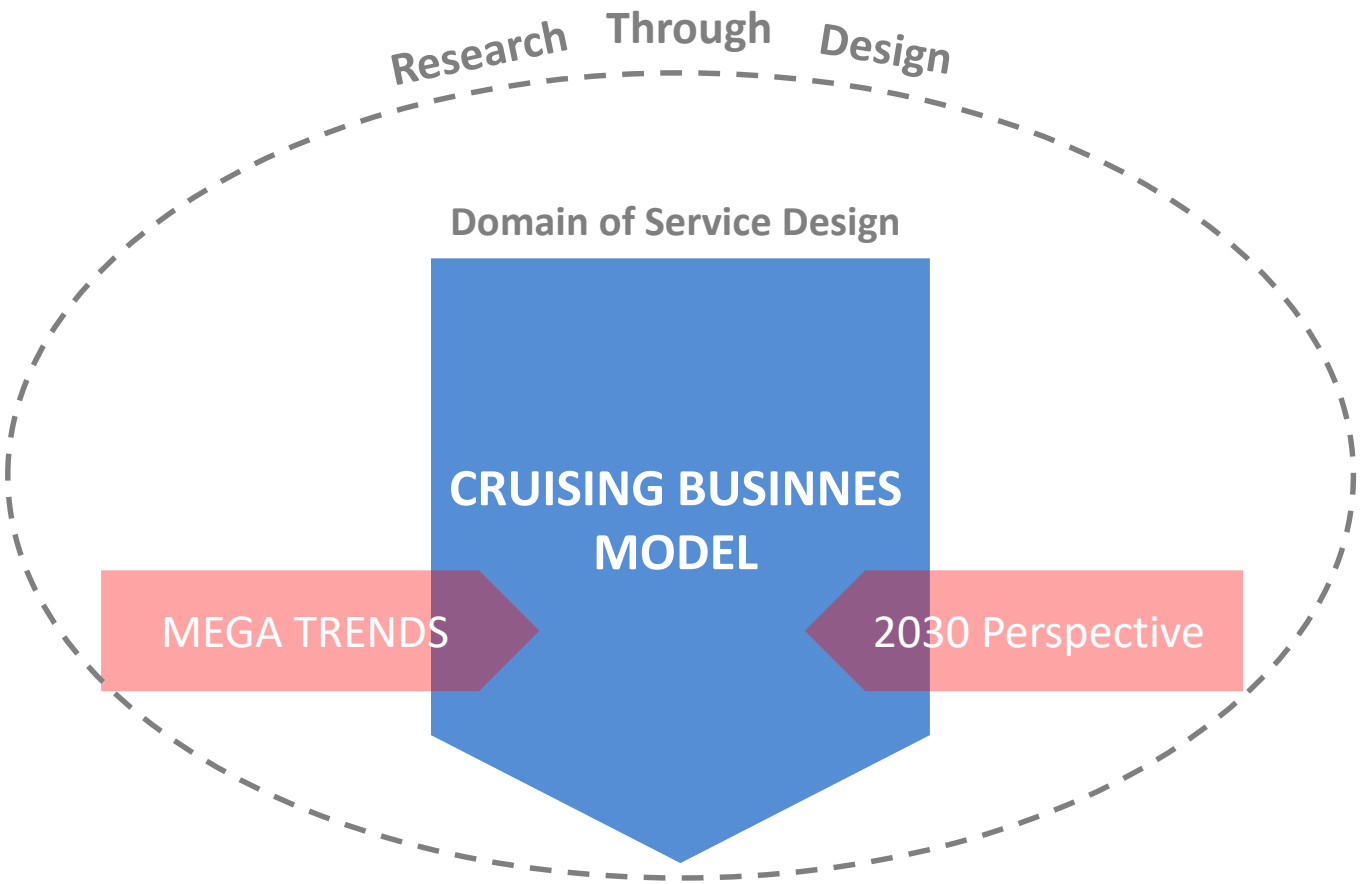
Institut für Transportation Design

Braunschweig University of Art
Hochschule für Bildende Künste Braunschweig

possible alternatives to the cruising business model in a 2030 perspective



GENERATION OF NOVEL FUTURE SERVICE CONCEPTS

PROGNOSIS

HOW IT WILL **PROBABLY** LOOK LIKE?

PROJECTION

HOW IT COULD LOOK LIKE?

CHARACTERISTICS OF OUR PROBLEM SPACE

- Multidimensionality
- non-present user/ testing platform (2030 perspective)
- Constraints are not determined (technology advances)
- Need for recalculation of design process (changing analytical base)

“The ever-changing dimensions of such research cases and their inter-relations make it very difficult to justify influence factors upon which the projection is made! “

(Tom Ritchey 2011)

What is

GENERAL MORPHOLOGICAL ANALYSIS (GMA)?

PARAMETERS DEFINING THE BUSINESS MODEL

A. Business expansion bias (exclusive transport services)

A1. onboard hospitality and entertainment
A2. onboard/onshore real estate investing
A3. on-shore service logistic
A4. no on-board involvement (limited to transportation)

B. Mobility performance (average vessel speed within a 2 weeks sailing)

B1. very slow or immobile (0 -5 knots)
B2. slower (12 ± 2 knots)
B3. same speed (20 ±2 Knots)

C. Ecologic factor emissions/energy efficiency (Passenger-day)

C1. Status-quo(worse than on-shores)169-340kg
C2. equal with on-shore
C3. very energy efficient(better ecologic factor than on-shore

D. Average capacity (capacity of crews and passengers per ship)

D1. highly decrease (CPS≤150)
D2. no change(CPS ~ 2000)
D3. highly increase(15000≤ CPS)

E. Vessel ownership (CL Pre-investment share for 1000 Passenger)

E1. CL entirely(m$150-250/1000p)
E2. CL only operation(m$5≤/1000p)
E3. CL partially Owner(m$ 5-150/1000p)

rows	Column A	Column B	Column C	Column D	Column E	Column F	Column G	ColumnH	Column I	Column J
	Business Model Biasing	**Ship Attributes**				**Megatrends**				
		Mobility performance	Ecologic Factors	average capacity	CL investment share	emerge of cheap renewable energy	dominant one-person families	fall of work/ leisure separation	high level eco-tourism trend	fall of middle class in Europe (shift to wealthy china)
1	Onboard Hospitality and Entertainment (**OHE**) (status quo)	predominantly immobile	Minus (status quo)	CPS≤150	m$150-250/1000p (status quo)	occurs	occurs	occurs	occurs	occurs
2	Condominium/ Residential Model **(CM)**	avg 15 ± 2 knots	Neutral	CPS ~ 3000 (status quo)	m$5≤/1000p	doesn't occur	doesn't occur	doesn't occur	doesn't occur	doesn't occur
3	Shore to Shore Floating Services **(SSFS**)	avg 20 ±2 Knots (status quo)	Plus	15000≤ CPS	m$ 5-150/1000p					
4	Limited Onboard Involvement **(LOI)**	avg ≥ 35 knots								

Carma CCA Viewer - [beb-total-11.scn]

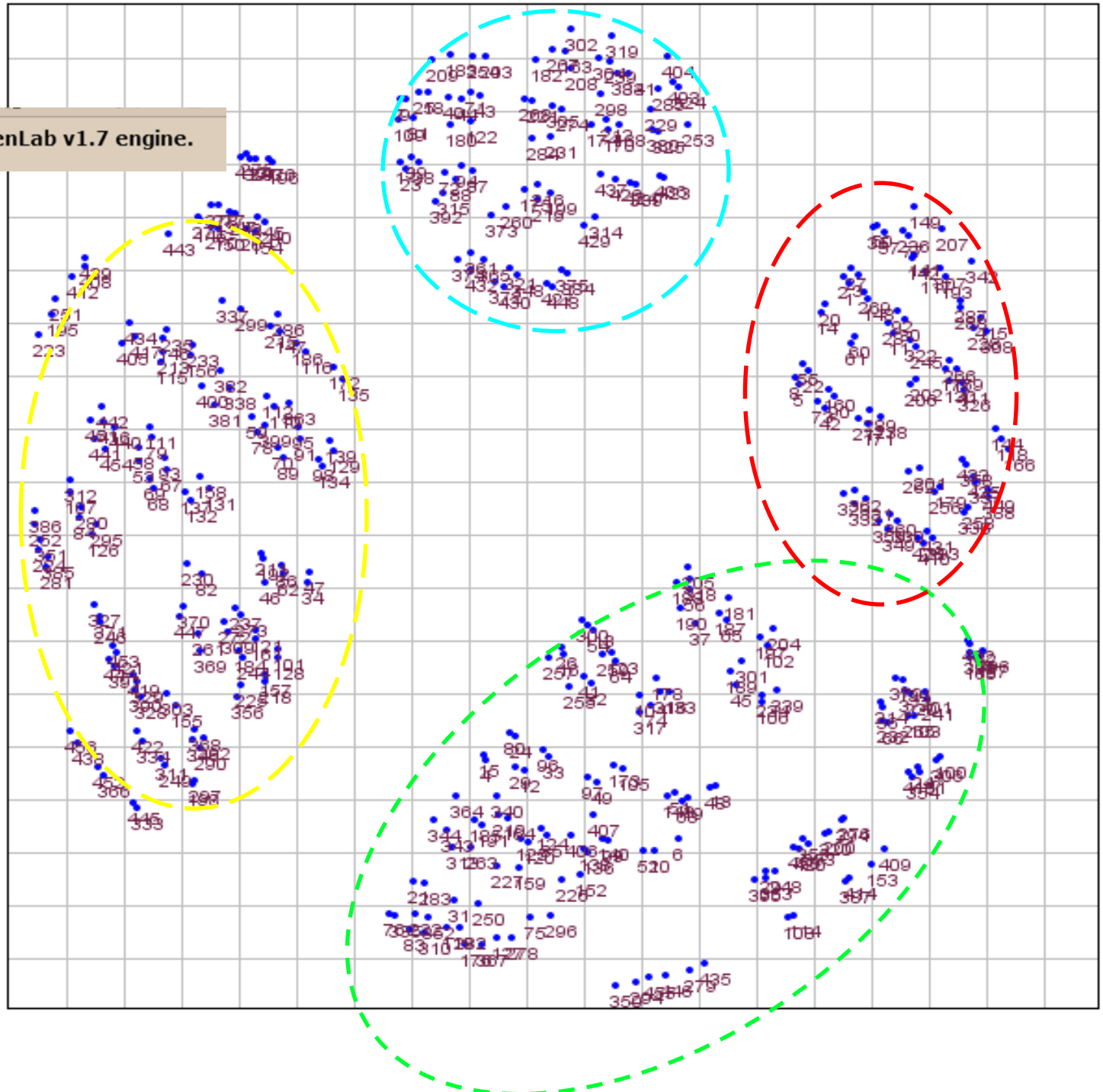
File Edit View Grid Options Window Help

Cross Consistency Analysis(CCA)- Carma engine

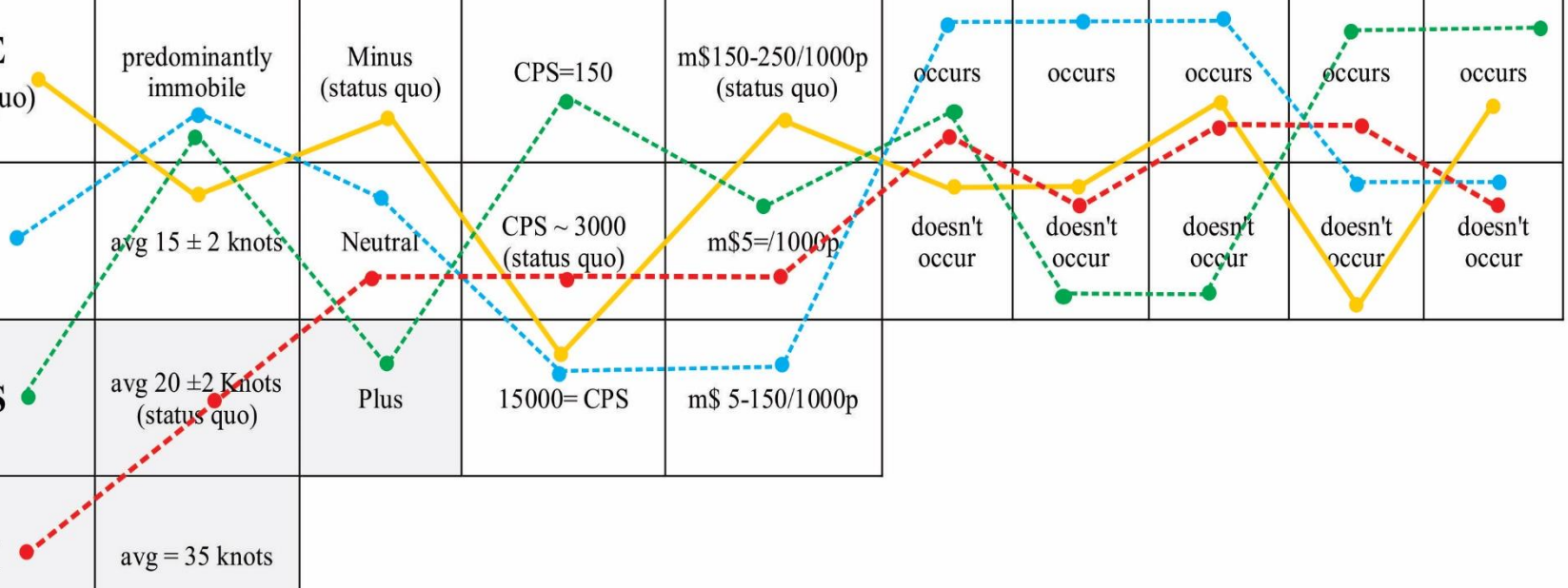
		Business expansion bias (exclusive transport services)				Mobility performance (vessel speed within a 2 weeks sailing)			ecologic factor emissions/energy efficiency (Passenger-day)			average capacity(capacity of crews and passengers per ship)			vessel ownership (CL Pre-investment share for 1000 Passenger)			emerge of cheap renewable energy		dominant one-person families		fall of work/ leisure seperation		high level eco-tourism trend	
		ard hospitality and entertainment	ard/onshore real estate investing	on-shore service logistic	vement(limited to transportation)	nantly immobile (avg 0 -5 knots)	slower (avg: 12 ± 2 knots)	status quo (avg: 20 ±2 Knots)	orse than on-shores)169-340kg	equal with on-shore	er ecologic factor than on-shore	highly decrease (CPS?150)	no change(CPS ~ 2000)	highly increase(15000? CPS)	CL entirely(m$150-250/1000p)	CL only operation(m$5?/1000p)	partially Owner(m$ 5-150/1000p)	happens	doesn't happen	happens	doesn't happen	happens	doesn't happen	happens	doesn't happen
Mobility performance (vessel speed within a 2 weeks sailing)	predominantly immobile (avg 0 -5 knots)	-	-	-	X																				
	slower (avg: 12 ± 2 knots)	-	K	K	-																				
	status quo (avg: 20 ±2 Knots)	K	-	X	-																				
ecologic factor emissions/energy efficiency (Passenger-day)	Status-quo(worse than on-shores)169-340kg	-	k	x	x	X	K	-																	
	equal with on-shore	k	-	x	-	-	-	X																	
	very energy efficient(better ecologic factor than on-shore	x	-	k	k	K	K	X																	
average capacity(capacity of crews and passengers per ship)	highly decrease (CPS?150)	x	x	-	K	X	-	-	K	X	X														
	no change(CPS ~ 2000)	-	-	-	K	K	-	-	-	K	K														
	highly increase(15000? CPS)	-	-	x	-	-	K	X	K	-	-														
vessel ownership (CL Pre-investment share for 1000 Passenger)	CL entirely(m$150-250/1000p)	-	x	k	X	K	-	-	-	K	K	-	-	K											
	CL only operation(m$5?/1000p)	x	-	-	-	-	-	-	X	K	-	K	K	-											
	CL partially Owner(m$ 5-150/1000p)	-	-	-	X	-	-	X	K	-	K	X	K	-											
emerge of cheap renewable energy	happens	-	-	-	-	-	-	X	X	-	-	-	K	-	-	-	K								
	doesn't happen	k	k	k	K	K	K	K	K	K	K	K	K	K	K	K	K								
dominant one-person families	happens	k	-	-	-	K	K	K	-	K	X	-	-	X	K	-	-	K	K						
	doesn't happen	k	k	k	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K						
fall of work/ leisure seperation	happens	k	-	-	-	-	-	K	X	-	K	K	-	-	K	-	-	-	K	-	K				
	doesn't happen	k	k	k	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	X	K				
high level eco-tourism trend	happens	x	x	k	-	-	-	X	X	-	-	-	K	X	K	-	K	-	K	K	K	-	K		
	doesn't happen	k	k	k	K	K	K	K	K	K	K	K	K	K	K	K	K	X	K	K	K	K	K		
fall of middle class in europe(shift to wealthy china)	happens	k	-	-	K	-	K	K	-	K	K	X	K	-	-	X	K	X	-	X	-	-	K	X	-
	doesn't happen	k	k	k	K	K	K	K	K	K	K	K	K	K	K	K	K	-	K	-	K	K	-	-	K

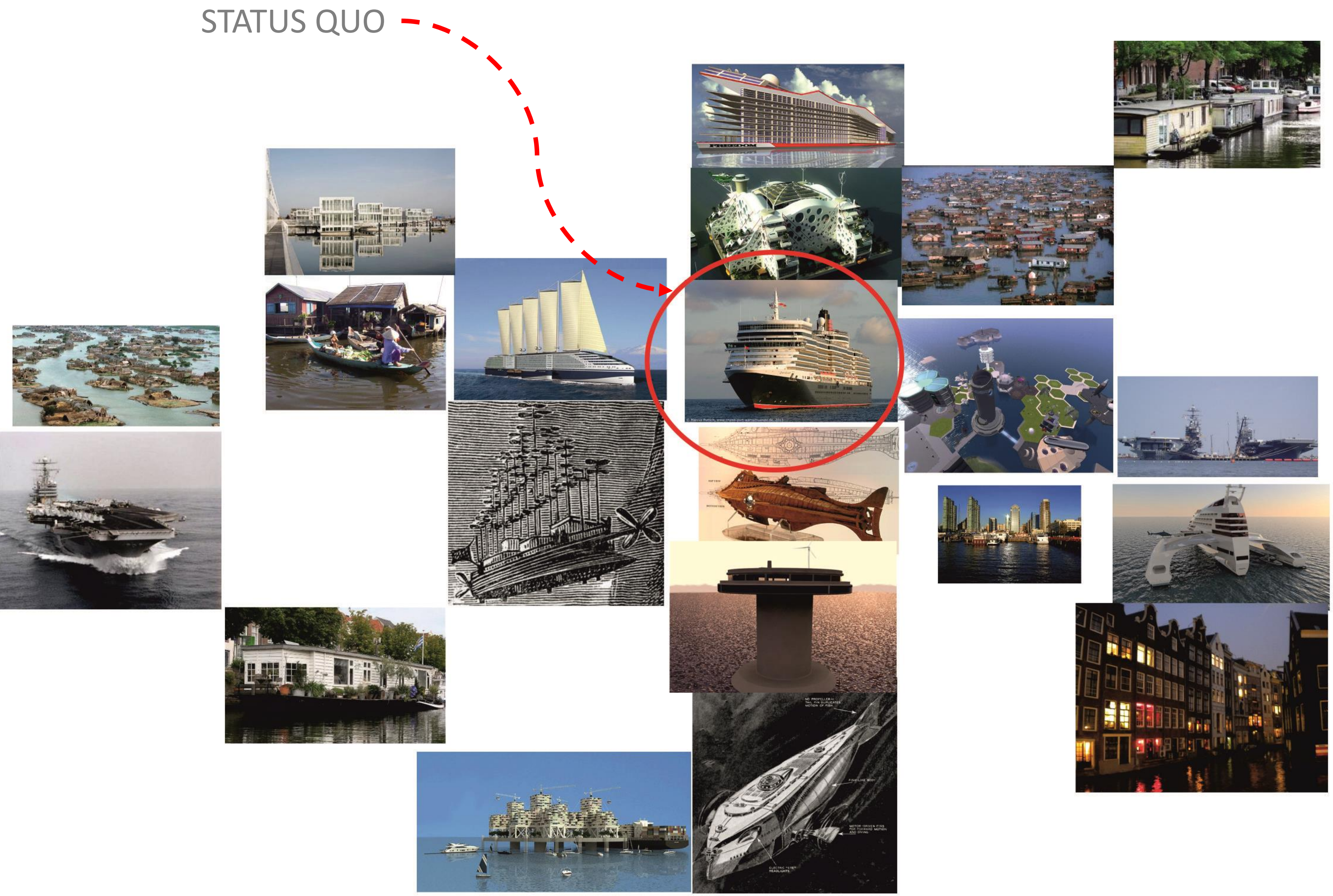
Ready

Projection Bundles found by ScenLab v1.7 engine.

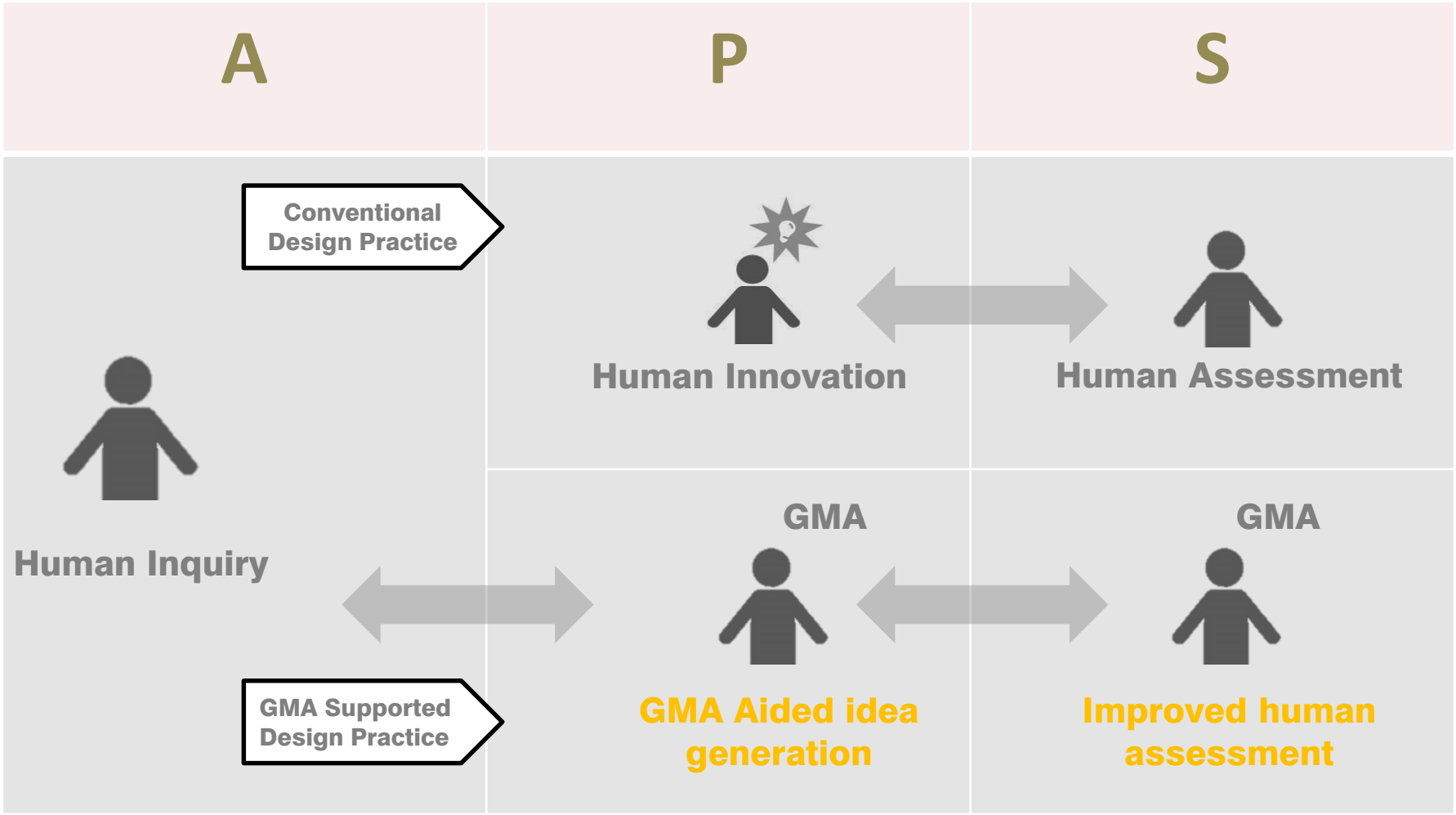


	Business Model Biasing	Ship Attributes				Megatrends				
TOVV	A	B	C	D	E	F	G	H	I	J
1	**OHE** (status quo)	predominantly immobile	Minus (status quo)	CPS=150	m$150-250/1000p (status quo)	occurs	occurs	occurs	occurs	occurs
2	**CM**	avg 15 ± 2 knots	Neutral	CPS ~ 3000 (status quo)	m$5=/1000p	doesn't occur	doesn't occur	doesn't occur	doesn't occur	doesn't occur
3	**SSFS**	avg 20 ±2 Knots (status quo)	Plus	15000= CPS	m$ 5-150/1000p					
4	**LOI**	avg = 35 knots								




STATUS QUO

What is the contribution of GMA to a design research process?


A
P
S
Conventional Design Practice
Human Innovation
Human Assessment
Human Inquiry
GMA
GMA
GMA Supported Design Practice
GMA Aided idea generation
Improved human assessment

1 Systemizing the arbitrary step of projection

2 Narrating the attributes of a possible service

3 Ranking the ideas

4 Modifiable and rearrangeable modeling

GMA CONSTRAINTS

- Limited calculable number of parameters and their values
- Determining the extent and severity of external influence factors
- Determining lowest and highest threshold of values
- Judging during CCA step

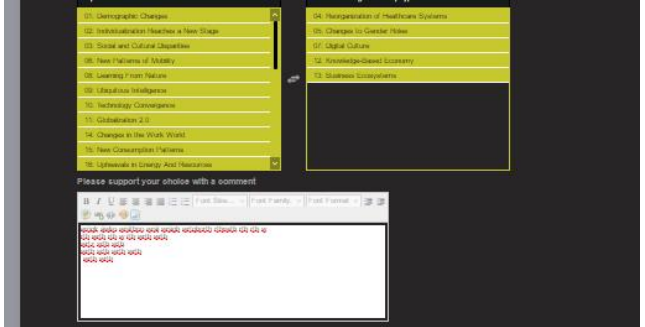
“This process represents two strangely superimposed (and what might seem to be mentally contradictory) tasks:

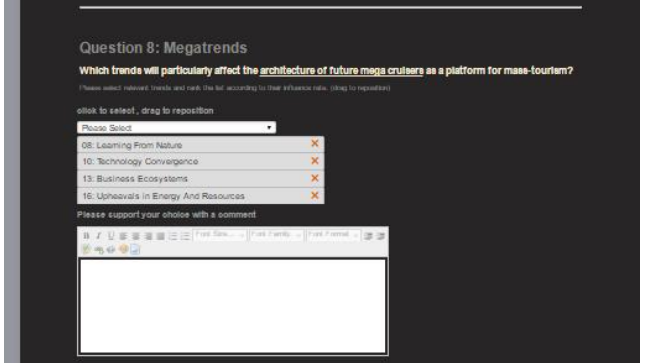
on the one hand, of identifying combinations of attributes which are seen to be logically impossible or empirically implausible – and discarding them;

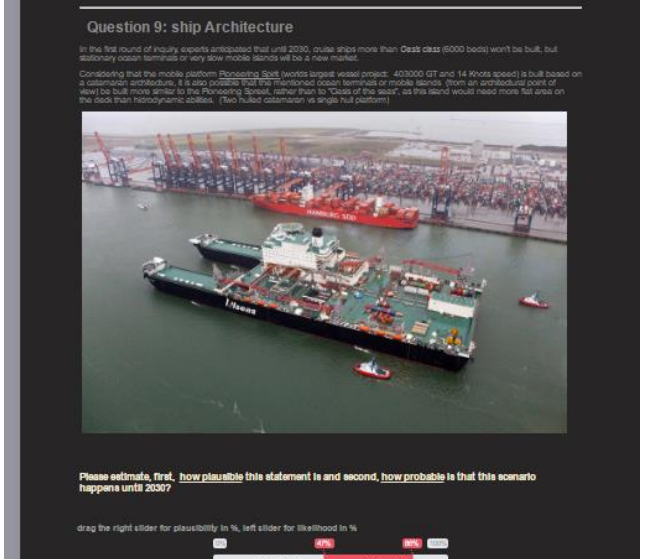
and on the other hand, of keeping one’s mind open for the discovery of strange and novel combinations that we may not hitherto have imagined.”

(Álvarez & Ritchey 2015)

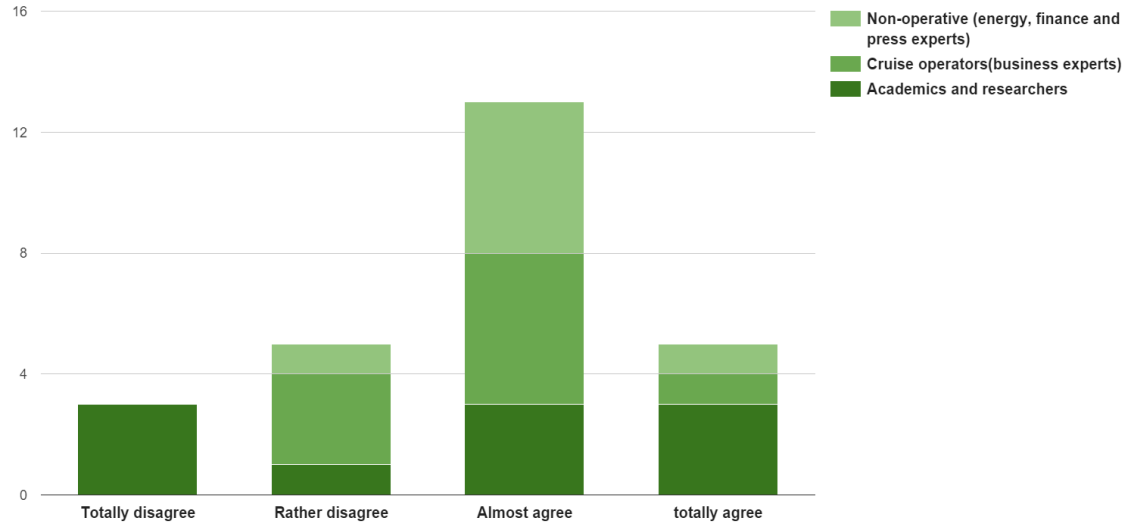
INTERACTIVE ONLINE DELPHI SURVEY







By 2030 floating Islands or stationary ships will be a new market.

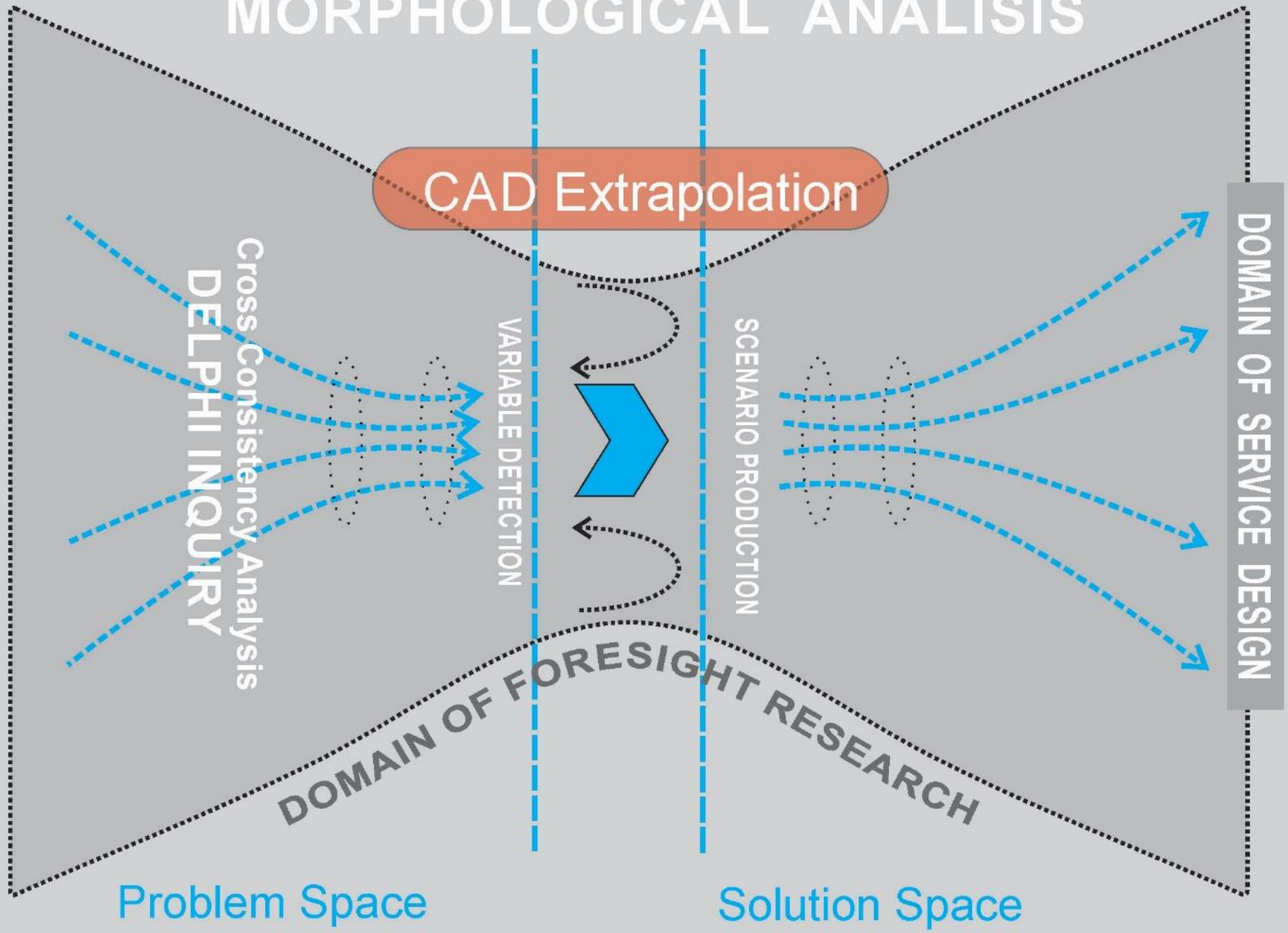


voted by 26 experts (9 from cruise companies,10 academics and 7 others)

Benefits of Delphi Integration into GMA

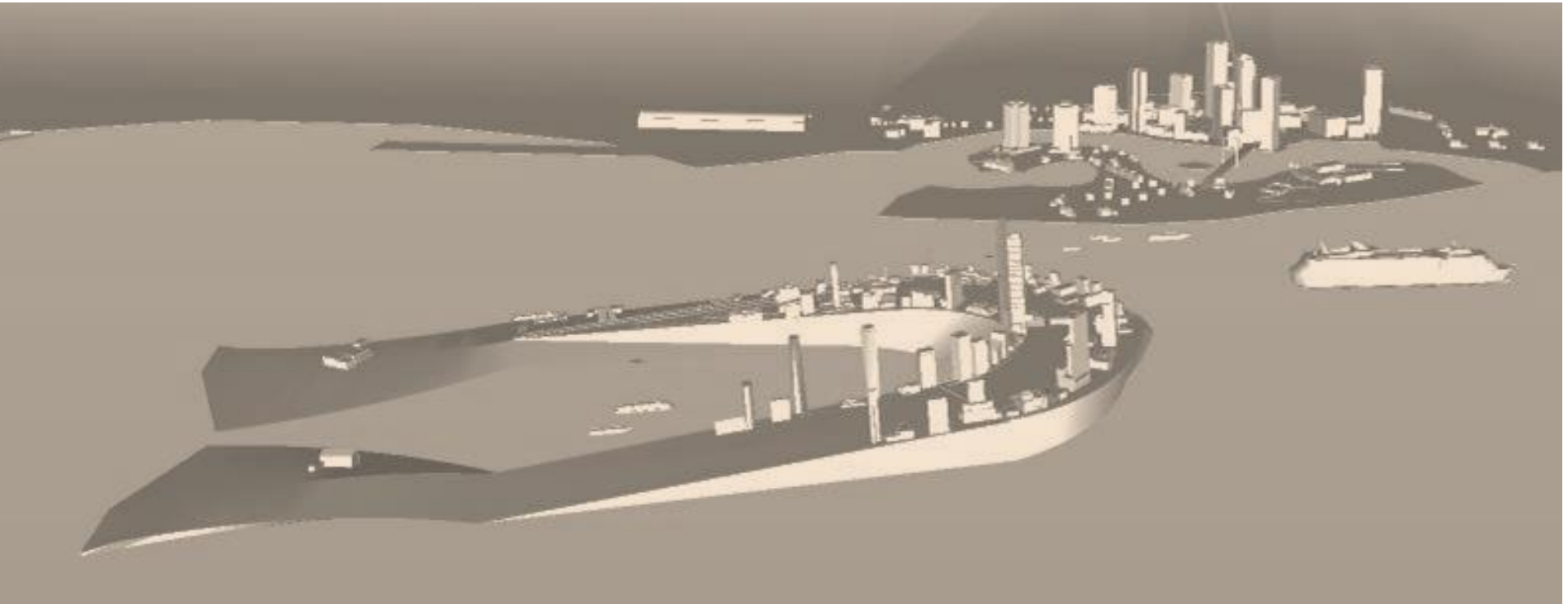
- Strengthening the diversity of expertise
- Integrating decision-makers (stakeholders) into the service generation process

Business expansion bias (exclusive transport services)	Mobility performance (vessel speed within a 2 weeks sailing)	ecologic factor emissions/energy efficiency (Passenger-day)	average capacity(capacity of crews and passengers per ship)	vessel ownership (CL Pre-investment share for 1000 Passenger)	emerge of cheap renewable energy
onboard hospitality and entertainment	predominantly immobile (avg 0 -5 knots)	Status-quo(worse than on-shores)169-340kg	highly decrease (CPS?150)	CL entirely(m$150-250/1000p)	happens
onboard/onshore real estate investing	slower (avg: 12 ± 2 knots)	equal with on-shore	no change(CPS ~ 2000)	CL only operation(m$5?/1000p)	doesn't happen
on-shore service logistic	status quo (avg: 20 ±2 Knots)	very energy efficient(better ecologic factor than on-shore	highly increase(15000? CPS)	CL partially Owner(m$ 5-150/1000p)	
no on-board involvement(limited to transportation)					


MORPHOLOGICAL ANALISIS
CAD Extrapolation
Cross Consistency Analysis
DELPHI INQUIRY
VARIABLE DETECTION
SCENARIO PRODUCTION
DOMAIN OF SERVICE DESIGN
DOMAIN OF FORESIGHT RESEARCH
Problem Space
Solution Space

Mobility performance (average vessel speed within a 2 weeks sailing)	Business expansion bias (exclusive transport services)	ecologic factor emissions/energy efficiency (Passenger-day)	average capacity(capacity of crews and passengers per ship)	vessel ownership (CL Pre-investment share for 1000 Passenger)	emerge of cheap renewable energy	logistic scope	dominant one-person families	fall of work/ leisure seperation	high level eco-tourism trend	fall of middle class in europe(shift to wealthy china)
very slow or immobile (0 -5 knots)	onboard hospitality and entertainment	Status-quo(worse than on-shores)169-340	highly decrease (CPS≤150)	CL entirely(m$150-250	Wild Card	trans-regional	Wild Card	Wild Card	Wild Card	Wild Card
slower (12 ± 2 knots)	onboard/onshore real estate investing	equal with on-shore	no change(CPS ~ 2000)	CL only operation(m$5≤/1(	No Wild Card	trans-national	No Wild Card	No Wild Card	No Wild Card	No Wild Card
same speed (20 ±2 Knots)	on-shore service logistic	very energy efficient(better ecologic factor than on-shore	highly increase(15000≤ CPS)	CL partially Owner(m$ 5-150/1000p)						
	no on-board involvement(limited to transportation)									

84	C9D4E6G2J2K1L1Q1T1U1\2	38.5	1.041E-7	1	0.2618	0.7000	0
85	C8D2E6G6J2K1L2Q1T1U2\1	38.5	1.042E-7	5	0.1511	0.7000	0
86	C8D3E6G2J1K1L2Q1T1U1\1	38.5	1.12E-8	9	0.0650	0.7000	0
87	C9D3E7G4J5K1L2Q1T1U1\2	38.5	1.35E-7	2	0.2240	0.7000	0



THANK YOU

Braunschweig University of Art
Hochschule für Bildende Künste Braunschweig

Institute of Transportation Design, Braunschweig
Germany

jonasw@hbk-bs.de
me.mozuni@hbk-bs.de

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