Braunschweig University of Art
Institute for Transportation Design

APPLICATION OF MORPHOLOGICAL ANALYSIS IN STRATEGIC PRODUCT DEVELOPMENT AND BUSINESS MODEL INNOVATION:

THE EXAMPLE OF CRUISE INDUSTRY 2030

PhD Dissertation
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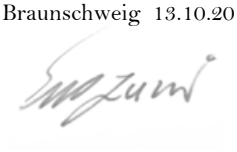

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Abstract

The benefits of matrix-based modeling techniques in covering entire solution space within innovation-management practices have been discussed by various researchers. However, these techniques will face methodological obstacles, when the design subject is future-oriented; since (1) the time-scale, in which the solution space is occurred, addresses users that are yet non-existent; and (2) continuous changes in the key factors and their interactions make the technique incapable to conceive all the relationships and deliver synthesizable data. Upon this dynamic and uncertainty, the rational core, upon which the projection is being established, suffers itself from the lack of substantiation. An example of such research cases was selected for the purpose of this dissertation, in which the cruise industry is being explored for novel user experiences in a 2030 perspective.

Cruising is a multi-dimensional user experience and business system encompassing many constraints and innovation latitudes represented by multiple disciplines. These constrains and possibilities are applicable to a current practice of UX design, yet not consistent and reliable for a 2030 perspective.

This study suggests that a matrix-based cumulative expert survey (a hybrid algorithm of *Delphi* technique and *Morphological Analysis*) can support the process of innovation-management in very complex environments. In addition, these two tools can mutually cover each other's theoretical and functional deficits by illustrating transparent value-based arguments in a modifiable iterative manner.

Keywords

Morphological Analysis, Systemic design, UX design, Scenario analysis, Delphi, Future-oriented research, Projection,

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1. INTRODUCTION

1.1. Aims of the Research

Via a "research through design", innovative, possible and feasible service-scenarios are being generated. These scenarios conceptualize future services and User Experiences in the context of *Product Development* as well as *Business Model innovation* in the cruise industry.

1.1.1. Theoretical aims of the research

- Evaluating a possible integration of *Delphi* technique in Morphological analysis in processing future-oriented service design inquiries where the end-user is not researchable.

- Proposing an algorithm for a systematic generation of novel solutions in multi- and inter-disciplinary problem complexes with a focus on innovation-management and decision-making practices.

In addition, this dissertation is an empirical evaluation of Ritchey's concept of morphological analysis being able to accelerate collaborative innovation-management (Ritchey 2011a)

1.1.2. Practical aims of the research

- Providing an atlas of current variations of cruising concept and their position within the maritime (tourism) sector is the first practical stage of the thesis. This task is completed by a giga-mapping[1] of the stakeholder network of mainstream cruising business.

- An explorative inquiry will be dedicated to diversification potentials of cruising business model. These diversifications involve novel business concepts, service models and strategies in form of scenarios.

- The outcome of the research are "n" scenarios, each narrating a service or a business model in association with a concept for a vessel type. The scenarios are ranked and chosen from a pool of mathematically possible scenarios according to the framework described in the chapter four.

The scenarios should serve the following:

- Enabling the global cruise sector to design new niche services and markets by following a *blue ocean strategy*.

- Raising the awareness, and therefore the sustainability and robustness of decisions made within the cruise industry in dealing with mid- and long-term future challenges.

- Conceptualizing new ship types in the context of cruising experiences 2030.

This research seeks to expand the usage area of cruising service know-how (beyond the current cruising stakeholder network) and to apply it in new stakeholder settings. Therefore, the findings can also be exploited for developing following user-centered services beyond the cruise tourism industry:

[1] Giga mapping is an infographical tool for a visual description of nodes, relations and connections among a complex system, especially as a presentational map in interdisciplinary research discourses. (Sevaldson, 2011)

- Acquiring novel urban settlements and sustainable agricultural solutions considering the increase of see levels and climate change: “using the water instead of fighting it”.

- Mobilizing urban components as a respond to demographic changes and other future mega-trends (temporal venues such as sport arenas, exhibitions, etc.).

- Evacuation and disaster service models particularly in association with cruise industry’s corporate philanthropy.

1.2. Research Framework

1.2.1. **Research questions**

To fulfill the objectives outlined in 1.1 and 1.2, following questions will be addressed and discussed:

(1) What future trends will meet the concept of cruise tourism in a 2030 perspective? Which potentials and challenges are inherent in these times for the cruising concept?

(2) What other service models, user experiences and business concepts can be derived from the current infrastructure of cruise sector? Which ones can carry the ability to be considered as a sustainable product development or business model Innovation?

In this regard, not only future technical and economic possibilities are addressed, but at the same level, socio-cultural, political and environmental conditions of the cruise sector.

However, the Focus of the inquiry will not be on a viability assessment of single business ideas, but on a holistic “designerly way of thinking” (Jonas et al. 2010) to explore all borders of possibilities and to systematically generate novel ideas, strategies and scenarios.

Accordingly, the theoretical question of this investigation is:

(3) How is the performance of GMA in aiding and coordinating designers engaged in the process of designing new strategies? Can GMA matrix cover a whole field of stakeholder-relationship and support the intuitive sense of ideation in a designer?

1.2.2. **Scope of the research**

- The research design of this study is rather a potential inquiry than a restrictively problem-oriented one, i.e. a certain design-related deficiency or a human-centered usability issue is not addressed, but expanding the sector's perspective and exploring future service possibilities and business concepts.

- This is achieved by providing and facilitating interdisciplinary discourses between technical and marketing experts, trend researchers, designers, architects, cultural activists, politicians and all know-how owners comprising the stakeholder network of maritime businesses.

- Starting from the cruise industry, different service concepts (those featuring a type of user experience) in the maritime sector will be explored. This will include all existing and potential concepts in a 2030 perspective.

- The measure for whether to investigate a business (or service) model will be first its (potential) ties to the cruise sector and second the application of a vessel (not necessarily a cruise ship) in the activity.

1.2.3. **Design domain(s)**

Service design is an interdisciplinary approach derived from Industrial Design and Business Management. Unlike product design practitioners who aim to create tangible artifacts (e.g. cars, home appliances etc.), service designers utilize their creativity to develop intangible business or service models (e.g. Uber, Air-BNB etc.) and usage possibilities (e.g. charity shared libraries). To adopt current or future trends and deliver solutions, service designers apply "*a holistic world view which helps to understand relational aspects of otherwise fuzzy and complex issues*" (Rodriguez and Peralta 2014).

Systemic design (also known as system thinking) is the alternative term for service design used in the design research community to emphasis the theoretical (and methodological) aspects of solution-finding (see e.g. Maani 2014; Sun and Runcie 2016). Here is the emphasis on systems-oriented thinking, sensibility towards sources of changes (in a social or organizational system) and more importantly, driving the trends instead of anticipating

them. *Systemic design* goes through interconnected social and technical changes and supports the solution-finding process by designing new experiences and a service-delivery scheme i.e. a business).

Although any form of service design will designate a wished state of the future (see capital 2.1), those design inquiries aiming on far future(s), are mostly known under the term *Strategic Design*. An important characteristic of strategic design practices are applying scenario techniques (Ogilvy 2002; Meroni 2008), hence the theoretical overlap with foresight research (Fig. 1). These scenarios often propose and illustrate a usage experience associated with an innovative roadmap for creating a correlated symbiosis between service providers and service recipient (Fig. 2, see also capital 2.2).

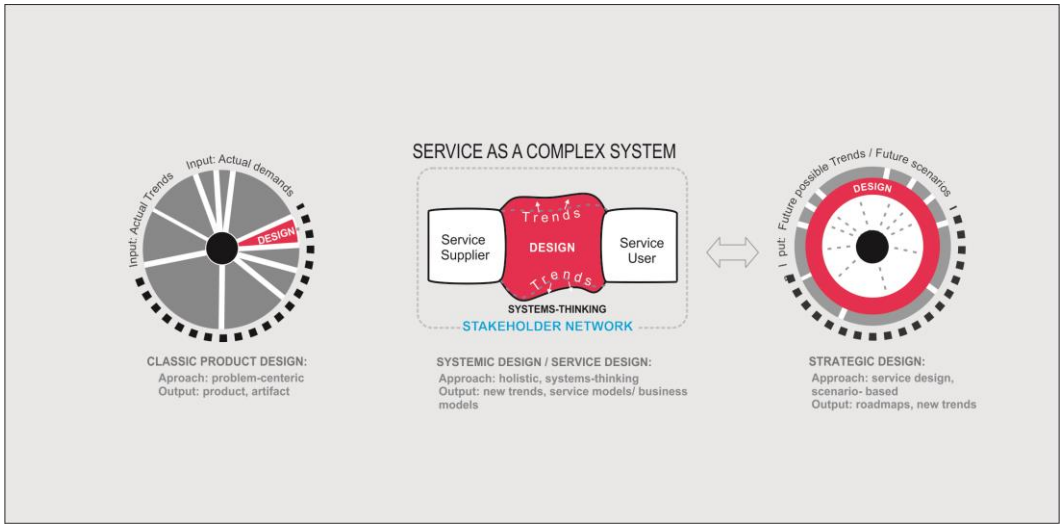

Fig. 1: Systemic design and strategic design approaches and aims in comparison to classic product design

The importance of scenario-development in strategic design is best described by Meroni:

"The way a strategic designer transforms visions into a plausible hypothesis is by building scenarios: Scenarios are sharable visions that translate information and intuitions into perceivable knowledge." (Meroni 2008)

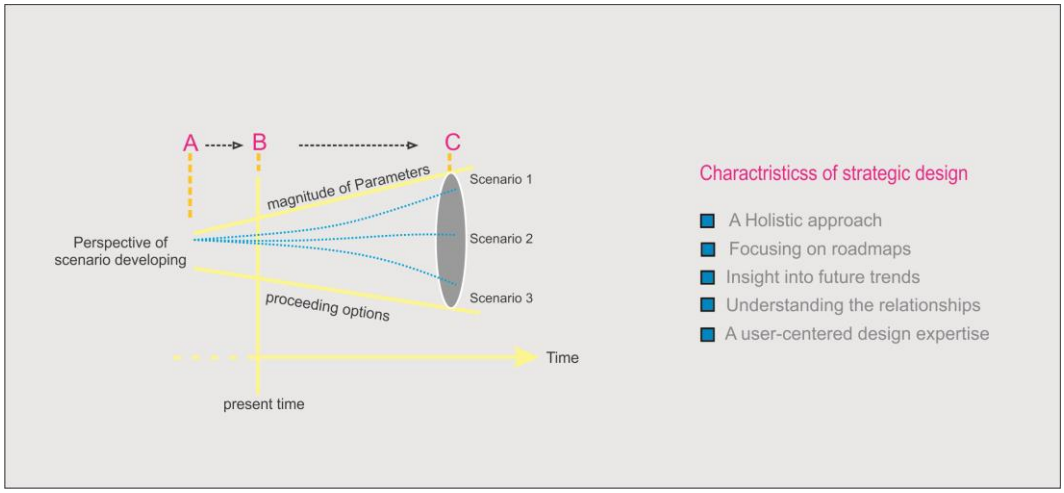

Fig. 2: Creating scenarios via tracing the changes (A-B) and redesigning their proceedings (B-C)

The present dissertation aims to envision creatively the future of cruise industry grounded on the theories of systemic design literature[2] and the practice of strategic design. The research follows particularly a systemic design topic and question: *How can we design in a (distant) future environment, where the inward and outward dynamics of the system are uncertain?* As outlined in the theoretical aims of the research, this dissertation seeks to propose a procedure for such research cases.

1.2.4. **Research method**

The research follows a "research through design" principle with a classic APS[3] iteration(Jonas 2007; Jonas et al. 2010). As extensively discussed in the second chapter, no known approach or research method in design, engineering or future science could single-handedly cover the entire problem and solution space. Thus, a hybrid procedure (of Delphi technique and MA approach) was developed and applied for this specific case study. The future of cruise industry as a very fuzzy and dynamic case study has been selected with care, as otherwise it would have been labeled as an unsearchable or ill-defined research case. The aim was to develop a new procedure and open up the access of design

[2] This dissertation draws also widely on tourism marketing and economy theories as well as on tourist behavior literature in particular. However, a theoretical association with these bodies of research is not strong and not relevant to the objective of this dissertation.

[3] Collecting data from the cruise industry and global future trends (A), generation of user experiences and business models (P) and assessment of the quality of scenarios and reflection to the cruise sector (S).

research to an increasing number of cases characterized by multi-dimensional strategic questions (duo to impact of technology convergence).

The Morphological analysis (MA) can be seen here as the main approach of the study. Yet many impulses from foresight research methods as well as from innovation-management have been applied and integrated in the MA approach. The role of MA is to prevent the process of idea-generation from following an arbitrary principle similar to intuitive methods (e.g. brainstorming). Furthermore, it combines designer's expertise with knowledge from other domains in an analytical model of problem- and solution-space, and supports the designer's intuition with prompt computation.

This dissertation undertakes separate investigations beginning with identifying the *key-factors* defining the cruising business model, understanding the status of the ship in the business architecture of the cruise sector. This is followed by building a morphological matrix comprised of four dimensions: (1) Cruising Future challenges, (2) Possible UX concepts, (3) Future mega-trends and (4) Vessels physical attributes.

An innovative rearrangement of the matrix will then lead us to generate new values and business concepts in the cruise sectors.

Following additional qualitative methods of social research will be applied during building (and completing) process of GMA matrix:

• Secondary analysis

• Benchmarking

• Expert reviews (Delphi method)

• Scenario technique

2. THEORETICAL FUNDAMENT OF THE RESEARCH APPROACH

2.1. Future research vs future design

As outlined in the research questions, this dissertation aims at a distant perspective (2012-2030). Therefore, common design methodologies that are set to explore the "accessible user of now" are not reliable here.

The practice of systemic design has in any case a procedural overlap with the practice of-foresight research, as it principally aims at a desired state in the future (Fig.3). This overlap grows especially when systemic design (as a user-centric approach) is incapable of researching the user, i.e. the subjected system addresses users of a mid or long-term future (e.g. 10 years from now)

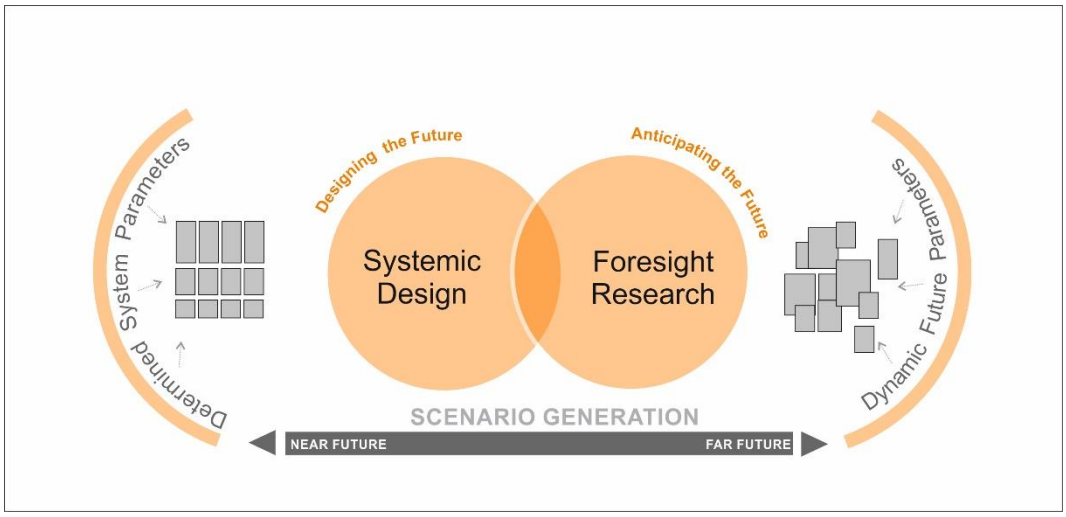

Fig.3: Overlap of systemic design and foresight research in practicing scenario

A further problem in future-oriented design is the ever-changing values of the key-factors. Under this dynamic, the rational core, upon which, the projection is being established, will need itself a constant validation (Ritchey 2011).

For coping with these problems, designing future systems will have to draw methodological fundaments (theory and practice) from the domain of foresight research (Godet, M., Chapuy, P., & Menant 1991). One of these fields is the adaptation of scenario techniques into future-oriented design. However, forecasting techniques seem not to suffice for such practices, since "visioning and designating the future" claims extra skills (i.e. innovation) than merely predicting the future.

The benefits of matrix-based approaches in modelling highly complex problem-spaces have been discussed by various researchers (see for example Mocko et al., 2007; Steward, 1981). These approaches are mostly known in design and engineering as *Generative Design*, and in foresight research under the term *Morphological Analysis*. The clustering possibility that matrix-based approaches provide is a comprehensive scheme for modelling dynamic key-factors, simulating their interactions and displaying all (mathematically) possible solutions. Many of these techniques are implemented in CAD[4] algorithms. Yet, some researchers refer to the lack of nobility and/or the deficit of these algorithms in stimulating the creativity of a design team (see for example Krish, 2011; Singh & Gu, 2012).

Delphi technique is considered in foresight research as a reliable alternative to user research. The technique is recognized for delivering highly innovative scenarios (due to its rich mental asset) yet weak in a systematic exploration of entire solution-space. We suggest that a matrix-based cumulative expert survey (a hybrid algorithm of Delphi technique and morphological analysis) can support the process of innovation-management in very complex future-oriented environments. In addition, these two tools can mutually cover each other's theoretical and functional deficits by illustrating transparent value-based arguments in a modifiable iterative manner.

In the following (1) we discuss the theoretical frameworks of *Future-oriented design*, where foresight research meets "research through design"(Jonas 2007), (2) review the advantages and disadvantages of both Delphi technique and Morphological Analysis in generating scenarios in design and foresight research and (3) propose a generic approach, in which Delphi technique receives a systemic framework from morphological analysis.

2.2. Epistemological Background of Future-oriented Design

2.2.1. Scenarios as conveyer of innovation

Scenario-generation seems to be a practice, standing at the fuzzy border between creative design practice and foresight research. In foresight research, there is not one future but

[4] Computer Aided Design applications such as *CATIA* and *SolidWorks* in Design and *Carma* and *ScenLab* in foresight research

multiple probable futures, hence developing scenarios is a widespread tool in this area of science. A “good scenario” captures pathways, dynamics and sources of changes out of a complex phenomenon and provides new material to think (Schoemaker 1993).

In most future-related studies, the process of generating scenarios demands a certain level of human creativity and imagination. This is because the input data, usually postulated for building a vision for tomorrow are fuzzy, uncertain and hardly processable via scientific methods. In design studies on the other hand, the creativity asset is rich, yet the functionality of most design approaches only apply to near-future perspectives, the validity declines when far-future practices are aimed.

Compared to foresight that has its roots in *Futures Studies*, *Future-oriented Design* investigates a wider scope of possibilities and speculates on scenarios that are more radical. However, as the relation between current needs and future needs of users (upon which the designer develops scenarios) are not necessarily provable and demonstrable similar to the techniques used in the trend research, Future-oriented Design will move -in comparison with foresight- faster towards the domain of science-fiction when the time-scale tends to the far future (Fig. 4).

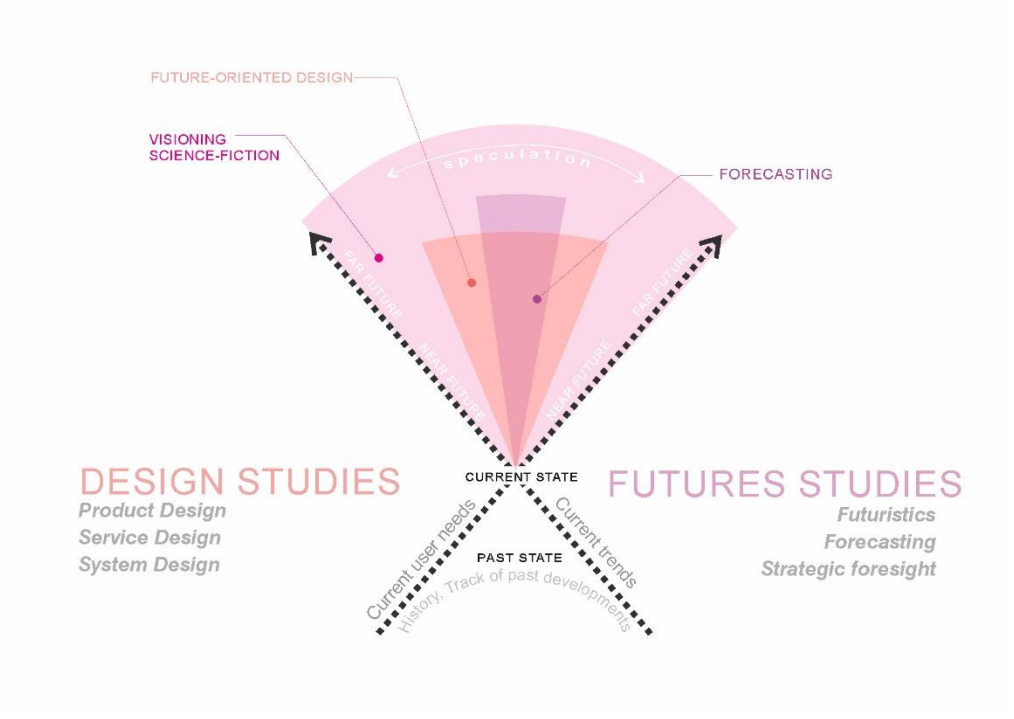

Fig. 4: Scope of Scenario speculation in Future-oriented Design compared to Forecasting and Visioning

Perhaps, estimating the future in the domain of strategic forecast has proven to be less productive than opening up new discourses for an innovative exploration of perspectives and possibilities in the context of utopian still reachable concepts. Huss (1988) sees developing scenarios more important than the act of foresight itself. Especially in the context of corporate planning, scenarios will “*assist management not only in reacting to future conditions, but more importantly in developing strategies which can proactively*

change these conditions." Evans (2004) argues that, future scenarios often convey "stories" rather than facts. The further the perspective we are looking at, the less defined our factual information and the fuzzier our insight will become. At this point, visual information becomes crucially important as a vital communication medium; and this is where designer's strengths often lie.

The notion of *design* has been widely used in the foresight research community to imply this *innovation* part of conjecturing foreseeable and unforeseeable future. Aaltonen (2010) compares multiple foresight techniques and differentiates between "*design"* and "*emergence"* within the landscape of innovation-centered foresight techniques. "Design" encompasses all known engineering and systemic (system thinking) approaches. It is also person-oriented and the quality of its outputs depends therefore on the designers' skill "*to stand outside the system and design the system as a whole*". (Table 1)

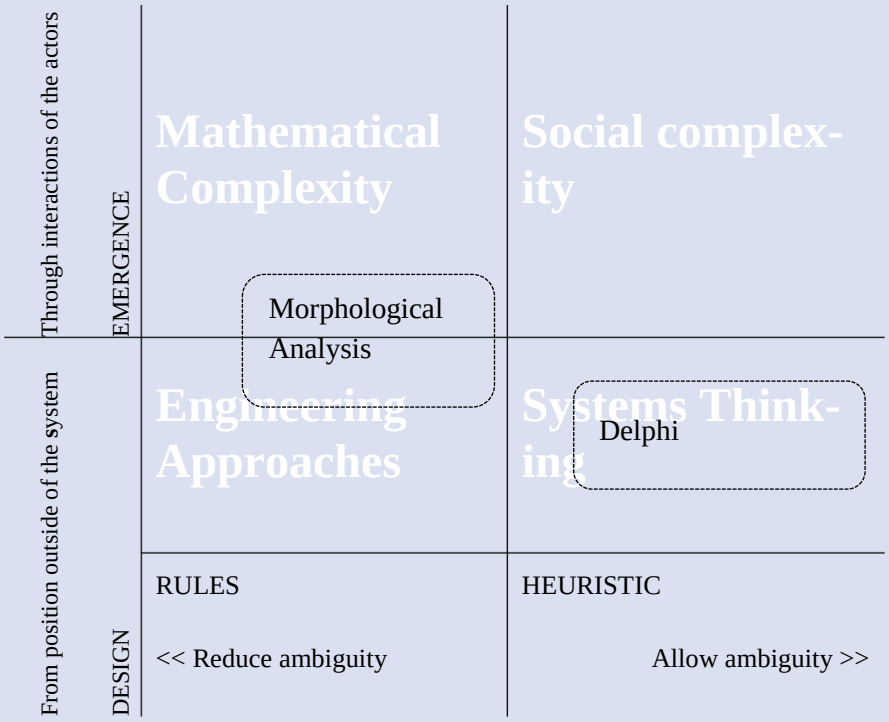

Table 1: Aaltonen's categorizing of foresight technics

Emergence in contrast "emerges" via a collective collaboration of actors (experts/stakeholders) with local knowledge. The outputs are not designed but are the result of interactions. (Aaltonen 2010)

Aaltonen positions morphological analysis at the border of *design* and *emergence (*yet rule based with less ambiguity), and Delphi a heuristic human-powered systems thinking with more ambiguity which provides space for innovation[5].

Based on this classification, a hybrid morphological Delphi can deliver *design* and *emergence* combined: the Delphi technique enriches the "design" quality of morphological analysis. Morphological analysis in return, increases the ability of Delphi panelists to capture new holistic insights beyond their specialized knowledge.

Perhaps, the success of design community[6] in tackling with scenario-driven domains (e.g. system design, strategy design) has its roots in the strong similarities between narrative scenarios to classic design projections in their required innovation skills as well as their procedural know-how in dealing with fuzzy data.

2.2.2. **Designing for the far future**

Projecting a concept derived from an analytical level is a complicated but established process in design research, accomplished by well-trained design practitioners. However, conventional design processes will face methodological obstacles, when the time scale, in which the design is introduced, addresses users or other design components that are not present yet. In this case, the rational core, on which the projection is established, suffers itself from lack of substantiation.

Many of these components are uncertain or unquantifiable by nature. For instance, field research can deliver a synthesizable data about the demands of the youths of today, but

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[5] I believe however that Aaltonen's classification that Delphi is a "design" tool might not be as accurate, since there is not a single procedure of Delphi, but a variety of the method with different application fields. This also involves the aim of the research and the selection of the panelists. For example, Delphi panelists will be unlikely to involve themselves in a reflective/creative process, if they do not possess related skills and background, especially when the group does not seek an innovative outcome or a solution. (for example in a medical operation)

[6] The notion of „design" as a discipline differs from the contextual terminology used in the foresight research by Aaltonen. However, Design as a discipline still goes often far beyond the conceptualization of real-world artifacts. It contributes in any way to the research of the future. In fact it is essential to every classic design tool to examine its hypothetical concept in interaction with formal, functional, sustainability, desirability and many other standards of tomorrow (and not today), helping to obtain believability for design proposals (Evans 2003).

will be incapable of researching those youths who will exist 20 years from now. The ever-changing dimensions of a research case and their inter-relations make it very difficult to identify influence factors upon which the projection is made. (Ritchey 2011b)

As outlined in the Fig. 2, design studies differ from futures studies also in terms of their initial starting point of analysis: While futures studies build their prognoses mostly based on tracing past development and current trends, design studies with near-future perspectives (e.g. UX design) focus rather on actual user needs than on trends.

For design practices aiming at the distant future, *Future-oriented design* introduces a third approach, in which, it materializes *mega-trends*, enabling the designer to move within a fuzzy border between design and forecasting and generate novel yet pragmatic concepts, systems or even social transformation paradigms. Mega-trends also suit best in a morphological analysis, as their probable occurrence, their impact on the system (and also on each other) can be divided in simple (cross-impact) analyses, which is easier for human creativity to process within a Delphi inquiry.

2.2.3. **Mega-trends**

Mega-trends are long-term all-encompassing transformation processes. In foresight research, trends are factual maps which indicate evolutionary transformation of things and thus the most reliable and probable state of future. In this context, mega-trends differ from other trends in two aspects: first, they cover a time-horizon of at least 15 years with perceptible demonstrable indicators (from the past into the future). Second, they act universal, transmitting interconnected social, cultural, political and economic transformations over the world, causing stable (mostly irreversible) global changes (Z_punkt 2014; Von Groddeck and Schwarz 2013). Because of their reliability and long-lasting effect, mega-trends are understood in foresight research as a reliable source of innovation and strategic planning.

However, two criteria distinguish a designerly approach towards mega-trends from a strategic planning approach:

- Design practitioners are better skilled in synthesizing and converting multi-dimensional transformation implications in (for co-researchers) conceivable visual information.

- The creativity reservoir inherent in design methods often enables the practitioners not to follow mega-trends to predict the future, but to process mega-trends to design the future and generate new values.

The latter criteria is a notable procedural advantage, since similar solution-oriented approaches from other disciplines (such as backcasting) are criticized for being heavily dependent on different assumptions and therefore delivering impractical results, when the future event upon which the solution is delivered, does not occur as predicted. The designer in return avoids often predicting the future and envisions instead analogue worlds

in which, a wished service or product possibility could exist either within a linear or non-linear development of future trends. Thus, his solutions will not be falsified by either projection of the future.

However, the process of evaluating mega-trends and generating scenarios in design research is normative and strongly biased to researcher's (designer's) viewpoints (Fehr & Jonas, 2013). The role and impact of researcher has been the subject of controversy and discussion. While human's creativity and interpretation-skills are essential to an innovative scenario process, the biasing impact and also it's limitation in understanding the complexity in the interaction between mega-trends will cause the results to be disputable in terms of reliability (see Schoemaker 1993; Busenitz & Barney 1997; Nowack et al. 2011).

In respond to this insufficiency, some researchers have suggested that a hybrid usage of CAD algorithms and human innovation could be an optimal solution. However, struggles for an entire substitution of researchers (designer's) role with computer intelligence has failed in the past few decades (see2.2; see KAN & Gero 2008; Salim & Burry 2010).

2.3. Delphi Technique

Delphi technique is a survey method that utilizes expert's opinion to support decision making mostly on future-related questions. It employs consensus knowledge for providing sufficient awareness of an interdisciplinary case. The approach is conceived as a suitable alternative when direct data collection methods are not available.

Delphi is an established approach with known advantages and disadvantages (see for example Goodman, 1987; Hasson, Keeney, & McKenna, 2000; Malhotra et al., 2014).

An incorporation of Delphi method in design-related scenario inquiries for increasing the creativity was first suggested by Nowack (2011). His views rest on Kahn's (1962) emphasis on the importance of forecasters' creativity and genius in "thinking the unthinkable" for achieving meaningful scenarios. Nowack raises the question *what if the forecaster does not possess Kahn's mentioned genius?* He then examines and concludes that, consensus knowledge can improve the quality of outputs in terms of generating creative but at the same time credible and objective scenarios.

When planning for the research scheme, the intervention point and the intensity of the expert knowledge needs to be adjusted in relation with the typology and the purpose of the scenario research. Most researchers differentiate scenario approaches in three categories: *predictive, explorative* and *normative*, referring to the expert's attitude towards the excted scenarios. "What will happen? What can happen? And how can a specific target be reached?" (Dreborg 2004; compare also Börjeson et al. 2006; De Smedt et al. 2013).

Börjeson demonstrates that, in both predictive and explorative approaches, an original (or a modified) Delphi can be integrated especially when the complexity of the problem at stake goes over a single operator's (scenario researcher's) ability.

In future-oriented design, the objective is rather approximating to Börjeson's definition of explorative future studies. Considering this assumption, a Delphi technique can contribute to the morphological research in coping with following sub processes:

1- Determining the design factors

2- Determining external influence factors and trends

3- Judging cross-factor interactions

4- Converting configurations to scenarios or to designs

However, it is important to utilize the Delphi technique only with awareness to its strengths and weaknesses. Perhaps contradictive reviews on the functionality of Delphi can partly be associated with the application of wrong Delphi version for the wrong purpose. For example while Everett (1993) describes Delphi as a "quick and efficient" tool, Williams & Webb (1994) label the method to the contrary as "time consuming". Here one should consider what type of Delphi has been implemented and what alternative tools in the surveyed domain has been available to be taken as milestone for judging the time-efficiency of Delphi technique.

2.3.1. **Classic and modified Delphi**

A classic Delphi inquiry consists typically of two or three rounds. Although later studies have integrated a variety of different procedures and customized techniques, the basic process is as following:

- A series of experts (called panelists) are identified to cope with a certain task. If the research has multidisciplinary dimensions, the group of panelists should appropriately represent disciplines, from which respective knowledge needs to be harvested.

- At the first round, the panelists are faced with a series of questions. There are several variations of this round, from a classic version of sending questionnaires by post to newer online inquiries.

- The timeframe allocated to each round is decided by research designers in relation with communication speed among panelists. A conventional Delphi plans

one or two weeks for gathering the first responses(Delbecq, Andrew H. Van de Ven, and David H. Gustafson 1975). The number of panelists and their geographical distribution can yet extend this scale to several month.

- There are also *Delphi workshops*, in which, the first round is accomplished in a single day(de Loe 1995). Online inquiries known as *real-time Delphi* can also speedup the process (Gnatzy et al. 2011).

- The data from the first round is then processed for designing the second round of the questionnaire.

- As a general rule, outputs from interdisciplinary surveys are being assessed and analyzed qualitative. In return, quantitative analysis is mostly applied on enquiries with a high number of experts from a limited number of disciplines (for example in clinical research).

The number of panelists is also a subject of disagreement. Armstrong (1985), for example, suggests that 5 to 20 experts dependent on their availability would be adequate. Murphy et al. (1998) consider limited panelists for unrepresentative, and propose that the larger the panel is, the more reliable is the consensus process. Rowe and Wright (2001) and Powell et al. (2003) disagree this idea and note that a larger panel may lead to information overload and incoherency. For Powell, the expertise of panelists, their eagerness in making a valid contribution and a reasoned judgement has a higher priority: *"The Delphi does not call for expert panels to be representative samples for statistical purposes. Representativeness, it seems, is assessed on the qualities of the expert panel rather than its numbers."*

It has been also noted that, unlike the first round, questionnaires formulated for the second and consecutive rounds are typically more structured and tends to collect more quantitative content.

How the findings achieved by a Delphi inquiry are being evaluated, and how reliable the result are, has also been questioned and discussed frequently (see for example Kozlowski & Hattrup 1992; Hasson et al. 2000; Kastein et al. 1993). There is little research evaluating whether the consensus knowledge will deliver similar results, if the expert's panel are changed. It has been also advised to compare expert surveys to other tools of data ascertainment in terms of their validity. Delphi results are, however, not repeatable scientific facts, but are very efficient and effective, provided that the subject, the experts, the research frameworks and finally the expected outputs are designated with care prior to initiating the study.(C.-C. Hsu and Sandford 2007)

The anonymity of the panelists as a key aspect of the method is also criticized for being a source of distorted results. One may not invest expected time and concentration (if not

feeling responsible) and deliver accordingly hurried decisions. Making panelists accountable for their expressed views is in the classic version of Delphi an issue if not impossible.(Sackman 1974 & 1975)

Based on the procedure outlined, a Morphological Delphi can shape the communication during all of steps mentioned earlier, and facilitate decision-making agreements within diverse groups. MA increases the panelists' possibility to capture new collective insights even more than the total sum of their individual knowledge. The Delphi technique in return enriches the "design" quality of morphological analysis with adding human innovation to an otherwise solid computerized calculation.

2.4. Matrix-based Modeling

In the foresight research, matrix-based approaches are known under the term *Morphological Analysis (MA)* or *General Morphological Analysis*. Morphological analysis is the act of splitting and clustering objects, phenomena and concepts to such detail that our mental world image could conceive and visualize the interrelations among them (Zwicky 1967).

A methodological equivalent of Morphological Analysis in design is *Generative Design (GD)*. GD aims at computerizing the -intuition-based- process of generating concepts. (See next section)

Generative design itself draws heavily its theoretical framework on parametric algorithms[7]. Parametric modelling is the idea of using key factors to describe a model.

[7] Although discussing parametric modelling in detail will take us away from the main route of the research, however we find interesting cognitive and epistemological linkages between the MA approach and relatively older and more established approaches of parametric modelling such as Parametric Design procedures (Hernandez 2006) and Parametric Design Thinking (Oxman 1997; Oxman and Gu 2015).

Many CAD software (e.g. SolidWorks) are already utilizing since 3 decades geometric and numeric key factors but also constraints to determine a shape. Constraints are descriptive key-factor values that define what the model could not be, so that finally only one shape remains that suits the attributes defined.

Both morphological algorithms and generative systems are strongly associated with the application of computing software in overtaking the tremendous calculating of key factors and their relationships. Their differences are mostly in the manifestation of APS[8] steps in a classic research-through-design demonstration: while in GD the matrix is built to find maximum design solutions and ranking best ones (A⇨S⇨P), in morphological analysis the aim is to find the most likely futures and "discussing" them (A⇨P⇨S). (Fig. 5)

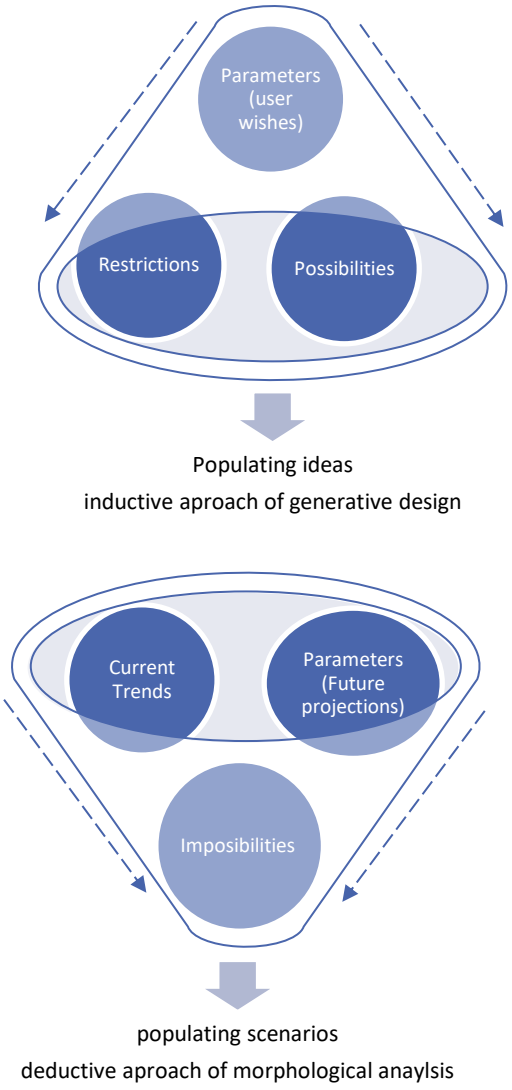


Fig. 5: Morphological Analysis vs Generative Design, Matrix-based approaches in design and foresight research

2.4.1. Generative Design tools

Ideation is one of the crucial steps among the design process. In some projection-oriented approaches it is conceived as the leading activity in the research process and sometimes as the entire notion of *"design"* (see e.g. McDaniel 2003; Schleicher et. al. 2010). In a variety of practices associated with design, the quality and the quantity of generated solution outputs seem to be entirely dependent on human's intuition rather than procedures and systems.

[8] Analysis, Projection, Synthesis (see Chow & Jonas, 2009)

Generative Design (GD) algorithms follow the principle of designing a scheme for creating ideas by an autonomous machine, instead of designing the product directly (McCormack, et al., 2004). McComack perceives generative systems "closely tied to the general concept of synthesis". He refers to the designer's role in a generative design approach as the "rule-designer" in determining the aesthetic, semiotic, cultural, political, economic and ecologic dimensions of the solution space and not as the creator of the artifact. He emphasizes:

" […] *Design using generative methods involves the creation and modification of rules or systems that interact to generate the finished design autonomously. Hence, the designer does not directly manipulate the produced artefact, rather the rules and systems involved in the artefact's production."*

One of the most common characteristics of generative systems is the usage of computation for collecting design-factors and memorizing their internal relevance. In the conventional design, this task is regulated intuitively by the designer and is understood as part of his professional quality. Since human's capacity in checking all possible connections is limited, generative systems claim to deliver a far more comprehensive analysis (and therefore a higher quantity of final ideas). In addition, the risk of biasing or preconceptions by the designer is lowered.

In the past, Computer aided tools were developed to detail and expound design proposals once an early concept has been shaped. Generative design is about to bring CAD tools to an earlier stage of the design process, where solution space is being still explored for design possibilities. A generative design tool is supposed to "*stimulate the designer's creativity by guiding the designer through viable design spaces constrained by performance criteria*". (Krish, 2011)

However alike other CAD tools, generative design software applications are considered as auxiliary means and merely serve the generation of raw possibilities and not a projection of novel designs or revolutionary ideas. This task demands still a further interpretation of raw ideas by human expertise.

To authors' knowledge, most generative design methods (including Morphological analysis) share three characteristics in their build and procedure: *Deduction, Computation and Permutation* (Fig. 6). An *Interpretation* step has also been added in some tools, yet not necessarily required in all GD inquires (e.g. form sketching in architecture).

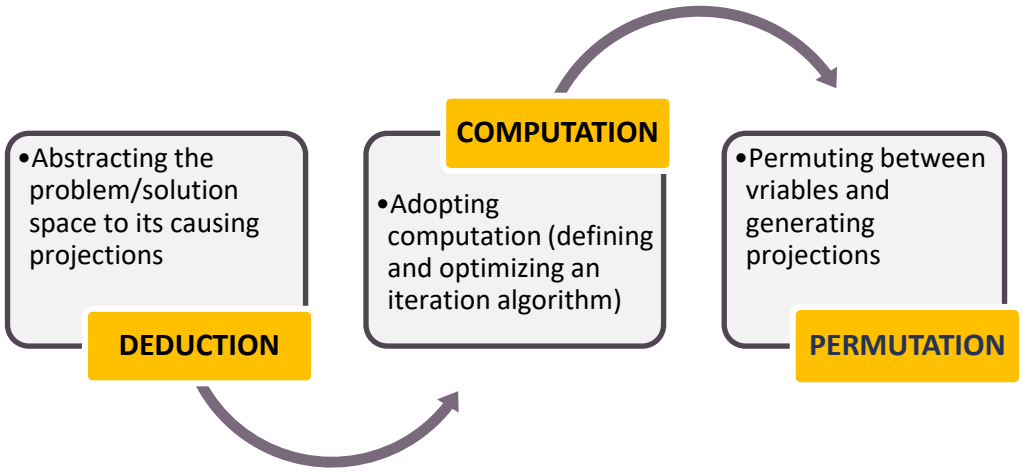


Fig. 6: Common process of a generative design approach

Krish divides design objectives to *routine* and *creative design* problems. He outlines three characteristics of creative design objectives to be very difficult for a designer to automate through a virtual intelligence procedure:

1. Partial contradictory of the objectives
2. Unquantifiability of some parameters. (E.g. aesthetical parameters)
3. Limited designer's domain knowledge compared to the vast dimensions of problem or solution space

The generative methodology offers an unconventional way of conceptualizing and working in design i.e. developing design scripts and design routines. Research in generative systems is closely tied to the general concept of synthesis.(McCormack, Dorin, and Innocent 2004)

2.4.2. **Algorithms versus heuristics**

Defined in general terms, generative design is about algorithms versus heuristics. In the conventional design practice, a concept is the designer's heuristic conclusion of his cognitive perception of the problem space. Thus it is strongly dependent on the designer's perception, causing a series of systematic errors recognized in the literature (such as cognitive biases, see e.g. Liedtka 2015).

In terms of delivering revolutionary concepts, heuristic approaches, have proven (in spite of being subject to designer's experiences, actual mood, etc.) to be more effective than algorithms. Algorithms instead, perform better in exploring the problem space (rather than solution space), through a step-by-step logical process to limit the investigation

scope. In simple but successive steps, they filter-out and eliminate the reasons that are impossible to be causing the problem, so that finally the actual cause is detected. A proper algorithm can be very time-efficient in exploring a problem/solution space. However, designating an effective algorithm will demand itself a notable amount of human innovation, which is sometimes a time-consuming challenge.

Possible usage domains of generative design is best outlined by Singh (2012):

- Using computational support in order to automate parts of the design process.
- Exploration of larger and/or multi-criteria design spaces.
- Increasing the quantity of design instances.
- Efficiency and cost reduction (reduced time and labor).

Singh has also found that those generative Design techniques, which are based on only one diverging-algorithm, are unable to compete with traditional design approaches in terms of emergence and innovation. He proposes that, merging multiple algorithms (available in simpler procedures) together can increase the quality of the generated ideas.

However, the exploration strategy is not the only interaction point of a designer and a generative Design machine. *Key-factors*, *constrains* and also *scenario interpretations* are another points that need to be set carefully, depending on the objectives of the research and expected results (Guoyan, Xiaozhen, and Pengs 2009). In most cases, decision on these interactive factors will change the results drastically. (*Fig. 7*)

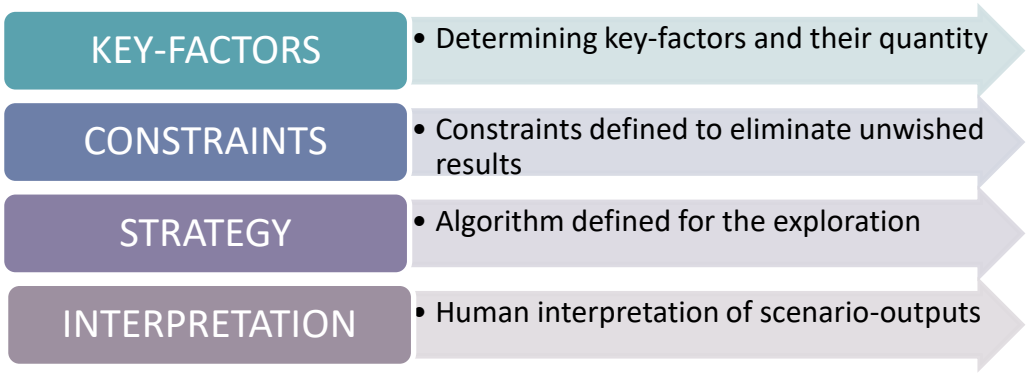


Fig. 7: Factors influencing the results of a GD algorithm

Some of these criteria such as *Key-factors* need to be kept limited in quantity. However, the decision on the proper number of key-factors has been remained ill-defined and obscure in the research domain. Multiple researchers have suggested different algorithms for permuting the key-factors, yet very few attempts has been conducted on instructing, how to determine the key-factors themselves.

This lack of instruction especially causes confusion in large-scale future-oriented design inquiries, where routinely the large number of key-factors complicates the calculation. For example, while four key-factors each having two projections will generate 16 scenarios, doubling the number of key-factors and projections will raise the quantity of possible scenarios to 894. In this case, even if the computer is capable of calculating all possibilities, yet the huge number of solutions will confuse the decision-makers in keeping the overview.

2.4.3. **General morphological Analysis (GMA)**

As stated before, morphological analysis has close procedural ties with known "Generic Design" methods. From the mid-1990s, General morphological analysis (GMA) has gained recognition in research domains, where inter- and multidisciplinary approaches are prevailing. In a variety of socio-economic inquiries, wicked problems are becoming increasingly the routine. Their complexity impedes usually small teams to come to solutions in the short time and large teams to compromise on certain outputs. GMA has proven to be an effective tool to overcome such issues in decision-making inquiries.

GMA is a revised approach (or software tool) of morphological analysis, that allows a considerable degree of human collaboration. Tom Ritchey (1998) describes GMA as a matrix-based and mainly computer–aided method for modeling and analyzing large problem-complexes and at the same time simulating strategy laboratories and developing scenarios. The mathematical permutation that GMA generates is a comprehensive tool for generating and assessing of ideas in future oriented design questions. Moreover, it provides a simultaneous assistance for ranking generated projections (and solutions) according to defined criteria.

The procedure of GMA is as the following:

1. A list of most important *Key-factors*[9] comprising the problem complex is being prepared. (between 5 to 15 parameters depending on the calculating capacity)

[9] Tom Ritchey uses the term „*Parameters*" instead of „*Key-factors*"

2. Each key-factor is assigned with a set of projections[10]. (for exaple for an sports event, weather condition is a Key-factor, sunny, cloudy, rainy and snowy are possible projections.)

3. The matrix built in this way comprises the range of solution space. A scenario will be a combination of multiple key-factors, each represented by a projection.

4. Via a *Cross consistency analysis* (CCA), projections are compared pairwise, inconsistent combinations are being filtered out.

5. CCA can also apply more elaborative algorithms, for example giving numerical values to each pair (e.g. giving a value of 1 to 5, declaring whether the pair is theoretically impossible, only possible but not wished, or both possible and wished, etc.)

6. If the CCA is sensibly designed and performed, a GMA application can rank possible scenarios according to their likelihood, plausibility or any other criteria that the expert team needs for the further synthesis.

The manipulation of the CCA is perhaps the intelligence core of a GMA practice. The operators should be conscious, not to eliminate novel futuristic concepts when exploring in a creative thinking context. Álvarez & Ritchey have addressed this issue perfectly:

"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 and Ritchey 2015)

To avoid excessive workload (while checking the cross-impact relationships) and having the track of potential "novel" pairs, it is advised to avoid large number of key-factors: if there are 6 key-factors each having 4 projections, the entire solution space will contain 4096 possible configurations. Even though many of these configurations will be excluded from a further examination by the CCA step, yet there will be 240 pairs to judge, which is still an overwhelming quantity.

Some GMA computer applications offer also interactive interfaces in which, the research group can fix one or more projections and observe (visually) and discuss the behavior

[10] „*Conditions*" in Ritchey's terminology

change of other projections. This computation poses a certain advantage especially when a team of decision makers needs to discuss certain circumstances.

Depending on the research domain that GMA is applied on, researchers find the method time-saving (e.g. Belaziz et al. 2000) or overwhelming in contrast (Godet 2006, 73), but comprehensive in any case.

As mentioned in 2.1.1 GMA methodology resembles Generative Design approaches in many aspects. Generative design itself draws heavily its theoretical framework on parametric algorithms. Parametric modeling is the idea of using parameters (key-factors) to describe a model. CAD software (e.g. SolidWorks) utilize already since 3 decades geometric and numeric parameters, but also constrains to determine a shape. Constrains are descriptive key-factors that define what attributes the model does not have (and excluding related scenarios), so that finally only one shape remains which fits to defined attributes.

2.4.4. **Morphological Analysis in Innovation Management**

A morphological analysis, as described by Ritchey, is an iteration of Analysis and Synthesis (Ritchey 2011b). Thus, a step of *projection* is still needed, so that a healthy cycle of design process is completed. In this sense, the design team moderating the research will play a vital role in delivering innovative thinking.

Although MA has been invented rather for developing scenarios in foresight research, there are still a notable number of studies that have applied the tool for inventive work. A pioneering attempt is performed by Zwicky (1967) using MA for designing jet engines. He argued that a requirement for designing novel concepts is having a bird's-eye view over the entire solution space.

Nonetheless, one should note that, a larger solution-space does not necessarily mean more quantity in creative concepts. It can even cause extra confusion and inefficiency. Questions on how to derive promising ideas from a MA matrix is for example reflected in Card et al. (1991). They suggested that splitting the solution space into regions of interests (and investigating areal) could reduce the time needed for judging all solutions.

Similar to CAD applications, MA tools are only supporting computer applications, facilitating the human’s design task. They cannot generate any creative value on themselves. However, they enable the designer to systematize the ideation process and optimize the results by delivering quantitatively as many raw-solutions as possible. Some researchers however, advocate the idea that MA is more than a merely “morphological box” and can actively contribute to a creative process. (e.g. Dartnall & Johnston 2004 & 2005, Seidenstricker et al. 2014)

In innovative design, there are recorded documents attesting that MA can accelerate the visualization time of concepts: a single *multiset* (made of one projection per key-factor) in a morphological cluster is no other than a narrative sketch of a conceptual design[11]. Such feature is especially useful, when many concepts are generated and need to be compared and discussed (e.g. aesthetical settings).

2.4.5. **Computation of MA**

Multiple tools using computation for supporting human's creative repertoire for dealing with wicked problems have been proposed (see for example Nordin et al., 2011; Strobbe et al., 2011). Computation can drastically increase the quantity of mathematically possible configurations (concepts, scenarios, solutions etc.).

Nonetheless, the huge quantity of generated solutions still has to be evaluated and compared for the final decision. This can "*place a significant cognitive burden on the designer*" and is considered by some researchers as a collective advantage and issue (von Buelow 2002; Krish 2011).

Another crucial aspect of conventional creative design that CAD researchers struggle to simulate is the reflection of the designer to already existing designs: How can a CAD algorithm distinguish novel ideas from a bunch of old ones? This intuitive cognitive structure is the essence of classic innovation management that evolves the designer's inputs into further inspirations.

Dartnall and Johnston for example, applied a MA approach in a creative process of designing water pumps. They realized that many generated designs are already existing products or registered patents that for any reason have never become a finished product (J. Dartnall and Johnston 2004). They received this as a positive indicator, which shows, morphological matrix is properly arranged and is capable of generating concepts (since patents are well-elaborated novel designs). Besides, enough non-patented concepts will still remain for further reflections. On this ground, we can argue that a MA matrix can contribute actively in a design process via:

[11] This feature is in fact, the essence of many research attempts on instructing computers to design concepts based on parametric algorithms.

1. **Preventing the process of being a haphazard practice:** unlike a designer who may conclude with a few concepts based on his talents and biases, MA indeed illustrates all possible designs including those already available, and in this way, MA illuminates design gaps that had never been detected yet and worth to assess.

2. **Enabling decision-makers to decide between evolutionary or revolutionary ideas:** Within a MA matrix, combinations of those middle-range projections most likely will deliver conservatively only new configurations (or evolutions) of already existing designs, whilst marginal projections in the list (and those extreme values) will lead to revolutionary and totally novel ideas. This will enable operators to actively rethink their decisions during the iterations.

The goal of building a MA matrix is to depict the network of stakeholders in the future of cruise industry and to find scenarios for novel concepts in short and long-term perspectives. MA works here as an innovation-machine, taking the mega-trends and the current state of the stakeholder-network as input and starting point. The output will then be generating various scenarios, depicting a metamorphosis of cruise ships into different form of floating structures. The contribution of the two approaches (Delphi and Morphological analysis) in a "*Matrix-Based Delphi" (MBD) tool* is illustrated in the Fig. 8.

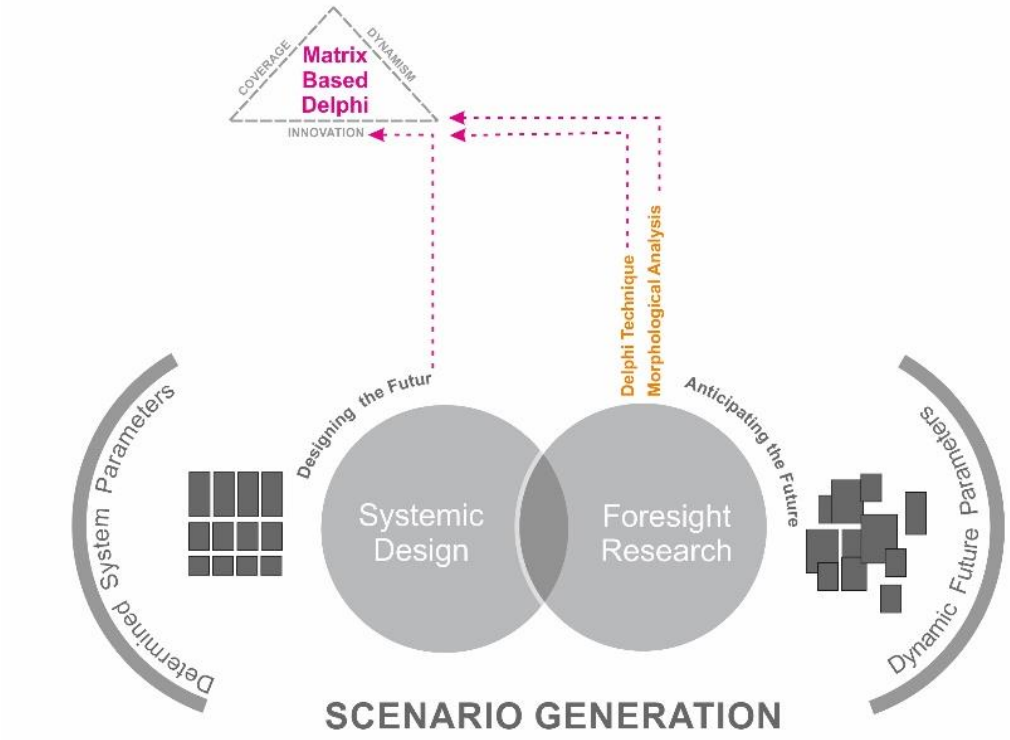


Fig. 8: Matrix-based Delphi, integrating foresight research tools in future-oriented systemic design

2.4.6. **Instance Procedure for a Morphological Delphi**

To outline the procedure proposed for a Matrix-based Delphi, an example inquiry in the maritime industry is being introduced: *"Feasibility inquiry on offering a zeppelin-flight experience on a cruise ship launching at 2025"*

The procedure for a software-supported morphological Delphi is as following:

1. A moderator (with design expertise) launches a Delphi round (inviting panellists according to expertise requirements).

2. Panellists discuss and select the most important key-factors influencing the system. Subsequently they assign to each key factor an index (multiplier) indicating the importance or priority of the key factor.

3. Each key factor receives a set of values[12]. The values also receive one or multiple indexes (multipliers) reflecting feasibility, likelihood, novelty or any criteria concerning the objective of the research (Fig. 9).

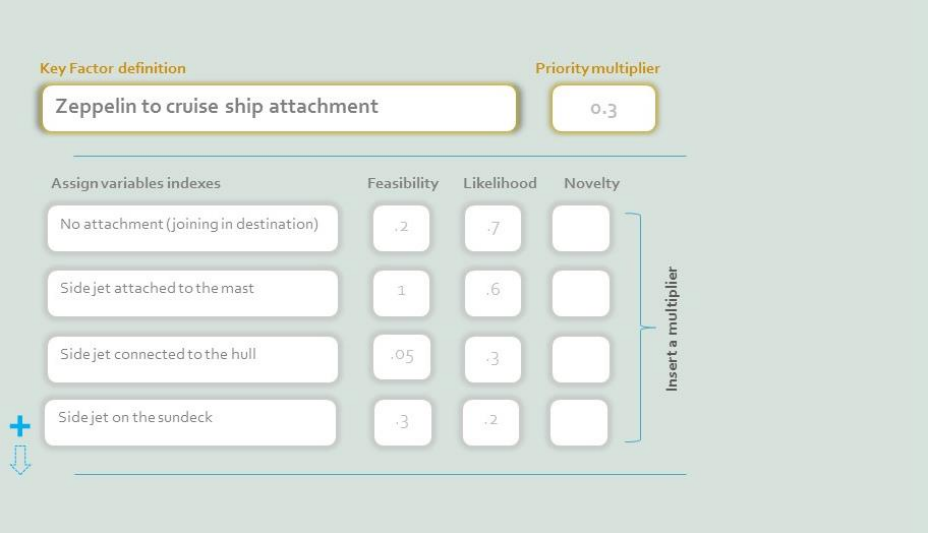


Fig. 9 A single "Key factor" and its 4 assigned values. Both Key factors and values are associated with one or more multipliers (decided by respective experts)

[12] Values are different states of a single key factor, e.g. different wishes, technological possibilities, event likelihoods etc.

4. Once all key factors, values and their respective multipliers are determined, the moderator can build the morphological matrix. (Fig. 10)

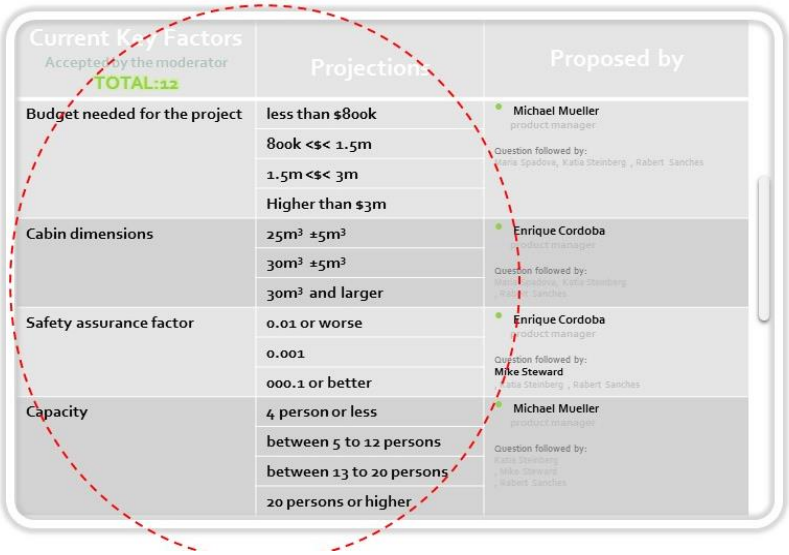


Fig. 10 Experts detect and elaborate gradually relevant Key-Factors via exchanging ideas. The result are then transferred to the moderator.

A hypothetical solution (scenario) will be a combination of multiple key-factors, each represented by a value. The multipliers that experts have assigned to each key-factor and respectively each value, will help the system to calculate and rank most feasible, likely or novel configurations. These criteria are decided in advance, according to the typology of the inquiry (design optimisation, strategic decision, product development etc.)

However, in the real world, key-factors do not act sovereign of each other. The existence and chronological development of many factors is strongly associated to the development of other factors. This dynamic (see Table 2) is principally an important driver for the development of innovative and revolutionary designs. In the Zeppelin example, the value "20 Persons or more" from the key-factor "Capacity" can only exist when the value "30m^3 and higher" in the key-factor "dimension" occurs. Thus, in order to integrate this dynamic in the system in the fifth step:

5. Experts responsible for each key-factor are asked to review other experts' key-factors. By detecting any dependency between values from their expertise to an external value, the experts link them together.

This linkage structure will be particularly useful, when during the development of concepts, decision-makers decide to grant a value for fixed. In this way, all related values will get a higher ranking in the index.

6. After the system generated possible scenarios and ranked them according to the entered criteria (by experts), now the design team can easily convert output to visual information and design outputs.

7. If the results are not satisfying, an iteration with minor adjustments in the inputs will let the system recalculate the possibilities and generate real-time results.

The final model of the Morphological Delphi has been illustrated in the Fig. 11.

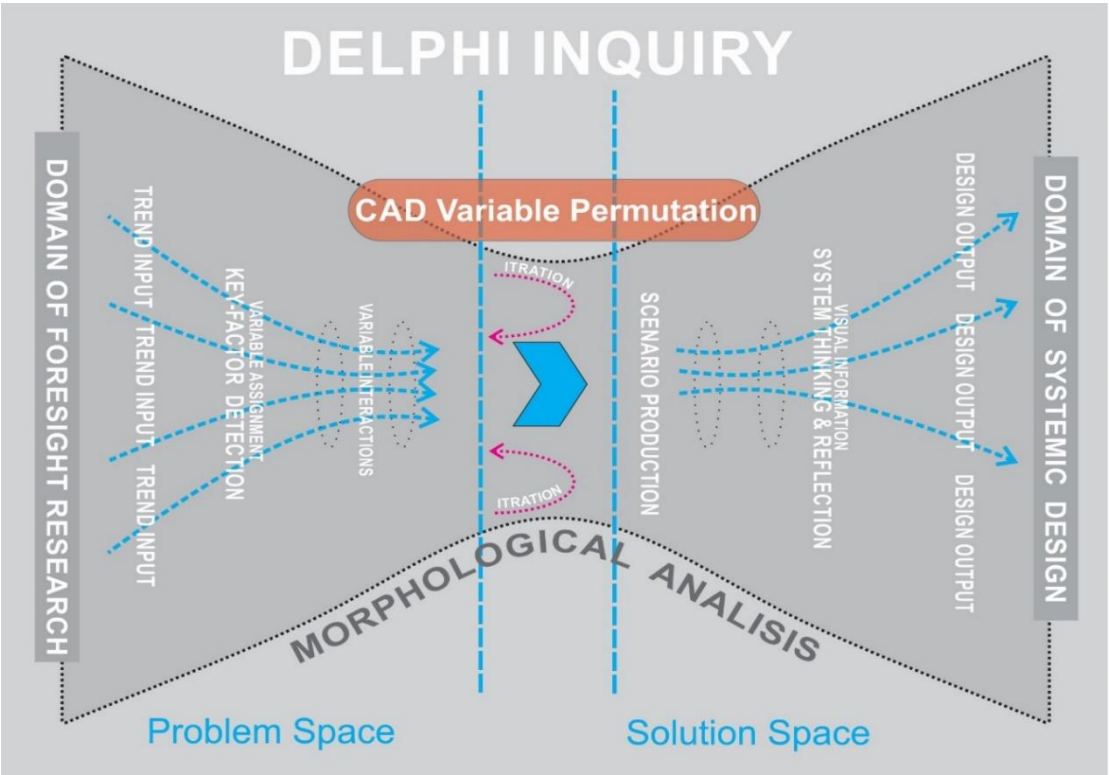


Fig. 11: The final model portraying the procedure of a Morphological Delphi, proposed for future-oriented UX design

In this approach, tools and techniques from two domains of research, i.e. (systemic) design and foresight research have been integrated: generative design and CAD are stablished design tools, while Delphi is a known technique in the foresight research.

Mega-trends and key-factors are primary inputs that the design team (Delphi panellists) carefully choose and insert in the matrix. This helps to define the problem space. CAD algorithms then process the data and deliver raw scenarios. At the final step, the design team converts (via consensus knowledge and reflection) raw scenarios to visual information and design outputs. The computation also enables the panellists to iterate the process with adjusting input data and observing the real-time changes in the output, so that an optimized result is gained at the end.

2.5. Chapter conclusion

"Future-oriented systemic design" does not merely pursues the aim to follow the trends to predict the future, but to track trend-pathways to design the future. This new interdisciplinary domain is faced with multiple theoretical and procedural obstacles. A *morphological analysis*, a *Delphi* survey and a design expertise can each partially cover some of these problems. Multiple issues such as lack of comprehensiveness, operators' biasing or lack of sufficient knowledge were referred to and discussed in this chapter.

Table 2 shows that how different features of a morphological Delphi process will address diverse issues and requirements evolving in a future-oriented design practice.

ISSUE	FEATURE/TOOL
Non-existent user (user research infeasibility)	Delphi
Solution space comprehensiveness (covering maximum possible concepts)	Morphological analysis, computation
Designers biasing (human factors e.g. Background, talent or personal preferences)	Delphi
Designer's insufficient domain knowledge (multidisciplinary domains)	Consensus knowledge
Dynamic key factors (changes in technological and social key factors during the development of time)	Computation, aps iteration

Table 2 Issues existing in future-oriented design, addressed by a Morphological Delphi

Defined in general terms, matrix-based research is about algorithms enriched by heuristics. In the conventional design practice, a concept is the designer's heuristic conclusion (or his cognitive perception) regarding the problem space. Morphological analysis goes through a systematic clustering of key-factors involved in a system and applies algorithms to populate different key-factors-arrangements in order to generate concepts.

The proposed Morphological Delphi tries to integrate both heuristic and algorithms in systemic design and to utilize the advantages of both approaches. Human's Heuristic (Delphi) is effective, highly innovative but not comprehensive. Algorithms are the opposite (MA), covering the whole solution space but time-consuming in delivering clear

design outputs. The *Morphological Delphi* can be implemented in a CAD application and support the process of idea generation (and idea management). The tool's usage domain is in the future-oriented systemic design, where the "user research" is not possible, but instead, mega-trends and expert knowledge act as the analytical base. The suggested algorithm enables the decision-makers to focus straightforwardly on the assessment of highly ranked scenarios and not on the entire solution space.

Perhaps, the tool not only can be applied in future-oriented design, but also (as a generic algorithm) in the wider domain of teamwork innovation management.

3. CRUISING BUSINESS

3.1. Introduction

Ship's architecture is central to the cruising business. It claims heavy production resources and has a lifespan of at least two decades. If the vessel's design is not designed progressive enough to cover the whole life-cycle of the ship, redesigns and modifications are inevitable (as has been witnessed in many ships).

In the 1950s when transatlantic ships converted gradually to cruise ships and changed the business domain from transportation sector to tourism sector, strategic design still did not exist as a discipline. The developments were not the result of futuristic precautionary measures, but mainly the result of gradual evolution of trial and error processes, driven by market pressure and the need for finding new functions for an existing (but no more demanded) infrastructure.

To meet the theoretical aims of my dissertation (evaluating the usefulness of MA approach in service design inquiries) cruising concept is an excellent subject of research, as it contains already a proven history of hosting multiple business models on its basic concept. Yet, there is still a wide spectrum of uncontested business domains and service possibilities to be explored systematically with a service design approach.

Being characterized by quantitative approaches, the available body of cruising research reflects mostly the status quo of the business, following predominantly the interests of marketing and tourism research. The majority of these investigations are limited in scope, highlighting only a segment of the cruising business mostly via phenomenological inquiries. (see for example Lawton and Butler 1987; Hung and Petrick 2011 and Wild 2012).

This research employs a morphological analysis to shed a bird's-eye view and explore the system in a rather holistic service design context.

The outcome of the morphological Analysis will be scenarios. Yet, scenarios in a service design context will go beyond forecasting the business in an n-year perspective: they will picture actively new usage and expansion possibilities. Shortly said: how it could look like, instead of how it probably will look like! These scenarios are UX and business proposals that address use-cases between 2020 and 2030.

Scenarios force companies to turn their internal view to an external view and estimate their future position in the business (Huss 1988). For Huss, scenarios "provide insights into business dynamics" and are completely different from forecasts.

In this chapter we (a) review the evolution of cruising concept to its current status quo, (b) discuss the "economy of scale" and the growing "bug" in this business strategy, (c) shed light on emerging niche businesses and their stakeholder mechanism, and (d) estimate influence factors that might challenge the dominance of conventional cruising scene by 2030.

3.2. The Evolution of Cruising Concept

At its core, cruising business model is -from my point of view- the business of flexibility: a business-complex based on conveying other smaller businesses, and an ideal hotbed for further service design innovations.

The concept of cruising was first developed by *Albert Ballin*, the general manager of *Hamburg HAPAG* shortly before the end of the 19th Century. He suggested that passenger ships could be utilized for leisure trips to warmer areas in the winter months (Smith 2010). Some other historians account Samuel Cunard's attempt for crossing the Atlantic on a steamship in 1840 as the first cruise trip (e.g. Gulliksen 2008).

The stage of cruising business demonstrates a history of flexibility, gradual evolution and adopting social, political and economic changes.

Cruising as a pervasive business model was developed gradually in the cross-section of two entrepreneurship models:

- Transatlantic ships transporting immigrants and travelers between European and American ports, and

- Smaller Steamships, offering to the growing population of American tourist a vacation to the Caribbean.

The evolution of the business started in 1920s when the trans-Atlantic passenger ships began a rivalry on attracting valuable wealthy travelers with more luxury and prestigious charm. Soon, comfort and entertaining services became a part of service image. On the other side, especially during the prohibition era[13], more travelers appealed to steamships, which were now offering legal bars and lavish lounges filled with alcoholic beverage onboard the designated routes between US main ports and nearby destinations in Caribbean.

It did not take long until European cruise companies noticed the lucrativeness of the Caribbean cruise industry. First during winter seasons and later (due to early 1930s recession as well as fall of trans-Atlantic migrants) in the whole year many ocean-liners were gradually diverted to Caribbean routes. Soon the Caribbean market shaped the largest scene of cruise industry and surpassed the Mediterranean in terms of revenue and number of tourists. (Maxtone-Graham 1997)

Lawton & Butler (1987) state that cruise industry was from its inception until the world war II, rather a north American phenomena, mostly based on "popularity of pleasure" traveling among growing upper middle class in the US:

"[…] This is attributable to the emergence of a clientele no longer able to afford worldwide cruises, but retaining a demand for longer-duration voyages within the region."

However, transportation from port A to port B remained central to the business until the 1960s, when passenger ships lost the competition to commercial jets in operating long distance transport market. From this period, cruise industry started gradually a service "transformation" (Jonas 2011) advertising the entertaining aspects of the cruising, in which the ship is not solely a mean of transport but a mobile platform of designated pleasure additionally.

Cruise companies also reacted to the 1973 oil crisis and the consequent economic recession in the USA with designating new short routes taking 7 days or less (in contrast to formerly 14 days programs). Longer stays in destination ports were also scheduled to save fuel. The acquisition and construction of private cruise terminals on the Caribbean Islands that was once justified by security issues, found now economic reasons. (Kerr 1985; Lawton & Butler 1987)

[13] Legal ban of alcohol consumption on the mainland USA, 1920 to 1933

The sector proceeded its evolution in 1980s and 90s with the "the economy of scale" policy (Rodrigue and Notteboom 2012), i.e. bringing Mega Cruisers and a series of new on-board services into action. According to Dowling, the emerge of on-board entertainment and leisure programs as they are common in mainland resorts (e.g. wedding chapels, skating rinks, climbing walls, shopping centers, bars, discos, casinos, health, sport and wellness facilities) and a comparatively comfort transit to foreign ports and cultures were new changes which guaranteed the growth of cruising in the new millennium. (Dowling and Vasudavan 2000)

As briefly reviewed, most of the aspects characterizing today's Cruising business model, have historical roots, each being the result of an innovative (or inevitable) respond of cruise lines to cultural, political or economic circumstances. Some of these measures proved however to be rewarding (even without the original motive) and have lasted until today. For instance, the widespread presence of alcoholic beverage onboard that was once designated to attract Americans during the prohibition era, is still a part of cruising culture (and revenue maker) globally (Fig. 12).

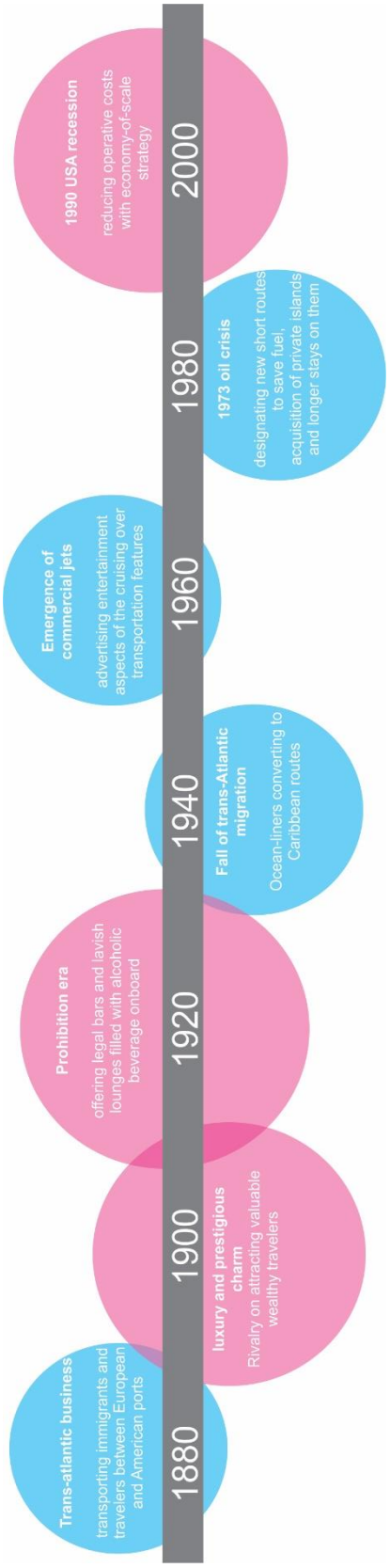


Fig. 12. Chronological evolution of cruising business & service model from 1880 to 2000

3.3. Status quo business model

3.3.1. Current challenges

Despite all developments mentioned in the previous section, the core business architecture has been remaining conventionally capital-based and new comers have to enter the business with heavy investments on both vessels (leasing or acquiring) and destinations.

Current model has to deal with two challenges:

1. long lifespan of vessels and the need to foresee the future trends

2. increasing environmental regulations

New orders are strategic long term investments based on "actual capacity openings and proper financing terms", notes Stewart Chiron (Satchell 2014). While from one side the uncertainty inherent in tourism market barely allows cruise lines to have any prognosis of their future five financial years, ships as the major tool of the sector require to be planned for an operation mainly around two decades (Schmid 2010)

Whereas the capital-based strategy seems to be dominant in the segment and owners of expensive liners are not provided with other alternatives, cruise industry has been facing iterative market shocks followed by recessions and overcapacities in its fleet. Post 9/11 effects, financial crisis of 2007-08 and Costa Concordia disaster are all recent examples, showing the sensitivity of this tourism cluster. (Schmid 2010; Wild 2012).

Considering the time needed for financing and ordering a vessel to shipyards, adding a nearly billion-dollar new ship to the fleet seems to be a high-risk investment for cruise lines. The risk turns to be higher, as due to market conditions, newer ships have to be bigger and costlier, imposing higher investment risks on ship-owners. This will particularly affect smaller cruise businesses forcing them to either merge into bigger companies or quit the market.

3.3.2. **Critique at current model**

In the course of public awareness in the recent years, cruise sector has drawn strong criticism for its negative ecological impacts and unsustainable tourism policies. According to World Tourist Organization, a sustainable tourism development should meet the needs of tourists and host regions with protecting and enhancing opportunities for the future. However, according to Walnum (2011), while maritime ways are still the most efficient services among international cargo transport systems, in the passenger section, cruise ships produce 3 times more greenhouse emissions than long haul airplanes. The differences between the emissions produced by cruise and freight ships points out a deficit in cruise business model regarding energy management. (Fig. 13)

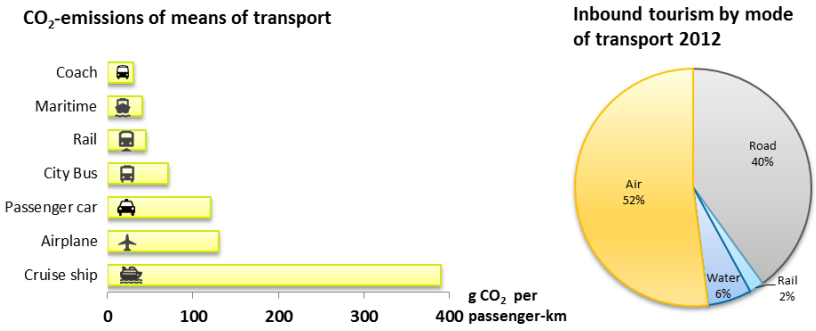


Fig. 13: Market share and emissions of cruise sector, compared to other modes of transport.

Source: Spescha & Reutimann (2013) (Inrate Sept. 2013), based on data from European Environment Agency / UNWTO 2013: UNWTO Tourism Highlights, 2013 Edition.

Interestingly, the roots of caused inefficiency in cruising concept, are unlike other tourist segments, most probable not in the "transportation part" but in hospitality part of the business. The energy used by “hotel function” of cruise ships is around twelve times as much as their equivalent onshore hotels (per visitor night). Inrate assumes that overcapacity and failing to get fully booked, huge spaces needed per passenger, and entailing inefficient amenity services are among the main causes of sectors bad resume in terms of sustainability. (Inrate 2010)

3.3.3. **Economy of Scale**

As mentioned before, in the course of 1970s oil crisis and raising operational costs, the sector (specially the north American operators) turned in the 1980s and 90s to what was later called the "economy of scale" policy (Rodrigue and Notteboom 2012) i.e. accommodating more travelers per cruise.

To appeal to the mass (specially to the middle class) *mega cruisers* and a variety of new on-board services were brought into action. This new strategy turned soon into a competition among the famous operators as part of their brand image to be launching the biggest ships.

During the last decade, large-scale business actions based on optimistic long-term prognoses seemed to be favored in the sector. Owners of expensive liners were "eager to add bigger and pricier ships to trump their competitors" (Satchell 2014). However, iterative market shocks caused by post 9/11 effects, the financial crisis of 2007-08 and the *Costa Concordia* disaster revealed a considerable bug in the cruising business model and the need to reconsidering the "economy of scale" policy: the bigger the ship, the more complex becomes a prognosis on its long-term lifecycle, and therefore, the riskier the

investment for the operator and its associated investors. According to Saleth (2010), the temporal overcapacity of 2009 in the European fleet was mostly due to the launch of new ships that was ordered already in the booming years of 2005-2006.

As for research and development, it seems mainstream cruise providers still follow a "path dependency" paradigm, laying the majority of their potential exclusively on developing the current business pattern and rejecting or marginalizing alternative outside-the-box business concepts. The result is a continuous global growth in average ship dimensions, and subsequently, in investment needed per vessel since 1990s without any remarkable innovation. The same trend applies to the border of technical possibilities, as the title of "the biggest Mega-cruiser" held by a ship, is being taken by another one shorter than expected. (Fig. 14)

Between 2000 and 2015, the border of the largest existing cruise ship has grown by 61% in capacity and 64% in the gross tonnage. From a financing perspective, an increase in building costs per unit is equivalent with an increase in total business risk (in case of a market shock).

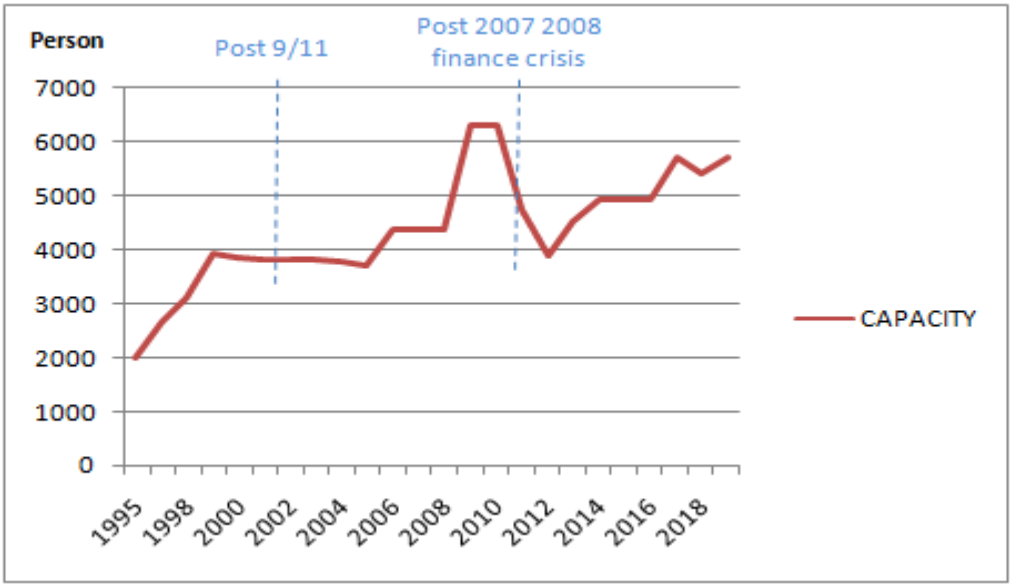


Fig. 14 The capacity of the largest cruise ship, yearly comparison between 1995-2018

Saleth (2010) discusses that the number of ship owners who can independently finance their new orders declines globally, and banks and other credit institutions gradually claim a bigger share.

The current model might be a successful but nonetheless a sensitive cluster in tourism business, which can easily fall into recession and overcapacity. As the ships grow in size, the bug exposes itself accordingly.

In a struggle to avoid these issues, some start-ups and newcomers in the marine business have embraced new alternative business concepts, arguing that risking and initiating an entirely unproven new model would not exceed the risk of ordering a mega-cruise and investing in the conventional cruising business (see 3.5).

In the following, we will review the elements of cruising business model and the possibility to reconfigure them.

3.4. Element of Cruising Concept

3.4.1. **Vessel**

The vessel and its crew make up the main operative asset of any cruise provider. Financing a ship normally demands a strengthen cooperation of three important partners in the stakeholder network: a cruise company, a finance institute and a shipyard. As a general rule, finance institutes provide the shipyard with funding supply in behalf of cruise company, and then the cruise company returns the capital to the bank gradually with the operation of the ship.

Ships are involved in the process of generating revenue in two models: Their own hotel and transportation business (marketed as inclusive package), and hosting other businesses onboard. (Known as exclusive activities).

With the emerge of mega-cruisers, ships were expanded to become floating resorts, making space for new innovations and possibilities from gym and spa saloons to rock-climbing walls and simulated skydiving, addressing all three generations of a middle class family. (Gulliksen 2008; Parnyakov 2014)

Ships -building traditionally the main structure of the business- claim now gradually (trend towards mega-cruisers) a much higher proportion of the entire enterprise. They demand however, a longer-term design, based on ship's lifecycle. Their size, speed, interior architecture and other physical characteristics are to be determined in advance to fulfill long-term market prognoses and business strategies of their respective operators.

3.4.2. **Destinations**

Destinations are portal facilities and/or natural resources that stay as nodes in between and at both ends of a route. They have been traditionally the only aim of travel, but now have found new functions in the business.

Destinations are here to be conceived as:

1- Cruise terminals at Port of calls (embarking points).

2- Port cities, culturally or economically of touristic value.

3- Recreational facilities (mostly including coastal beaches and natural refuges).

4- Expeditionary destinations & no-landing sightseeing (coastal waters and/or marine life attractions)

Most destinations are public properties. Nonetheless, from the 1980s onwards multiple large providers have invested in acquiring and excluding facilities (particularly on islands) and have add them to their business capital.

In the global scale, the number of accessible destinations have not grown in consonance with the number of operative ships (duo to different geographical, political and cultural reasons); maintaining and preserving existing destinations is a current and future challenge in the industry.

Ideally, ports of-call are located in port cities with advanced harbor facilities and cruise terminals, have themselves touristic highlights to offer, and are connected to densely populated areas or a well-trafficked airport. Cities like Barcelona and Miami which offer these features combined, are however rare and very focused by cruise companies. Rodrigue & Notteboom (2012) note that the proximity to a cruise terminal can be stimulating on deciding for a cruise, some north American providers offer multiple “close to home” ports to capture more customers with sparing them an extra flight to a hub port.

3.4.3. **Cruisers**

Cruising is a niche tourism activity and cruisers are those travelers who either switch casually between different modes of tourism, or are loyal cruisers.

Loyal travelers are those tourists who prefer to take repeatedly cruising (on the same cruise brand) rather than other forms of tourism, mostly for the following reasons:

1- Proximity to a cruise terminal

2- Aptness to Seniors and their mobility limitations

3- All-inclusivity of the travel (transport, accommodation, catering)

4- Fitting to longer vacation schedules

5- Possible financial Advantages

6- Emotional attachment to the onboard culture

A survey conducted by Doreen Bühle (2011) on German cruise travelers came across similar results with top three influencing factors being:

1- Visiting multiple cities in a short time, no hotel change (47%)

2- Curiosity about something else, recreation, variety of offers (28%)

3- Charm of the sea, enthusiasm for ship travel (11%)

For Casual cruisers and "first time Cruisers", mostly the unique experience is of importance. Nonetheless, they might shift to other options, once the curiosity is satisfied. Henry et al. (2015) also demonstrate that there are a growing number of a third group of cruise travelers, the so called "long-haul" cruisers, who are experienced cruise travelers flying from abroad to the port of call, still have no intention to return to that port or the destination for a second time, nor feel loyal to the brand they have traveled on.

As motivation for taking a cruise in general, marketing researchers come across responses such as "escaping from the routine" or "relaxation" or the "desire to explore". Yet, for scholars researching on tourism in the context of social theories, these motives may imply deeper needs and more theoretical concepts of tourist's sociopsychological behavior (see for example MacCannell 1976)

As a general concept in traveler's behavior research, these motives are divided in pushing (taking distance from the status quo) and pulling (attracting) motives. (see for example Crompton 1979; Ambrož & Ovsenik 2011) but the responses to these push and pull factors varies in different individuals, market segments and social milieus. Thus, a successful regional pattern cannot be acculturated to new less developed markets.

Jamrozy & Uysal (1994) for example, indicate that solo German travelers are more influenced by the push factors, in contrast to couples and families, which are more attracted by the pulling factors of the destination rather than getting away from the everyday life. Thus, they encourage vacation designers to address the right motives with the proper vacation product. Fu et al. (2010) on the other hand examines Chinese cruise tourists from a cultural-historical perspective and state that both push and pull factors uniquely are attributable to cultural roots and reflect the Chinese association to the water. In fact, water symbolizes those culturally praised values such as "Life", "purity" and "natural state of being". These values are referred to by Chinese travelers in form of push factors such as

"relaxation" or pull factors in form of "openness" or "Beautiful scenery". Further motivation researches conducted by Chen et al. (2011, 2016) suggest that extrovert individuals are positively influenced by the entertaining and recreational aspects (and their quantity and diversity).

Travelers with introvert character in contrast show a higher preference towards "self-esteem". They are very unlikely to use the entire facilities onboard and look normally for familiar environments. This cluster probably makes up a major typology of Asian cruisers, especially in the Japanese and Taiwanese market. For example, a "Teahouse" as a cruise product might be more appealing to Japanese tourists than to American ones.

However, Asian market as a unique entity does not exist and is represented by multiple ethnic and sociocultural milieus each having different motivations, intentions and preferences. Chen's examination on four Asian markets (Japan, Taiwan, Hong Kong and China) indicate that the decision making of Chinese tourists revolves around "children" and " Ports" while Taiwanese market is more attracted to products offering "escaping" and "bonding" opportunities. Taiwanese cruise pattern seems be more similar to that of global. A survey conducted by Hung & Petrick (2011) indicate that "escaping and relaxation" is the primary factor shaping the American cruisers' decision, followed by "Learning/Discovery & thrill", "Self-esteem/ Social recognition", and "bonding" with friends and family.

We conducted in this regard an independent Delphi survey between 2015 and 2016, evaluating the current influence factors for booking a cruise in the global market. Experts mentioned 13 different factors, of which, price, routing, destination and amenities onboard are the most important factors, reflecting the impact of marketing (materialistic motivations) on a decision-making for a cruise travel (Fig. 15).

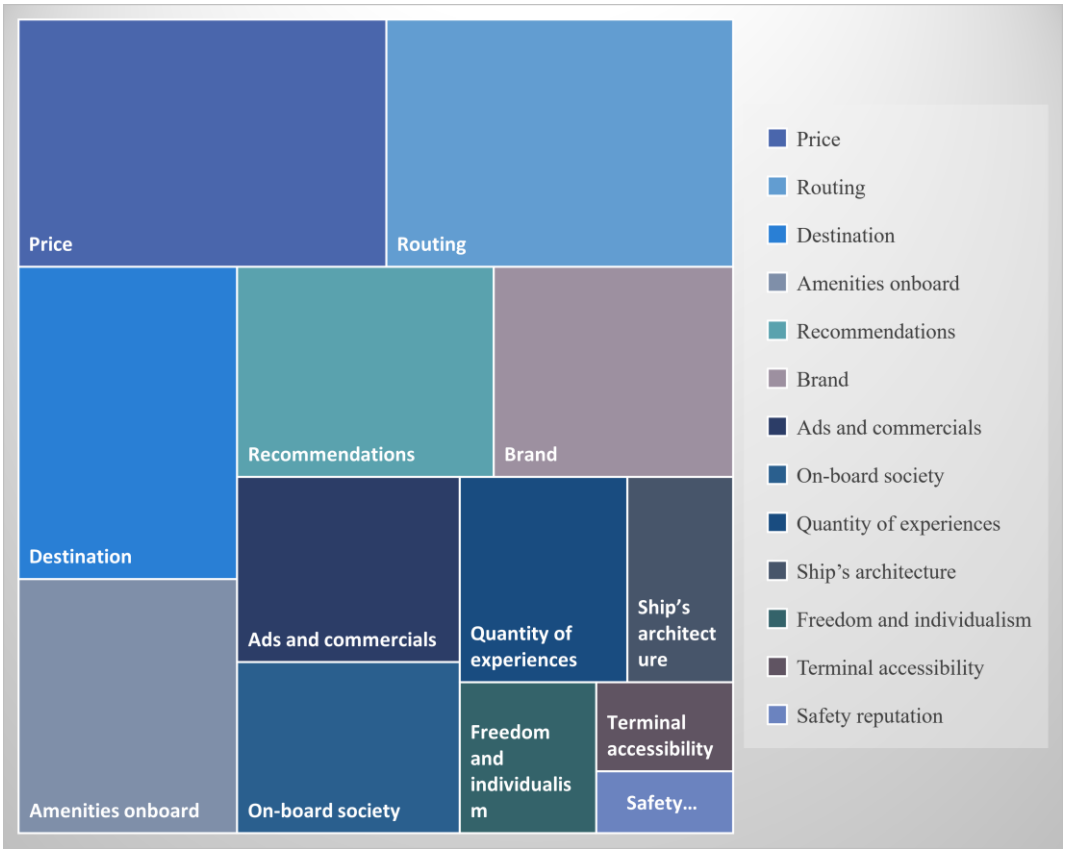


Fig. 15: Factors influencing the decision-making of current cruise travelers (28 experts participated, two invalid)

Contemporary cruising especially the north American cruise scene is associated with a so called "cruising culture" or onboard culture (see e.g. Kowollik and Jonas 2016). This recognizable culture is perhaps due to the repeating presence of individuals in a closed environment, as big proportion of the ships capacity is filled with loyal travelers and crews making a familiar (and comfortable) atmosphere.

Many characteristics of the onboard culture have historical roots and are attributable with different eras of the evolution of cruising from a transportation service to a tourism service:

- **Sailing sub-culture:** Although speaking of a single onboard-culture as Foster (1986) proposes is not universal and travelers may experience different atmospheres from cruise to cruise, yet there are common phenomena that are uniquely experienceable onboard the ships and distinguish a practice of cruising than other modes of tourism. Two elements presumably build a higher role: a congregation of people from similar class (upper middle class) with similar aims (pleasure and recreation) in an unusual habitat (maritime environment) (Douglas and Douglas 1999)

To emphasize the exceptionality of cruising, providers have retrieved and marketed many rituals and social norms from centuries of sailing sub-culture. Even assigning

ships with female name and a godmother, sail-away gathering on the deck or the symbolic dining of the captain with the travelers are evidences of the sub-culture inherited from sailing ships.

- **Luxury:** Sailing for pleasure appeared in the American's late nineteenth-century culture when a new elite class emerged in geographical proximity to the Great lakes. The rich detected the freedom and thrill on the water, and brought its luxury lifestyle onboard the private yachts. Steam-liners recognized the huge revenue the upper class can generate and introduced exclusive voyages for the rich from east coast cities to the Caribbean. In 1890s, European companies joined the competition with their more spectacular ocean liners such as the German made "Prinzessin Victoria Luise" of HAPAG, which could outbound private yachts of its time in glamor and spectacular opulence (Schwerdtner 2013). The ship's voyage and its royalty stories drew strong medial attraction and contributed to the appearance of larger luxury ships that were now a symbol of national pride and modernity on both sides of the Atlantic. (Lawton and Butler 1987)

Being known in the popular culture as the tourism for the rich, many cruisers see cruising as a demonstration of their wealth and social status or a mean to improve their personal image (Douglas and Douglas 1999; Hwang and Han 2014)

- **Beverage consumption** Although alcoholic beverages were always present in the sailing culture and generally in the leisure behavior in many cultures, introducing ships particularly as floating bars started with the prohibition era (see 3.3). In the popular culture, drinking is conceived as one of the main activities onboard, and shapes a remarkable part of the cruising (both negative and positive) image in the outside world. Its motivational factor is as high, that the introduction of a robot-bar onboard the *Quantum of the Sea* was highly advertised by the RCC (Parnyakov 2014)

As for popularity of cruise in the US market, Douglas & Douglas (1999) state that American tourists are less adventurous in comparison and have less willingness to be exposed to large-scale experiments. When it comes to international travels, they would prefer observation or limited exposure to the unfamiliar atmospheres in controlled conditions. Cruising with its preserved environment and secure guided excursions guarantees a low risk, still rich of variety travel. They also suggest that highly "Americanized" onboard events (familiar shows in the mainland US) can be correlated to the aim of guaranteeing a rapid return to their familiar ambience at the end of each excursion day.

3.4.4. Crews and human resources

There are less businesses alike cruising, in which the number of service providers might reach half of the number of service receivers. Under crew members we consider the staff

residing on the ship, including those responsible for the ship operation and those engaged in gastronomy and entertainment services, and exclude land-based workforces and associates.

Hwang & Han (2014) examine brand prestige in luxury cruises and found that the attractiveness (appearance/professionalism) of crewmembers is one of the main influence factors affecting the perception of travelers and consequently a brand's prestige.

With the growth of cruise industry, the need for skilled and educated crewmembers has been increasing continuously. In the recent years, recruiting unskilled workers from under-developing countries for "back-door" activities has become an issue in the cruise industry. In the course of global social awareness, travelers react negatively to the working conditions of this group of crew[14], which are drastically below the standards of the served society. In the Fig. 16, a Giga-mapping[15] of the cruising business model as well as the network of its stakeholders is illustrated.

[14] Compactness of the onboard environment makes interpersonal interactions between staff and travelers inevitably part of onboard experience.
[15] The term giga-mapping is used In the system design for large-scale infographics illustrating the many relationships and complexities of a system.

Fig. 16: Giga-mapping of cruising business model

CRUISING STAKEHOLDER NETWORK

3.5. Adjacent service models

Beside the "business as usual" with a common configuration of the elements of the business (listed in the previous section), many entrepreneurs have changed partly or entirely one of these elements and have initiated a niche business model or a non-commercial activity. For example, *ResidenSea* with offering *The World* has solely changed the residency model of the business (Hallman 2009). Or *Regis* the hotel ship, is principally a stationary cruise ship which doesn't offer transportation service (Kuhl 2011).

As mentioned in 3.3, with the average cruise ship growing in size, the ability of smaller providers in financing their new ships declines accordingly. This imposes further dependency of cruise providers to their financial investors (such as KfW IPEX-Bank in the German market). One hypothesis is that, cruise providers might lose their leading role in this large stakeholder network and pass it to finance investors. Although Investors would perhaps remain finance experts and are unlikely to show interest in leading new cruise projects, yet they might shift their interest (as any other shareholder) to fields with higher return of capital, which could differ from the mainstream cruise industry. (Fehr and Jonas 2013)

A second hypothesis is that, some business model concepts being today a niche, may become mainstream in the future. Motivated by "Blue Ocean Strategy[16] or financial self-sufficiency, some start-ups have embraced new alternative business concepts, arguing that, risking and initiating a new unproven model would not necessarily exceed the risk of ordering a mega-cruise and investing in conventional cruising business. (McCartan and Edens 2013)

There are different semi-cruising business models practiced by niche providers, we review those that share following characteristics:

- The ship is the main appliance of the business
- The business serves end-users

[16] Creating new uncontested market space with the purpose of avoiding direct competition mostly in saturated markets. The strategy applies innovation to generate new demand and often social trends. (see e.g. Chan Kim & Mauborgne 2005)

Being associated with the tourism sector is not a criterion here, the aim is to explore the whole spectrum of possibilities[17].

The reviewed business models differ generally in the position of the ship among the business architecture, their enterprise policies, or their stakeholder-network arrangements.

Considering the typology of users and vessels, as well as the onshore-offshore relationship in the service process, we distinguished four business domains:

- **Onboard hospitality and Entertainment**: main revenue generated by onboard activities (implemented by mainstream cruising business)
- **Limited onboard Investment:** oriented towards transportation services with less onboard facilities
- **Shore to shore floating services:** functioning as mobile buildings, service delivery at shores
- **Long Term Residencies:** Condominium and residential cruising (Fig. 17)

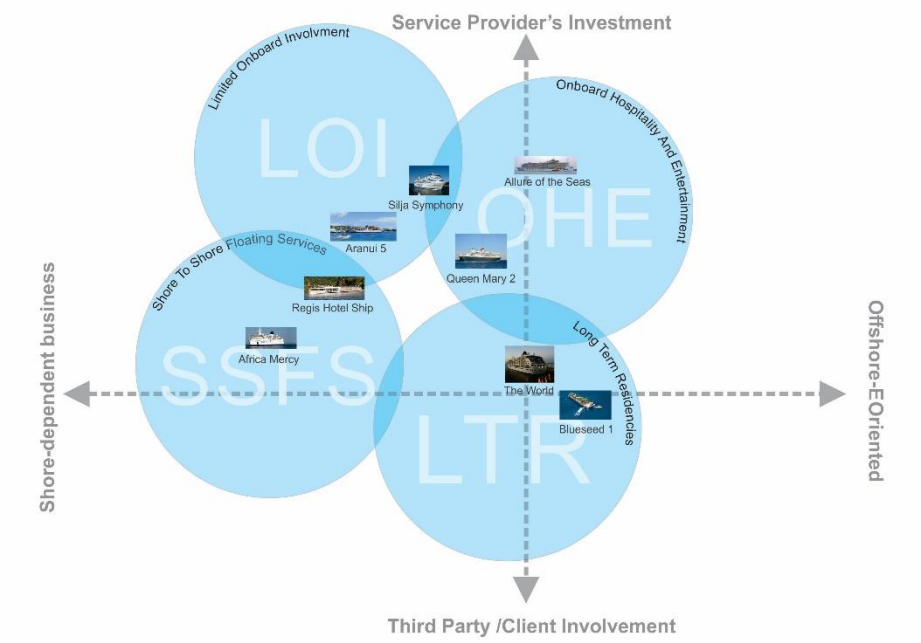


Fig. 17 Current cruising business model and its adjacent domains

[17] In order to apply MA on the cruising business we deliberately expand the scope of our investigation area towards other business and non-business domains. This enables MA to explore and generate further niche models within the cruising business, but also entirely external usage possibilities. The latter one is one of the practical aims of this dissertation listed at 1.1.2

In the mainstream model (such as in Royal Caribbean), the cruise provider owns the ship and is responsible for the entire business capital. In contrast, there are models, in which the provider shares the investment with their clients or third party investors. In terms of mobility, a series of businesses are shore-oriented, i.e. the vessel serves basically as a transporter. Therefore, vessel's mobility range and speed are important, in return, there are businesses in which, the ship is itself the destination; transportation and speed are of secondary value.

The model used today in the mainstream cruising is essentially an evolution from the classic transportation services, especially the luxurious ocean liners with long travel schedules and passengers demand for gastronomy services. Providing *Onboard Hospitality and Entertainment (OHE)* builds the core business of the mega-ship operators while the transportation part is seen essentially in charge for serving to entertainment. This policy has been dominating the North American market since 1970s and later the European market. (Wild 2012)

A small but evolving niche is *Long Term Residencies* (LTR). In this concept, the ship owner provides its users with a floating residency. The service provider shares in this way its investment costs (and risks) with its clients (Weaver 2005). The residency cruise ship "The World" (operated by *ResidenSea* since 2002) or the stationary residency cruise ship *Blueseed* (scheduled for 2018) are examples of this model.

Fig. 18 USNS Mercy-San Diego Bay - Source:blog.daum.net

Shore to Shore Floating Services (SSFS) is another less known niche in the maritime industry. This model is based on mobilizing conventionally land-based services on a floating infrastructure and is seen in commercial and non-commercial branches. "Mercy ships" with operating hospital ships and "Regis Hotelschiff" which provides floating event-hotels are of this kind. (Fig. 18).

SSFS has only been sporadically taken on by major cruise providers in philanthropy activities (see 4.3.5). However, off-season transitions to “event ships” or other land-based businesses can be seen in smaller cruise companies such as Color line (Nilsson 2009) or some other river-cruise providers specially in the European market.

A service focused mainly on transportation and mobility services with the service provider having non or *Limited Onboard Involvement (LOI)* is less favored among major lines, and is still widely driven by companies with small scale vessels i.e. ferries, expedition ships etc. Here the ship’s dynamic and technical features such as speed and robustness are crucial to the business.

With the LOI being the pre-1960 model (passenger ships) and OHE representing the current model used by Mega cruises, the LTR and the SSFS are relatively new to the sector.

However, the majority of commercial ships are designed for providing dual services, but celebrate one model over the other one. For example, while in the ferry segment, the Estonian Silja Symphony with her tax-free shops and spa facilities swings between OHE and LOI, the ferry Villum Clausen of the Danish Bornholmerfærgen stays loyal only to the LOI policy, eventually to be able to keep the title of fastest ferry in the world. (compare ships in the Fig. 17)

Therefore, among cruise and semi-cruise businesses, ships can be utilized for their:

- Transportation and freedom of movement
- Attractiveness of maritime habitat
- Space acquisition for residential/commercial usage

These three foundations (and variations of them) make up perhaps the majority of maritime businesses. Although the first and second foundation have been chronically appearing and stablished in the history of maritime businesses, the third one seems (despite high potential and technical feasibility) to have difficulties emerging in a recognized business. A notable number of launched but unimplemented projects (status quo 2017) are evidences of this disability. In the following, we review some of these efforts.

3.6. Cruise ships in the context of space acquisition

New challenges such as global warming, demographic changes and rising land costs in coastal metropolises support the idea that, taking the successful pattern of cruise industry and utilizing *Very large Floating Structures* (VLFSs) might be a sustainable solutions for land reclamation for residential, agricultural or commercial purposes (see Fresco 2007; Friedman & Gramlich 2009; Wang et al. 2008).

In the past, there was an epistemological separation between the notion of *land* and *wet* zones. Lands with fixed territories had an essential status in forming and developing civilizations. Wet zones were in return perceived as external entities, either to define the boundaries of the societies or as mediators between them. The emergence of cruise ships (and aircraft carriers) and their blossoming functionality has blurred this separation, setting new perspectives in forming floating and/or mobile communities on the sea. (Steinberg 2011, 2114–2217)

However, with the exception of cruising concept (and to some extent aircraft carriers), exploiting floating structures for deploying land-based solutions has remained a marginal segment globally. Apart from technological obstacles, a poor social acceptance, environmental considerations and above all, heavy start-up funds (needed to capitalize such projects) are among the disapproval causes of VLFSs.

Wang et al. (2008) and Lamas-Pardo et al. (2015) have conducted a comprehensive review on typology and usage fields of VLFSs. Lamas-Padro et al. classify VLFSs in two types in regard to their deployment site:

- Coastal VLFS
- Offshore VLFS

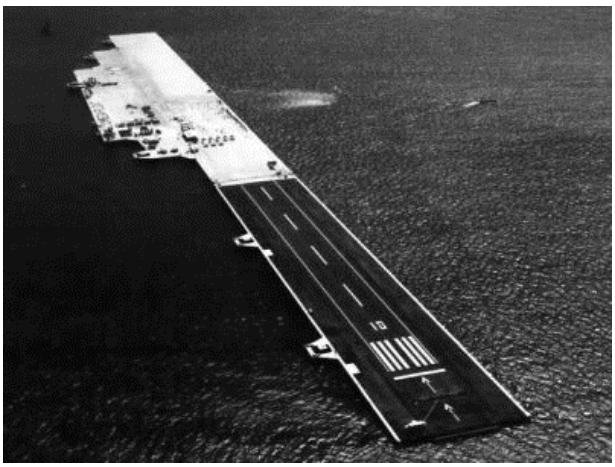


Fig. 19 Floating runway. Source: Department in Shipbuilding Research Centre of Japan (SRC)

Coastal VLFSs are normally floating entities built as extensions of the nearby lands and therefore are designed for the shallow-water. Their construction comes mostly into the consideration, when the economic value of the land they reclaim, surpasses the investment needed for their construction (and maintenance). There are existing instances of floating docks (LaNier et al. 2005), bridges (Seif and

Koulaei 2005), port facilities and other urban structures as well as a range of application proposals, from floating residencies (Callebaut 2015) to floating airports (Suzuki 2001, see Fig. 19), predominantly designed based on semisubmersible pontoons.

Offshore VLFSs on the other hand, have an older application history (see e.g. Hammett et al. 1977). Their construction is mostly aimed for exploiting ocean resources without necessarily having a fixed connection to the coast. Thus, offshore VLFSs need vessel-like structures to stand difficult high-sea conditions. There are different instances from offshore wind parks to floating oil-platforms and fishing farms but not any operative ocean based habitat. Except for a few visions and proposals, a successful attempt for stablishing offshore cities has not been performed. In comparison, smaller floating units such as houseboats[18] have a longer history in accommodating residents (and businesses) beyond the tourism sector. Moreover, they are established as different business models, both in developed countries (as a lifestyle) and developing countries (as a low-cost residency solution).

Apart from residential cruise ships that may still be associated with the tourism sector, aircraft carriers seem to be a closer example to the concept of offshore habitats (Fig. 20). For example, the USS Carl Vinson (an aircraft carrier from the Nimitz-class) consists of

Fig. 20: Inside a Nimitz class aircraft carrier. Source: http://www.mtelegraph.com/onboard-harry-truman.html

[18]A boat that serves as well as a residency is called a houseboat (Shah 2013). Houseboats can be mobile (motorized) or stationary and moored in a permanent location. In German these two types are distinguished with " Hausboot" representing the mobile, and "Wohnboot" representing the stationary version. In tourism terminology the phrase "Boatel" is used, which refers to a hotel boat.

about 5,000 permanent residents. Services onboard the ship include a post office, a supermarket, a radio and television stations, a newspaper, a library, hairdressers, a priest, a dental clinic and a hospital, so that the crew may not land ashore for months. Moreover, 1.5 million liters of fresh water is being produced daily (Strazzabosco 2004). For electricity, there are eight on-board generators, each can produce 8,000 kilowatts of electricity.

The transformation of *Minsk (*a former soviet aircraft carrier until 1993) may deliver a good image of how future floating towns will look like: It was bought and re-purposed in 2000 by a Chinese company to be a floating amusement park in Shatoujiao, Yantian District. In 2010 the ship was attracting 30,000 visitors per day (Nectar 2016). When the visitors started to drop, the ship received new function and new location to serve as a theme park in in Nantong in East China , making 5000 new jobs.(Han 2016)

First experimental attempts for establishing sovereign offshore habitats can be traced back to Norman Nixon's proposal for constructing a floating city, home to 40000 people in 1998. He raised the idea that a ship can not only be used for short-term recreational purposes but also for permanent urban life (Friedman and Gramlich 2009). His project *Freedom Ship* with a length of 1400 meters would be 4 times longer than *Harmony of the Sea,* currently the largest cruise ship in the world (stand of 2016). The concept is featured with an airport atop of the vessel, as well as apartments, commercial buildings, big shopping malls and recreational facilities. However, due to high investment costs - $ 10 Billion to 2013- (Strange 2013) the construction has not yet been started.

Bolonkin (2010) pushed the idea of *Freedom City* forward with a design proposal for reducing construction costs. He suggested using huge ice sheets produced in Arctic as a base for a floating infrastructure. A thermal insulation system consisting of conventional insulation material, an air film and a refrigeration system would provide the ice with a permanent solidity. The artificial island could theoretically be divided into smaller platforms, flow on warm waters and serve as floating airports, condominium or offshore ports.

The idea of using ice sheets originates from the *Geoffrey Pyke's* concept, who presented during the World War II the plan *Habakkuk* to British army for constructing four aircraft carriers in the Atlantic (Bolonkin 2010; Langley 1986). His studies led to the introduction of Pykrete[19] as a constructing material, which had comparatively better strength and mechanical features than plain ice. Bolonkin argues that using Pyke's method for building gigantic floating platforms in the scale of freedom ship will reduce the costs up to 10 times.

[19] a mixture of ice and 14% sawdust

Recently, more serious and comprehensive research (and development) on floating cities has been conducted by *Seasteading Institute*. With regular research cases, annual conferences and multiple campaigns for raising funds, the Institute tries to draw public attention to the advantages of establishing sovereign societies on international waters.

In 2011 two ex-employees of the institute founded Blueseed, a startup company to build the first commercial venture of this type. Plans for establishing the *Blueseed-I* , an offshore habitat 12 miles off the Californian coasts[20] was scheduled for 2014. It was however revised due to insufficient funds and finally was abandoned for newer projects (Fig. 21). *The Seasteading Institute* in return aimed at more feasible prototypes, launching in 2013 the *Floating City Project*, similar concept to Blueseed but on calm and shallow waters inside the US territory. (Czapiewska et al. 2013) The project is in the locating phase (stand Nov. 2016); an operation date has not been announced.

Wang et al. (2008) anticipate that floating cities will be finally realized within the 21th

Fig. 21 Blueseed habitat project. Source: blueseed.com

century, due to one or multiple of their advantages:

- **Construction speed:** Compared to land-based firms, shipyards are faster in delivering fabricated buildings.

- **Construction flexibility:** different components fabricated globally can be towed and assembled elsewhere in the target site.

[20] As the first step, a cruise ship was planned to be purchased and refunctioned, making offices, residencies and commercial centers. The vessel then may be stationed outside of the territorial coasts, accommodating non-American entrepreneurs without a US work visa.

- **Mobility**: They can easily be removed, relocated or expanded over the time, taking a transitionary role between cruise ships and residencies (permanent traveling lifestyle)

- **Aesthetical attractively:** The scenic value they have (or add by their presence in the coastal areas) will attract entertainment and recreational industries enjoying the waterfront aesthetics

3.7. Chapter Conclusion

Ships build the main structure of cruising businesses of any kind. Their technical attributes are determined in advance to fulfill the long-term business strategies of their respective operators. However, decision-making in terms of new orders will increasingly become an issue, as two future trends are expected to become inconsistent: ships growing in size (& price) and the increasing pace of future changes (market uncertainty). The long lifespan of vessels and the need to foresee future trends is indeed the main driver for the whole scenario research elaborated in this dissertation.

Cruising is a very complex business model with diverse stakeholders, connecting multiple sectors from tourism and retail businesses to social services, engineering and architecture. During the first part of this chapter, we reviewed how these stakeholders gradually joined the original passenger-ship concept and formed the existing model. Although the current business model experiences a steady annual growth of around 4.5% globally, there are serious concerns regarding the sustainability of this growth in the long term. All four main elements of cruising concept, i.e. vessels, destinations, cruisers and crews & human resources were reviewed during the chapter with regard to their present state and future challenges. In particular, the trend for larger vessels was discussed, and related issues such as heavy investment risks for ordering new ships, their ecological and environmental impacts and their potential to host new products and niche businesses especially as residencies or land acquisition. A brief history of attempts for commercializing semi-vessel structures (coastal and offshore VLFs) was reviewed. In order to characterize these concepts, we categorized four adjacent business and service models that have the potential to be merged (in the long-term) in the main stream cruising, phrasing them as: *Onboard Hospitality and Entertainment*, *Limited Onboard Investment*, *Shore to Shore Floating Services*, and *Long Term Residencies.* These four business domains are then integrated in the Morphological Matrix and are materialized for generating innovative business models (see 4.2.2).

4. MORPHOLOGICAL RESEARCH

What innovations are imaginable for the cruise industry in a 2030 perspective? To process this question, we need to have an anticipation about technological advances and possibilities available at the time. Yet, more influential will be the state of social, economic and political trends that shape the user's perspective and consumption behavior, and consequently cruise products of 2030. Reasonably, in such a case, when conventional marketing research is unable to deliver data about "the user of future", expert surveys are a proper alternative for collecting data. A morphological analysis will then support this process, finding interactions between local knowledge domains and developing future scenarios. A design team (or a product management think-tank) can then convert these outputs into innovative products, cruise services or backcasting roadmaps.

One should also note that, we use intentionally the term "cruise industry" instead of "cruise tourism" as we consider all expansion possibilities of the industry, which might not necessarily fit within the tourism segment[21].

4.1. Delphi inquiry

For the purpose of collecting consensus knowledge, we conducted two rounds of online Delphi inquiry between 2015 and 2016. Twenty-eight experts participated in the first round, of which, 18 experts contributed to the second round too. Panelists were chosen

[21] We consider two patterns for the development of cruise industry in Ansoff's definition: first, a *vertical/horizontal* pattern, which is focused on the mainstream cruising and stresses a quantitative increase in current success factors (growth in destinations, ships etc.). Second, a *Lateral* pattern which promotes niche businesses and seeks development with searching for uncontested markets and diversifying the business model.

from marketing, management, finance sector, cruise academic, naval architects, journalists and innovation managers, all accredited with cruise development and foresight expertise.

Experts were asked to respond only to questions related to their discipline; however, there were interdisciplinary questions addressing all experts.

4.1.1. **Survey aims**

The cruise industry has shown a considerable robustness towards risks inherent in the business model expansions. However, the growth has been historically aimed at horizontal and vertical development in classic *Ansoff Matrix* of diversification attempts.(Ansoff 1957). With the exception of few incidents,[22] major cruise lines have been understandably less interested in a lateral diversification, seeking in return less risky strategies of either market or product development.

Current Expansion attempts in the cruise industry[23] can be roughly categorized as following:

- Market Development (applicable to markets with the cruising making up still a small fraction of entire tourism market, e.g. Chinese market)
- Product Development (pursued mostly in old and nearly saturated markets to strengthen the competitiveness , e.g. in the US cruise market)
- Lateral diversification (manifested mainly by startups or small brands, venturing new domains e.g. *The world*)

[22] E.g. recent philanthropy activities recorded by multiple lines

[23] The term "cruise industry" is used to differ between a sector diversification and a corporate diversification. We do not aim diversification in a sense of business-expansion concepts in a single cruise company. "Diversification" is here used to address novel solutions that could push the conventional borders of "cruising" as an economic domain and usage area, making new business space for startups and medium-size enterprises.

As *market development* is expected to become gradually hard to achieve in post 2030 era, product and lateral diversification concepts will be probably more witnessed in the cruise industry supporting the growth rate[24].

Chesbrough (2010) uses the term "business model innovation" (BMI) instead of lateral diversification. He states that BMIs are very risky strategic "experiments", with real barriers making the success difficult to achieve. They can be as disruptive as they are promising, therefore presumably a choice for startups and medium size firms. Compared to large firms with real products and real customers, startups are de facto business experiments, "probing potential new business models".

Although BMI is rather a complex process of trial and error, exploration and learning with unforeseeable results (Sosna, Trevinyo-Rodriguez, and Velamuri 2010), practicing foresight can enhance the maneuverability of an organization with BMI. Foresight helps them to conceive socio-economic dynamics before their actual impact starts (Mootee 2013).

Here the proficiency of innovation managers and service designers in interpreting insights and converting them to tangible products or intangible business roadmaps will remain a crucial factor to abate the risk inherent in venturing BMI.

The Delphi survey aims to enrich designers' know-how via receiving support from experts during the whole service design cycle including:

- Understanding the status quo of the cruise market
- Identifying sector's future challenges
- Determining applicable megatrends
- Spotting (Service)-Design intervention possibilities
- Evaluating concepts and scenarios

[24] These two models are also more innovation-demanded and subjected to complex strategic ideation which will likely lead to a new demand for service design practice.

4.1.2. **Future cruise markets**

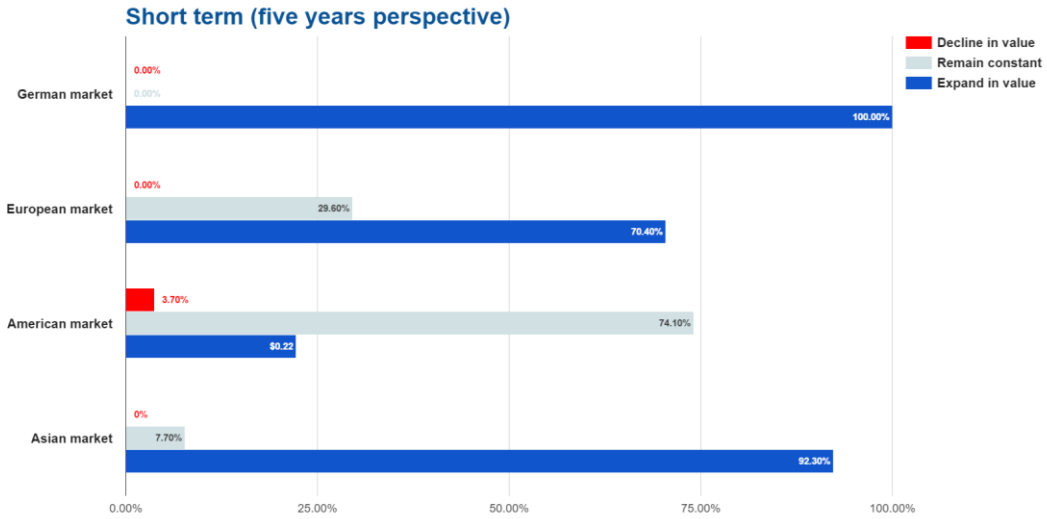
Contemporary to this research, cruise market is enjoying -thank to constant market development- an annual growth of 4.5% for nearly two decades (CLIA, Cruise Line International Association 2015a). However, the market capacity is not infinite; the industry has also seen multiple fluctuations in its history.

A foresight inquiry on the cruise market would enable us to understand when and where market diversification will no more be effective and other strategies are required.

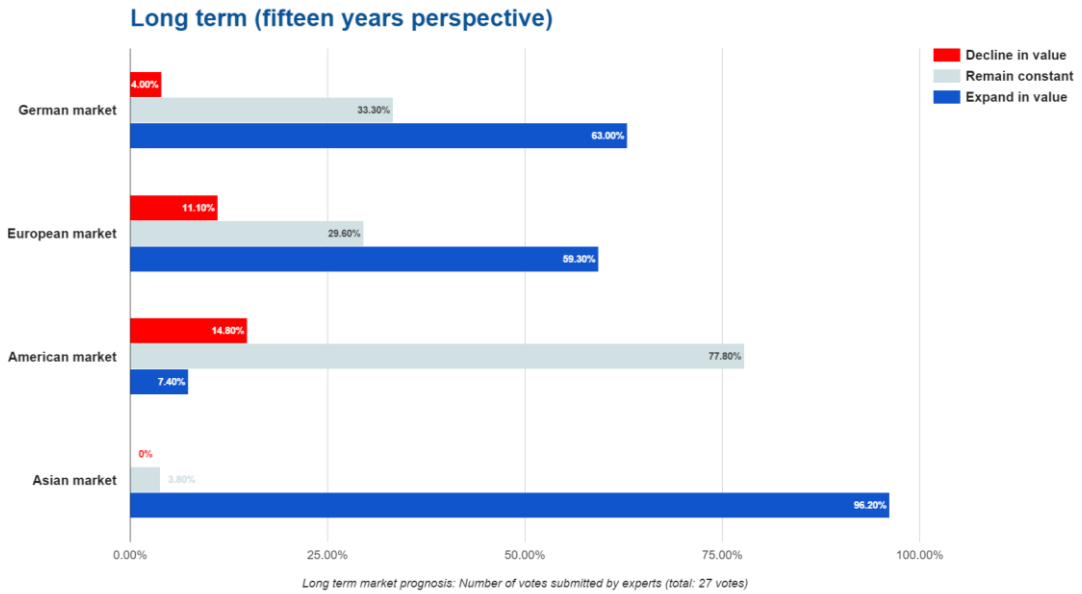
In the first round of the Delphi, we asked experts to estimate the global markets in a 5 years and a 15 years perspective:

Q. In the future, which markets will expand/decline in value?

We surveyed three regional markets (American, European, Asian) as well as the German market in particular.



Short term market prognosis: Number of votes submitted by experts (total: 27 votes)



Experts anticipated that German market (German-speaking market) will in a 5 years' perspective have the highest growth pace compared to other surveyed markets.

However, in the long term (2030 perspective) the European market including Germany is expected to show some early signs of saturation (see the indicators of "*remain constant"* in both tables).

In terms of a possible overcapacity (compare red indicators: decline in value), experts do not expect any incident in the near future until 2020. However, in the long run, the threat will exist in all markets except for the Asian market:

- German:3.7%
- European: 11.1%
- American: 14.8%
- Asian: 0%

American market[25] is conceived by experts as a benchmark for other markets. Thus, current growth rate, trends and challenges within this developed submarket can reflect the

[25] In most publications American market is mostly attributed with U.S.-American and Canadian vacation seekers as target users. Due to strong association of this clientele with programmed cruises to destinations in the Caribbean, some scholars refer to North American market as Caribbean market.

future of other markets that are still in their developing steps. To experts' opinion, European market follows and studies the American paradigm in terms of development strategies; Asian sector mostly represented by Chinese, follows the patterns of older American and European markets, yet (thanks to decades of preserved knowledge and proven strategies in those markets) will be developing with a higher pace:

> *"China is the cruise market of the future but is still a "baby" that has to be pampered and brought up, so within 15 years, it will be the growing market of the future. Compared with China, the growth [in] German, British (European) market will be small. Within the next five years, European markets will grow in a significant way as the US market shows us today…"*
>
> *Anonymous expert, May 2015*

The relative slow growth rate of 3.5 percent in the U.S. market between 2009 to 2014 (CLIA. Cruise Line International Association 2015b) compared to the accelerated development of cruise industry in Germany has urged the experts to assign a peak point for the penetration[26] of cruising. The increase in the number of passenger embarkations in a certain market segment is however in direct association with the total number of potential available tourists in the same market, which is in turn attributed to the total population as well as available tourism traffic at terminals:

> *"US and Canada have been showing signs of market saturation in the past few years, and I don't think this was a temporary phenomenon. Latin America's affluent upper classes are limited in size and don't seem to grow much in numbers of households, so not much new demand can be expected from there either. Asian demand, by contrast, is only beginning to wake up. This is where the cruise industry's hopes lie. Europe is somewhere in between, with some large, more mature markets (especially UK, followed with some distance by Germany and Italy) and several earlier-stage and question-mark markets."*
>
> *Anonymous expert, June 2015*

Changes to the demography of cruisers was also one key factor influencing the dynamic of markets especially in Europe, yet a point of discrepancy. While some argue that the expansion of the EU as well as the baby-boomers starting to retire will generate a new wave of first time cruisers, others warn that the shrinking upper-middle class will affect specially the European and American Market:

[26] It's share among other modes of vacation travel in the tourism sector.

"... The markets in America and Europe will have problems [for] growing as elderly people, giving support to the development in the cruise industry so far, won't have as much money as they have today."

Anonymous expert, May 2015

Experts also noted following points regarding the market dynamics in the 4 surveyed regions and sub-regions:

- Most potentials in the U.S cruise market have already been utilized.
- German market is still immature but with high potential.
- New EU members will improve the German cruise in the long term.
- New customers can be still globally gained until 2020 by market development (launching new routes, ports of calls and destinations).
- Between 2020 and 2030 Low cost cruising (McDonaldization) will bring new passengers onboard

4.1.3. **Future challenges of cruise industry**

Challenges that cruise industry will perhaps meet in the future have been sporadically mentioned in the (cruise) research society (see 3.3.3). Economic and ecological concerns seem to be the main issues addressed by scholars. In the first round of our Delphi survey, we urged the experts to contribute in providing an updated insight and assisting us to compile industry's future challenges between 2020 and 2030:

Q: In your opinion, what challenges will affect the future of the cruise industry (horizon 2020-2030)?

In respond to this question, 48 challenges were named. Passing through a qualitative data assessment the challenges were clustered in 11 main topics and compared accordingly (see Fig. 22).

To our surprise, experts did not name "oil prices" or "Yield management" as the most likely challenge, but "green cruising" (27%).

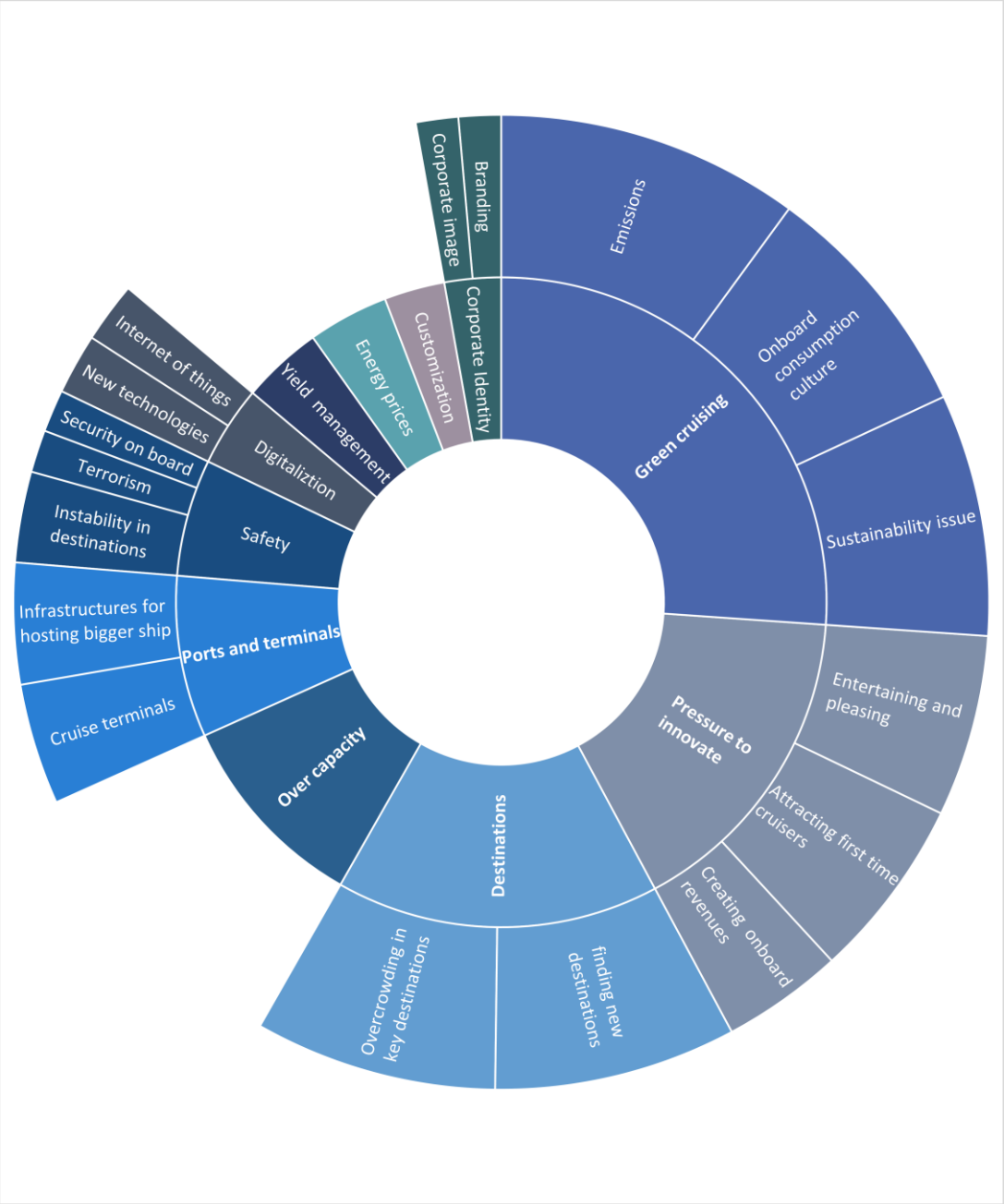


Fig. 22 Future challenges of cruise industry named by experts (Round I, 28 experts, 48 challenges named)

"Green cruising" especially emissions and ecological impacts are topics that concern cruise providers at the present (see 3.3.2). In countries with a high environmental awareness such as Germany, the bad reputation of cruising in being an emission-high business accompanied with an unsustainable consumption culture has been a strong rejection factor among potential tourists.

"Destination" (16.7%) and "pressure to innovate" (16.7%) are also other challenges that cruise sector will be facing in the future. The latter one probably mentions the importance of innovation in feeding the constant demand of tourists for "the new". Perhaps when

there are less destinations to utilize, the creativity of cruise providers in enhancing product diversity onboard the ships will be a vital means of marketing.

Another future issue mentioned by specialists is the "Over capacity". With many mega ships being ordered (due to providers' optimistic outlook on the upcoming financial years), concerns around filling all capacities arises:

> *"Although the number of passengers is increasing every year at the moment, I think it will be a challenge to fill all the capacities which will exist by then with all new ships coming. In addition to this it will also be a challenge to find enough ports where those ships from the Breakaway-Class or similar size can dock."*
>
> *Anonymous expert, May 2015*

Beside the mentioned four challenges, providing infrastructures for hosting bigger ships, ticket-pricing and terrorism and safety issues were less likely but considerable challenges that experts draw attention to:

> *"Continued massification leading to overcrowding of key destinations, for which, there is no substitute. Ticket-price-based competition as a side effect of massification and capacity growth, making cruise lines ever more dependent on onboard and fringe business. Geopolitical uncertainty is likely to stay, limiting the choice of safe and culturally rich destinations. Demographics may also start kicking in (post-baby-boom cohorts in their best cruise age)."*
>
> *Anonymous expert, May 2015*

In the second round we requested panelists to express, to what extent do they agree with the outcome. They were asked to rank items from the listing table according to their priority, regardless of the results from the first round. The results show that experts have verified the outcomes from the first round with some minor corrections. For example, the four top challenges remain unchanged, however, "pressure to innovate" that was in the first round identical to the destination, is now to expert's opinion more challenging. "Yield management" received this time a higher ranking too, indicating experts' concerns in terms of ticket pricing and revenue policies in the post-fossil era. (Fig. 23)

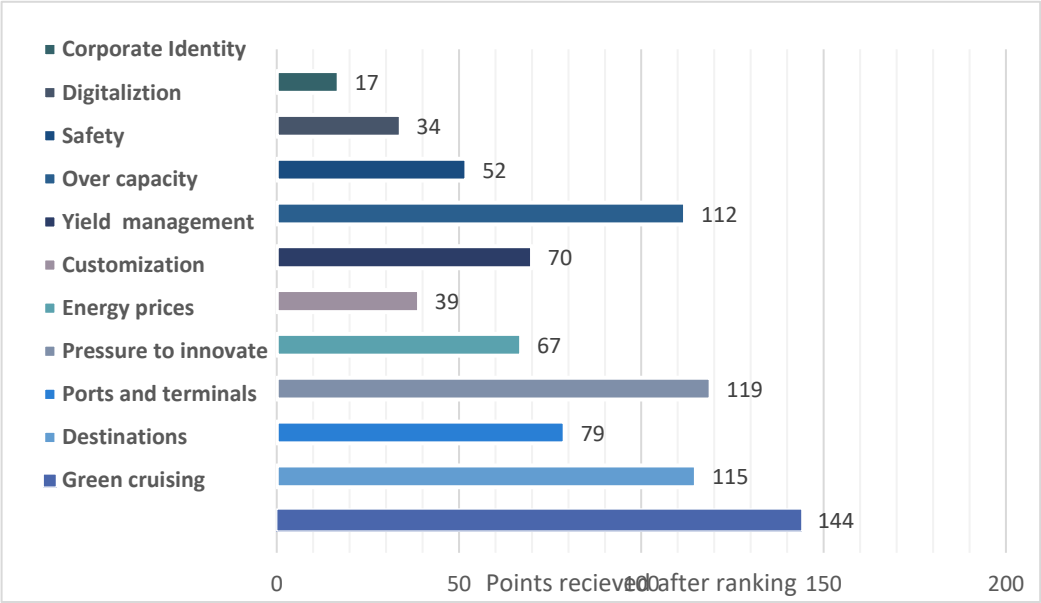


Fig. 23 Future Challenges of cruise industry (round ll, ranked by 19 panelists, 2 entries invalid)

4.1.4. **Destination vs onboard experiences**

The question on the future of the provider's tendency to keep travelers' expeditors onboard has been the matter of discourse in the recent literatures. Whether or not the marketing importance of destinations will be surpassed by onboard activities duo to this trend, would be an associated topic[27].

We asked the panelists to deliver a prognosis regarding the future of these two fundaments of cruising concept in the three market segments, American, European and Asian as well as the sub-market Germany:

As illustrated in Fig. 24, experts believed that in the German (and to some extent European) market, visiting destinations will still remain more important or at least equally important to ship-side activities. In contrast, American and Asian market will shift strongly towards onboard businesses.

[27] The answer to this question is of high relevance to the aims of this dissertation, as we pursue business model innovations and solutions only in association with ship design and architecture.

The result implies also a future divergence in the European and American typology of cruising: The European cruise sector (including Germany) started its debut with having the American cruising culture as its business paradigm. Yet, cultural differences and geographical possibilities is driving the European cruise to designate its own cruising model, enjoying denser destinations and having a wider spectrum of touristic attractions. Since

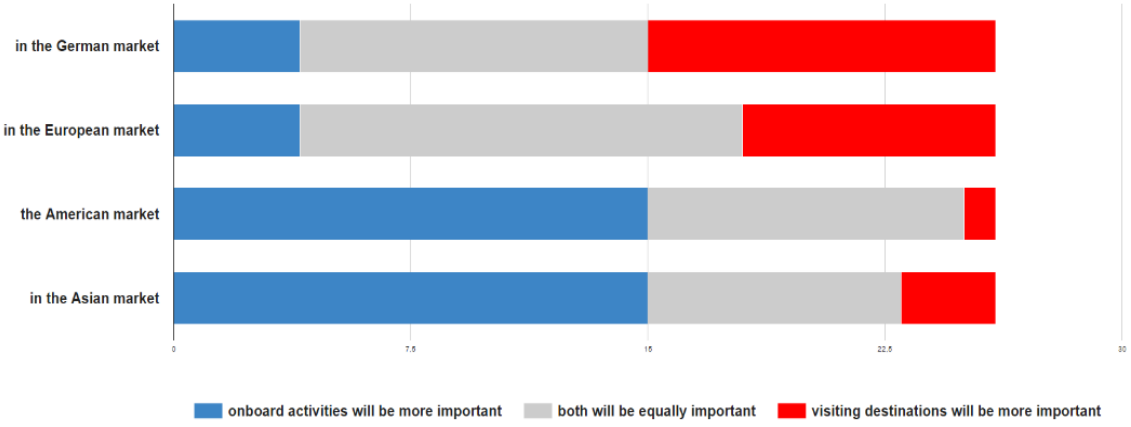


Fig. 24 "Destination" vs "onboard activities": anticipated by 26 experts responding to the difference between different markets (Delphi survey round I)

this feature does not exist in the American market, experts expect that in response to raising operation cost in long distance cruises (e.g. fuel costs), providers cut long distance cruises (from two-week pattern to one-week or less) and move rather towards more profitable on-board activities, providing the middle class (as its largest market) with more affordable low-budget cruises.

Asian cruise sector (sometimes conceived as only the Chinese market) on the other hand, is comparable with the European market in the 80s and 90s: following the American cruise model as a successful pattern. In the long run, however, Asian market will have to keep following the American ship-centered cruising paradigm, as unlike Europe, cultural variety in Asia stretches in a wider geographical area (C. H. C. Hsu 2015).

Beside the clear possible conclusion of “less destination options leads to more onboard options”, different expert groups seem not to agree with the global orientation of cruise sector in 2030 regarding “destination vs ship question” topic.

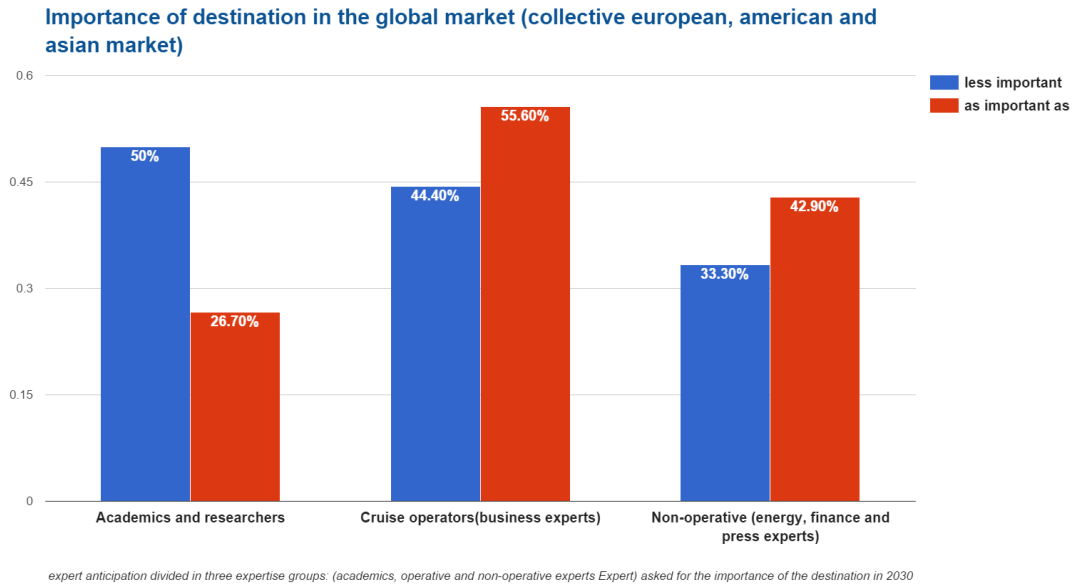


Fig. 25 expert anticipation divided in three expertise groups: (academics, operative and non-operative experts) asked for the importance of the destination in 2030- Delphi survey round I

While more than half of experts employed by a cruise provider believe that "visiting destination" will be as important as onboard activities (55.6%), this amount between the academics was only 26%, yet some 50% of them anticipated that destination will lose its value in the future. (Fig. 25)

Experts from cruise companies support their stand arguing "*the key idea of a cruise is to see various destinations within a short period of time*" will always be praised by customers. Academics note in the contrary that onboard products are much more variable than destinations: by 2030, there will be likely a large population of U.S-repeaters that have visited the majority of their nearby destinations. For this clientele being pampered and entertained with most new experiences on the floating resorts will matter more than visiting already visited destinations.

Cruising without destination is another topic concerning cruise experts. Whether there will be a remarkable market for cruising without destination by 2030, the panelists evaluated the case as rather unlikely. (Fig. 26)

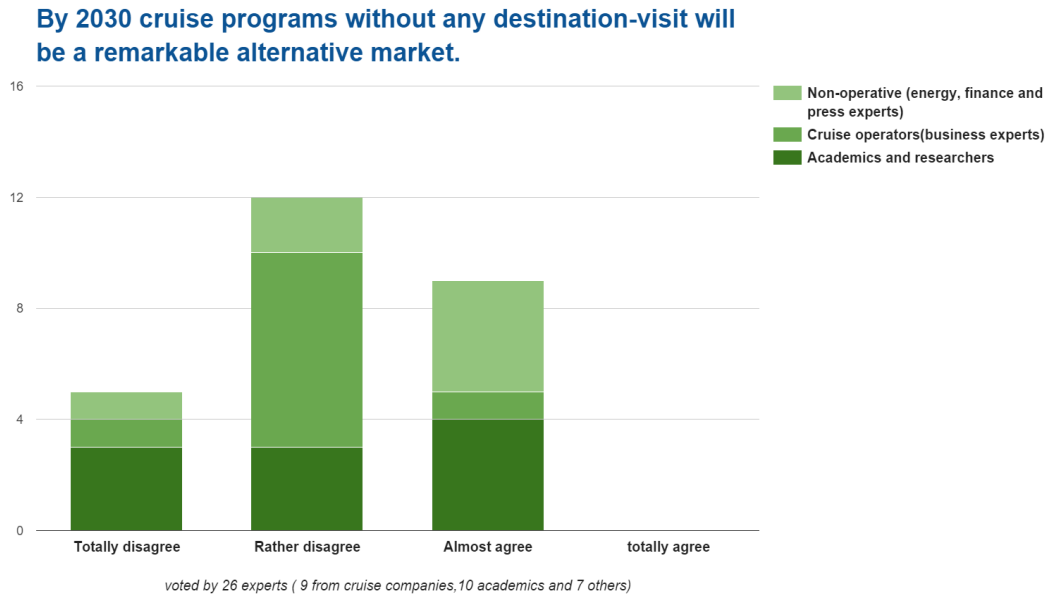


Fig. 26 Cruising without any destination voted by 26 experts - Delphi survey, first round.

Yet experts expect that floating islands or stationary ships evolve as a new vessel type and cruise product. Perhaps the evolution of mega cruises as floating theme parks will lead to larger vessels that have no propulsion system, but in return, more surface for entertainment and recreational facilities. (Fig. 27)

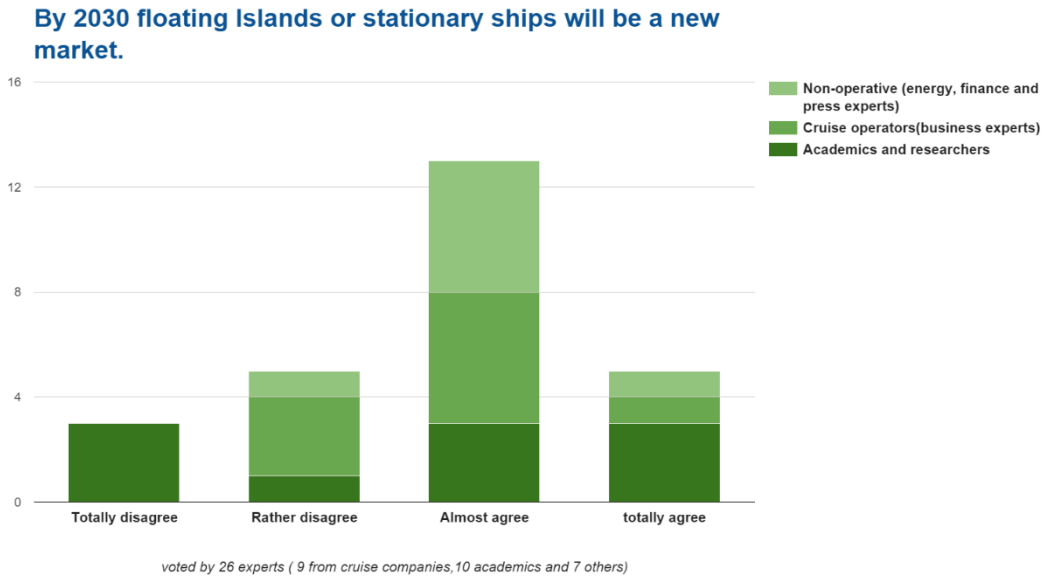


Fig. 27: floating island as a new trend, voted by 26 experts-Delphi survey, first round.

4.1.5. Future trends

Regarding the importance of megatrends would the statement suffice that many current drivers present in the cruise industry have been identified as global trends one decade ago by trend research organizations.

Due to heavy costs of adding new ships to the fleet and the long life cycle of ships, cruise lines are particularly obliged to have long term strategies and therefore are heavily reliant on trend researches to best "exploit opportunities, to keep up with the accelerating pace of change in technology and to improve business results" (S. Singh 2012, 227)

In order to identify trends applicable to future diversification strategies (see 4.1.1), experts were faced with a list of trends (and their sub-definitions), asking to respond to three questions (Table 3).

<table>
<tr><th>LIST OF TRENDS (Provided by Z_punkt 2015)</th><th>QUESTION</th><th>ADRESSED DIVERSIFICATION</th></tr>
<tr><td rowspan="3">Demographic changes
Individualization reaches a new stage
Social and cultural disparities
Reorganization of healthcare systems
Changes to gender roles
New patterns of mobility
Digital culture
Learning from nature
Ubiquitous intelligence
Technology convergence
Globalization 2.0
Knowledge-based economy
Business ecosystems
Changes in the work world
New consumption patterns
Upheavals in energy and resources
Climate change and environmental impacts
Urbanization
New political world order
Global risk society</td><td>In your opinion which of trends above can change the type of current travelers in a 15-year perspective? (age, gender, nationality and social milieu)</td><td rowspan="2">product Development and Market diversification</td></tr>
<tr><td>Which trends will particularly affect the architecture of future mega cruisers as a platform for mass-tourism?</td></tr>
<tr><td>In your opinion which of these trends can result in new ship types connected to new niche businesses?</td><td>Business Model Innovation (BMI / Lateral diversification)</td></tr>
</table>

Table 3: Megatrends enquired in a Delphi survey addressing market development, product development and BMI

The questions were indirectly referring to three[28] possible diversification strategies in Ansoff's definition (Ansoff 1957). Among the 20 megatrends suggested, experts identified eight factors[29] as most influential on mainstream cruise products. *Demographic changes* was foresighted by experts as the most important driver, followed by *Digital culture*, *Individualization* and *New consumption patterns*.

However, with the exception of *Demographic changes*, experts did not distribute similar trends to the surveyed diversification possibilities. For instance, while *Individualization* to expert's opinion would affect heavily the architecture of mega cruises in the context of mass tourism, it will not lead to a diversification in typology of travelers. Reversely, *Changes in the work world* would best contribute in generating new markets (first-time cruisers) rather than causing new products onboard. (Table 4)

Trend List	Trends changing the type of current travelers	Trends affecting the architecture of mega cruisers	Summery
Demographic Changes	**11**	**11**	**22**
Digital Culture	9	**5**	**14**
Individualization Reaches a New Stage	2	**9**	**11**
New Consumption Patterns	**6**	3	**9**
Climate Change and Environmental Impacts	5	2	**7**
Global Risk Society	5	2	**7**
Social and Cultural Disparities	4	3	**7**
Upheavals in Energy And Resources	3	**4**	**7**
Changes in the Work World	**6**	1	**7**
Learning From Nature	3	3	**6**
Changes to Gender Roles	2	**4**	**6**
Globalization 2.0	5	1	**6**
Technology Convergence	3	3	**6**
Business Ecosystems	**6**	2	**6**
Reorganization of Healthcare Systems	3	2	**5**
Urbanization	2	2	**4**
New Political World Order	3	1	**4**
Ubiquitous Intelligence	2	0	**2**
Knowledge-Based Economy	2	0	**2**
New Patterns of Mobility	5	0	**0**

Table 4: Megatrends influencing mainstream cruise products in a 2030 perspective (Delphi survey, round. II)

[28] The first and second questions address a mixed product and market development and the third question address BMI.

[29] The top five nominations of each question were selected. "Demographic Changes" and "Digital Cultures" were common in both columns. (see table 4)

For a lateral diversification, experts nominated 5 megatrends, of which *Demographic changes* is common with the previous list. Four new megatrends i.e. *Climate changes and environmental impacts*, *Social and cultural disparities*, *New patterns of mobility* as well as *Learning from the nature* are also highly influential factors in terms of BMI. (Table 5)

Trend List	Trends resulting in new ship types connected to new niche businesses
Demographic Changes	**7**
Digital Culture	4
Climate Change and Environmental Impacts	**8**
Individualization Reaches a New Stage	4
Global Risk Society	4
Learning From Nature	**7**
Social and Cultural Disparities	**5**
New Consumption Patterns	4
Upheavals in Energy And Resources	4
Changes in the Work World	3
New Patterns of Mobility	**5**
Reorganization of Healthcare Systems	4
Changes to Gender Roles	2
Globalization 2.0	1
Technology Convergence	1
Urbanization	3
New Political World Order	1
Business Ecosystems	0
Ubiquitous Intelligence	2
Knowledge-Based Economy	1

Table 5: Most influential megatrends in terms of business model innovation in a 2030 perspective *(Delphi survey, round. II)*

As argument for their choice, experts delivered multiple complex and associated scenarios. For example, *Demographic changes* together with the raising trend *Reorganization of healthcare systems* will likely make sheltered traveling scheme (floating retirement home) a notable niche in the cruise sector.

"Individualization reaches a new stage" and "*New consumption patterns*" to experts' opinion can also source another wave in the cruise industry: Retired persons have already shown strong enthusiasm towards mobile lifestyles. In the US for example, mobile-home parks are at present a fast growing market. Some wealthier retirees already spend a large portion of their time on cruise liners as a way of life. The demand for boarding a cruise ship as a continuation to mobile homes or generally for individual lifestyles may not be supported by current ship designs and architecture focused on programmed "two-week" mass tourism.

The new development in real-estate market can be also transferred to cruise sector:

Single-monthly-subscriptions allowing residents to access apartments in various cities around the world is becoming a new trend followed by individualism, globalization, and new consumption patterns: "*Ships designed for this market will have familiar amenities akin to those of an upmarket apartments and small town rather than exotic attractions and activities designed for families." (Anonymous Delphi panelist- ship building expertise)*

Many experts also agreed that cruise industry has been less "*learning from the nature*" considering the vast potentials available. A trend that together with global ecological awareness will specially affect ship building in the future: *„Future mega cruisers will probably lose their boring appearance as "machines" for the efficient delivery of vacation experiences. Interior and exterior design will be much more diverse and heterogeneous, maybe mirroring a small- or medium-size city in its diversity."(Anonymous Delphi panelist- ship building expertise)*

4.1.6. **Ship dimensions**

The maximum dimension of mega cruisers has been lately the matter of speculation among scholars. It would be a key advantage to have an outlook over the size of future mega ships, since larger vessels can offer more freedom for onboard service design and product development concepts.

A traceable history can be observed in terms of a constant increase in capacity and dimension of cruise ships. Following the economy of scale, the average capacity of ships ordered by global cruise providers has been continuing to increase remarkably since 1990s. Same trend applies to the limits of technical possibilities, as the title of the "largest Megacruiser" held by a ship is being taken by another one, shorter than expected. Between 2000 and 2015, the size of the year's largest cruise ship is extended by 61% in capacity and 64% concerning the gross tonnage. (Mozuni and Jonas 2016, see also Fig. 14)

In a hypothetical linear growth, the development within the last 15 years can be an indicator for the future 15 years. Although some experts doubt such a development due to technical or economic reasons, some other see it as entirely probable, at least as a manifestation of brand supremacy in the sector.

In the first round of Delphi survey, we exposed three scenarios for discussion, a best case, a worst-case and a moderate scenario regarding the ship dimensions and asked experts to evaluate them:

To the question of whether ships with 10k passengers or larger will exist by 2030, experts responded diversely, from "*approximately 6,000 Pax is the maximum capacity accepted by guests*" and similar comments voting for the unlikelihood of the scenario (63%) to positive responses such as "*on the base that the ships become the destination, they will grow bigger and bigger*". (See Fig. 28 & Fig. 29)

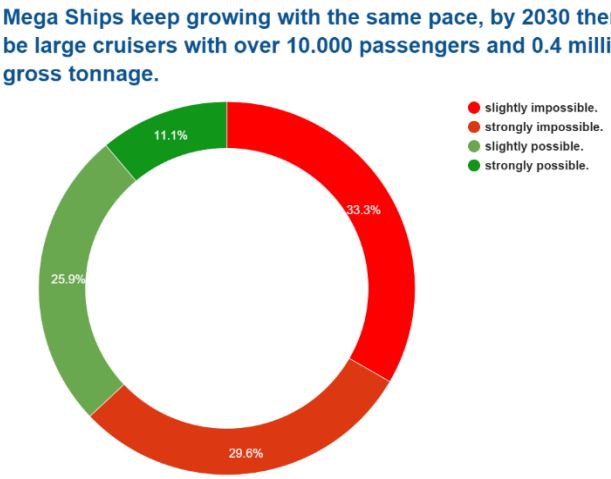


Fig. 29 Likelihood analysis of ship dimension, best-case scenario, (Delphi survey, first round- total: 27 experts votes)

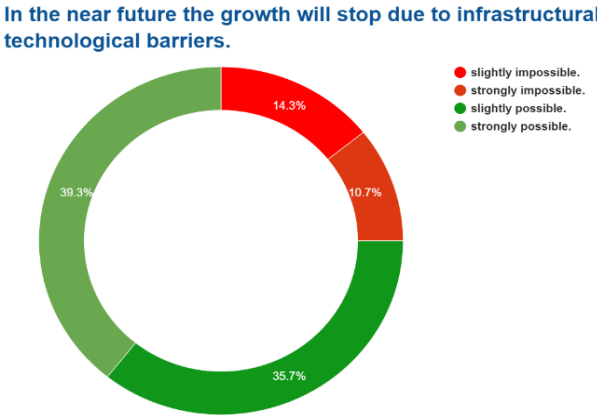


Fig. 28 Likelihood analysis of ship dimension, medium case scenario, (first round of Delphi survey- total: 27 experts voted)

Analog to their response, the majority of the panelists believed to a medium case scenario, in which, the growth would stop in the near future, most likely due to infrastructural and/or technological barriers.

We asked panelist to respond to a worst-case scenario, in which, mega cruisers lose their current popularity and the trends shifts to smaller vessels. To our surprise, many experts considered this scenario as possible (72%), delivering “individualization” as the key factor (Fig. 30).

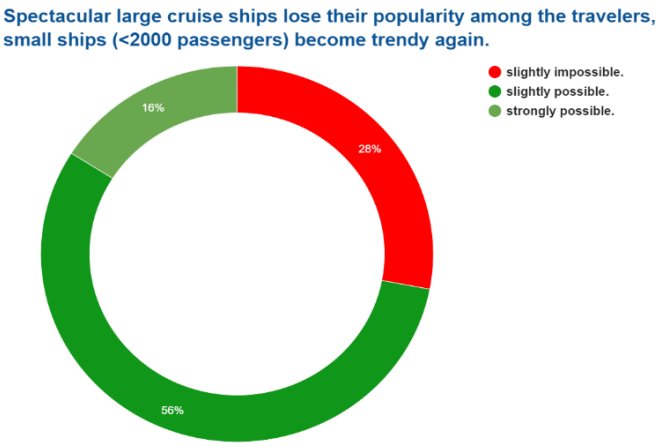


Fig. 30 Likelihood analysis of ship dimension, worst-case scenario, (first round of Delphi survey- total: 27 experts voted)

To the opinion of these panelists, smaller ships with a capacity around 2000 passenger or less will make up the majority of the providers’ fleet in 2030. However, in the second round of the Delphi inquiry, this argumentation was rejected again by different counterarguments. For example, some stated that the demand for cheaper ticket prices would not let mega cruisers decline. Others stated that both trends could grow simultaneously: People’s interest for big ships will stay alive, but a new interest for small ships will emerge and grow as people look for exclusive forms of travelling. Big ships will become floating center parks.

Regarding technical and infrastructural barriers, the majority of panelists anticipated that they will likely cause mega cruisers from further growing. For example, recent ban of big cruise ships imposed by Venetian authorities or tonnage restrictions of ships visiting Hamburg due to the depth of Elbe and many other local regulations (e.g. disembarkations capacity limits in some destinations) are different obstacles that were mentioned by panelists advocating this scenario.

Since the responds to the state of ship dimensions were very diverse and contradictive (the minority delivered more compelling reasons than the majority), experts were given the possibility to compare their votes with other panelists in the second round of Delphi.

We chose 4 arguments (representing 4 different perspectives) and asked the experts to evaluate them (agreement level from 1 to 5). In this way, panelists could possibly rethink their mind and come to a consensus summery.

Statement I	agreement level
"There is a market for all tastes. So there will be mega ships which will be highly popular as well as the more tranquil choice of small ships. I can imagine that even larger ships than the Oasis or Allure of the Seas can be built which reach up to 10,000. The question will be though, where they can disembark passengers in a comfortable way, as they might not have sufficient infrastructure in ports. Even when the Oasis was built, cruise ports had to be adapted to cater to her size. Another possibility would be of course to offer cruises to nowhere or ports for tenders. The larger the ships the more likely they have great onboard entertainment for passengers and the passengers are less willing to leave the ship. So the ship becomes the destination in that case which in turn means higher profits for the cruise company due to onboard revenue. "	2 2 3 3 4 4 5 5 5 5
Experts predominantly agree (6 agree votes (green) vs 2 disagree votes (red))	

Statement II	agreement level
"I think the maximum of size is reached. Even now there is the problem that those large ships can't go to every port they would like to. I experienced among cruise passengers, that they like the small ships better, as it is more 'familiar'. But this is also dependent on the culture. I also experienced that Americans love those big ships and that this is rather the destination than the places they are going to. "	1 1 2 2 3 4 4 5 5 5
Strongly disputed (5 agree votes (green) vs 4 disagree votes(red))	

Statement III	agreement level
"I would expect that the size of the vessels will still increase but at a lower rate and at the same time smaller vessels with higher standards will become more popular."	4 4 5 5 5 5 5 5 5 5
All agree (10 agree votes (green) without anyone disagreeing)	

Statement IV	
It is going to be technically difficult for mega ships to disembark in a single day; ports are not fully equipped to accommodate 10 thousand passengers. The new market (BRIC and China) will offer mega ships, older markets, European and American market will prefer the small ships.	2 2 3 3 3 3 3 4 5 5
rather ambiguous, experts couldn't conclude (5 neutral votes (in gray))	

The results from the second round indicated that many experts have revised their judgment from the first round. The assumption that the maximum capacity is already reached became falsified. In return, experts all agreed that there will be a two sided development. Contemporaneous with a strong demand for smaller exclusive cruise ships, mega cruisers will grow larger, yet in a slower pace than today.

4.1.7. **Survey summary**

The survey proves again that the sector still follows business guidelines which Weaver (2005) demonstrated a decade ago in his "McDonaldization Thesis": "rationalization, standardization, and routinization" shaped by strong price policies. The vast majority of providers rely on the price-volume strategy, emphasizing on turnovers generated by entertainment, consumption and pseudo-luxury experiences. However, based on the results, cruise operators will have to face challenges such as "green cruising", "destination management", but also "pressure to innovate", which in the long run will surpass the "pricing problem" in terms of priority.

The cruise product is currently designed for the short-term, market and marketing-driven and less innovative, demonstrating "more of the same". The demand for boarding a cruise ship as a continuation to mobile homes or generally for individual lifestyles may not be supported by current ship designs and architecture focused on programmed "two-weeks" mass tourism. Megatrends such as demographic change, digitalization and individualization will strongly influence these patterns and will cause new impulses in the cruise industry.

As conservative market-penetration strategies are becoming ineffective (due to the growing market saturation), it is expected that cruise companies will have to venture "product and lateral diversification" strategies in the middle future. Modified business models and

innovative niche concepts are foremost expected to be introduced by American providers, since the US market is the first affected by market saturation.

Incentives for new strategies and innovative niches will come in particular from "demographic changes", "climate changes and environmental impacts", "learning from the nature", "social and cultural disparities" and "new mobility patterns", attesting the experts involved in the Delphi survey.

In the future, vessels as the hardware of the business will have to undergo many structural and architectural changes. Due to the long lifecycle of ships (up to 30 years), it is necessary that cruise providers and shipyards consider these future challenges when ordering and designing new ships.

4.2. MA Matrix

As discussed in 2.4.5 and followed in 4.1.1, we build 2 separate matrixes, one seeking for ideas in "product development", and one aiming at the more complicated "business model innovation" in delivering niche cruise businesses.

During the Delphi survey, experts identified the most influencing megatrends needed for both matrixes. Many important key-factors required for each diversification strategy were also extracted from the topics discussed in the third chapter.

An early matrix of the morphological Analysis can be now built. This matrix helps the design team to evaluate the quality of generated scenarios, and iterate earlier stages to gain satisfying scenarios. Once this level is achieved, we can proceed to the step of system thinking and reflection (See 5.1).

4.2.1. Matrix for Product development

Today's onboard products of cruise ships are mostly associated with responding to two basic tourist needs: entertainment and recreation[30] (see also 3.4.3). In this regard, almost every entertainment or recreational product available on land could be implemented onboard the ship. Even commercially unsuccessful land-based concepts could be taken here in consideration since:

[30] The transportation function in its today's format serves principally these two needs.

1. Ships are conserved environments; the user has to decide within a not very diverse spectrum of options

2. Having a status of a tourist, the general willingness to venture unproved, risky or expensive experiences is higher.

Yet, our aim is not to brainstorm possible business concepts that could be running onboard a ship, but to systematically detect and rank most novel, feasible, robust and promising service concepts imaginable in a 2030 perspective.

Our analytic matrix consists of three interacting dimensions, the challenges ahead of the industry (1), attributes of solutions or products that are to be invented (2) and megatrends that can accelerate (or hinder) the development of these solutions (3) (Fig. 31).

4.2.1.1. Dimension (A): Future challenges

From the list of future challenges detected during the Delphi survey, (see 4.1.3) those relevant to product development are being selected. The challenges should pass two criteria:

a. Generating or influencing an end-user experience onboard.

b. Generating direct or indirect revenue for the cruise line.

We chose according to these two criteria, three challenges directly (*Customization*, *Yield management* and *Overcapacity*) and seven sub-challenges associated with *Green cruising*, *Pressure to innovate*, *Digitalization* and *Corporate identity* (see Table 6)

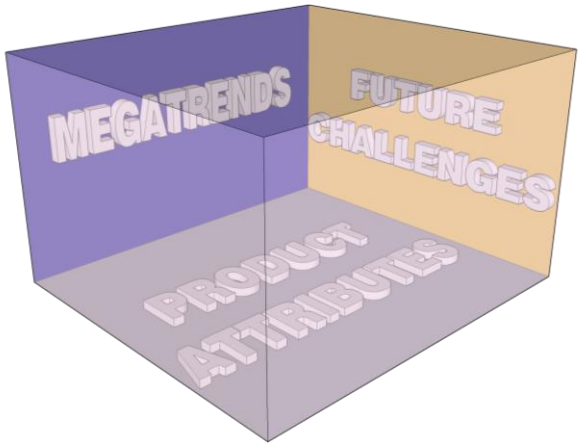


Fig. 31 Interaction of future challenges, Megatrends and Product attributes in a three dimensional matrix

CHALLLENGE RELEVANT TO PRODUCT DEVELOPMENT	SUB_CHALLENGES
Green cruising	Sustainability issue
	Onboard consumption culture
	Emissions
Destinations	Overcrowding in key destinations
	finding new destinations
Ports and terminals	Infrastructures for hosting bigger ship
	Cruise terminals
Pressure to innovate	Attracting first time cruisers
	Entertaining and pleasing
	Creating on-board revenues
Energy prices	
Customization	
Yield management	
Over capacity	
Safety	Security on board
	Terrorism
	Instability in destinations
Digitalization	Internet of things
	New technologies
Corporate Identity	Branding
	Corporate image

Table 6: Eleven challenges and sub-challenges selected the matrix of product development

4.2.1.2. Dimension (B): Megatrends

During the Delphi survey, experts listed twice (for two different questions) those relevant trends to product development (see Table 4). We take the top five trends of each list to be considered in the Matrix. However, since each megatrend is a universalization of a series of sub-trends, we go through a further two criteria filtration (similar to the filtration of challenges), so that at last 13 sub-trends are chosen for the final calculation[31]. (See Table 7)

[31] The number of applicable trends could grow more, however a reduction in number is needed so that the matrix remains calculable for the current state of software/computer availability.

SUB-TRENDS	MEGA_TRENDS INFLUENCING MAINSTREAM CRUISE PRODUCTS
Growing global population	**Demographic changes**
Ageing populations	
Declining populations in the West	
Increasing migration streams	
Demographic shifts	
Individualism, a global phenomenon	**Individualization reaches a new stage**
Changing relationship patterns: Few strong, many loose relationships	
Complex biographies and identities	
From mass markets to micro markets	
Self-sufficiency and DIY-economics	
Digital technologies pervading and connecting all aspects of daily life	**Digital culture**
Greater differentiation between digital lifestyles	
Digital natives: New forms of social communication, participation and organization	
Web 3.0 is on its way	
Growing energy and resource consumption	**Upheavals in energy and resources**
Strategic resource scarcities	
Use of alternative sources of energy and renewable resources	
Revolution in resource efficiency	
Decentralized infrastructures	
Breakdown of traditional gender roles	**Changes to gender roles**
Increasingly important role played by women in the workplace	
Appreciation of social and communicative skills	
Growing importance of a healthy work-life balance	
New family structures and lifestyles	
Rising temperatures and CO2 emissions	**New Consumption Patterns**
Third World enjoying greater prosperity	
Catch-up consumption in newly-industrialized countries	
Sustainable consumption in the West	
Change in buying habits—hybrid and virtual models	
Growing importance of collaborative consumption	
New value-chain partnerships	**Business Ecosystems**
System innovations	
Business mash-ups—interfaces give rise to new markets	
Creation of the fourth sector	
Complexity management	
Highly dynamic and flexible working practices	**Changes in the work world**
New managerial and organizational patterns	
Collaborative methods of working	
Advances in automation	

Table 7: Eight mega-trends expanded to thirteen sub-tends applicable to matrix of product development

Two important columns of the matrix are now determined. These two columns from one side interact to each other and from the other side impact the third dimension (solution space) so that we could explicitly determine what product concept can be offered in response to either challenge and respectively in association with which megatrend. (Compare with Table 9)

In order to exemplify how the matrix interrelates single projections, a two-dimensional illustration of single interactions between future challenges and future mega-trends is graphically illustrated in the Fig. 32.

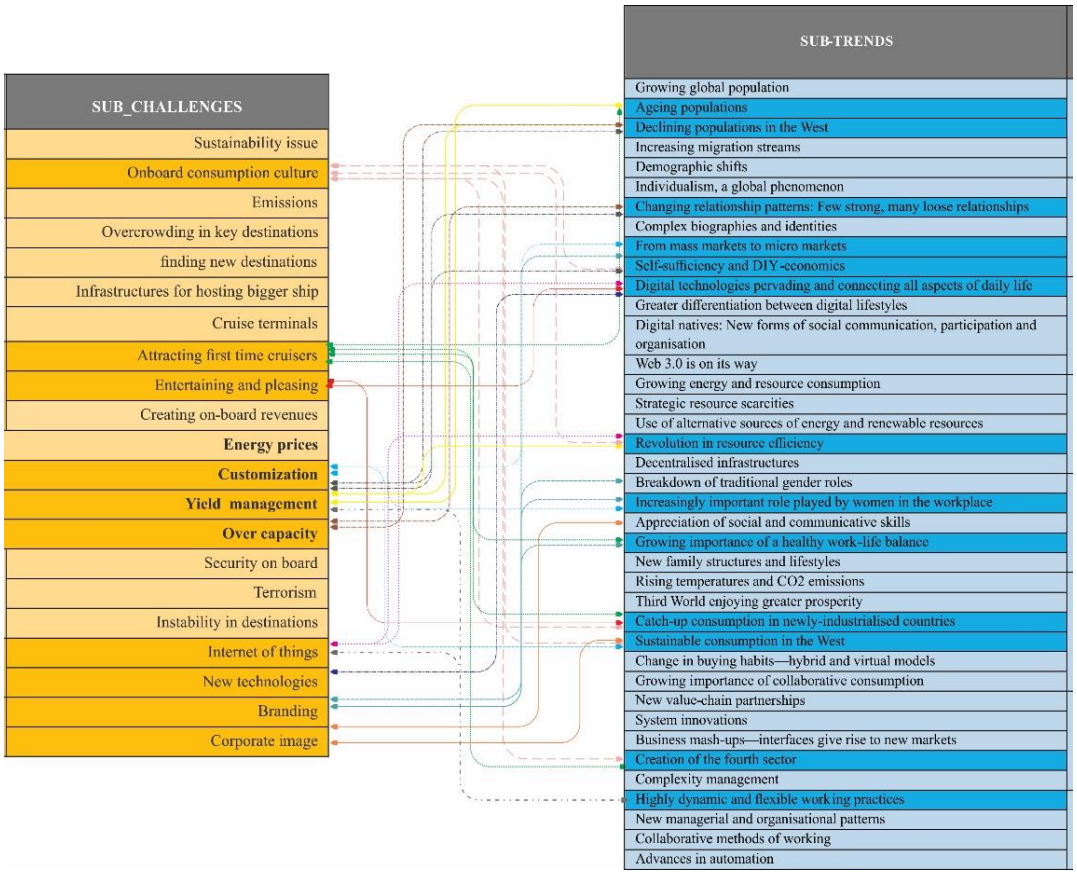


Fig. 32 the interaction dynamic between single challenges and sub-trends

4.2.1.3. Dimension (C): Solution space (Product identifiers)

The third dimension is where our solution space positions, and is the source-input for our brainstorming purpose. This dimension consists itself of six key-factors comprising most important attributes of possible services that could exist in our exploration. These selected six key-factors have been chosen carefully (via trial and error) to have from one side a maximum coverage over our galaxy of ideas, and from the other side remain compact in quantity. The descriptions for the six key-factors present in this dimension are as following:

C_1 (Addressed milieu): The first and most important key-factor in our product attribute bundle is the demography of possible service receivers[32]. It associates the solution space with the user[33] and carries the question, to whom the service is being delivered. Possible projections could be very diverse, in terms of social class and life-style, We chose four different relevant social milieus clustered by *Sinus Institut* (Flaig and Calmbach 2017) as sample addressees of our service development[34]:

1- **Established** (leadership, exclusive tastes, conservative moralities and role patterns)

2- **Performers** (flexible and socially mobile, good qualifications and readiness to perform)

3- **Sensation-Oriented** (looking for fun, thrill & action and entertainment; rather unconventional and rebellious)

4- **Traditionals** (security and status-quo oriented, rather rigidly sticking to traditional values- see Table 8)

[32] Most key-factors have been set analog to the brainstorming approach 5WH (see Isaksen, Stead-Dorval, and Treffinger 2011, 66 ff)

[33] Service design is essentially a user-centric discipline with an emphasis on optimizing individual social experiences (in contrast to sales-centric approaches in marketing and business administration)

[34] Sinus Institute has introduced nine social milieus (developed countries including Germany), of which we have chosen two non-adjacent milieus from the middle (and partly lower) class and two non-adjacent milieus from the upper class, so that the sampling remains low yet well diversified.

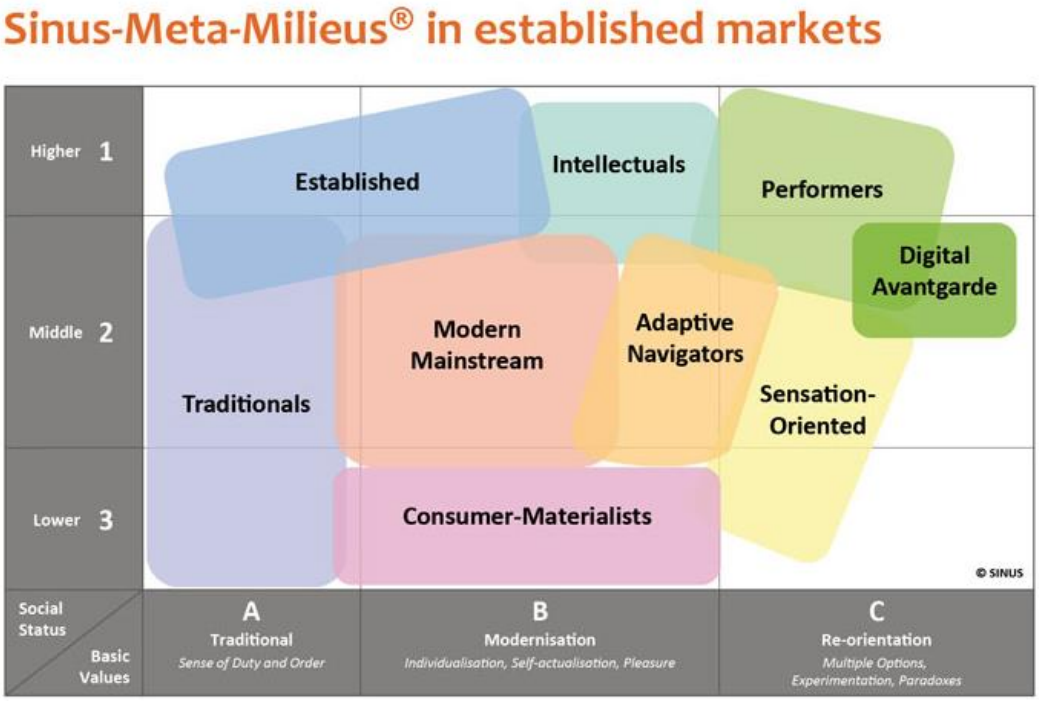


Table 8: The position of four chosen usage groups within the social milieus in developed countries: Established (conservative upper class), Performers (progressive upper class), sensation-Oriented (progressive middle/lower class), Traditional (conservative lower/middle class); ©Sinus Institute- Germany

C_2 (User motives): the second crucial attribute of a hypothetical product is the motives of the users discussed at 3.4.3.

Reflecting on the question "why should a certain user take a certain service", possible motives are needed to be calculated and cross-impacted with key-factors from other dimensions[35]. We take 4 projections identified by Hung & Petrick, (2011): "*Self-esteem & social recognition*", *"Escape and relaxation"*, "*Learning, discovery and thrill*" and "*Bonding*" and add them under the bundle "solution space" as column C_2.

C_3 (Solution source industry): required for the brainstorming process, this key-factor questions the sector/stakeholder, from which the innovation comes. The key-factor provides the ideation with alternating between the six service domains present currently in

[35] As they stay in direct association with the products offered on-board.

the mainstream cruising (*Sports & Games; High-Tech; Mobility & Transport; Art & Media; Retail & Consumer Goods; Health & Food*; see 3.2 & 3.3) , as well as possible new domains marked as "*Others (non-cruising stakeholders)*" to ensure an outside-of-the-box insight into the ideation process.

C_4 (Experience characteristic) and **C_5 (User involvement):** C_4 and C_5 focus on the quality of the experience and integrate it in the ideation process: **C_4** implies the nature of onboard-product alternating whether it is a "*Routine Lifestyle Experience*" (e.g. shopping) or a *"Unique Experience" (e.g. a VR waterslide);* **C_5** defines roughly the involvement type of the user in the activity in three clusters "*Very Active*" (physical and mental engagement, e.g. Ultimate Dry-Slide, Zip Line). "*Active"* (physical engaged, mental relaxed e.g. gyms, swim pools) and passive (Physical relaxed, mental engaged e.g. dining venues, Theaters, etc.)[36]

C_6 (Main geo environment): This key-factor questions the environment typology of the service. This "where question" is rather a supportive ideation impulse, helping the design team to gain a general image of the hypothetical product (required for brainstorming). Based on the status quo of the market, we have defined three clusters, typically available on the cruise ships, i.e. "*Natural Urban Habitat"* (e.g. shopping malls, central parks), "*Staged / Screened"* (e.g. theater venues and cabaret shows) and "*Maritime & Marine Life"* which is an exclusive environment for marine-based tourism (e.g. aqua splashes, onboard beaches etc.).

The key-factors C1 to C6 encompass our solution space. With the help of morphological matrix we can now relate them to our problem-space (dimensions A: future challenges and dimension B: Megatrends) in the matrix (see Table 9).

[36] In the human physiological and clinical studies, almost every activity has a certain level of mental engagement; however, the clustering used here is based on theories of game and entertainment design. (see Nakatsu, Rauterberg, and Vorderer 2005)

FUTURE CHALLENGES (A)	SUB-TRENDS (B)	SOLUTION SPACE (PRODUCT IDENTIFIERS) (C)					
		C_1	C_2	C_3	C_4	C_5	C_6
		ADDRESSED MILIEU	PREDOMINANT USER MOTIVE	SOLUTION SOURCE INDUSTRY	EXPERIENCE CHARACTERISTIC	USER INVOLVEMENT	MAIN GEO ENVIRONMENT
Onboard consumption culture	Ageing populations	Performers (upper class progressive)	Self-esteem & social recognition	Sports & Games	A Routine Lifestyle Experience	Very Active (both physical and mental engagement)	Natural Urban Habitat
Attracting first time cruisers	Declining populations in the West	Established (upper class conservative)	Escape/relaxation	High-Tech	A Unique Experience	Active (physical engaged, mental relaxed)	Staged / Screened
Entertaining and pleasing	Changing relationship patterns: Few strong, many loose relationships	Sensation-Oriented (middle class progressive)	Learning/discovery & thrill	Mobility & Transport		passive (Physical relaxed, mental engaged)	Maritime & Marine Life
Customization	From mass markets to micro markets	Traditionals (middle class conservative)	Bonding & Socialization	Art & Media			
Yield management	Self-sufficiency and DIY-economics			Retail & Consumer Goods			
Over capacity	Digital technologies connecting all aspects of daily life			Health & Food			
Internet of things	Revolution in resource efficiency			Others (non-cruising stakeholders)			
New technologies	Increasing role of women in the workplace						
Branding	Growing importance of a healthy work-life balance						
Corporate image	Catch-up consumption in newly-industrialized countries						
	Sustainable consumption in the West						
	Creation of the fourth sector						
	Highly dynamic and flexible working practices						

Table 9 morphological matrix for cruising product development 2030 with three dimensions (future challenges, Mega-trends and solution space), 8 key-factors and 46 possible projections

4.2.2. **Matrix for Business Model Innovation**

In the second part of diversifying attempts (see 4.1.1), we dedicate the exploration to business model innovation (BMI). As stated in 4.1.3 and 4.1.5, BMI is a risky but necessary move towards sector's future challenges, a task that *product development* alone cannot achieve. Possible expansion possibilities with minimum shifts (from the status-quo business model) were extensively discussed in the 3.5 and 3.6. Existing niche businesses will provide us with a reliable point of departure in BMI, from which further innovations could be explored.

Thus, in the explorative BMI matrix, relevant future challenges will make up the first dimension, mega-trends the second dimension, and the "Business Model Characteristics" (solution space) our third dimension, respectively.

Here the three-dimensional matrix will help us to have a better understanding with regards to (a) which niche has a better survival chance in the future and (b) under which future circumstances a certain business model can reach its optimal performance.

4.2.2.1. Dimension (D) BMI challenges

Similar to product development, relevant challenges are raised from the Delphi survey (Table 10). Ten challenges were chosen, of which five challenges vary from the list of product development. (Compare to Table 6)

CHALLLENGE	SUB_CHALLENGE applicable to BMI
Green cruising	Sustainability issue
	Onboard consumption culture
	Emissions
Destinations	Overcrowding in key destinations
	finding new destinations
Ports and terminals	Infrastructures for hosting bigger ship
	Cruise terminals
Pressure to innovate	Attracting first time cruisers
	Entertaining and pleasing
	Creating on-board revenues
Energy prices	
Customization	
Yield management	
Over capacity	
Safety	Security on board
	Terrorism
	Instability in destinations
Digitalization	Internet of things
	New technologies
Corporate Identity	Branding
	Corporate image

Table 10 Ten challenges and sub-challenges applicable to the matrix of BMI (highlighted challenges)

4.2.2.2. Dimension (E) BMI trends

We also chose 10 sub-trends derived from the five top relevant megatrends decided by the experts (see *Table 5*). The mega-trend "demographic changes" is represented in both *BMI* and *Product Development*, however, in this query, two different sub-trends i.e. "Growing global population" and "Increasing migration streams" were selected to be calculated in the MA matrix (Table 11).

SUB-TRENDS	MEGA_TRENDS capable of generating BMI
Growing global population	**Demographic changes**
Ageing populations	
Declining populations in the West	
Increasing migration streams	
Demographic shifts	
Rising temperatures and CO2 emissions	**Climate Change and Environmental Impacts**
Growing risks posed by environmental problems in newly-industrialized and developing countries	
Increased food shortages	
Stricter regulations	
Strategies for mitigating and adapting to climate change	
Cleantech investments	
Natural structures and processes becoming a key characteristic of innovation	**Learning From Nature**
Bionics incorporated into design and technology	
Digital natives: New forms of social communication, participation and organization	
Influence of biology on production systems— decentralization and the closed-loop economy	
Swarm intelligence	
Growing polarization of the rich and poor	**Social and Cultural Disparities**
Precarious lifestyles becoming the norm	
Social fragmentation across different life situations	
Revolution in resource efficiency	
Competing and merging value systems	
Mobility increases worldwide	**New Patterns of Mobility**
Barriers to mobility increase	
Intermodal mobility patterns	
Digital networking of traffic	
New vehicle concepts and drive technologies	
Intelligent logistics solutions	

Table 11: Trends selected for the matrix of BMI (10 highlighted sub-trends)

4.2.2.3. Dimension (F) BMI Characteristics

The third dimension is dedicated to the business model(s) characteristics. This dimension builds the solution space and is the focal point of the morphological matrix. Similar to solution space for the product development, this dimension consists itself of multiple key-factors as the following:

F1 (Business Model Scheme): identifying the business domain, in which the vessel is operating, is the first part of our BMI exploration. F1 is the center core, around which, the morphological matrix revolves and permutes the projections. We set the mainstream cruising at the F1 cell (Onboard Hospitality and Entertainment) and the other three niche

businesses discussed at 3.5 in F2 to F4. It will enable us to calculate and observe the behavior-change of these business models in interaction with other dimensions and will guide us into the BMI (Table 12).

F_1	BUSINESS MODEL SCHEME	Example
F_{11}	Onboard Hospitality and Entertainment (OHE)	Mein Schiff
F_{12}	Onboard Real Estate Investment (REI)	Bornholmerfærgen , Tallink Group
F_{13}	Shore-Side Service (SSS)	Mercy Ships
F_{14}	Only Transportation and Logistics (OTL)	The World

Table 12: Four domains of Business to be explored by the morphological matrix

F_2 to F_4, Ship Attributes: Ships are complex systems characterized by their attributes. Ship attributes either are determined to serve a business concept or are a result of technical circumstances, or an outcome of both, e.g. the vessel speed.

The number of attributes assigned to a ship can increase to an unlimited quantity. In order to reduce the attributes to a calculable amount within our matrixes, we reduce them to three crucial ones: *Mobility pattern* (see F_2), *Capacity pattern* (see F_3) and *Architectural evolution* (see F_4)

F_2 (Mobility Pattern): Mobility is one of the crucial attributes of a vessel. It determines the main characteristics and functionalities of the ship (and the business) and is carefully decided based on business intentions. For the majority of "party-ships", the voyage speed remains around 17 knots for the sake of fuel efficiency. In return, for ferries and expedition ships, a fast speed up to 35 knots is essential to give them a better performance in the business. For service ships -which might be stationary ashore for a long period of time- mobility is per se of minor importance.

Among the four business models introduced, we identified three classes of mobility performances[37], which roughly embody all vessels present in the current maritime industry (Table 13).

F2	MOBILITY PATTERN	Sample
F_{21}	Status quo (avg: 20 ±2 Knots)	Oasis of the Seas
F_{22}	Slower (avg: 12 ± 2 knots)	MF Storegut, MV Chetzemoka
F_{23}	Predominantly immobile (avg 0 -5 knots)	Mercy ships, blueseed

Table 13: Key-factor F_2 in the BMI matrix; ship attributes: Mobility performance categorized in three classes

F_3 (Capacity Pattern): Capacity is together with the speed one of most determining attributes of a maritime vessel.

In the cruise sector the average dimension of ships has almost doubled due to the economy of scale from 60,000 GT in 1999 to 110,000 GT by 2008 (Schmid 2010, 199). From 2013 to 2016, a number of 22 ships have been scheduled to be added to the worldwide cruise fleet, providing 66,917 beds, which indicates a capacity of 3000 berths per ship (CLIA Europa 2013). In the matrix input, we consider three conditions: a status quo (~ 2000-6000 beds), a drastic raise (10000 beds and beyond) and a drastic decrease (150 beds and less, see Table 14).

F_3	CAPACITY PATTERN	Example
F_{31}	Status quo (2000-6000 beds)	Regal Princess
F_{32}	Highly increase (10000 and higher beds)	The Float at Marina Bay
F_{33}	Highly decrease (150 beds or less)	Blue & Gold Fleet

Table 14: Key-factor F3 in the BMI matrix; Ship attributes: Average capacity of crews and passengers per ship

F_4 (Architectural Evolution): Under the notion, "form follows function" ship's architecture follows inevitably the requirements of the business. However a successful

[37] The quantities entered as conditions are allocated according to the status quo of the parameter and then the estimated maximum and minimum possible amounts.

(marketing) trend or a technological leap can cause a drastic architectural evolution in the vessel design, opening up new perspectives and possibilities in designating new services dissimilar to current cruising concept. This evolution can be as limited as an aesthetical trend in the vessel design, up to radical technical upheaval in the shipyard industry. We reviewed architectural arrangements in many vessel formats mentioned in 3.5. and 3.6.[38] and have clustered possible scenarios, considering that two or more scenarios could also occur at the same time[39].

F_4	ARCHITECTURAL EVOLUTION	Example
F_{41}	Exterior design gains importance	Superyachts e.g. "Joy"
F_{42}	Two hull Catamaran platform	Pioneering Spirit
F_{43}	Integrated beach/ Coastal resort	Sea-going barge train vessel
44	LASH / Modular carriage	Rhine Forest
F_{45}	Semi-submersible	MV Blue Marlin

Table 15: possible evolution scenarios in the architecture of cruise ships in a 2030 perspective

F_5 (Fuel & Emissions Development):

Questions on first, how fuel prices will change and second, how intensified regulations regarding vessel emissions will develop in the future 15 years, will lead to new scenarios regarding the evolution of cruising business model. The CO_2 emissions of the current cruising business model is between 169-340 g per passenger-day (Walnum 2011; Howitt et al. 2010). Intensified emission policies without a change in oil prices would perhaps cause the occurrence of more cases similar to the ban regulations in Venice (F53). A drastic price change alone (without changing regulations) may cause in designating shorter routes to save fuel (F_{52}). With an occurrence of both cases at the same time, a shift to alternative fuels such as LNG or solar systems is the most likely scenario (F_{51}). A technological leap can however, mitigate the impact of these two challenges and lead us to entirely new scenarios (F_{54}; see Table 16).

[38] As well as many published but not executed patents

[39] The sampling could grow notably, the author decided to consider only the most likely ones

F_5	FUEL & EMISSIONS DEVELOPMENT	Example
F_{51}	Shift to alternative fuels	Solar Albatross, MS Tûranor
F_{52}	Shorter routes	48h mini-cruises
F_{53}	Entrance ban in destinations	Venice ban
F_{54}	Technological leap (better ecologic factors)	3-D printing technology

Table 16: Four likeliest scenarios regarding the development of fuel prices & emission policies

Based on the assumption that maritime units will have a better access to the sources of renewable energy (e.g. solar, wave energy etc.), they have the potential to even become more energy efficient than land-based activities ((Olthuis and Keuning 2010, 98)

F_6 (Pricing & Revenue Policy):

As studied during the Delphi inquiry, cruising business is strongly dependent on the willingness of tourists in associating a price with the service offered (see Fig. 15). Pricing scheme and yield management however will remain a future challenge in the sector (see Fig. 22) and a strong driver for creating niche business among the cruising concept. Near the status quo (F61), we consider an upscale scenario, in which the prices are notably higher than the current average prices, either due to operative costs or due to the targeted milieu (e.g. luxury tourism) (F_{62}). There are scenarios attesting a fall in net ticket prices following a continuous trend in economy of scale, or even entirely free of charges entrances (such as a town-like municipality) focusing only on onboard purchases (F_{63}). Corporate philanthropy could be another independent strategy motivated by long-term corporate policies to improve the brand image (F_{64}).

F_6	PRICING & REVENUE POLICY	Example
F_{61}	Status quo (no change)	
F_{62}	Rise in average rates	Due to operative costs
F_{63}	Fall of average rates	Free entrance (onboard revenue)
F_{64}	Corporate Philanthropy	Carnival Australia

Table 17: Most likely scenarios anout developments in ticket prices and revenue policies

The final model of the morphological matrix for a business model innovation (BMI) within the cruise industry can be seen in the table 18. In this model, related challenges are clustered under the column D, related sub-trends column (E), and six key-factors comprising the solution space are clustered under columns F_1 to F_6.

FUTURE CHALLENGES (related to BMI) (D)	SUB-TRENDS (related to BMI) (E)	SOLUTION SPACE (BUSINESS MODEL CHARACTRISTICS) (F)					
		(F_1)	(F_2)	(F_3)	(F_4)	(F_5)	(F_6)
		BUSINESS MODEL SCHEME	MOBILITY PATTERN	CAPACITY PATTERN	ARCHITECTURAL EVOLUTION	FUEL & EMISSIONS DEVELOPMENT	PRICING & REVENUE POLICY
Sustainability issue	**Growing global population**	Onboard Hospitality and Entertainment	Status quo (avg: 20 ±2 Knots)	Status quo (2000-6000 beds)	Exterior design gains importance	Shift to alternative fuels	Status quo (no change)
Cruise terminals	**Increasing migration streams**	Onboard Real Estate Investment	Slower (avg: 12 ± 2 knots)	Highly increase (10000 and higher beds)	Two hull Catamaram platform	Shorter routes	Rise in average rates
Attracting first time cruisers	**Increased food shortages**	Shore-Side Service	Predominantly immobile (avg 0 -5 knots)	Highly decrease (150 beds or less)	Integrated beach/ Coastal resort	Enterance ban in destinations	Fall of average rates
Energy prices	**Strategies for adapting to climate change**	Only Transportation and Logistics			LASH / Modular carriage	Technological leap (better ecologic factors)	Corporate Philanthropy
Customization	**Cleantech investments**				Semi-submersible		
Instability in destinations	**Bionics incorporated into design and technology**						
Internet of things	**Precarious lifestyles becoming the norm**						
New technologies	**Revolution in resource efficiency**						
Corporate image	**Intermodal mobility patterns**						
	Intelligent logistics solutions						

Table 18: The data source of MA matrix for business Model Innovation (BMI) consisting of three dimensions (future challenges, Mega-trends and solution space), 8 key-factors and 42 possible projections.

4.3. Scenario Development

Based on the knowledge gained from experts (as well as from the literature) we developed a series of scenarios to initiate a second wave[40] of reflection and consensus thinking. The purpose of this step is not to propose any final design or solution output, but rather to adjust the key-factors, serving the iteration of A>P>S cycles.

4.3.1. Energy resources and energy efficiency

The type and amount of energy that will keep future cruise ships operative, is a crucial key-factor of these gigantic industrial products in years ahead. As experts also emphasized, "Upheavals in energy and resources" is an influential mega-trend with clear indicators which can be perceived even today. We proposed two assumptions and asked the panelists to reflect and forecast how cruise companies will probably react to these changes. Experts were asked to write their own scenario based on the proposed assumption.

Experts anticipated eight possible futures to happen in the aftermath of the scenario "oil prices rising significantly after 2020" (Fig. 33). The most probable scenario suggests that, "the liners will gradually shift to other fuel alternatives". An increasing thrust from both consumers and politics will lead to serious efforts for replacing fossil energy with renewable energy. Electric engines powered by wind or solar systems are concepts that are already being tested on. For the meanwhile LNG powered engines will be probably a transitionary step towards fully green cruising.(Meyer Werft 2016).

A tendency towards shorter cruise routes was also anticipated as a possible alternative strategy. In general, experts agreed that in the long term technological advances will overcome the problem and a decline in demand alone due to rising prices (based on rise in oil prices) is less likely to happen.

[40] The first wave of reflection was the Delphi inquiry

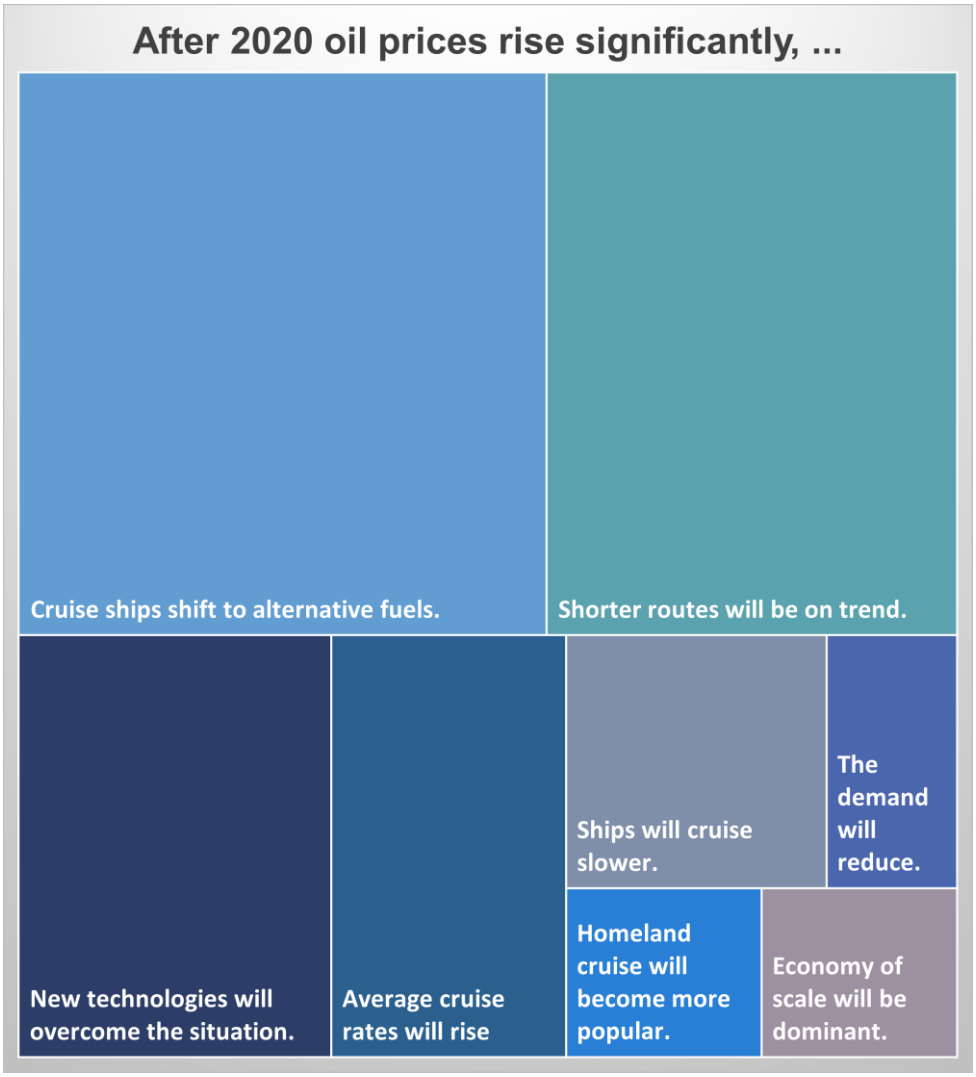


Fig. 33 Scenarios anticipated by experts in case of a significant rise in oil prices from 2020 onwards. (Total: 28 experts, 26 scenarios validated)

However, the responses among different expertise groups were not homogenous: while academics and researchers found "shifting to alternative fuels" without a change in ticket prices as a more likely scenario, operative experts delivered a more pessimistic anticipation seeing "shorter routes" and "higher rates" as considerably probable scenarios:

> *"There will be major fuel surcharges. Demand will recede because fuel prices affect households' purchasing power in general, and cruise demand has been price-elastic in the past. Cruise ships will operate on shorter itineraries to save fuel. Homeland cruising will become more popular because flying to distant ports has become expensive. Cruise lines may offer insurances to early bookers against further price increases."*

Yet non-operational cruise experts anticipated that in case of a rise in oil prices, research on technological alternatives will speed up, but until a solution is found, ships will cruise on a lower speed.

As complementary question, we asked the experts to complete the scenario with a presumption:

"Politicians and consumers exert extra pressure. Cruise ships are expected to be at least as energy efficient as land-based hotels"

In response, four scenarios were generated. Many argued that such a scenario will not cause any issue, as changes towards energy-efficiency exists already in the interest of the cruise industry. Further scenarios are illustrated in the Fig. 34.

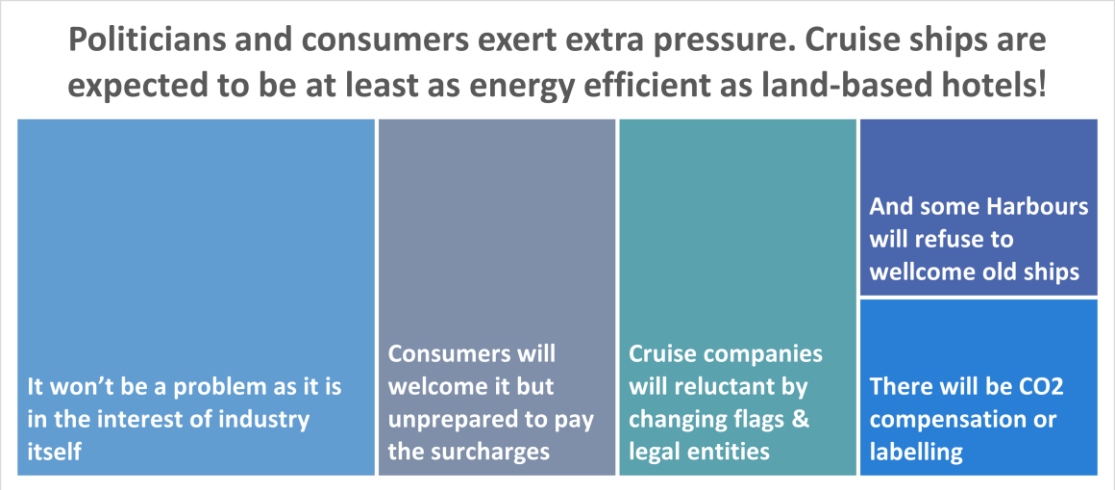


Fig. 34 Scenarios anticipated by experts in case of an excess pressure from consumers and politicians (21 experts, 19 generated scenarios)

4.3.2. **Financing future ships**

Financing new ships is getting increasingly challenging, expensive and risky both for main and niche providers. According to the CLIA, shipbuilding has been costing on average 25% of all expenditures of the European lines (CLIA Europa 2013, 13). From 2013 to 2016, European lines paid $172 million for every 1000 beds, an average of $520 million for every new ship.

In the recent decade, providers with limited revenue have tried to overcome the financing problem by examining the Condo model. Condominium strategy permits small providers

to share shipbuilding costs and risks with the cruisers. This is based on giving the passengers an actual residential status by enabling them to buy apartments and cabins onboard the cruise ships.

There are prognoses claiming Condo model could take a larger share of cruising business model by 2030. In the Delphi survey, experts reacted to the question both in association with large ships and small niche vessels and approved a relative considerable likelihood for all type of ships, however more likely for mega ships (Fig. 35):

> *"For bigger ships an interesting idea, as more people get older and have more lifetime to travel. Smaller ships: the prices are too high and the market for possible clients is very small."*

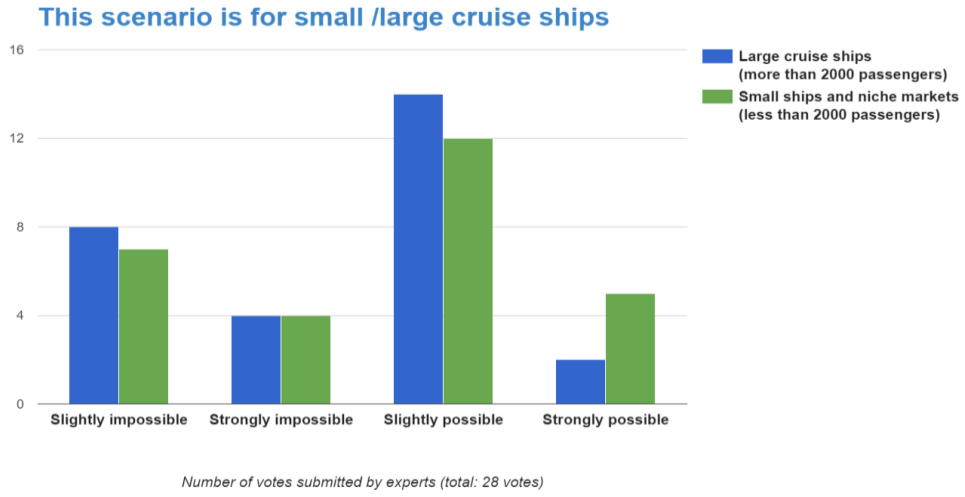


Fig. 35 Experts' evaluation on condominium model becoming a larger business model in 2030

A further concern is the ever-growing role of financial institutes (such as KFW IPEX[41]) in the stakeholder network. We formulated an extreme-case scenario and asked the panelists to express, to what extent they agree with the following statement:

"The involvement of banks in financing new ships has increased notably within the last 10 years. If this trend continues, the value of finance investors will exceed the value of ship operators among the business stakeholders. By 2030, banks or other investors are rivals to cruise companies in launching new ship projects. As a result, the bank/ the

[41] A Germany-based bank active in financing new ships

government/ the city become the main owners of ships and follow their own business interests (tourism/urban facilities/private businesses). The know-how of Cruise companies will become an acquirable service."

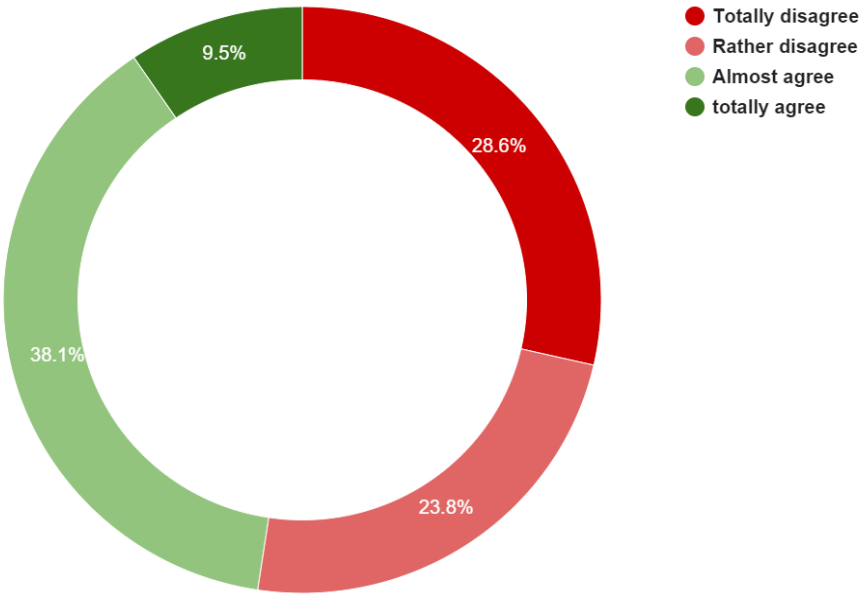


Fig. 36 future relationship between cruise providers vs finance institute

To our surprise, despite the severity of the scenario, almost half of the experts received the scenario as likely (Fig. 36). However, both groups articulated diverse reasons listed as following:

Reasoning by agreeing experts:

- If the industry can't overcome some difficulties and improve their yields this can be a reality.
- It will be like REIT[42]s in the Hotel market.
- In the next years new and innovative financing models are necessary and very realistic.
- At present, financing own vessels is relatively more attractive due to low interest rates; the scenario above might be realistic in the long run

[42] Real Estate Investment Trusts

Reasoning by disagreeing experts:

- Nautical knowledge is too specific, no city or government would invest in those projects
- Banks are only service providers; their role will remain marginal.
- Cruise companies will still have the important know-how required to operate ships and therefore a definite advantage.

4.3.3. **Ship aesthetic**

Ship's interior design has always been marketed by providers as a point of attraction. Yet exterior has lost its value, particularly after the fall of ocean liners in the 1960s. The functional appearance of today cruise ships stays in strong contrast with the streamlined private boats and yachts. This raises the thought that travelers pay less attention to exterior design, or at least from a marketing point of view, an investment on the exterior design would not generate an extra revenue. In the Delphi survey, the majority of experts disagreed the assumption that ship's exterior doesn't lay in the current traveler's interest (Fig. 37)

This fact raises the question, why decision-makers have failed to detect and utilize this driver in brand identity or other marketing actions.

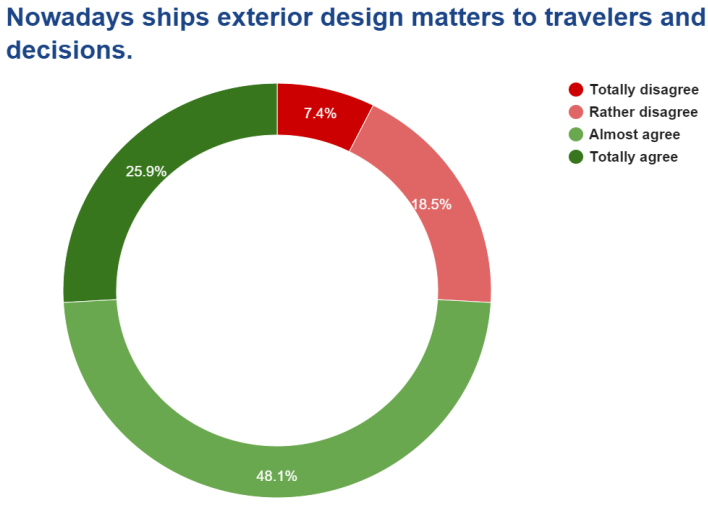


Fig. 37 Experts' evaluation on the importance of exterior design of the ship for current travelers

To deepen the discourse, we asked in the second Delphi round the experts "why unlike the yacht industry, a form diversity in ship's architecture does not exist yet in the cruise sector and the majority of cruise brands have not invested more than only a body painting on their ships external design?"

Beside the understandable reasoning such as being an excess expense (10 votes) or no market pressure (6 votes), panelists mentioned two interesting points: first, cruise companies are not aware of this customer demand (better exterior appearance), and second lack of reliable criteria for ship's exterior aesthetics (Fig. 38).

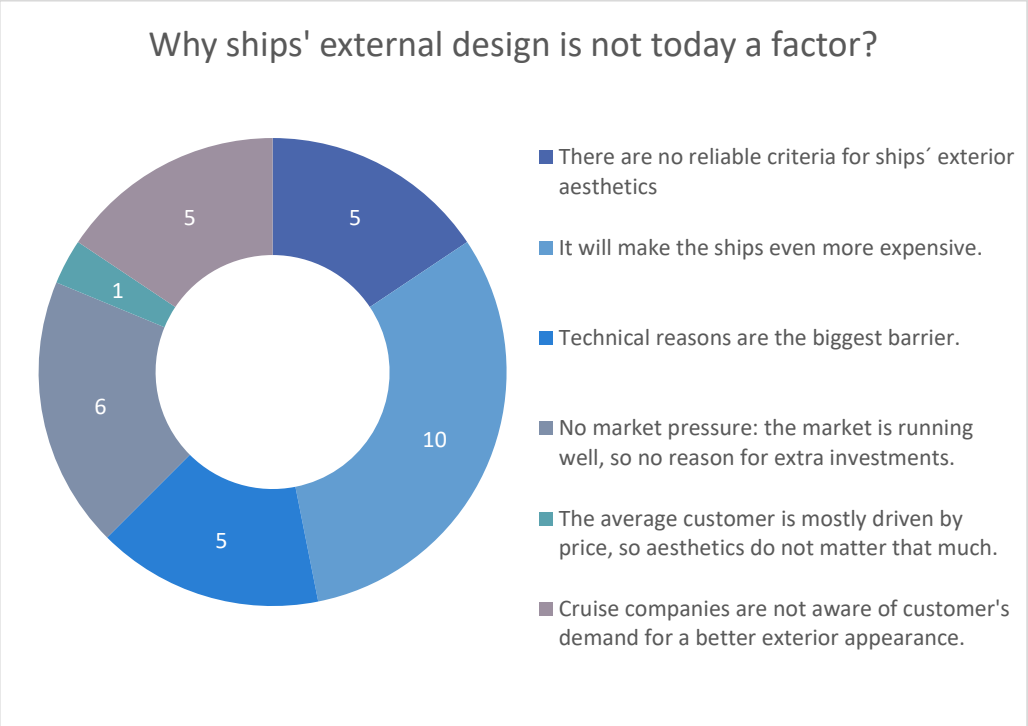


Fig. 38 Reasons delivered by experts about exterior design not being taken serious by cruise providers yet.

These two points indicate a gap of research in this area and the need for a contribution between marketing scholars and design expert's in deepening this topic. However, experts anticipated that by 2030 exterior aesthetic will become an important criterion for cruise owners, when ordering a new vessel. This will mean an increase in the future awareness of cruise companies towards this factor. (Fig. 39)

4.3.1. **Ship architecture**

In the first round of inquiry, experts anticipated that until 2030, cruise ships larger than Oasis class (6000 beds) will not be built, but stationary ocean terminals or very slow mobile islands will be a new market.

"Considering that the mobile platform Pioneering Spirit (world's largest vessel project: 403000 GT and 14 Knots speed) is built based on a catamaran architecture, it would be

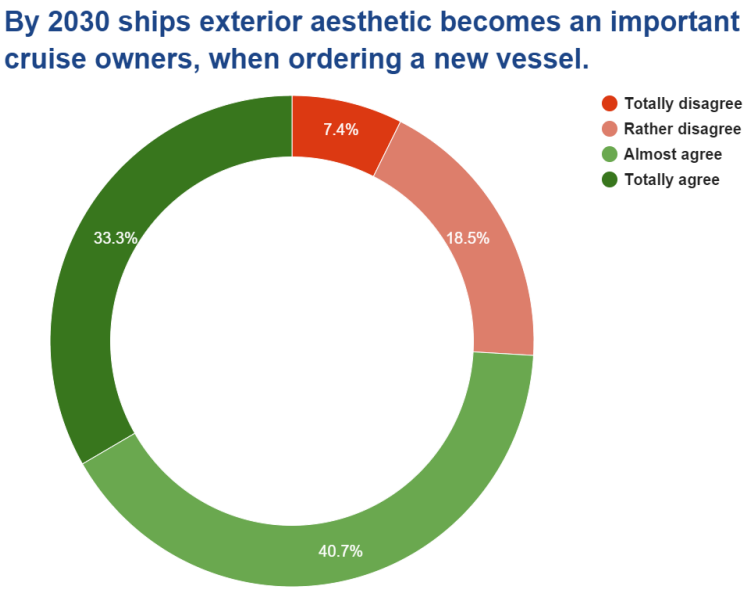


Fig. 39 Experts anticipation on the role of exterior aesthetics in the future. (2030 perspective)

also considerable that the mentioned ocean terminals or mobile islands (from an architectural point of view) will be built more similar to the Pioneering Spirit, rather than to Oasis of the seas (two hulled catamaran vs single hull platform). The reason will be that such concepts would need more flat area on the deck than hydrodynamic abilities." (Fig. 40)

In the second round we asked the experts to judge, first how plausible this statement is and second, how likely it is that this scenario happens until 2030?

Fig. 40 mobile oil platform Pioneering Spirit

In response, the majority of the experts received the scenario as strongly plausible (more than half voted with 100% plausible), indicating the need for a drastic change in the structure and architecture of cruise vessels towards providing more flat surfaces. However, experts did not find it very likely that until 2030 a shift to catamaran format (or similar flat surface formats) happens, votes remained at the conservative level of 49%. (Table 19)

Expert	Likelihood	Plausibility
1	35%	100%
2	9%	64%
3	30%	100%
4	75%	100%
5	25%	75%
6	23%	100%
7	30%	100%
8	50%	80%
9	80%	85%
10	50%	54%
11	46%	51%
12	50%	100%
13	50%	100%
14	100%	100%
15	75%	100%
16	50%	90%
Average	**49%**	**87%**
RESULT		**Likelihood: Middle** ➔ **Plausibility: Strong** ↑

Table 19 structural shift to catamaran format until 2030

Consequently, we posed a second question depicting the future of a trend that has already began: providing nature-like environments on the ship.

We proposed a logical transition of current design of *Oasis class* and asked experts to express themselves in this regard:

"*Compared to Freedom Class, the architecture of Oasis class was a try to simulate amenities that the travelers usually expect to have in the destination ports. A large "Central Park" in the middle of the ship featuring lush tropical gardens was a try to design more nature-like en vironment in contrast to the former metal bodies. This would also follow the general policy of cruise providers to keep the guests (and their expenditures) onboard the ship.*

Since a basic attraction of the coastal resorts are their beaches and the natural feeling of "direct contact with the water", would it be possible that until 2030 we have ships, which go beyond the central park concept and offer their travelers an artificial beach? (For example, a semi-submersible ship featuring an integral beach which becomes active when the ship docks and submerges near a destination coast; Fig. 41)"

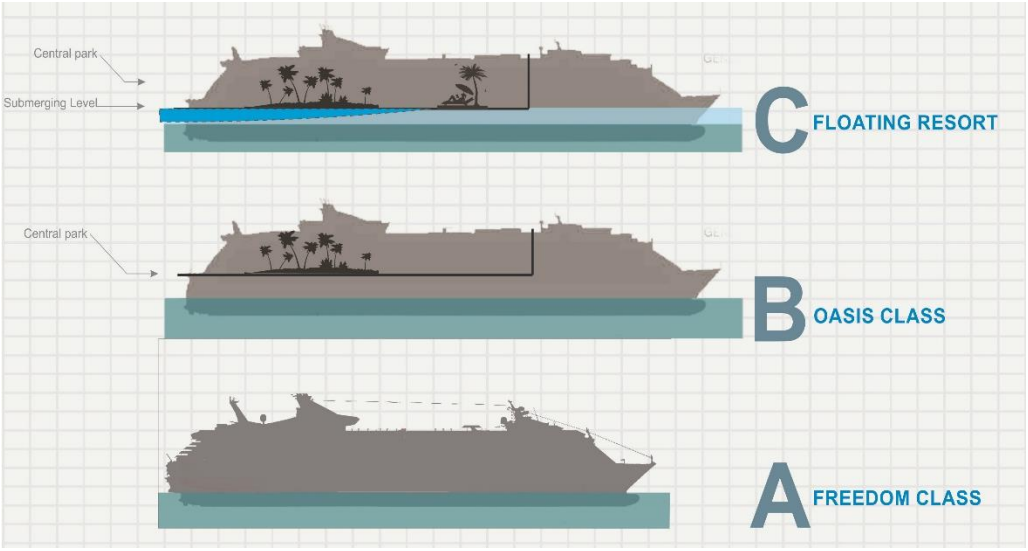


Fig. 41 Semisubmersible 3rd generation cruise ship with an integral botanic beach

In response, almost all experts agreed the "plausibility" of the statement (with the exception of two experts). Yet, in terms of "likelihood", the responds were very diverse. There were 6 experts considering the scenario as "very unlikely", arguing that semisubmersible cruise ships need very complicated engineering, and there was the same number stating the opposite, that already some yacht companies are working on the concept (Gree 2016); and that the demand of being in touch with water or even a sandy beach is strong.

Expert	Likelihood	Plausibility
1	0%	30%
2	10%	100%
3	100%	100%
4	20%	100%
5	26%	100%
6	41%	100%
7	5%	50%
8	51%	100%
9	52%	52%
10	75%	85%
11	78%	100%
12	80%	95%
13	80%	98%
14	0%	30%
15	10%	100%
16	100%	100%
Average	**48%**	**85%**
RESULT		**Likelihood: Middle ➔** **Plausibility: Strong ↑**

Table 20: Expert's evaluation (plausibility and likelihood) on the evolution of cruise ships to floating resorts- Delphi survey. Second round

4.3.2. **Corporate Philanthropy**

In what was then called as "an act of goodwill"(BBC News 2010) Celebrity Cruises sent in 2010 a cruise ship from Southampton to rescue 2220 British tourists stranded in Spain following the shutdown of airspaces due to the eruption of Eyjafjallajökull volcano. In another example, Carnival Australia used in April 2015 four of its cruise ships to deliver humanitarian aid to Vanuatu Islands after they were devastated by Cyclone.(Goldsbury 2015)

The US navy and the charity organization Mercy Ships has been operating hospital ships for nearly 35 years.(Fadeley 2002; Sechriest et al. 2012) The hospital ships are a successful model of massive non-profit logistical operations, attracting charity volunteers from the Europe and US and providing healthcare services in African coasts or elsewhere. (Fig. 42)

Fig. 42 U.S Naval Hospital Ship Ship Mercy- San Diego Bay, 2009

With the assumption that Corporate Philanthropy increasingly gains value for the cruise companies (associated to PR and image improvement) it is imaginable that large international organizations (such as UN) would willing to utilize the infrastructural and/or logistical knowhow of cruise companies (for example in exchange to the emissions trading)

We asked Delphi panelists to evaluate such a scenario and the probability of a systematic engagement of cruise companies in off-business activities. The results are as the following (table 21):

Expert	Likelihood	Plausibility
1	0%	0%
2	10%	100%
3	10%	20%
4	30%	100%
5	32%	100%
6	35%	50%
7	40%	46%
8	41%	100%
9	45%	100%
10	50%	100%
11	72%	100%
12	76%	85%
13	0%	0%
14	10%	100%
15	10%	20%
16	30%	100%
Average	**37%**	**75%**
RESULT	**Likelihood: middle** → **Plausibility: Strong** ↑	

Table 21: Expert's evaluation (plausibility and likelihood) on the evolution of cruise ships into floating resorts- Delphi survey. Second round

An example for a systematic long-term cooperation could exist in the form of an international mobile aid island, funded by the UN, the governments or other charity organizations. The floating aid island is built once but can be flexibly utilized more times in different occasions, for example providing shelter for the Syrian refugees in the Mediterranean in 2017 and then be delivered to Thailand some years later to replace temporally a damaged infrastructure because of a natural catastrophe. (Fig. 43)

Experts received the concept as strongly plausible (75% of plausibility), yet they were partly skeptical towards the likelihood of such scenario, stating that corporate philanthropy is a relative new topic among cruise providers.

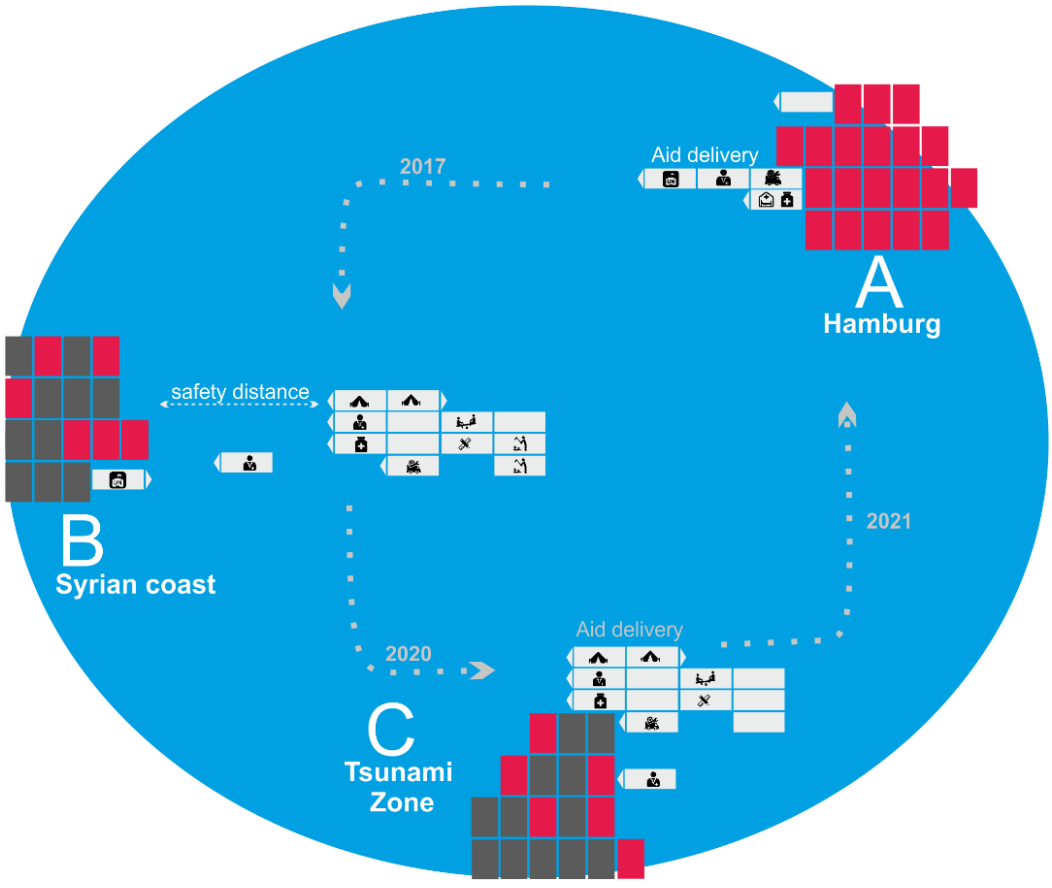


Fig. 43 A model for international mobile aid island

5. RESULTS

According to the aims outlined in section 1.1, results are delivered in two section, i.e. practical and theoretical results. In this framework, practical results will exclusively build on previous research in the cruise tourism research. The theoretical results on the other hand address current discourses in design-related theories.

5.1. Practical Results

Since the first signs of market saturation in the American (followed by European market) are expected to emerge by 2030, endeavoring the risky *lateral diversification*[43] strategy seems to be an inevitable move for stabilizing the growth and opening up new dimensions and perspectives to the industry.

In this case, ships as the main components of the business model will be the scene of various business attempts. With ships having a long lifecycle of over two decades, venturing uncontested domains will be attributed with architectural incompatibility causing excess re-functioning costs or demand for entirely new vessel types. This excess capital-loss and many other risks inherited in lateral diversification strategies can be minimized if long term-trend prognoses and foresight researches are applied in advance. However, a prognosis can only deliver a report (a probability research) and estimate the state of the future of the researched domain, without actively delivering any solutions.

In comparison, this dissertation has ventured a step forward in not only exploring the state of the future, but also seeking for innovative solutions and attractive possibilities (from both users and providers view) in the cruise sector, hence the approach "future-oriented design".

In order to generate concepts and solutions in a Future-Oriented Design approach, extensive qualitative and quantitative data is required to be processed, which in our case were missing or outdated (stand 2015).

In a Delphi research covering this knowledge gap in the cruise industry, it has been tried to (1) discuss and collect data on current and future social, economic and political trends

[43] Creating new, uncontested market space with the purpose of avoiding competition in a mostly saturated market. (also known as Blue Ocean Strategy)

that will challenge the industry in a 2030 perspective; (2) combine consensus knowledge with the creative-capacity of service-design to generate innovative solutions for any possible scenario; and (3) estimate the solutions with the help of consensus knowledge.

In two morphological analyses supported by an interdisciplinary Delphi survey, we managed to develop and evaluate various hypotheses suggesting new cruise-related businesses for the future 15 years.

Based on the two matrixes built in sections 4.2.1 and 4.2.2, the results[44] have been delivered and interpreted in two sequences, respectively providing various perspectives and insights in association with "product development" and "BMI" strategies in cruise tourism.

5.1.1. Matrix interpretation for product development

As outlined in section 4.2.1, the aim of this matrix is to find cruise product solutions in response to certain challenges (see Table 9 column A) and in association with the occurrence of one or more trends in the future 15 years.

We used two different MA engines[45] to compare the results for their authentication. Scenlab engine generated 1744 mathematically possible scenarios, of which 212 scenarios "were near to optimized" or relatively good solutions. However not every challenge received a solution.

In Fig. 44, the formation and distribution of scenarios in the galaxy of the solution space based on an SMACOF [46] algorithm is illustrated. As displayed, two main clusters at north

[44] The engines delivered as many as 384 good scenarios; we sample top seven scenarios.

[45] Scenlab from EvolveIT and Carma from Swedish Morphological Society.

[46] SMACOF stands for Scaling by Majorizing a Complicated Function. The algorithm works similar to a human intelligence while starting with a puzzle with 50 pieces. Every piece has four corners (projection), if starting with a random piece, there will be with 100% certainty another piece, which has a matching corner. Yet the probability that the person positions randomly the right corner of each piece and finds a match is 1/4x4x50. Therefore, one might have a very hard work in finding right matches at the beginning, but once the majority of the puzzle is completed, the speed of finding (accidentally) the right matches grows steady until the end of task. Hence, a human intelligence starts logically with corner pieces that contain more describing data and less ambiguousness. A SMACOF algorithm follows a similar logic to rapidly scale facts and populate right configurations. (For mathematical details see ScenLab Manual)

and south of the map can be recognized, mostly due to the association of products to either entertainment or hospitality industry. One might also distinguish multiple smaller clusters, which indicate the relevance of product solutions to their respective *Source Solution Industries (C3 in the Table 9)*[47].

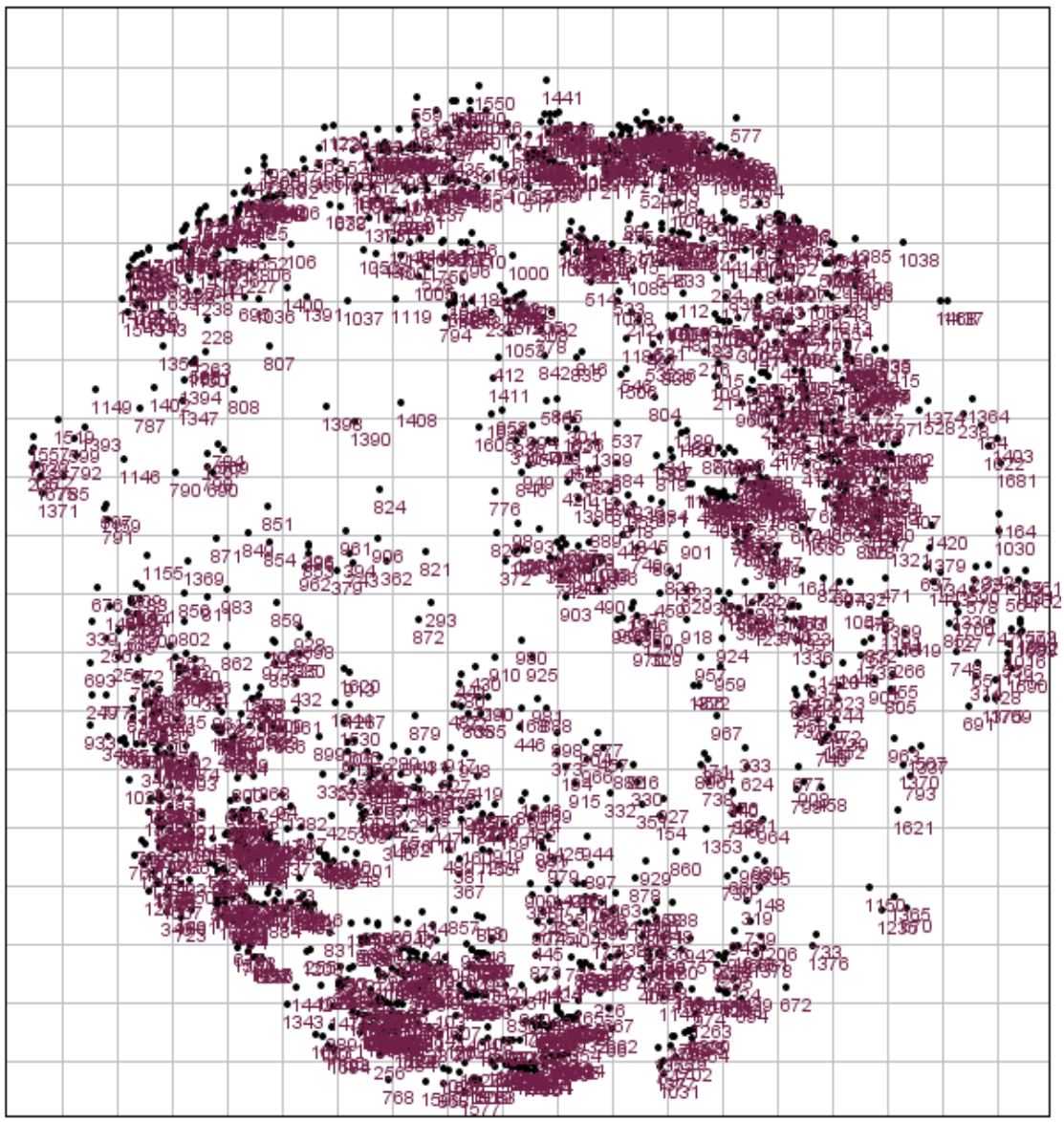


Fig. 44: the galaxy of solution outputs, MDS illustration of Scenlab engine

[47] The empty space between the two main product-bundles (implying the substantive distance between the products) is the result of symbiosis effect among tourism products, i.e. many business concepts could only survive in co-presence of other products. For example, businesses related to alcohol consumption are related to club businesses and vice versa, a club business can better survive in symbiosis with businesses offering alcoholic beverage.

The engine also detected 157 scenarios as bad or worst-case scenarios, i.e. they will intensify a challenge and will endanger the cruising business in case of occurrence (Fig. 45). We skip these scenarios from our interpretation, as the focus of this dissertation is not to demonstrate future problems but the solutions[48].

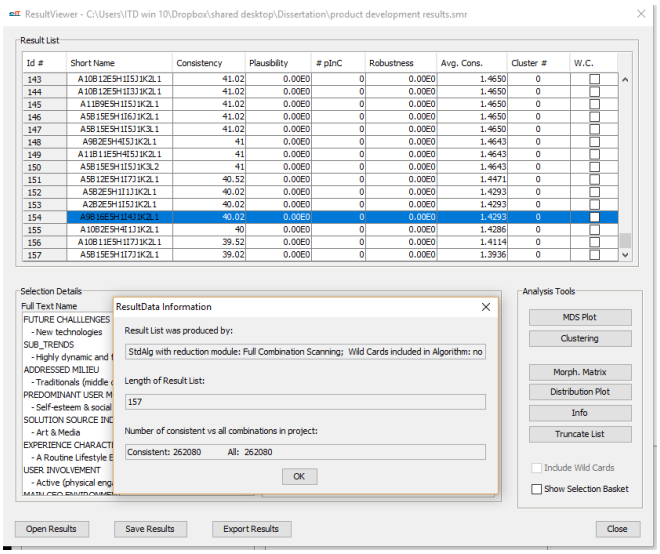


Fig. 45: List of worst-case scenarios, endangering the cruising business in case of occurrence (Total 157; detected by Scenlab engine)

At following, we review a few challenges outlined in section 4.1.3 via a Parameter Activity check[49] and discuss generated results accompanied with a FOD interpretation and a scenario-configuration-brainstorming [50]:

Onboard consumption culture (A1)[51]:

As stated in the 4.1.3, following the trend for *Green cruising* among travelers especially among the *progressive milieu* who criticize the current consumption culture onboard the

[48] However, the findings could be very vital for the sector and can be materialized in future researches by other cruise scholars.

[49] In a Parameter Activity Check (PAC), we fix a projection (e.g. Onboard consumption culture) and see how the behavior of other parameters would change in the matrix. For more information see (Ritchey 2011a).For details about algorithms and calculation procedures used in Scenlab and Carma engines see respectively (Gauger and Mueller-Stoffels 2006, 21) and (Ritchey 2011b, 85)

[50] The objectives of *Future-Oriented Design* and its borders to *foresighting* from one side and to *visioning* and *science-fiction* from the other side has been outlined and illustrated in 2.2.1 (Fig. 4)

[51] Compare with column A in the matrix of product development Table 9 morphological matrix for cruising product development 2030 with three dimensions (future challenges, Mega-trends and solution space), 8 key-factors and 46 possible projections

ships, the negative environmental impact of such consumption behavior will become crucial in the future if not being treated today.

The Carma[tm] engine suggested two scenario-products on this, addressing performers and sensation oriented respectively (upper and middle class progressive, see Fig. 46). The first scenario is based on the interest of the milieu *performers* for tracing their consumption behavior and emissions: Volunteer travelers receive a digital armband, which helps them to keep track of their consumption and receive efficiency suggestions within their daily activity. This will be possible when "*digital technologies connect all aspects of life"* (B6).

Cruise ships in this regard can act as a small green-city laboratory, as they have the privilege of being a closed environment i.e. are easier to be inter-connected digitally. Such a product can likely attract those individuals who have concerns about cruising (as an unsustainable mode of tourism) and give them a clear conscience regarding their consumption behavior.

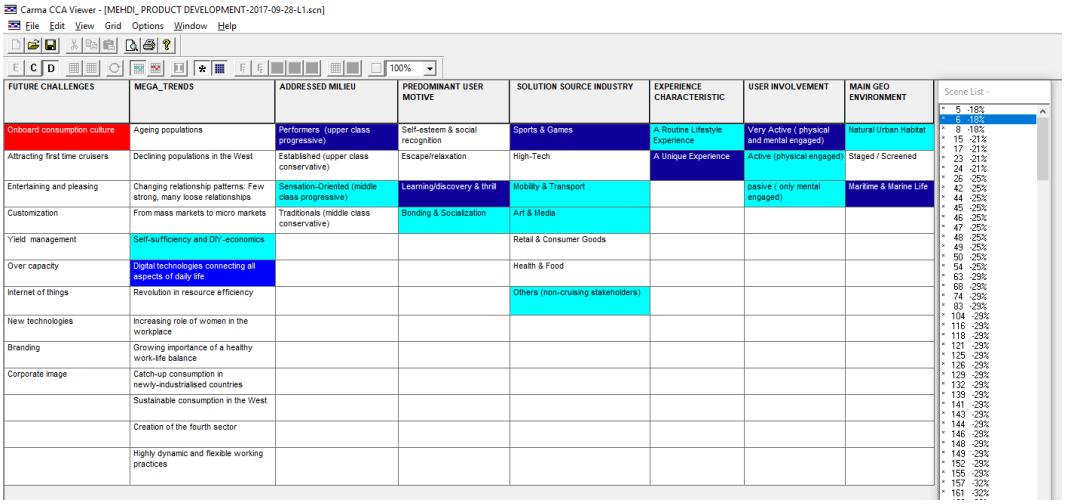


Fig. 46: suitable configurations associated with the challenge "onboard consumption culture" in blue color; dark blue items represent the "best-case scenario"

The second scenario-product associates *"Self-sufficiency and DIY"* trend with the *"Sensation-oriented"* milieu. This can be interpreted as a cruise product, in which the travelers take distance from all-inclusive programs and excessive consumption and instead, try to follow the same scheme as they used to do in their "*Natural urban habitat*" i.e. shopping at super markets and serving themselves. In this regard, cruise providers make their revenue via running the supermarkets and not the restaurants. This product model however will attract only those tourists who prefer *"A routine lifestyle experience"* while traveling. The service also attracts individuals who enjoy "*socializing*" while preparing their meal in the shared kitchens.

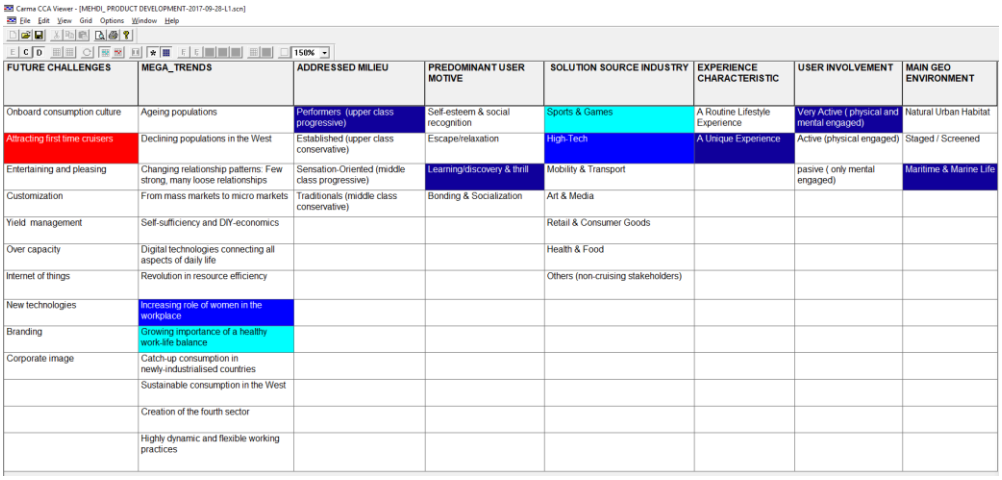
For tourists who seek "*A unique experience*" this model would not probably be successful. Instead, sustainability and an improved "*onboard consumption culture"* can be gained in the *"sports & game industry"* with the integration of *"digital technologies"*. An example could be here the combination of VR games with physical games: a VR-water-slide can simulate different environments including but not limited to a "maritime and marine life" environment, yet being frugal in using and polluting water resources onboard (Fig. 47).

Fig. 47: Scenario-configuration brainstorming: VR waterslide can improve the energy efficiency of the ships and at the same time expand the product spectrum of a cruise experience. (Photo: Business insider)

Attracting first time cruisers (A2):

One can brainstorm many ideas when asked about a product to cope with the challenge *"attracting first time cruisers".* Yet many concepts could be rejected again, when considering different aspects of the ideas. Carma engine delivered 13 reliable configurations, the one(s) with the highest consistency are the following: Generating *"learning/discovery and thrill"* for the "*performers"* as the addressed milieu, in association with the trends *"increasing role of women in the workplace"* and *"Growing importance of a healthy work-life balance"*. The product shall come from the "*high-tech*" industry, generate a "*unique Experience*" and engage the user mentally and physically in the activity (Fig. 48).

An example for this attributes could be a “work & cruise concept”: Female office employees who are fatigued of their routine work on land, can be presented with a week work & cruise reward. Such a product is possible when a company has many female employees who work at offices (mostly only with a PC), dealing with job-burnout and have lost their productivity. In cooperation with a cruise provider, the company can promote every month a few of its female employees, allowing them to continue their work for two weeks onboard a cruise ship, while enjoying the “*maritime and marine*” environment.



FUTURE CHALLENGES	MEGA_TRENDS	ADDRESSED MILIEU	PREDOMINANT USER MOTIVE	SOLUTION SOURCE INDUSTRY	EXPERIENCE CHARACTERISTIC	USER INVOLVEMENT	MAIN GEO ENVIRONMENT
Onboard consumption culture	Ageing populations	Performers (upper class progressive)	Self-esteem & social recognition	Sports & Games	A Routine Lifestyle Experience	Very Active (physical and mental engaged)	Natural Urban Habitat
Attracting first time cruisers	Declining populations in the West	Established (upper class conservative)	Escape/relaxation	High-Tech	A Unique Experience	Active (physical engaged)	Staged / Screened
Entertaining and pleasing	Changing relationship patterns: Few strong, many loose relationships	Sensation-Oriented (middle class progressive)	Learning/discovery & thrill	Mobility & Transport		pasive (only mental engaged)	Maritime & Marine Life
Customization	From mass markets to micro markets	Traditionals (middle class conservative)	Bonding & Socialization	Art & Media			
Yield management	Self-sufficiency and DIY-economics			Retail & Consumer Goods			
Over capacity	Digital technologies connecting all aspects of daily life			Health & Food			
Internet of things	Revolution in resource efficiency			Others (non-cruising stakeholders)			
New technologies	Increasing role of women in the workplace						
Branding	Growing importance of a healthy work-life balance						
Corporate image	Catch-up consumption in newly-industrialised countries						
	Sustainable consumption in the West						
	Creation of the fourth sector						
	Highly dynamic and flexible working practices						

Fig. 48: The optimal product development configuration(s) for the challenge “Attracting first time cruisers”; (Illustration: Carma engine)

Such business partnerships could exist between the cruise company and many land-based companies and originations (e.g. public sector, universities etc.) to support each other mutually.

Entertaining and pleasing (A3)

For this challenge, both Carma and ScenLab engines delivered the same configurations, with the top three scenario-concepts being very similar: The product(s) come(s) from the

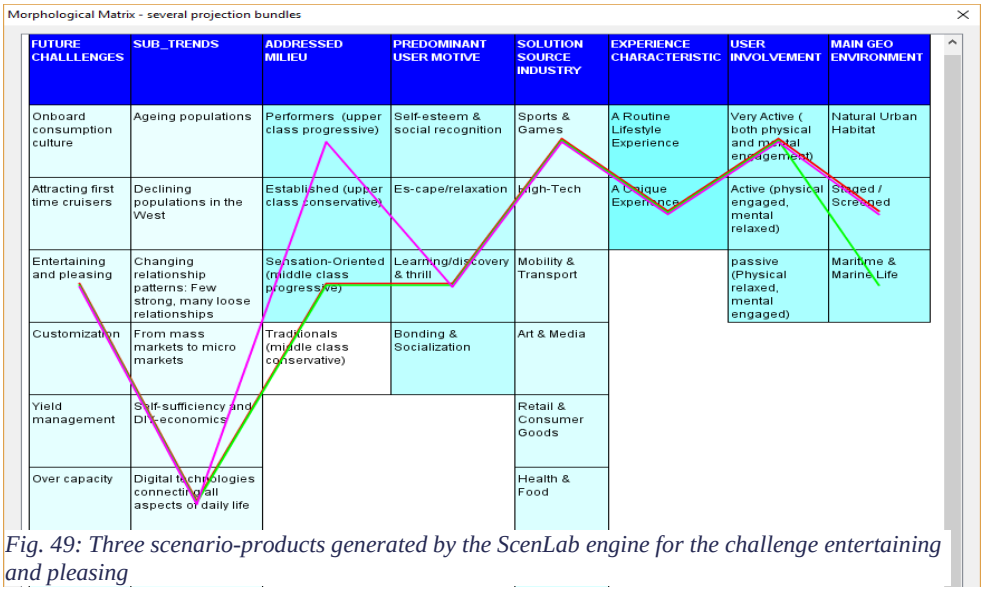


Fig. 49: Three scenario-products generated by the ScenLab engine for the challenge entertaining and pleasing

"sports & games" industry, when "*digital technologies connect all aspects of life*" in 2030. Addressed milieus are performers and sensational who are tech-affine and welcome new experiences. The product should respond to their demand for "*discovery and thrill*", be "*unique*" and very active in type. The environment is staged and/or happens in "*marine life*" (Fig. 49).

Fig. 50: An image of Amphibian SCUBA diving simulator, a research project from the MIT Media Lab (Photo: James Day)

An example of such product (from many possible), can be an Amphibian" SCUBA simulator" developed by MIT, which *"lets users experience the underwater world through a high presence virtual reality system (*Fig. 50*). The user is resting on a suspension system wearing Oculus Rift, a snorkel with breathing sensor, and gloves for motion detection."* (Lacey 2016)

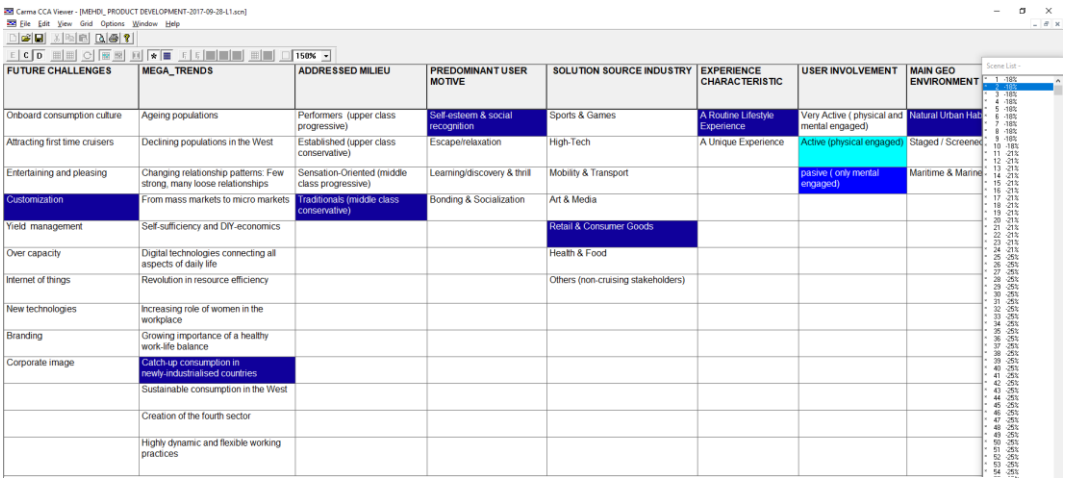
Customization (A4):

Customization as a challenge can be attributed with many future Mega-trends and sub-trends. From a marketing point of view, customization stands for responding to individual wishes of cruise travelers in contrast to massification strategies (providing inclusive packages for everyone onboard). From a designerly viewpoint, however, this might not be an optimal solution[52]. Instead, customization is rather associated with understanding the user(s) in their ethnography (their social affiliation, social milieu, etc.) and delivering creative ideas, which may not have been directly requested by the individual. An example for such creative product-design can be illustrated as the following:

Our morphological Analysis has suggested a consistent configuration for the *"traditional milieu (middle class conservative)"* in newly industrialized countries where *"Catchup consumption"* is going to be a future trend. The solution should come from "*Retail &*

[52] As they might not have a certain product in mind if surveyed for naming a product-wish, expecting the innovation to be delivered from the side of provider not themselves. (see for example Kytö 2015)

consumer goods", serving the "*self-esteem & social recognition*" of the users. The activity involves the user passively (also actively) and is practiced as "*routine lifestyle*" in his "*natural urban habitat*" (Fig. 51).



FUTURE CHALLENGES	MEGA_TRENDS	ADDRESSED MILIEU	PREDOMINANT USER MOTIVE	SOLUTION SOURCE INDUSTRY	EXPERIENCE CHARACTERISTIC	USER INVOLVEMENT	MAIN GEO ENVIRONMENT
Onboard consumption culture	Ageing populations	Performers (upper class progressive)	Self-esteem & social recognition	Sports & Games	A Routine Lifestyle Experience	Very Active (physical and mental engaged)	Natural Urban Hab
Attracting first time cruisers	Declining populations in the West	Established (upper class conservative)	Escape/relaxation	High-Tech	A Unique Experience	Active (physical engaged)	Staged / Screene
Entertaining and pleasing	Changing relationship patterns: Few strong, many loose relationships	Sensation-Oriented (middle class progressive)	Learning/discovery & thrill	Mobility & Transport		pasive (only mental engaged)	Maritime & Marine
Customization	From mass markets to micro markets	Traditionals (middle class conservative)	Bonding & Socialization	Art & Media			
Yield management	Self-sufficiency and DIY-economics			Retail & Consumer Goods			
Over capacity	Digital technologies connecting all aspects of daily life			Health & Food			
Internet of things	Revolution in resource efficiency			Others (non-cruising stakeholders)			
New technologies	Increasing role of women in the workplace						
Branding	Growing importance of a healthy work-life balance						
Corporate image	Catch-up consumption in newly-industrialised countries						
	Sustainable consumption in the West						
	Creation of the fourth sector						
	Highly dynamic and flexible working practices						

Fig. 51: Suggested configuration for the challenge "customization" in association with product development; (Illustration: Carma engine)

A market-driven interpretation of such products (for instance for a conservative Chinese individual from the middle class) could be a cruise with a luxury-shopping theme. A ship, dedicated to brand-shops providing him with the pleasure of "*social recognition*" in the shape of belonging to a higher social class (than he actually belongs).

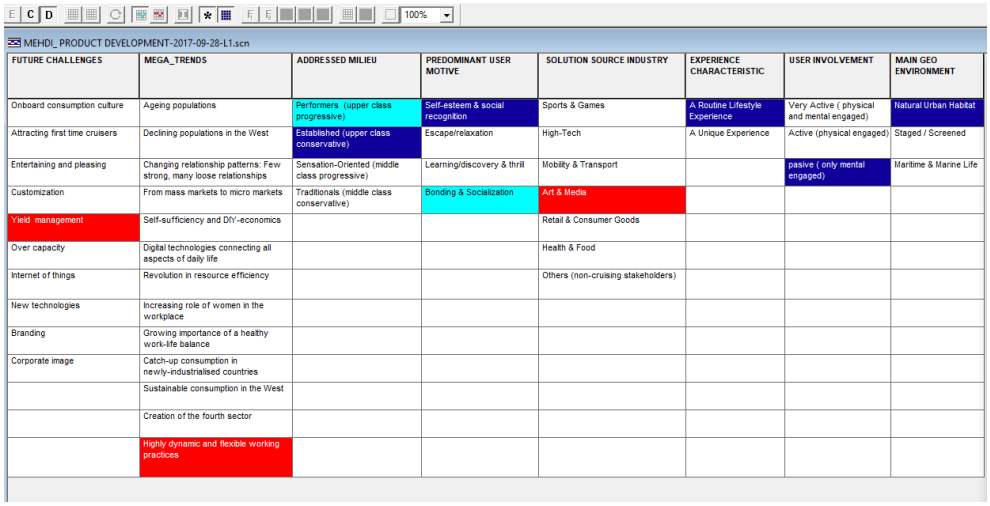
Fig. 52: traditional Chinese kite-fly festival, Photo by Maywong_photos.

A designerly interpretation, tries instead, to materialize traditional Chinese games and social activities and commercialize them for the behalf of both user and cruise provider. For example, *Kite Flying* is a popular activity among the traditional milieu of Chinese population. Converting this practice to a cruise product, a one-day kite-flying competition can be held on the ship while anchored in a destination. It can provide an aesthetical scenery for the ship (from the side of spectators ashore) as well as bring social admiration and recognition for the participants onboard (Fig. 52). While expanding the product palette with a very low investment, the

cruise company can then make revenue directly from kite purchases and coaching, and indirectly via promoting the ship to landside viewers [53].

Yield management (A5):

Since yield management is a very abstract topic (as a challenge) with a vast domain of application, our both engines could not find an optimal configuration, but many plausible configurations. In order to focus on one single scenario-concept, we determined two other projections (i.e. the trend "*highly dynamic working practices";* and the source industry "*Art & media*") and observe possible scenarios. As displayed in Fig. 53, such products will best address the upper class, involving them passively in a routine lifestyle experience that resembles their natural urban habitat. Here, two scenario-concepts are suggested: a scenario targeting "*self-esteem*" among "*established*" milieu and a scenario aiming at generating "*bonding and socializing*" for the "*performers*".



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FUTURE CHALLENGES	MEGA_TRENDS	ADDRESSED MILIEU	PREDOMINANT USER MOTIVE	SOLUTION SOURCE INDUSTRY	EXPERIENCE CHARACTERISTIC	USER INVOLVEMENT	MAIN GEO ENVIRONMENT
Onboard consumption culture	Ageing populations	Performers (upper class progressive)	Self-esteem & social recognition	Sports & Games	A Routine Lifestyle Experience	Very Active (physical and mental engaged)	Natural Urban Habitat
Attracting first time cruisers	Declining populations in the West	Established (upper class conservative)	Escape/relaxation	High-Tech	A Unique Experience	Active (physical engaged)	Staged / Screened
Entertaining and pleasing	Changing relationship patterns: Few strong, many loose relationships	Sensation-Oriented (middle class progressive)	Learning/discovery & thrill	Mobility & Transport		pasive (only mental engaged)	Maritime & Marine Life
Customization	From mass markets to micro markets	Traditionals (middle class conservative)	Bonding & Socialization	Art & Media			
Yield management	Self-sufficiency and DIY-economics			Retail & Consumer Goods			
Over capacity	Digital technologies connecting all aspects of daily life			Health & Food			
Internet of things	Revolution in resource efficiency			Others (non-cruising stakeholders)			
New technologies	Increasing role of women in the workplace						
Branding	Growing importance of a healthy work-life balance						
Corporate image	Catch-up consumption in newly-industrialised countries						
	Sustainable consumption in the West						
	Creation of the fourth sector						
	Highly dynamic and flexible working practices						

Fig. 53: possible scenarios regarding Yield management from the art & media industry when highly dynamic working practices become the norm

[53] Building on that idea, the next step could be organizing a competition between teams of travelers for creating cumulatively very large kites that could act as a Skysail propulsion.

To recap the scenario-product, the configuration raises the question: "how to utilize the trend *dynamic working practices* and make yields from the art and media industry? (Red projections)".

A hint for the brainstorming or product-interpretation is then delivered by the MA matrix by displaying blue colored projections. For example, an event-cruise for stock market-trading for the established milieu meets all the given criteria: trading stocks is being a popular hobby among Chinese and Japanese upper class entering their retirement years (Fig. 54).

The practice doesn't need physical abilities and can be followed any time from the hotel room on a laptop or even on the deck with a mobile applications (Laly 2015)[54]. The cruise line can designate and add stock- cruising to its product pallet and yield from providing the digital infrastructure or from educational workshops. As a side-effect, bonding to the instructors and/or other practitioners, will turn senior travelers to long term residents.

Fig. 54: The trend for stocks-trading among baby-boomer pensioners especially in Asia and the potential to become a cruise product; (Photo: Reuters/Aly Song)

[54] Naming reasons for the pensioner's interest for trading is off-topic, however some scholars claim that the practice is likely comparable with the tendency to gambling in this milieu, yet with a higher "social recognition" and an actual perspective to rewards. Pensioners get thrill of seeing results any time by any decision-making, and get skilled during the time.

Collective diagram:

An overview on the collective diagram of optimal (or best possible) configurations associated with all challenges, can help us to understand the importance of each projection considering the "big-image" of the challenges.

For example, the two trends "*catch up consumption in newly industrialized countries*" and "*digital technologies connecting all aspects of life*" are more present in the top scenarios, indicating they carry more potential when it comes to comparing trends to each other (Fig. 55). Same attention should be also dedicated to "*sports and games*" and "*retail and consumer goods*" as being the most promising source industries.

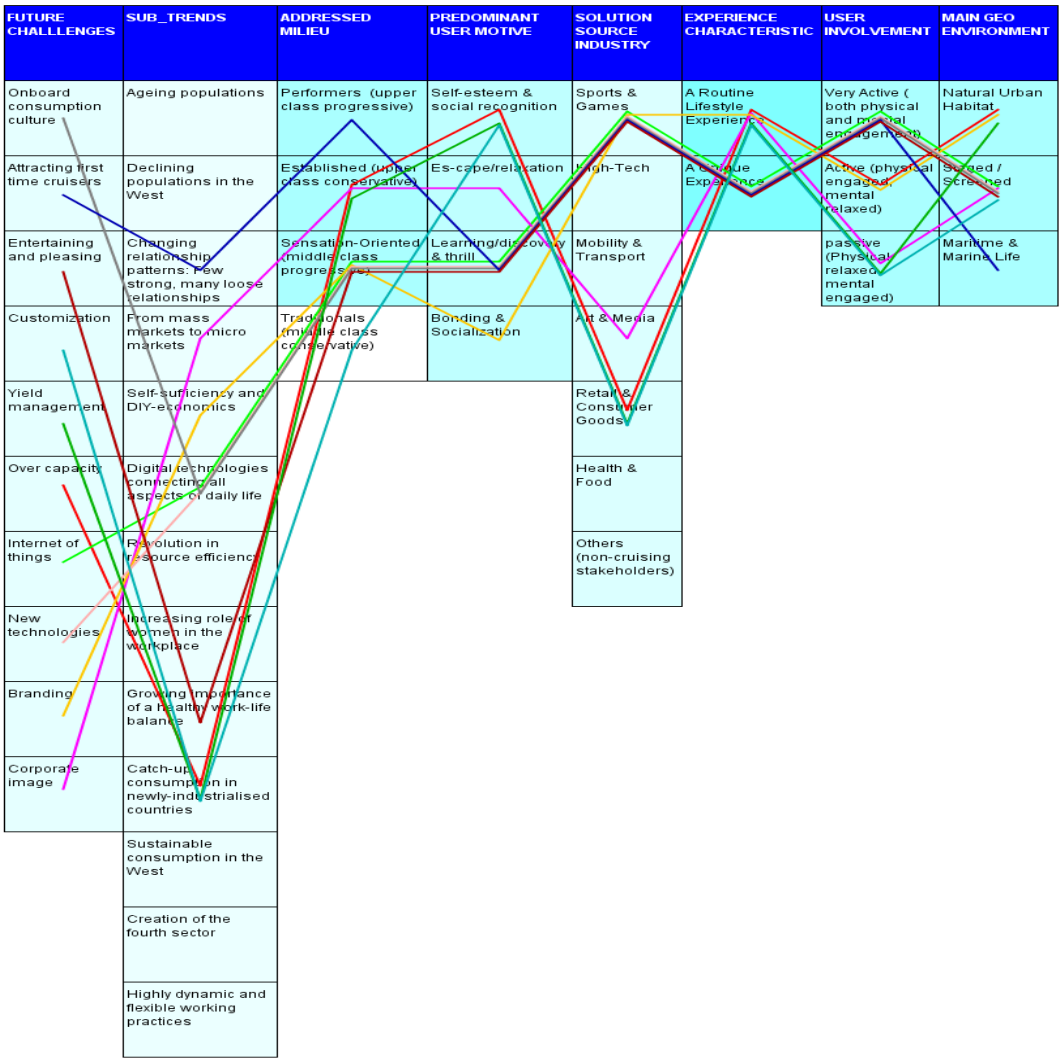


Fig. 55: Collective diagram of optimal configurations associated with all 10 challenges researched (distribution stress generated by scenLab engine)

5.1.2. **Matrix interpretation for business model innovation (BMI)**

As outlined in 4.2.2 4.1.5and later in 4.2.2, our objective is to find optimal ship architectural settings in association with the upcoming challenges and sub-trends (columns D and E) in a 15 years perspective. In particular, it is important to illuminate, under which business model scheme (F1), a diversification in the service concept (or venturing a risky and radical new niche business) would have promising results.

Similar to the matrix interpretation for the "product development", many configurations were generated by our two software engines that can be a valuable material for being assessed by cruise experts. We discuss and interpret a few interesting ones:

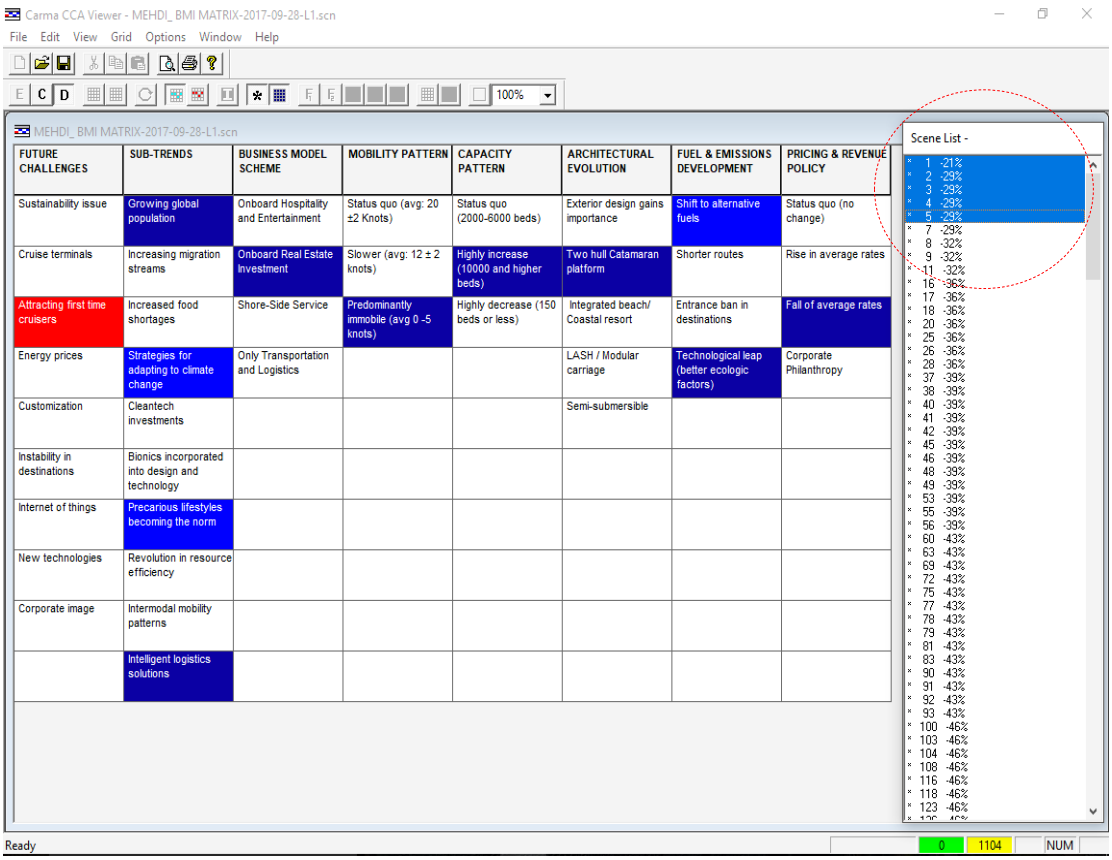
Attracting first time cruisers (D3):

Brainstorming on attracting first timers could be a very ambiguous topic when coming to business model innovation, since the user here is not necessarily a cruise tourist. Moreover, the solution space is so widespread, that the given seven key-factors and their projections still seem very general-defined, rather than being able to filter the solution space and frame a single concept.

However, to our surprise, the top five scenario-configurations shared nearly the same projections, differing only in one criteria (compare *Scene list* and *Sub-trends* in Fig. 56). This data is valuable, as we can now determine that "*growing global population*", "*adapting to climate change*", "*precarious lifestyles*", and "*intelligent logistic solutions*" are potentially powerful trends to attract new users[55]. Thus, decision-makers, product developers and think-thanks of those companies planning to enter the market in upcoming years or designate a niche business should invest and prepare exclusively on these four key trends.

In this regard, "*onboard real estate investment*" seem to be the better promising scheme for venturing niche business models outside of classic cruising. However, vessels need to be structured larger and undergo architectural evolution: They should be able to accommodate 10000 or more people. Vessel's speed shall instead decline drastically. The ship will cruise either very slow around 5 Knots or even lays immobile for a season in a destination. The slow speed is mostly due to a shift to alternative fuels, such as solar or wind

[55] We use the term "user" instead of „first time cruiser", as the conceptualized business model might differ from the classic cruise tourism.



FUTURE CHALLENGES	SUB-TRENDS	BUSINESS MODEL SCHEME	MOBILITY PATTERN	CAPACITY PATTERN	ARCHITECTURAL EVOLUTION	FUEL & EMISSIONS DEVELOPMENT	PRICING & REVENUE POLICY
Sustainability issue	Growing global population	Onboard Hospitality and Entertainment	Status quo (avg: 20 ±2 Knots)	Status quo (2000-6000 beds)	Exterior design gains importance	Shift to alternative fuels	Status quo (no change)
Cruise terminals	Increasing migration streams	Onboard Real Estate Investment	Slower (avg: 12 ± 2 knots)	Highly increase (10000 and higher beds)	Two hull Catamaran platform	Shorter routes	Rise in average rates
Attracting first time cruisers	Increased food shortages	Shore-Side Service	Predominantly immobile (avg 0 -5 knots)	Highly decrease (150 beds or less)	Integrated beach/ Coastal resort	Entrance ban in destinations	Fall of average rates
Energy prices	Strategies for adapting to climate change	Only Transportation and Logistics			LASH / Modular carriage	Technological leap (better ecologic factors)	Corporate Philanthropy
Customization	Cleantech investments				Semi-submersible		
Instability in destinations	Bionics incorporated into design and technology						
Internet of things	Precarious lifestyles becoming the norm						
New technologies	Revolution in resource efficiency						
Corporate image	Intermodal mobility patterns						
	Intelligent logistics solutions						

Fig. 56: Four top trends that have potential to generate new users (cruisers); dark and light blue ; Carma engine

energy or a combination of all renewable resources. A technological leap might even accelerate this development, making such floating residencies even more energy–efficient than their land-based counterparts[56].

Such mobile cities have likely a catamaran-like platform, making the empty space between the two hulls presumably for portal usages, i.e. for designating sand beaches, waterfront and mooring dockyards for smaller boats (Fig. 57).

Motivation for residing on such mobile cities could be very diverse. As outlined earlier, there will be more adventurous people, who live a precarious lifestyle and prefer to be

[56] Some sources of renewable energies are more accessible on the see than on the land, (for example high-speed natural wind)

Fig. 57: Mobile cities as hybrids between cruise ships and small towns with a capacity of 10000 to 15000 dwellers, commuting seasonal between multiple countries. Illustration by author (background from 10Design imagery).

traveling with their home. The logistic opportunities that a mobile residency offers, is attractive for many businesses. Climate changes are also another driver. A floating structure is not threatened by raising water levels. Moreover, the vessel route can be scheduled in a way, so that it offers always a moderate summer weather to its dwellers.

The relatively high number of residents (cruisers) will cause the average rents (cruise rates) sink considerably, as the operative costs now is being distributed between more people. However, both cruise providers and users will likely show interest to condominium model purchases[57], as both sides will need long-term schedules for their respective plans.

[57] Purchasing a cabin or residency right for a fraction of year or permanently.

Shore side services (F13):

In the section 3.5 we reviewed four adjacent[58] business schemes and raised the question that "tending to which scheme could generate new promising niche businesses similar to cruising?" In the previous scenario, we experienced that "*Onboard real estate investment (F12)*" generates most consistent configurations in our matrix, yet "shore side service" seems to be the second suitable scheme in delivering reliable scenario-concepts. The most potent setting for this scheme is empowered by two global trends: "*intelligent logistics solutions*" and the demand for new "*strategies for adopting to climate change*" (Fig. 58).

FUTURE CHALLENGES	SUB-TRENDS	BUSINESS MODEL SCHEME	MOBILITY PATTERN	CAPACITY PATTERN	ARCHITECTURAL EVOLUTION	FUEL & EMISSIONS DEVELOPMENT	PRICING & REVENUE POLICY
Sustainability issue	Growing global population	Onboard Hospitality and Entertainment	Status quo (avg: 20 ±2 Knots)	Status quo (2000-6000 beds)	Exterior design gains importance	Shift to alternative fuels	Status quo (no change)
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Attracting first time cruisers	Increased food shortages	Shore-Side Service	Predominantly immobile (avg 0 -5 knots)	Highly decrease (150 beds or less)	Integrated beach/ Coastal resort	Entrance ban in destinations	Fall of average rates
Energy prices	Strategies for adapting to climate change	Only Transportation and Logistics			LASH / Modular carriage	Technological leap (better ecologic factors)	Corporate Philanthropy
Customization	Cleantech investments				Semi-submersible		
Instability in destinations	Bionics incorporated into design and technology						
Internet of things	Precarious lifestyles becoming the norm						
New technologies	Revolution in resource efficiency						
Corporate image	Intermodal mobility patterns						
	Intelligent logistics solutions						

Fig. 58: optimal configuration for the business model scheme "shore side services"

Motives for cruise companies to enter this relatively new domain could be different, from pure profitmaking intentions to "*corporate philanthropy (F64)*". Governments might be also interested in cooperating with maritime sector and support them financially to combat global *"sustainability issues (D1)"*. A suggestion service model in this regard could be an interregional component-sharing system based on floating platforms:

Some urban structures such as sport venues have short usage periods, yet they are very expensive to construct and deconstruct again[59]. As a sustainable solution, most of these components could be erected on floating structures and become mobile, the way hotels are installed on cruise ships and travel between multiple destinations (see Fig. 59).

[58] Adjacent to cruising business model

[59] For example 2012 London's Olympic venue was disassembled after the games and raised many sustainability concerns

Fig. 59: A mobile tennis stadium, a hybrid between a cruise ship and an urban facility (illustrated by the author)

Different business models can be conveyed in this way on floating structures. The cruise company can then either see the business as a diversification strategy or make revenue only via the infrastructure and its know-how, subletting the business to third party businesses or organizations. The model will also initiate a new market for shipbuilders and cruise lines, integrating them in urban building sector by constructing, maintaining, operating and managing semi-vessel urban annexations (Fig. 60).

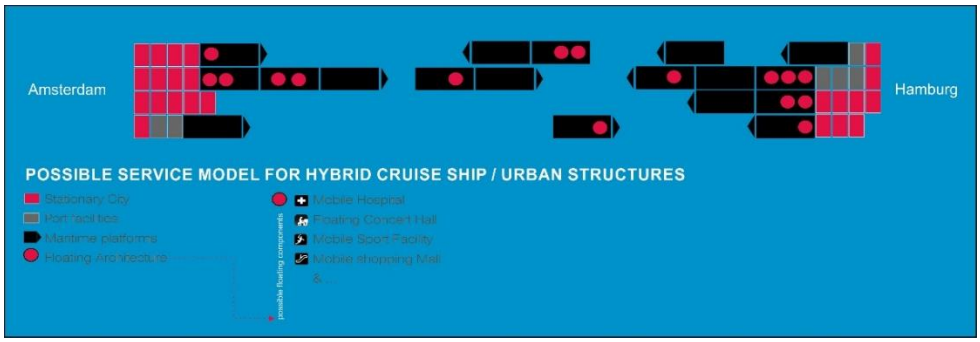

Fig. 60: A hypothetic component-sharing between two neighboring port cities, Hamburg and Amsterdam (Illustrated by author)

Some niche businesses also can develop complex services on this principle. For example, a technical hospital and nursing ship cruising around the world can be an attractive service for pensioners from the upper class who enjoy the thrill and variety of such lifestyle (compared to stationery nursing homes on land; see Fig. 61). It also can offer its hospital services to the people in need around the world as part of company's corporate philanthropy. This or similar concepts could render a better public image for the cruise industry regarding its current unsustainable business scheme, and promise a better attitude from the side of first-timers towards cruising concept as a whole.

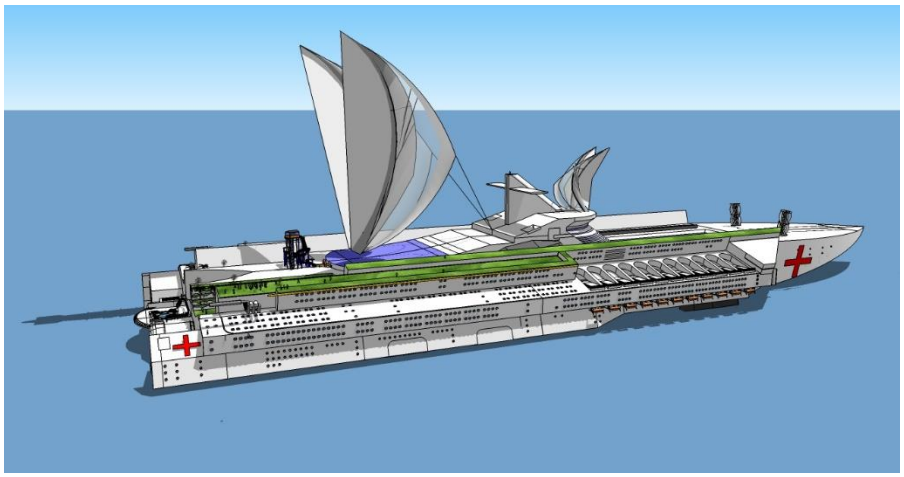

Fig. 61: A multi-purpose large floating senior home and hospital complex, sailing the world and participating occasionally in humanitarian actions in rural destinations (Illustrated by author)

5.1.3. **Results Summary**

Except for the currently unsustainable onboard services in the cruising business model (gastronomy and hotel functions), the remaining entities containing infrastructural, administrative and software capacity of the sector can be greatly utilized for developing new service models and niche businesses, serving both the sector and potential new users.

As stated, cruise industry needs to open up towards innovation and venture new business domains, first, because due to market saturation, a steady growth rate for the era after 2030 cannot be guaranteed. Second, its unsustainable business model with a bad reputation regarding onboard consumption culture as well as in terms of its emissions and its impact on the maritime environment will draw disapproval from the side of public opinion and will consequently drive the governments and policymakers to impose more restrictions and limitations on this sector.

The examples outlined above proved that the sector has yet enormous potential for innovation. Perhaps the complexity of the business model in terms of the number of involved stakeholders, but also the huge amount of invested capital, has made the decision-makers and think-tanks to move very conservative towards out-of-the-box ideas and revolutionary innovations.

With the help of Morphological Analysis, we displayed that it is possible to collect facts from different stakeholders and combine them in a creative way to generate feasible cruise products as well as new niche businesses. However, the scenarios we have generated are raw innovation-oriented models. As a common approach in GMA inquiries, the findings need be consequently analyzed and be researched in depth for developing backcasting roadmaps and practical strategies.

5.2. Theoretical results

During the research, we realized that many scenario-concepts generated by the MA are already known, patented business concepts in the real world. We did not conceive it as a drawback or lack of creativity, but rather a proof sign that our MA-matrix is correctly arranged and clustered. There were still numerous remaining potential concepts illustrated by the MA matrix that a brainstorming or any other non-systematical idea generation method might have failed to spot.

The number of the key-factors can grow unlimited. Yet it is a task of trial and error and experience to find a satisfying number of key-factors, which is limited in quantity but encompasses the whole solution-space. In our case, we examined different *key-factor* sets to find a satisfying matrix, hense our final matrix differed notably from the preliminary matrix we built (compare Table 9 with Table 22). Multiple key-factor/projections were added to extend the solution space coverage of the matrix (blue colored). Some other projections were eliminated (red colored), as they were not generating any new input, causing only redundancies in the ideation process.

Dimen-sion	Key-Factor	Projection 1	Projection 2	Projection 3	Projection 4
C	**Predominant user motive**	Self-esteem & social recognition	Escape/relaxation	Learning/discovery & thrill	Bonding & Socializa-tion
D	**Involvement type**	Active	Passive		
F	**Experience tendency**	Routine lifestyle	Tourism contexted	Unique experience	
G	**Typical addressed milieu**	Established	Performers	Modern Main-stream	Sensation-Oriented
H	**Main stimulation environ-ment**	**Urban habitat**	**Maritime or aquatic habitat**	**Staged, Screened**	

Table 22: Initial matrix for the product development, some key-factors and projections were added later (blue color) and some were eliminated (red color)

We noticed also that one method for verifying the correctness of a morphological matrix (a set of key-factor/projections) is to test it on real-world products[60]. As a validation test, we applied our matrix on the list of amenities onboard the Royal Caribbean's *Harmony of the Sea.* As a logical rule, (a) all products must be able to be clustered to projections defined in the Table 9, and (b) every two products must defer in at least one projection. As illustrated in the Table 23, almost every product could be coded by our matrix, confirming the validation of our key-factor/projection setting.

PRODUCT	coding based of key-factors				
Ultimate Abyss dry slide	Learning/discovery & thrill	Active	Unique experi-ence	Learning/discovery & thrill	Staged, screened
"Vitality" Spa and fitness	Established	Active	Routine lifestyle	Escape/relaxation	Urban habitat
Splashaway Bay" water play area	Established	Active	Unique experi-ence	Bonding & Socializa-tion	Maritime habitat
swimming pool	Modern Main-stream	Active	Routine lifestyle	Escape/relaxation	Maritime habitat
Casino Royale	Established	Active	Unique experi-ence	Learning/discovery & thrill	Urban habitat
escape room	Established	Active	Routine lifestyle	Escape/relaxation	Urban habitat
molecular gastron-omy restaurant	Performers	Active	Unique experi-ence	Self-esteem & social recognition	Urban habitat
Ice Rink	Modern Main-stream	Active/ passive	Unique experi-ence	Bonding & Socializa-tion	Staged, Screened
Aqua Theatre	Established	passive	Unique experi-ence	Learning/discovery & thrill	Maritime habitat
Bionic Bar	Sensa-tion-Ori-ented	passive	Unique experi-ence	Learning/discovery & thrill	Urban habitat
DreamWorks Expe-rience	Established	Active/ passive	Unique experi-ence	Bonding	Staged, Screened
climbing walls	Sensation-Oriented	Active	Unique experi-ence	Unique experience	Staged, Screened
Zip-line	Entertainment	Active	Unique experi-ence	Unique experience	Maritime habitat
Shopping mall	?	Active	?	Routine lifestyle	Urban habitat
Central Park	Relaxation	Active	Visual and/or Audial	Routine lifestyle	Urban habitat

Table 23: Coding available products with the help of projections and clustering them as a validation test for our proposed key factor/projection matrix.

During further theoretical research on the question "how to efficiently determine optimal key-factor/projection sets for a matrix", we realized that an early blind-brainstorming will

[60] Current products available on the market (instead of future ones).

positively accelerate the process of finding key-factors needed for the matrix. Fig. 62 illustrates how we have applied an initial brainstorming to determine the key-factors we needed for our "product identifiers (C_1 to C_6).

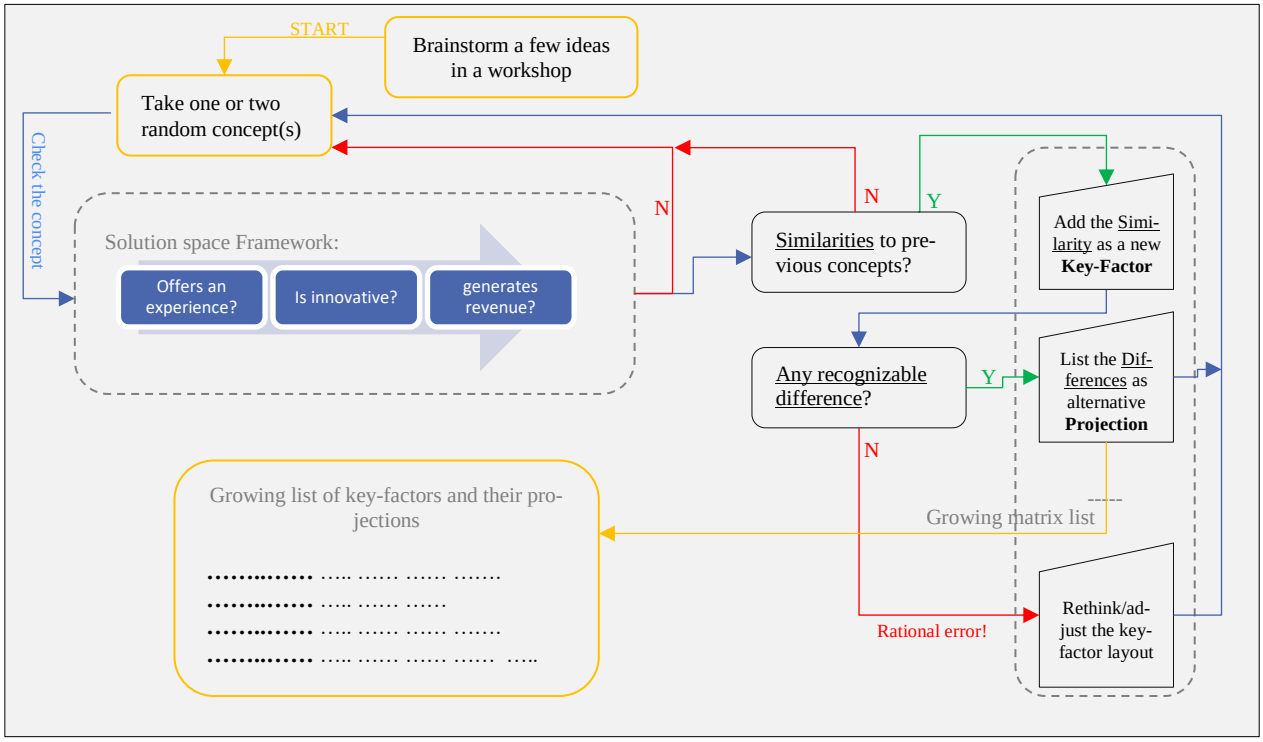

Fig. 62: The flowchart used to find an optimal key-factor/projection set (third dimension in the matrix)

As the flowchart describes, first we brainstorm and collect one or a few random concepts, followed by processing each of them in a logical algorithm. Second, the idea needs to pass a three level question, checking whether the idea conforms to the framework of our solution space at the first place: "1) Does it offer an experience? 2) Is it innovative? 3) Does it generate revenue? "If the answer to all questions is "yes", then we go forward with the "concept" and ask another question: "Does this concept has some similarities to our previous collected concept(s)?"

In case of a positive answer, we determine the similarity as a *"key factor"* and go forward with a new question: "Can we recognize at least one difference between this and our previous concepts?" Here if the answer is again positive, we determine now the difference as a new "*projection*" under the respective key-factor. If the answer is "no" it shows our key-factor layout is still ill-defined and needs to be adjusted.

With continuing the procedure above, one can effectively determine the key-factors and the projections needed for any morphological analysis. For example if we brainstorm for a pointing device for PCs, a "mouse" and an "eye-tracking" device will pop up to the

mind. They both use (electrical) energy, so “energy source” can be inserted in the MA matrix as a Key-factor. They differ then in the type of energy, one is battery-powered and the other one receives its energy from a USB cable, so “battery” and “cable” can be listed as respective projections. We can then grow, adjust and revise the quantity of our key-factors and their respective projections until a satisfying matrix is shaped.

Further theoretical findings are as the following:

- Morphological analysis is not a handy and quick ideation method, but is very reliable when it comes to a systematic exploration of solution space. It can significantly integrate brainstorming tools and provide them with a comprehensiveness that they normally do not contain on themselves.

- MA is very effective in collecting and connecting data inputs from different research sources. This makes the approach an ideal tool for multi-disciplinary researches and workshops for example when data from a Delphi research needs to be processed, analyzed and discussed.

- A simple CCA[61]-filtering would not suffice for limiting the solution space and focusing on interesting scenarios. One should have the courageousness to consciously eliminate those “ordinary” projections and focus only on extreme projections, sinse only these projections contain revolutionary ideas and interesting scenarios. As Tom Ritchey proposes:

  > *“GMA seeks to be integrative and to help discover new relationships or configurations. Importantly, it encourages the identification and investigation of boundary conditions, i.e. the limits and extremes of different parameters within the problem space.”*

- Morphological analysis is not an ideation machine. Nor can it replace human’s intelligence in interpreting raw scenarios. Yet its ability in using artificial intelligence (software) in relating and clustering facts about complex systems, makes it a very reliable assistance tool in dealing with complex research fields with big data such as future-oriented-design practices.

[61] Cross consistency analysis, see 2.4.3

5.3. Further research suggestions

This dissertation proposed the idea of integrating Delphi tool in morphological analysis for facilitating innovation management. One requirement for this integration is to computerize the Delphi. In this regard, an interdisciplinary research cooperation between survey designers and IT programmers can build on this research with first: developing algorithms that convert a manual Delphi survey to a digital one, and second, integrating the Delphi method in a computerized Morphological Analysis. This integration should also cover different requirements of a MA research, i.e. the ability to be operated by multiple users (experts), discussing the data, editing the inputs and observing the results in real-time.

The outcome of such research, will be presumably a software application, which not only will find its usage in future-oriented-design, but also in other disciplines such as in marketing, architecture, strategic management, and many other branches where decision making is coupled with creativity and/or innovation management.

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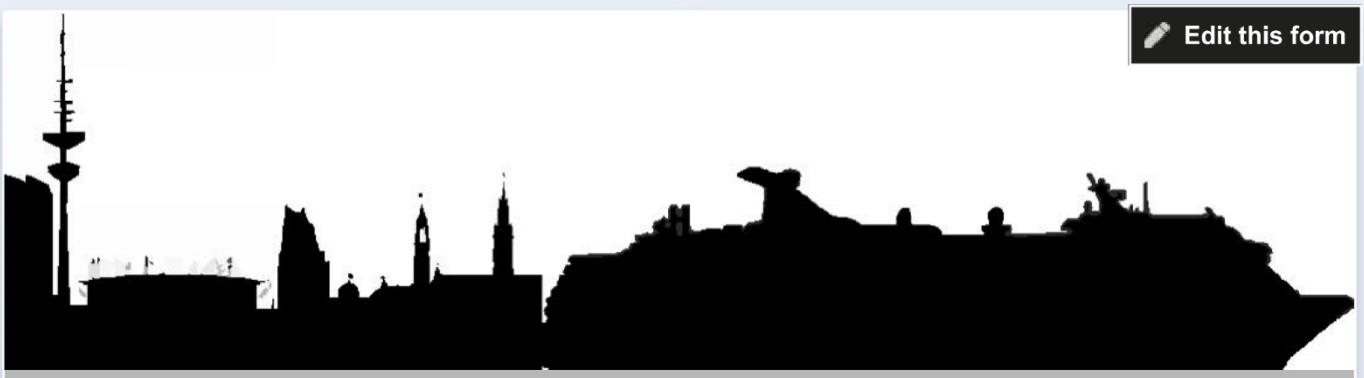
7. APPENDIXES

7.1. Appendix 1: Delphi survey round 1

Edit this form



Delphi Survey: Future of Cruising Business

Thank you for taking time and participating as an expert in our Delphi inquiry. (for more information about Delphi method, see http://en.wikipedia.org/wiki/Delphi_method)

* Required

Dear expert,
our aim is to picture different futures for the cruise industry from 2015 to 2030. Your answers will help us to rank and evaluate the scenarios we have developed.

The Institute of Transportation Design at HBK Braunschweig and the EBC Hochschule Hamburg comply with the provisions of the German Data Protection Act (BDSG) and all other privacy-related regulations. Your personal data will not be disclosed to third parties, and all results will be analysed and published in an anonymised and aggregated form only.

Attention: This Delphi study consists of two rounds.

please enter your email address so that we can inform you for the second round. (In order to enable us to connect your answers from the first and second rounds of questions, please use the same email address for both rounds)

*

My expertise is mostly associated with the field of *

If others please specify

Question 1: Current factors

In your opinion, which crucial factors currently influence the decision-making of a potential cruise traveler?

[Please answer in note form]

Question 2: Future challenges

In your opinion, which will be the future challenges of the cruise industry (horizon 2030)?

[Please answer in note form]

Question 3: Future markets

In the future, which markets will expand/decline in value?

Short term: within the next five years the: *

	decline in value.	remain constant.	expand in value.

	decline in value.	remain constant.	expand in value.
German market will	○	○	○
European market will	○	○	○
American market will	○	○	○
Asian market will	○	○	○

Long term: within the next fifteen years the: *

	decline in value.	remain constant	expand in value.
German market will	○	○	○
European market will	○	○	○
American market will	○	○	○
Asian market will	○	○	○

Why? *

Please support your choices with a statement.

Question 4: Future factors

To what extent do you agree with the following statement?

"Due to changing conditions e.g. new socioeconomic, demographic, and political frameworks, cruise travelers (horizon 2030) will base their decision-making process on other factors." *

- ○ Totally disagree.
- ○ Rather disagree.
- ○ Almost agree.
- ○ Totally agree.

Comment (form and intensity of changes, etc.)

Question 5: Ship dimensions

Please read this statement:

"A traceable trend can be observed in terms of capacity and dimension of cruise ships. Following the economy of scale, the average capacity of ships ordered by global cruise providers continues to increase remarkably since 1990s.

The same trend applies to the limits of technical possibilities, as the title of the "biggest Mega-cruiser" held by a ship is being taken by another one, shorter than expected (see diagram below). Between 2000 and 2015 the limit of largest cruise ship is extended by 61% in capacity and 64% concerning the gross tonnage.

In a hypothetical linear growth, the changes within the last 15 years can be an indicator for the future 15 years. "

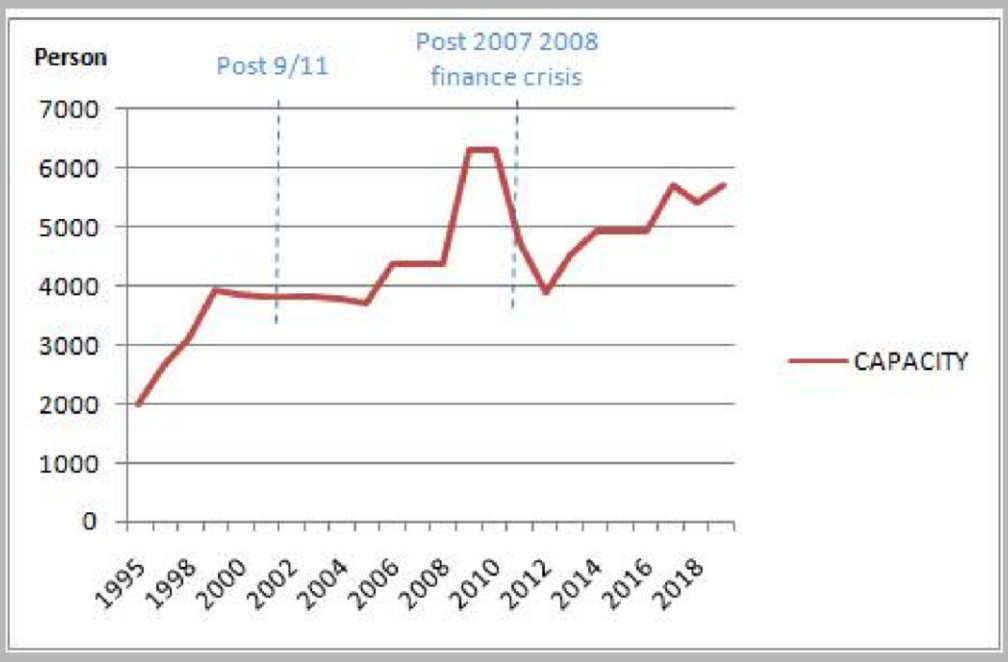


Diagram 1: Maximum capacity of the largest Mega-ship launching in a certain year. (source: CLIA data/ authors)

Please evaluate the following scenarios:

Mega Ships keep growing with the same pace, by 2030 there will be large cruisers with over 10.000 passengers and 0.4 million of gross tonnage. *

This scenario is

- strongly impossible.
- slightly impossible.
- slightly possible.
- strongly possible.

In the near future the growth will stop due to infrastructural and/or technological barriers. *

This scenario is

- strongly impossible.
- slightly impossible.
- slightly possible.
- strongly possible.

Spectacular large cruise ships lose their popularity among the travelers, small ships (<2000 passengers) become trendy again. *

This scenario is

- strongly impossible.
- slightly impossible.
- slightly possible.
- strongly possible.

Why? *

Please share your point of view about future mega-ships and their dimensions:

Question 6: Energy resources and energy efficiency

Please write your own scenario for the following assumptions. Decide how cruise companies will probably react to these changes.

After 2020 oil prices rise significantly... *

Politicians and consumers exert extra pressure. Cruise ships are expected to be at least as energy efficient as land-based hotels... *

Technological advances make producing electricity by offshore wind-parks being cheaper than by fossil fuels... *

Question 7: Destination vs on-board experiences

Please evaluate and complete the following statements.

By 2030 "visiting destinations" will be ..... than "on-board activities". *

	more important	as important as	less important
in the German market	○	○	○
in the European market	○	○	○
the American market	○	○	○
in the Asian market	○	○	○

Please explain your point of view:

Question 8: Destination

To what extent do you agree with the following two conclusions?

By 2030 cruise programs without any destination-visit will be a remarkable alternative market. *

- Totally disagree
- Rather disagree
- Almost agree
- Totally agree

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

- Totally disagree
- Rather disagree
- Almost agree
- Totally agree

Question 9: Financing

Please read the following statement and decide how likely are the concluded scenarios.

"Financing a new ship is getting increasingly difficult, expensive and risky both for main and niche providers. As a solution, cruise providers turn to joint-ownership models such as Condominium* model."

*In the Condominium model the customer purchases a cabin onboard the ship.

This scenario is for large cruise ships *
(more than 2000 passengers)

- strongly impossible.
- slightly impossible.
- slightly possible.
- strongly possible.

This scenario is for small ships and niche markets *
(less than 2000 passengers)

- strongly impossible.
- slightly impossible.
- slightly possible.
- strongly possible.

Please share your point of view with us:

Question 10: Business Model

To what extent do you agree with the following statement?

"The involvement of banks in financing new ships has increased notably within the last 10 years. If this trend continues, the value of finance investors will exceed the value of ship operators among the business stakeholders. By 2030 banks or other investors are rivals to cruise companies in launching new ship projects. As a result the bank/ the government/ the city become the main owners of ships and follow their own business interests (tourism/urban facilities/private businesses). The know-how of Cruise companies will become an acquirable service." *

- Totally disagree
- Rather disagree

- Almost agree
- Totally agree

*

Please explain your point of view:

Question 11: Aesthetic

To what extent do you agree with the following two statements?

Nowadays ships exterior design matters to travelers and affects their decisions. *

- Totally disagree
- Rather disagree
- Almost agree
- Totally agree

By 2030 ships exterior aesthetic becomes an important factor for the cruise owners, when ordering a new vessel. *

- Totally disagree
- Rather disagree
- Almost agree
- Totally agree

Please explain your point of view:

Is there any other question that you think would be of relevance, and you would like to share with us?

WE THANK YOU FOR YOUR CONTRIBUTION!

ITD Braunschweig & EBC Hochschule Hamburg

EBC HOCHSCHULE
UNIVERSITY OF APPLIED SCIENCES

Braunschweig University of Art
Hochschule für Bildende Künste Braunschweig

ITD Institut für Transportation Design

Submit

100%: You made it.

Never submit passwords through Google Forms.

7.2. Appendix 2: Delphi survey round 2

HOME | Cruising Market | Future Scenarios

Delphi Survey
Future of Cruising Business

Round 2

Dear expert,

Thank you for taking time and participating as an expert in this Delphi inquiry. Our aim is to picture different futures for the cruise industry in a 15 years perspective. Your answers will help us to rank and evaluate the scenarios we have developed.The Institute of Transportation Design at HBK Braunschweig and the EBC Hochschule Hamburg comply with the provisions of the German Data Protection Act (BDSG) and all other privacy-related regulations. Your personal data will not be disclosed to third parties, and all results will be analysed and published in an anonymised and aggregated form only.

For more information about the Delphi method, please click here

---

Attention

The questions in the second round will demand mental energy and time for composing your thoughts. Please plan 20 to 30 minutes time for responding to the 11 questions.

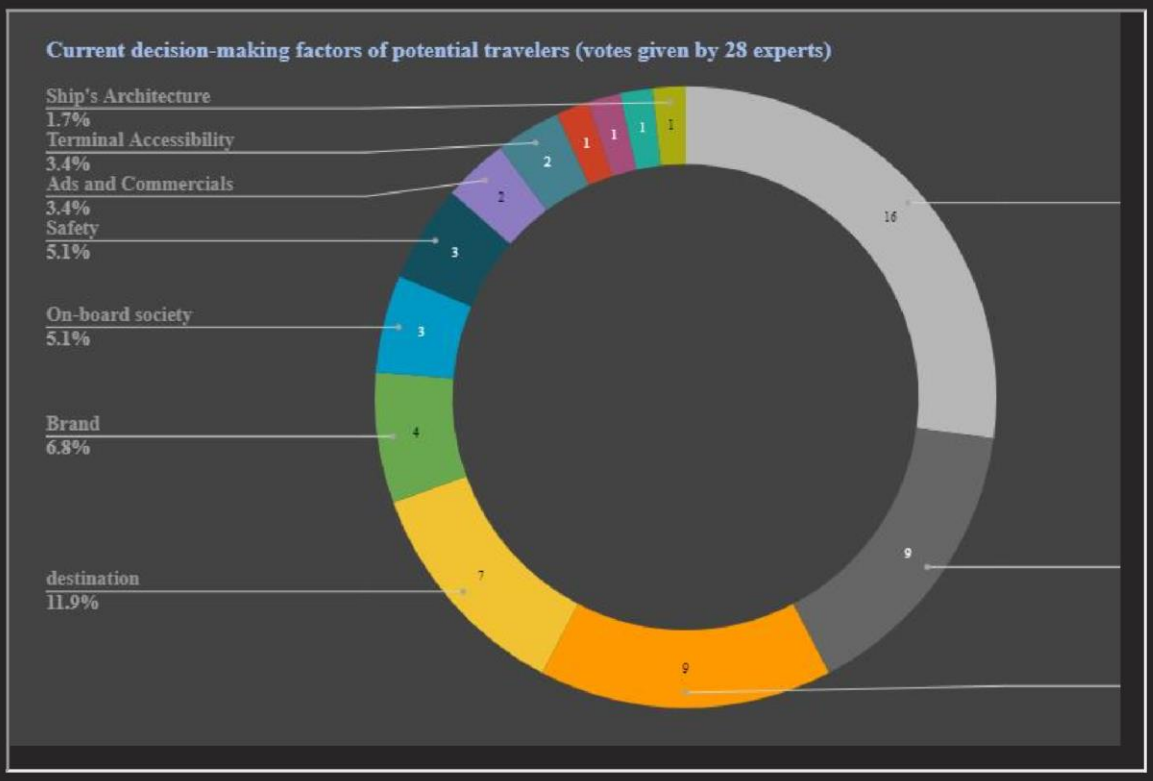
You can leave questions unanswered if not in your expertise. Two tabs near the home button will help you to navigate between questions relevant to " cruising market" or to "future scenarios". We however encourage you to answer to all questions if relevant to your area.

☐ Yes, I would like to be informed about the final results of the second round.

Question 1: Current factors

In the first round of Delphi inquiry, you were asked to name those factors that influence at the moment the decision making of a potential traveler:

We have categorized similar namings, 13 groups have been identified.The results are as the following:



Legend

Price: Ticket prices, peripheral prices and the price of inclusive packages

Routing: Start/End, duration and the itinerary of the travel

Amenities onboard: Diversity and novelty of possible onboard activities

Destination: Number of visiting destinations and their fame

Brand: The brand and service class of the cruise provider

Onboard society: Demography of co-travelers (language, age group and social class)

Safety reputation: The reputation of the brand & destination in providing a secure cruise experience

Ads and commercials: Direct advertising, marketings actions

Terminal accessibility: The proximity & ease of access to the boarding terminal

Freedom and individualism: The freedom of having privacy or following individual wishes onboard the ship

Quantity of experiences: Overall number of possible experiences pro cruise

Recommendations: Recommendations from trusted sources such as relatives or feedback portals

Ship's architecture: The exterior appearance of the ship in common & the design of cabins and indoor areas

To what extent do you agree with the results? At this step please select and rank from the menu below those factors that you think are the most important. Please do this regardless of the results from the first round.

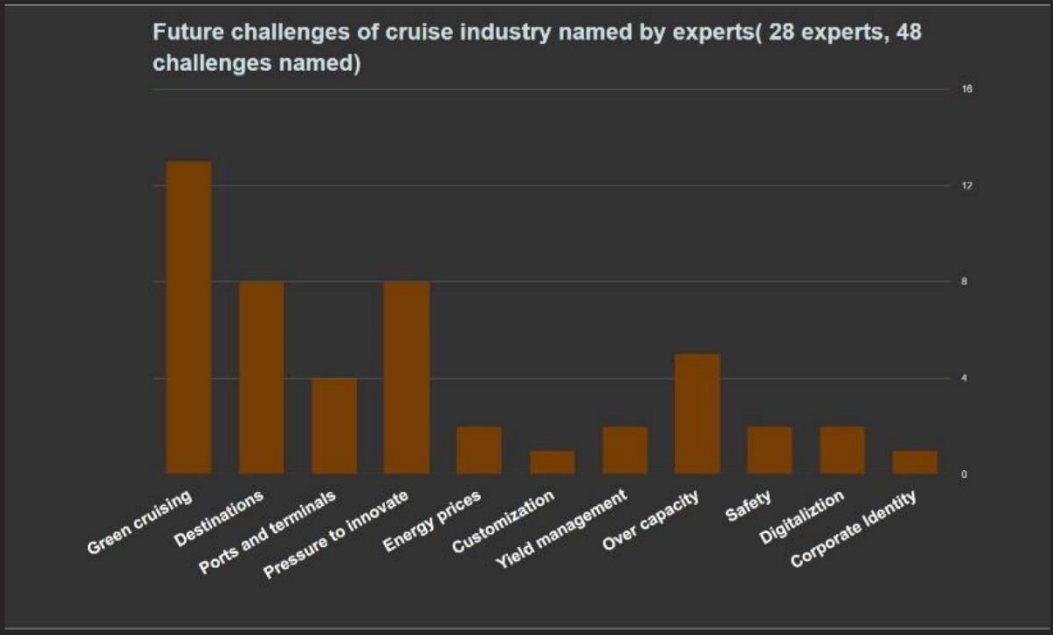
List of current factors (Please drag to change the ranking)

Please Select

Question 2: Future Challenges

In the first round of Delphi inquiry, you were asked to name future challenges of the cruise industry (horizon 2030).

We have categorized similar namings, 11 challenges have been identified.The results are as the following:



Legend

- Green cruising: sustainability issues, consumption culture and the emission
- Destination: Overcrowding in key destinations, finding new destinations
- Ports and terminals: infrastructures for hosting bigger ships, space for large terminals
- Pressure to innovate: attracting first time cruisers, entertaining, finding new markets
- Energy prices: growing energy prices
- Customization: dynamic packages, individualism vs economy of scale
- Yield management: service pricing
- Over capacity: increasing number of ships
- Safety: security on board, terrorism, uncertainty in new destinations
- Digitalization: Internet of things, new technologies
- Corporate identity: Branding, corporate image

To what extent do you agree with the results? At this step please select and rank from the menu below those factors that you think are the most important. Please do this regardless of the results from the first round.

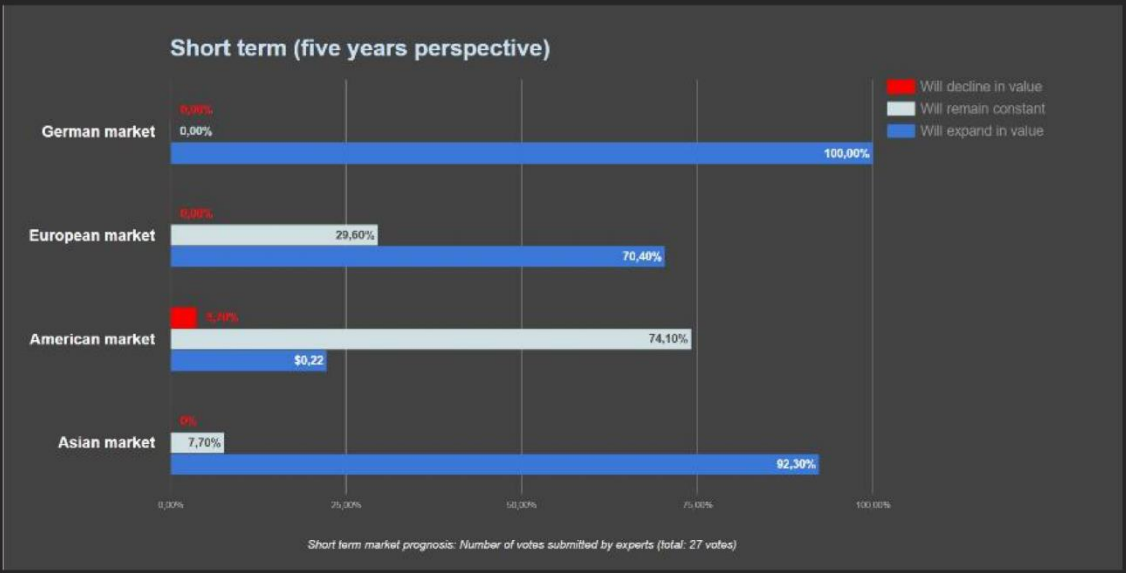
List of future factors

Please Select

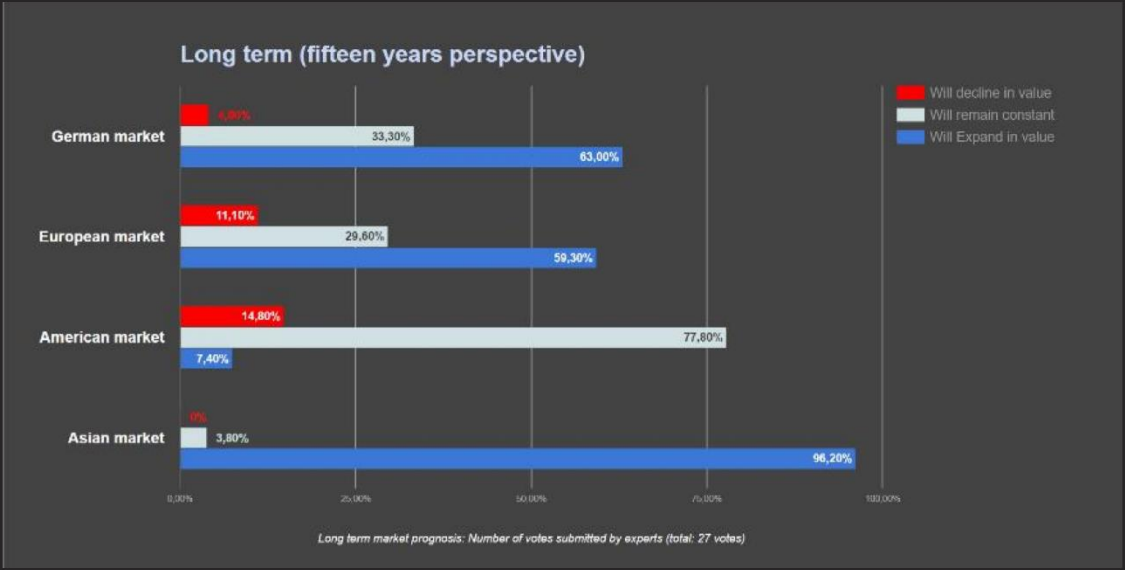
Question 3: Future Markets

In the future, which markets will expand/decline in value?

In the first round of survey, you were asked about the developments in the German, European American and Asian markets. The results are presented in the following diagrams:



Short term market prognosis: Number of votes submitted by experts (total: 27 votes)



Long term market prognosis: Number of votes submitted by experts (total: 27 votes)

Besides rating future markets, the panelists were asked at the first round to support their rating with a reasoning comment. We have chosen some of the comments, please rate at this step the plausibility of the comments.

"Germany is the big Player in Europe, but Europe in general is going back due to crisis. America hasn't growing at all over the last years. Asia and Australia are the big new kids on the block with a huge bright perspective."

★★★★★

[Translated from German] ~ "Asia is just starting, [...] in Germany many providers fill already their capacities with an international audience: in 15 years there will be no more German market, German providers should compete in European market. In 2030 the Americans will feel more unsafe in the world (fear for terrorism, Russians, Chinese, pirates ...), it will remain only 'Home based Cruising' since only

few Americans would book a cruise to the Emirates, North Africa, India & Asia. Therefore, the US market will remain limited to departures from Miami, New Orleans, New York and the rest of the world capacity will be filled with Europeans and Asians."

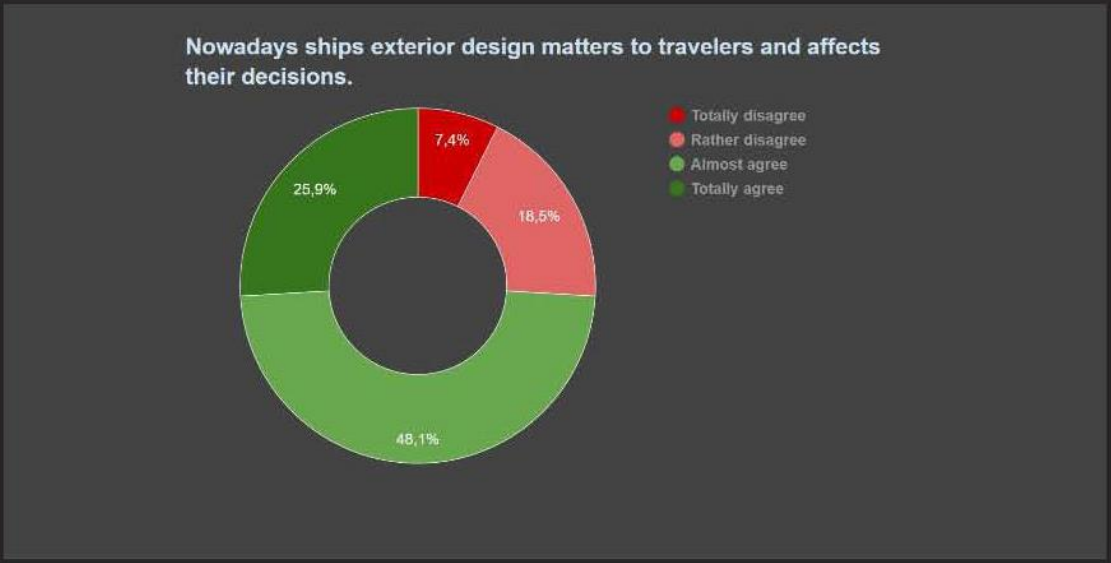
★ ★ ★ ★ ★

"US and Canada have been showing signs of market saturation in the past few years, and I don't think this was a temporary phenomenon. Latin America's affluent upper classes are limited in size and don't seem to grow much in numbers of households, so not much new demand can be expected from their either. Asian demand, by contrast, is only beginning to wake up. This is where the cruise industry's hopes lie. Europe is somewhere in between, with some large, more mature markets (especially UK, followed with some distance by Germany and Italy) and several earlier-stage and question-mark markets."

★ ★ ★ ★ ★

Question 4: Ship Aesthetic

In the first round of inquiry, 75% of experts agreed that "Nowadays ship's exterior design does matter to travelers and affects their decisions".



In your opinion why unlike the yacht industry, a form diversity in ship's architecture does not exist yet in the cruise sector and the majority of cruise brands have not invested more than only a body painting on their ships external design?

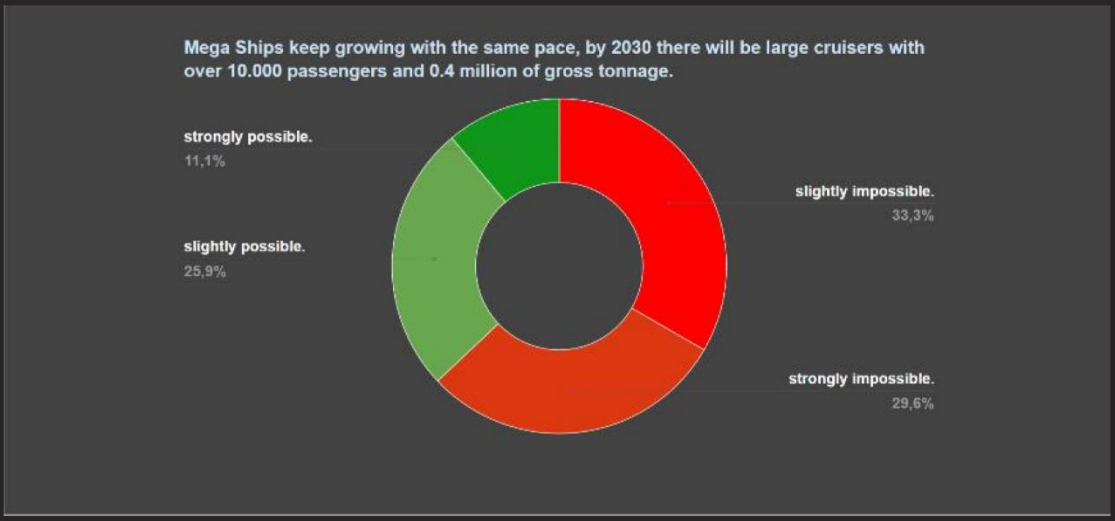
Please enter your own reasons and / or select those reasons other experts have entered.

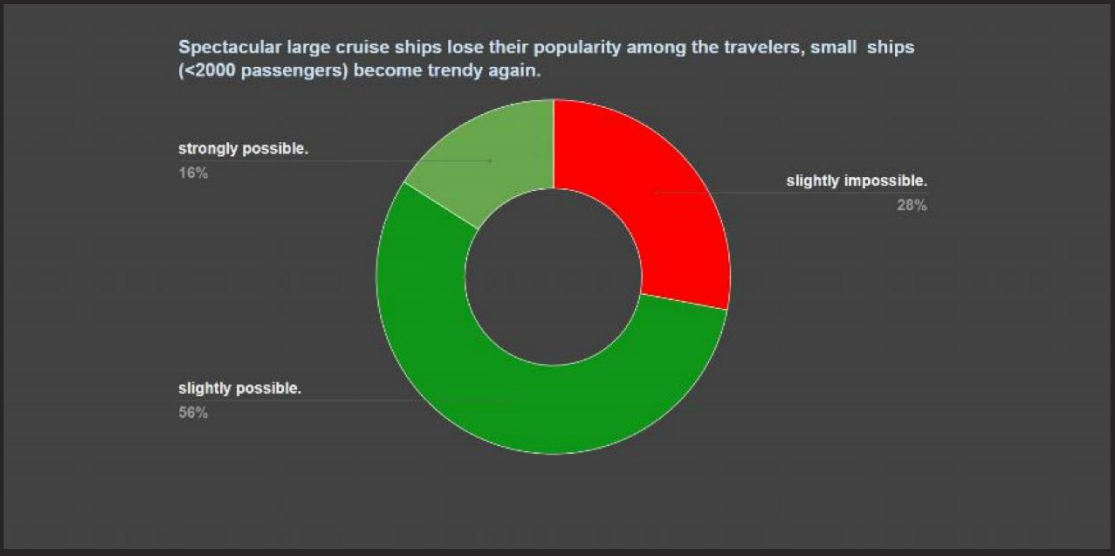
- ☐ It will make the ships even more expensive.
- ☐ Technical reasons is the biggest barrier.
- ☐ Cruise companies are not aware of customer's demand for a better exterior appearance.
- ☐ There are no reliable criteria for ships' exterior aesthetics
- ☐ Arroganz: der Markt läuft und hat Potential, da muss man nicht mehr als unbedingt nötig investieren
- ☐ The average customer is mostly driven by a decision by price, so aesthetics do not matter that much
- ☐ The appearance of a cruise liner is largely determined by engineering, naval, and economic criteria. Subjective aesthetic criteria don't enter in other than mostly superficial ways.

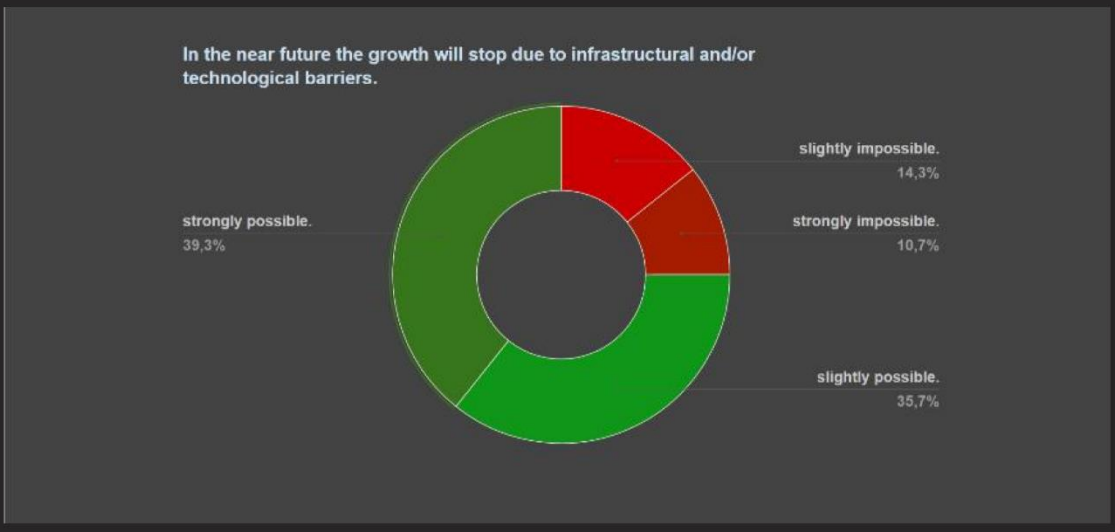
Add Option

Question 5: Ship Dimensions

In the first round of inquiry you were asked to evaluate three statements about the ship dimensions. The results are gathered in the following statistics.







We have chosen some of the comments regarding ship dimensions in the future, please rate at this step the plausibility of these following comments.

(Please do this regardless of the results from the first round)

"I would expect that the size of the vessels will still increase but at a lower rate and at the same time smaller vessels with higher standards will become more popular."

★★★★★

"[...] I think the maximum of size is reached. Even now there is the problem that those large ships can't go to every port they would like to."

★★★★★

"There is a market for all tastes. So there will be mega ships which will be highly popular as well as the more tranquil choice of small ships. I can imagine that even larger ships than the Oasis or Allure of the Seas can be built which reach up to 10,000. The question will be though where they can disembark passengers in a comfortable way, as they might not have sufficient infrastructure in ports. Even when the Oasis was built, cruise ports had to be adapted to cater to her size. Another possibility would be of course to offer cruises to nowhere or ports for tenders. The larger the ships the more likely they have great onboard entertainment for passengers and the passengers are less willing to leave the ship. So the ship becomes the destination in that case which in turn means higher profits for the cruise company due to onboard revenue. "

★★★★★

"It is going to be technically difficult for mega ships to disembark in [only] one day, and ports are not fully equipped to accommodate 10 thousand passengers. The new market (BRIC and China) will offer mega ships and European and american market will prefer small ships."

★★★★★

In the first round of inquiry some panelists emphasized the role of megatrends in being the source of future changes in the cruise industry. We have collected 20 megatrends provided by Z-Punkt. You can review them from the slider below.

01: DEMOGRAPHIC CHANGE

- Growing global population
- Ageing populations
- Declining populations in the West
- Increasing migration streams
- Demographic shifts

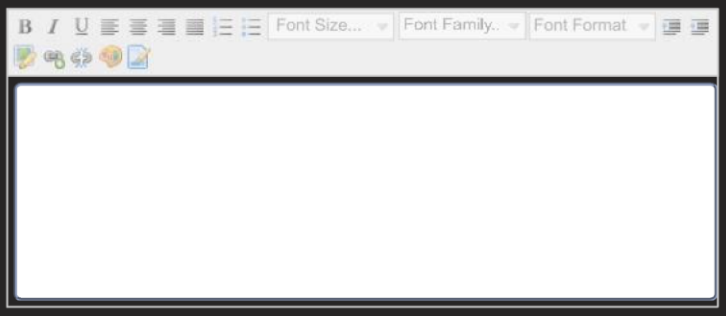
Z_PUNKT MEGATRENDS

Question 6: Megatrends

In your opinion which of trends above can change the type of current travelers in a 15 years perspective?
(age, gender, nationality and social milieu)

Options	trends resulting in new ship types
01: Demographic Changes	
02: Individualization Reaches a New Stage	
03: Social and Cultural Disparities	
04: Reorganization of Healthcare Systems	
05: Changes to Gender Roles	
06: New Patterns of Mobility	
07: Digital Culture	
08: Learning From Nature	
09: Ubiquitous Intelligence	
10: Technology Convergence	

Please support your choice with a comment



Question 7: Megatrends

In your opinion which of these trends can result in new ship types connected to new niche businesses?

Options	trends resulting in new ship types
01: Demographic Changes	17: Climate Change and Environmental Impacts
02: Individualization Reaches a New Stage	19: New Political World Order
03: Social and Cultural Disparities	20: Global Risk Society
04: Reorganization of Healthcare Systems	
05: Changes to Gender Roles	
06: New Patterns of Mobility	
07: Digital Culture	
08: Learning From Nature	
09: Ubiquitous Intelligence	
10: Technology Convergence	

Please support your choice with a comment

Question 8: Megatrends

Which trends will particularly affect the architecture of future mega cruisers as a platform for mass-tourism?

Please select relevant trends and rank the list according to their influence rate. (drag to reposition)

click to select , drag to reposition

Please Select

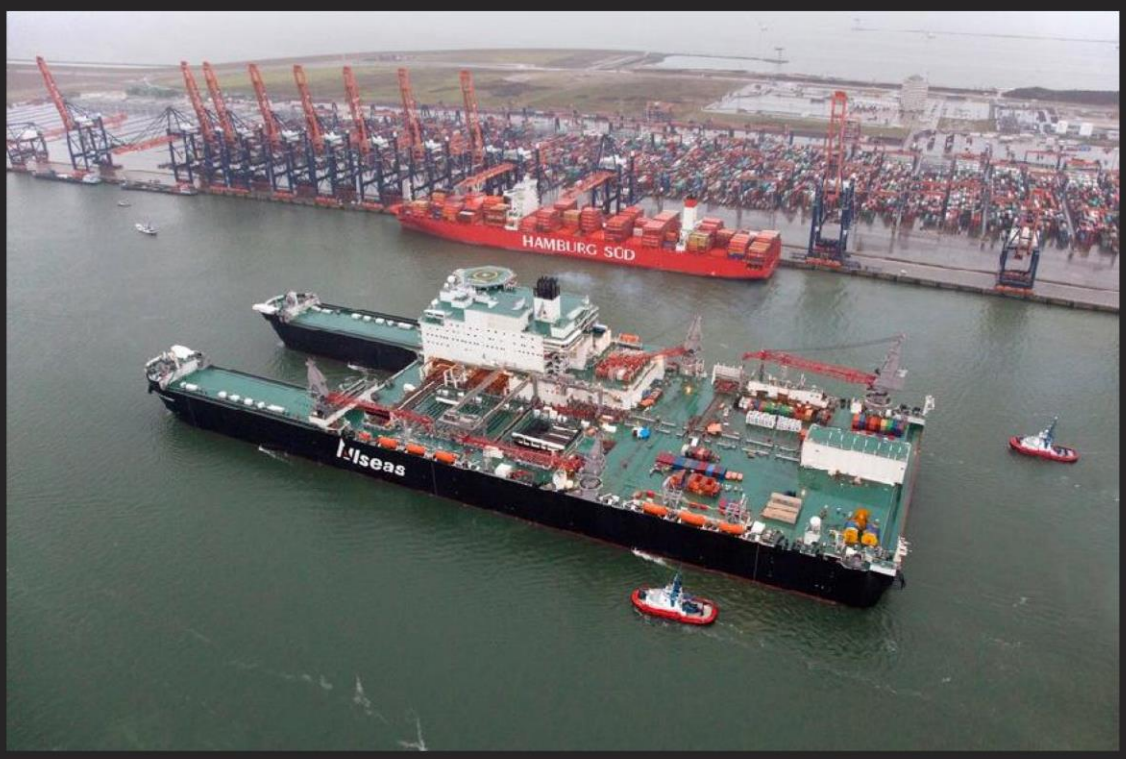
Please support your choice with a comment

Font Size... Font Family.. Font Format

Question 9: ship Architecture

In the first round of inquiry, experts anticipated that until 2030, cruise ships more than *Oasis class* (6000 beds) won't be built, but stationary ocean terminals or very slow mobile islands will be a new market.

Considering that the mobile platform Pioneering Spirit (worlds largest vessel project: 403000 GT and 14 Knots speed) is built based on a catamaran architecture, it is also possible that the mentioned ocean terminals or mobile islands (from an architectural point of view) be built more similar to the Pioneering Spreet, rather than to "Oasis of the seas", as this island would need more flat area on the deck than hidrodynamic abilities. (Two hulled catamaran vs single hull platform)



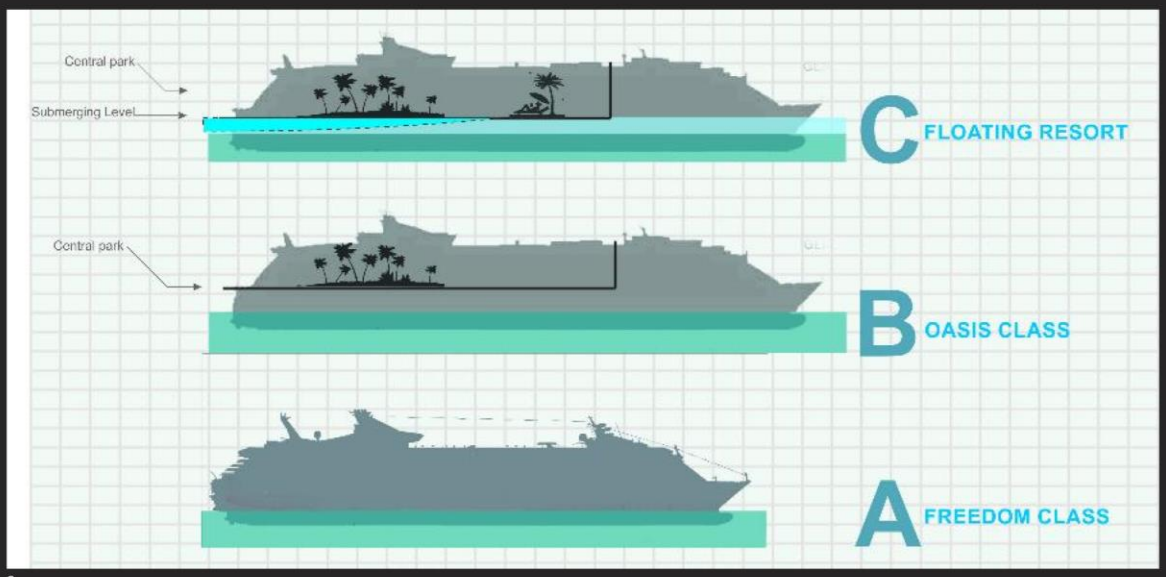
Please estimate, first, how plausible this statement is and second, how probable is that this scenario happens until 2030?

drag the right slider for plausibility in %, left slider for likelihood in %

Question 10: Ship's Architecture

Compared to Freedom Class, the architecture of Oasis class was a try to simulate amenities that the travelers usually expect to have in the destination ports. A large "Central Park" in the middle of the ship featuring lush tropical gardens was a try to design more nature-like environment in contrast to the former metal bodies. This would also follow the general policy of cruise providers to keep the guests (and their expenditures) onboard the ship.

Since a basic attraction of the coastal resorts are their beaches and the natural feeling of "direct contact with the water" would it be possible that until 2030 we have ships which go beyond the central park concept and offer their travelers an artificial beach? (For example a semi-submersible ship featuring an integral beach which becomes active when the ship docks and submerges near a destination coast; see floating resort below)



?

Please indicate, first, how plausible this statement is and second, how probable is that this scenario happens until 2030?

Drag the right slider for plausibility in %, left slider for likelihood in %

Question 11: Corporate Philanthropy

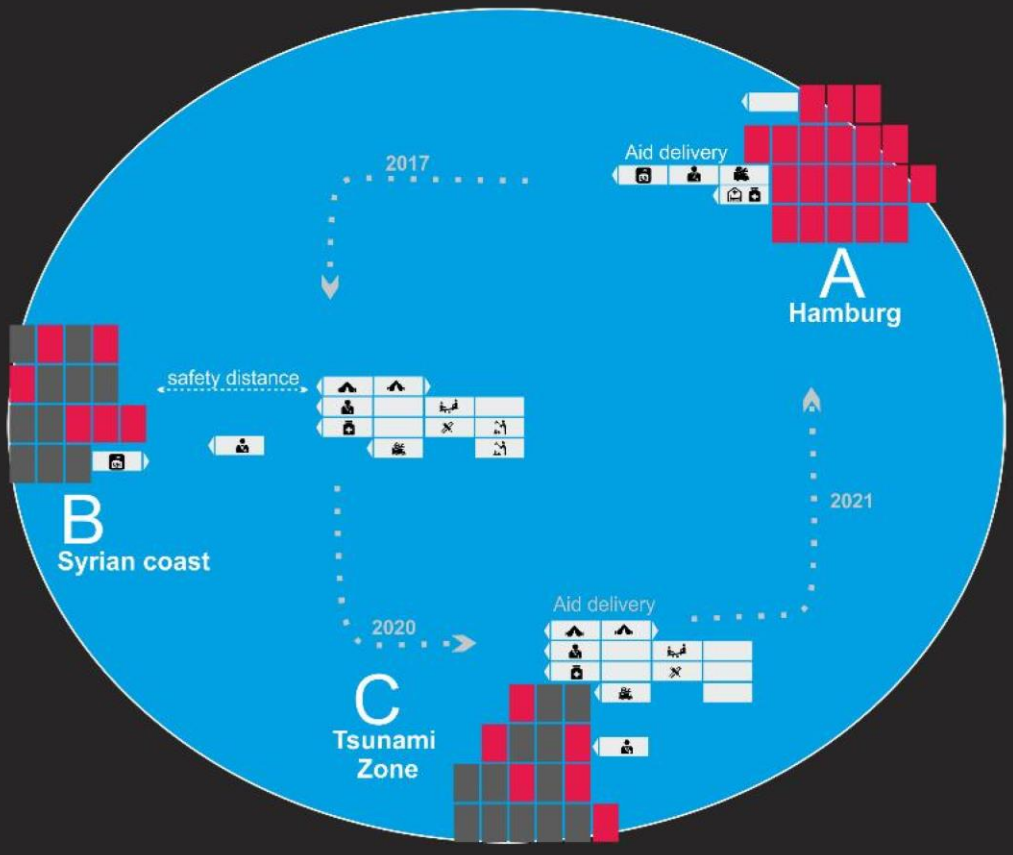
In what was then called as "an act of goodwill" *Celebrity Cruises* sent in 2010 a cruise ship from *Southampton* to rescue 2220 British tourists stranded in Spain following the shutdown of airspaces due to the eruption of Eyjafjallajökull volcano. In an other example, *Carnival Australia* used in April 2015 four of its cruise ships to deliver humanitarian aid to Vanuatu Islands after they were devastated by Cyclone.

The US navy and also the charity organisation Mercy Ships has been operating hospital ships for nearly 35 years. The hospital ships are a successful model of massive non-profit logistical operations, attracting charity volunteers from the Europe and US and providing healthcare services in African coasts or elswhere.

U.S Naval Hospital Ship Ship Mercy- San Diego Bay, 2009

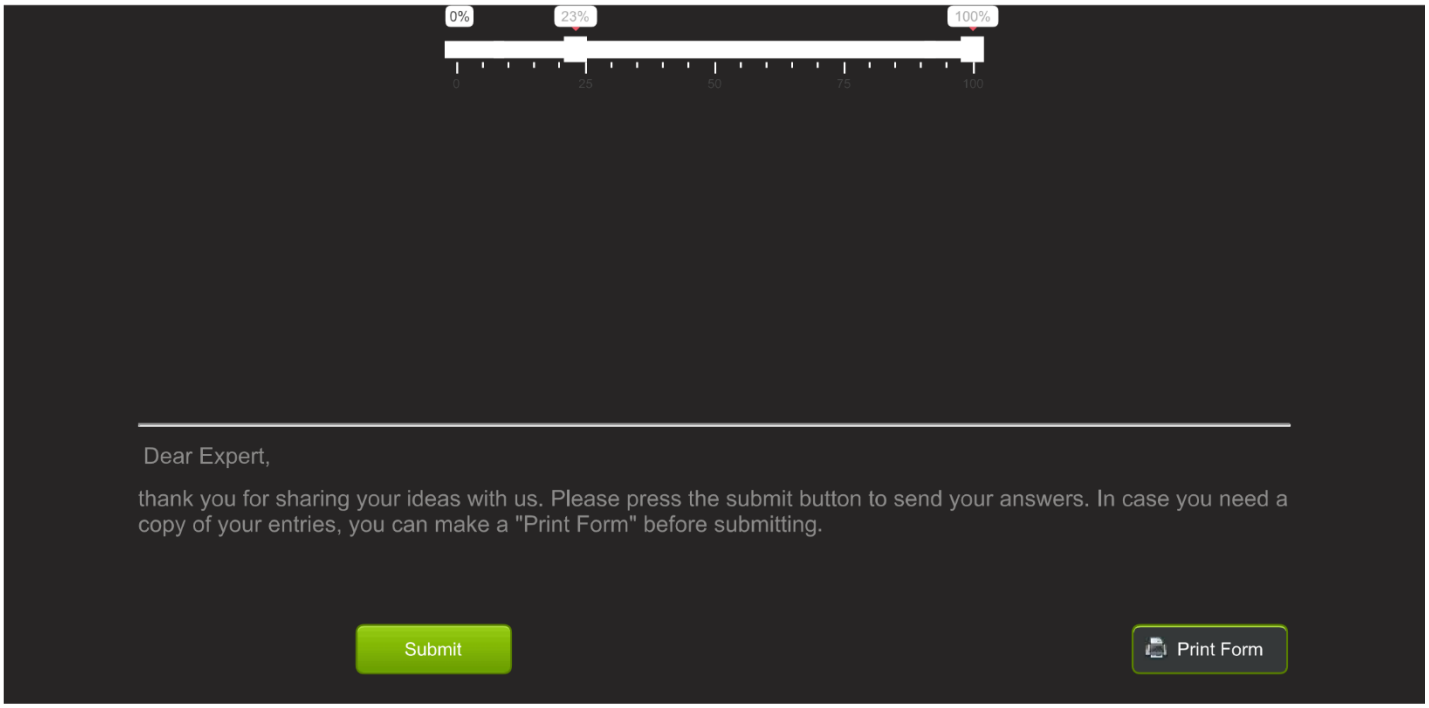
With the assumption that Corporate Philanthropy increasingly gains value for the cruise companies (associated to PR and image improvement) it is imaginable that large international organisations (such as UN) would like to utilize the infrustructure and/or logistical knowhow of cruise companies (for example in exchange to the emissions trading)

An example for a systematic long-term cooperation can be seen in the form of an international mobile aid island, funded by the UN, the governments or other charity organizations. The floating aid island is built once but can be flexibly utilized more times in different occasions, for example providing shelter for the Syrian refugees in the Mediterranean in 2017 and then be delivered to Thailand some years later to replace temporally a damaged infrustructure because of a natural catastrophe.



Please estimate, first, how plausible this statement is and second, how probable is that this scenario happens until 2030?

Drag the right slider for plausibility in %, left slider for likelihood in %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Dear Expert,
thank you for sharing your ideas with us. Please press the submit button to send your answers. In case you need a copy of your entries, you can make a "Print Form" before submitting.
Submit
Print Form

7.3. Appendix 3: Unsorted submissions (Delphi round I)

	A	U	V	W
1	**Timestamp**	**Politicians and consumers exert extra pressure. Cruise ships are expected to be at least as energy efficient as land-based hotels...**	**Technological advances make producing electricity by offshore wind-parks being cheaper than by fossil fuels...**	**By 2030 "visiting destinations" will be ..... than "on-board activities". [in the German market]**
2	3/24/2015 15:41:16			more important
3	3/25/2015 15:32:25			more important
4	5/5/2015 13:54:32	CO2 compensation, labelling	Hybrid engines	less important
5	5/5/2015 17:23:38	Not a problem.	Not an issue	less important
6	5/6/2015 16:58:32	Efforts like Schrubbers, lng barges, Mainland electricity access	No impact	more important
7	5/11/2015 15:33:31	and some Harbours will refuse to wellcome old ships	green energy supply within Harbours will be mandatory	as important as
8	5/12/2015 13:07:47	..	..	more important
9	6/1/2015 17:04:39	Realistic scenario for European operators, unrealistic to become real for American and Asian operators	Not by now but for the long run	more important
10	6/11/2015 10:47:24	daran wird bereits gearbeitet	Eine Frage des Return of Investment und der pol./rechtl. Rahmenbedingungen	as important as
11	6/15/2015 23:50:01	Stärkere Lobbyarbeit in der Politik	das wird nicht passieren	more important
12	6/25/2015 15:16:02	I have no idea how much big hotels and cruise ships differ in terms of energy consumption per passenger cruise day or room night. Even among hotels of different sizes and in different locations differences are probably huge. Cruise lines would probably argue that the comparison is unfair because hotels are immobile. They might counter attempts to regulate energy consumption by changing flags, relocating legal entities to regions with less strict regulations etc.	Producing and storing electricity from wind power are two different things. A cruise ship could probably be refitted to run on biogas or methanol, both of which are renewable and can be produced from biomass without major environmental damage. But transforming electricity into e.g. hydrogen, storing it safely in huge quantities on board and refuelling with thousands of passengers and crew nearby doesn't seem practical to me.	more important
13	7/6/2015 9:50:46	yes: see above	yes: no direct impact on cruise industry, except land electricity in ports	more important

14	5/6/2015 11:19:55	it is in the industry interest to continuously optimze energy efficiency	the cruise industry will adapt accordingly - provided appropriate infrastructure in ports	as important as
15	5/8/2015 11:22:06	Lobbyarbeit, neue Technologien	"Tesla Cruises"	more important
16	5/18/2015 12:14:04	Yes, but they will be reluctant to do investment or spend extra taxes on these.	no idea sorry	less important
17	5/19/2015 17:45:38	Operators will improve technology and use other alternative fuels more efficient	They will prepare all their cruise ships for get advantage of that,	less important
18	5/29/2015 8:35:58	This will not be possible.	I agree to this.	more important

	A	U	V	W
1	**Timestamp**	**Politicians and consumers exert extra pressure. Cruise ships are expected to be at least as energy efficient as land-based hotels...**	**Technological advances make producing electricity by offshore wind-parks being cheaper than by fossil fuels...**	**By 2030 "visiting destinations" will be .....than "on-board activities". [in the German market]**
19	6/9/2015 13:50:35	This is likely unreal, as it can't be compared 1:1.	This would be great, but maybe not a big use for a cruise ship, unless there are also techniques by then how it can be implemented on ships.	as important as
20	6/22/2015 14:37:14	Other sources such as liquid gas will play an important role	Other sources such as liquid gas will play an important role	as important as
21	6/22/2015 20:28:58	Cruise ships cannot be compared 1:1 to land-based hotels - as cruise ships are not only hotels but at the same time a means of transportation, location of restaurants and bars, theatre and location for recreation. The Cruise Industry already puts a lot of energy in finding ways of environmental friendlier cruise ships. New technologies are being driven forward.	Cruise ships sail the world - this is what makes the use alternative sources so difficult. Just as LNG is currently not (reliably) available all over the world, there might not be -offshore wind-parks all over the oceans in order to provide the needed energy for electricity on board of ships.	as important as
22	5/5/2015 14:52:29	s.o.	this is realistic	more important
23	5/7/2015 12:17:38	they will meet those expectations, but tickte Prices will go up, passengers have to pay for it.	no influences	as important as
24	5/8/2015 16:13:01	..halte ich für wahrscheinlich	ist jetzt schon der Fall!!!	as important as
25	5/11/2015 16:32:17	One day, they will. But the discussion about ecological aspects of cars has begun 30 years ago in the middle of the 80ies, and we're just finishing the replacement of cars withour katalysator. So it took one human genration. A car is designed to live 8 or 10 or 15 xears, a ship's concept expects a life time of 40 years. How can the protectors of natural resources expect the replacement of ships to be fulfilled faster than the replacement of old cars?	I can not recognize the meaning for the cruise industry, except the fact that ships are expected to accept electric current from the shoreside while they are in port. But this whole discussion never meets the real point of interest, as it only refers to cruise ships consuming much electricity in port, but cruise ships are only one percent of shipping worldwide. And it forgets that a cargo ship spends as much time as possible at sea, so the whole energy management has to be replaced by clean systems, then the discussion of current supply in port will be obsolete.	more important
26	5/28/2015 14:48:19	...energie-effiziente Lösungen und umweltschonender Einsatz	Guter Ansatz	more important
27	5/31/2015 10:34:18	this is a problem which is discusse but wont' be solved within the next years. It depends on the developement of new technologies	This is still far future for crusie ships	as important as
28	2015-08-19	consumers will welcome energy efficiency but will hardly be prepared to pay on top	The systems that can transport offshore energy to the ships still has to be developed.	less important
29	9/22/2015 10:58:21	There need to be laws to force cruise companies to work in an environmentally friendly way otherwise nothing will happen. A pure expectation will not be sufficient. It is also not quite fair to suggest that cruise ships should be as energy efficient as land-based hotels. Hotels are a different matter and bound to land. Cruise ships are always pumped up with energy and always on the move, whereas hotels might be able to more easily switch to renewable energy sources such as solar energy or wind power.	Cruise companies might make more use of "cold ironing", so whilst at a pier connecting to the local energy sources.	less important
30	10/13/2015 11:02:25		To operate a cruise vessel requires more than just to be familiar with the cruise industry. And, I don't think it is in the interest of f. ex. a bank to be ship owner and financier at the same time (except in a distressed situation for short time).	

	A	X	Y	Z	AA
1	**Timestamp**	**By 2030 "visiting destinations" will be ..... than "on-board activities". [in the European market]**	**By 2030 "visiting destinations" will be ..... than "on-board activities". [the American market]**	**By 2030 "visiting destinations" will be ..... than "on-board activities". [in the Asian market]**	**Please explain your point of view**
2	3/24/2015 15:41:16	more important	more important		
3	3/25/2015 15:32:25	more important	more important		
4	5/5/2015 13:54:32	as important as	less important	as important as	
5	5/5/2015 17:23:38	less important	less important	less important	Entertainment will be more important.
6	5/6/2015 16:58:32	more important	less important	less important	German travelers like to See the World
7	5/11/2015 15:33:31	as important as	less important	less important	onboard Entertainment varies, destinations not every year
8	5/12/2015 13:07:47	more important	as important as	as important as	..
9	6/1/2015 17:04:39	more important	as important as	more important	
10	6/11/2015 10:47:24	as important as	less important	more important	Unterschiedliche Bedürfnisse in den Märkten
11	6/15/2015 23:50:01	as important as	less important	less important	
12	6/25/2015 15:16:02	more important	less important	less important	I'm no big fan of the sweeping generalisations you ask us to make here. Segmentation is more a matter of brand/product than of source market. My judgement is based on Euro-centric prejudice and the information that Chinese and US cruise passengers love to shop and to lose money in casinos.
13	7/6/2015 9:50:46	more important	less important	less important	long term trends of tourism demand
14	5/6/2015 11:19:55	as important as	less important	less important	cultural differences
15	5/8/2015 11:22:06	as important as	less important	less important	Die Deutschen Pax werden älter in mögen Bling Bling und MegaFunParks nicht unbedingt. Das restliche Europa ist kurz hinter den Deutschen, was das Durchschnittsalter betrifft. (Europäer und gerade Deutsch sind nicht unbedingt die Zielgruppe für "on-board activities". Amerikaner und auch Asiaten mögen alles, was groß, laut, bunt ist und blinkt. Besonders für die Amerikaner gilt: an Bord ist man sicher, kann nicht überfallen werden und macht nur über die Reeling ein Foto vom Hafen.

16	5/18/2015 12:14:04	less important	as important as	as important as	
17	5/19/2015 17:45:38	less important	as important as	as important as	
18	5/29/2015 8:35:58	as important as	as important as	as important as	Most german travelers will always make the decision upon the itinerary

	A	X	Y	Z	AA
1	**Timestamp**	**By 2030 "visiting destinations" will be ..... than "on-board activities". [in the European market]**	**By 2030 "visiting destinations" will be ..... than "on-board activities". [the American market]**	**By 2030 "visiting destinations" will be ..... than "on-board activities". [in the Asian market]**	**Please explain your point of view**
19	6/9/2015 13:50:35	less important	less important	less important	The development can be seen already on the new built ships, that the sector of entertainment is in the focus.
20	6/22/2015 14:37:14	as important as	as important as	as important as	The key idea of a cruise "see various destinations within a short period of time" will always play an important role.
21	6/22/2015 20:28:58	as important as	as important as	less important	German market: the German customer wants to travel and visit destinations European Market: / American market: already now the case Asian market: /
22	5/5/2015 14:52:29	more important	as important as	less important	the cultural goals to a cruise travel are very different between europe and us and asia
23	5/7/2015 12:17:38	as important as	less important	less important	
24	5/8/2015 16:13:01	as important as	as important as	less important	Trend zu on-board experiences hatte schon ein starkes Wachstum für den deutschen und europäischen Markt.....
25	5/11/2015 16:32:17	more important	more important	more important	It's obvious worldwide that people are more and more interested in discovering other cultures and places in foreign countries.
26	5/28/2015 14:48:19	more important	less important	as important as	
27	5/31/2015 10:34:18	as important as	as important as	as important as	Passengers expect to have both and want to be able to decide what to choose - going ashore and explore new destinations or staying on board and experience attractions there.
28	2015-08-19				the tradition of travel in europe is destination-oriented. In Asia and in US its more exprience oriented.
29	9/22/2015 10:58:21				The American market gets the most usage of mega ships as these often cruise just on their doorstep, in the Caribbean. So it could be assumed that they will get used to these kind of ships. Also it could be that there are a lot of repeaters among the American source market by now and they might have seen a great deal of destinations and therefore switch to the ship as a main attraction. The other markets such as the German and the European are still quite interested in looking at the destinations they sail too. It also has to be taken into account that the German customer e.g. likes to know the end price of his cruise before going onboard. It is a different story with American passengers. They are more accustomed to be spending money onboard rather than a German guest, who prefers less unexpected costs whilst traveling. The price for cruises for US guests is sometimes quite small , also considering the high competition leaving from ports such as Miami or Fort Lauderdale. So the basic price for a 7 day Caribbean cruise can be quite low, but this is also due to the fact that the cruise companies then expect a large amount to be spent by American passengers whilst onboard. The Asian market is kind of hybrid. On the one hand they are very new to the cruise product and might want to explore destinations. On the other hand Asian guests like spending their time onboard with extensive casino visits or shopping. Therefore it could happen that the ship
30	10/13/2015 11:02:25				

31					might become more important to them then the actual destinations visited along the way.
32					
33					
34					
35					
36					
37					

	A	AB	AC	AD	AE
1	**Timestamp**	**By 2030 cruise programs without any destination-visit will be a remarkable alternative market.**	**By 2030 floating Islands or stationary ships will be a new market.**	**This scenario is for large cruise ships**	**This scenario is for small ships and niche markets**
2	3/24/2015 15:41:16	9			
3	3/25/2015 15:32:25	5			
4	5/5/2015 13:54:32	Almost agree	Totally agree	slightly impossible.	strongly possible.
5	5/5/2015 17:23:38	Totally disagree	Totally disagree	strongly possible.	slightly impossible.
6	5/6/2015 16:58:32	Almost agree	Almost agree	strongly impossible.	strongly possible.
7	5/11/2015 15:33:31	Rather disagree	Totally agree	strongly possible.	slightly possible.
8	5/12/2015 13:07:47	Totally disagree	Totally disagree	slightly impossible.	slightly impossible.
9	6/1/2015 17:04:39	Rather disagree	Almost agree	slightly impossible.	slightly possible.
10	6/11/2015 10:47:24	Rather disagree	Totally disagree	slightly possible.	slightly possible.
11	6/15/2015 23:50:01	Almost agree	Totally agree	slightly impossible.	slightly possible.
12	6/25/2015 15:16:02	Almost agree	Rather disagree	slightly impossible.	strongly impossible.
13	7/6/2015 9:50:46	Totally disagree	Almost agree	slightly impossible.	slightly impossible.
14	5/6/2015 11:19:55	Rather disagree	Almost agree	slightly impossible.	slightly impossible.
15	5/8/2015 11:22:06	Rather disagree	Almost agree	slightly possible.	strongly impossible.
16	5/18/2015 12:14:04	Rather disagree	Rather disagree	slightly possible.	strongly possible.

17	5/19/2015 17:45:38	Rather disagree	Almost agree	strongly impossible.	slightly possible.
18	5/29/2015 8:35:58	Totally disagree	Rather disagree	slightly impossible.	slightly possible.

	A	AB	AC	AD	AE
1	**Timestamp**	**By 2030 cruise programs without any destination-visit will be a remarkable alternative market.**	**By 2030 floating Islands or stationary ships will be a new market.**	**This scenario is for large cruise ships**	**This scenario is for small ships and niche markets**
19	6/9/2015 13:50:35	Rather disagree	Rather disagree	slightly possible.	slightly impossible.
20	6/22/2015 14:37:14	Rather disagree	Totally agree	slightly possible.	slightly possible.
21	6/22/2015 20:28:58	Rather disagree	Almost agree	slightly possible.	slightly possible.
22	5/5/2015 14:52:29	Totally disagree	Almost agree	slightly possible.	slightly possible.
23	5/7/2015 12:17:38	Almost agree	Almost agree	strongly impossible.	strongly impossible.
24	5/8/2015 16:13:01	Rather disagree	Totally agree	slightly possible.	slightly possible.
25	5/11/2015 16:32:17	Almost agree	Almost agree	slightly possible.	slightly possible.
26	5/28/2015 14:48:19	Almost agree	Almost agree	slightly possible.	slightly possible.
27	5/31/2015 10:34:18	Rather disagree	Rather disagree	slightly possible.	slightly impossible.
28	2015-08-19	Almost agree	Almost agree		strongly possible.
29	9/22/2015 10:58:21	Almost agree	Totally agree	slightly impossible.	slightly impossible.
30	10/13/2015 11:02:25			slightly impossible.	slightly possible.
31					

	A	AF	AG	AH
1	**Timestamp**	**Please explain your point of view**	**“The involvement of banks in financing new ships has increased notably within the last 10 years. If this trend continues, the value of finance investors will**	**Please explain your point of view**
2	3/24/2015 15:41:16		**exceed the value of ship**	
3	3/25/2015 15:32:25			gh
4	5/5/2015 13:54:32	Rf. development with holiday homes in the past	Almost agree	Risk diversion of banks - cruise/tourism as an industry in general are interesting investments but hard to estimate future developments
5	5/5/2015 17:23:38	nice idea	Totally disagree	non sense
6	5/6/2015 16:58:32	The World has been an example that works	Totally disagree	Nautical knowledge Combined with hospitality Expertise are too specialised
7	5/11/2015 15:33:31	like real estate market	Totally agree	like REITs in the Hotel market
8	5/12/2015 13:07:47	..	Almost agree	..
9	6/1/2015 17:04:39		Rather disagree	At present financing own vesssels is relatively more attractive due to low interesting rates; the scenario above might be realistic in the long run
10	6/11/2015 10:47:24		Rather disagree	weiß nicht
11	6/15/2015 23:50:01		Totally disagree	Banken sind nur Dienstleister, sie werden nur am Rande die vorgestellte Rolle spielen.
12	6/25/2015 15:16:02	The cabin ownership model has been tried out for many years on The World (launched in 2002), but not with much success. And there are no me-too cruise ships. Why should I as an investor go into such a dead segment?	Almost agree	Investing their own resources into tourism projects (and many other areas) is not the traditional business of banks. Following the 2008/2009 credit crunch and the subsequent low interest, however, the risks-return relationship of providing loans to medium-sized companies became so unattractive, and quantitative easing policies of major central banks made money so cheap for commercial banks, that they changed their modus operandi. Whether this is only a temporary thing until interest rates go up again and economies take off on their own is an open question. Given the high US/Japanese/European public and private endebtedness, I personally think that governments and central banks will be very cautious to let interest rates rise again. This could mean that banks can continue functioning as investors even until 2030.
13	7/6/2015 9:50:46	I think time-share at least in Europe is a too small niche.	Almost agree	why not, if there is a business case ...
14	5/6/2015 11:19:55		Rather disagree	specific cruise know how is essential as business model is complex
15	5/8/2015 11:22:06	Bei Großschiffen bereits existent (The World) und auch in Zukunft interessant, wenn durch Vermietung eine Rendite zu erwarten ist. Bei kleinen Schiffen ist das Verhältnis der Betriebskosten ungünstiger, wenn diese auf den Anteil umgelegt werden, wird es unrentabel. Nischenmärkte sind nur interessant, wenn ein sehr hoher Deckungsbeitrag zu erwarten ist.	Totally agree	Shareholder Value Ansatz

16	5/18/2015 12:14:04		Rather disagree	no idea sorry
17	5/19/2015 17:45:38		Almost agree	If the industry cannot overcome some difficulties and improve their yeald this can be a reality
18	5/29/2015 8:35:58		Almost agree	This assumption is quite possible

	A	AF	AG	AH
1	**Timestamp**	**Please explain your point of view**	**“The involvement of banks in financing new ships has increased notably within the last 10 years. If this trend continues, the value of finance investors will**	**Please explain your point of view**
19	6/9/2015 13:50:35		**exceed the value of ship**Rather disagree	Of course it can happen when a cruise line goes bankrupt that the ships will be owned by the bank then, but I don't think this is a major interest for the bank.
20	6/22/2015 14:37:14		Rather disagree	.
21	6/22/2015 20:28:58		Rather disagree	no comment
22	5/5/2015 14:52:29	could be only a niche product	Almost agree	in next years new and innovative financing models are necessary and very realistic.
23	5/7/2015 12:17:38		Totally disagree	to specific, no City or government would invst in those projects
24	5/8/2015 16:13:01	Alternative Finanzierungskonzepte werden m.E. generell zunehmen....wäre ggfalls auch eine Kapitalanlage für Investoren	Totally disagree	Banken werden bei ihrem Kerngeschäft bleiben!! Andere Investoren denkbar.... Banken unterliegen der Bankenaufsicht!!.... Wie soll dies auf den Bereich des Betreibens von Schiffen übertragen werden?? schwer vorstellbar!!
25	5/11/2015 16:32:17	I can't comment on this as I'm not familiar with Condominium models.	Totally disagree	Wherever any person or company has tried so far to launch or operate a cruise ship (finance investors as the MV "Deutschland" had or hotels which tried to operate a ship), they haven't been successful, as a cruise ship demands very detailled knowlede of the cruise branch which these people don't have. Their decisions always refer to their knowledge they got at the university - which is not at all suitable for the operating conditions of a cruise ship.
26	5/28/2015 14:48:19		Almost agree	...hängt vom Finanzmarkt ab
27	5/31/2015 10:34:18	For bigger ships an interesting idea as more and more people get older and have more lifetime to travel. smaller ships: the prices are too high and the market for possible clients is very small.	Rather disagree	This may work in China as there is huge capital and a big fast growing market but not in other countries.
28	2015-08-19	an ugly product doesnt sell well. if that affects the performance, cruise owners will have to work on aesthetics.		
29	9/22/2015 10:58:21	Already now exterior aesthetics are important. One example is NCL. They have artists design their exterior look. e.g. NCL Getaway: artist Peter Max or NCL Escape: artist Guy Harvey	Almost agree	I believe that cruise companies will still have the important knowhow required to operate ships and therefore a definite advantage.
30	10/13/2015 11:02:25	Appartments vessels are discussed but the experience with The World is not very encouraging. My guess is that such concepts might be realised but they only will be an add-on for some cruise companies, not so much for the major players.	Rather disagree	

	A	AI	AJ	AK
1	**Timestamp**	**Nowadays ships exterior design matters to travelers and affects their decisions.**	**By 2030 ships exterior aesthetic becomes an important factor for the cruise owners, when ordering a new vessel.**	**Please explain your point of view**
2	3/24/2015 15:41:16	Rather disagree	Almost agree	
3	3/25/2015 15:32:25	Totally agree	Almost agree	
4	5/5/2015 13:54:32	Totally agree	Totally agree	
5	5/5/2015 17:23:38	Totally agree	Totally agree	it is all about attracting guests
6	5/6/2015 16:58:32	Almost agree	Rather disagree	Other Developments will be more important and challenging
7	5/11/2015 15:33:31	Almost agree	Totally agree	form of vessels Change, Special painting, Special folio
8	5/12/2015 13:07:47	Almost agree	Almost agree	..
9	6/1/2015 17:04:39	Totally agree	Totally agree	Providing new experiences for experienced cruise tourists is nessecary Possibility for sophisticated customer segmentation, meeting interests for different types of customers
10	6/11/2015 10:47:24	Rather disagree	Rather disagree	Das Leben im Schiff rückt immer mehr in den Mittelpunkt des Marketings
11	6/15/2015 23:50:01	Rather disagree	Rather disagree	
12	6/25/2015 15:16:02	Almost agree	Almost agree	The two hypotheses are connected. If cruise ship owners agree with the first statement, the second will automatically be true. Personally, I haven't seen any study on the first item. I ticked the box that seems most plausible to me - after all, cruise lines ask highly paid designers to draw their ships.
13	7/6/2015 9:50:46	Totally agree	Almost agree	One of the few aspects of differentiation between the brands
14	5/6/2015 11:19:55	Almost agree	Totally agree	
15	5/8/2015 11:22:06	Almost agree	Almost agree	Heut sollte ein Schiff sauber und sicher aussehen, also neu. Ein Schiff Baujahr <1980 wirkt weniger Vertrauen erweckend. In 2030: AIDA hat es mit dem Kussmund vorgemacht und hatte Jahre damit ein optisches Alleinstellungsmerkmal mit Wiedererkennungswert. Heute sind nahezu alle Rümpfe bunt. In der Zukunft wird -soweit technisch machbar- die äußere Form auch mit entscheiden (Bow Bug, Bismark- Steven, Schornsteine, Yachtlook...) Es ist wie bei Autos, die Optik soll den State of the Art (technisch, Lifestyle) wiederspiegeln und den Erkenntnischarakter manifestieren.

16	5/18/2015 12:14:04	Almost agree	Totally agree	
17	5/19/2015 17:45:38	Almost agree	Almost agree	
18	5/29/2015 8:35:58	Almost agree	Totally agree	

	A	AI	AJ	AK
1	**Timestamp**	**Nowadays ships exterior design matters to travelers and affects their decisions.**	**By 2030 ships exterior aesthetic becomes an important factor for the cruise owners, when ordering a new vessel.**	**Please explain your point of view**
19	6/9/2015 13:50:35	Rather disagree	Almost agree	
20	6/22/2015 14:37:14	Almost agree	Almost agree	
21	6/22/2015 20:28:58	Totally disagree	Totally disagree	
22	5/5/2015 14:52:29	Totally agree	Totally agree	naval architecture and terminal architecture are a very unknown, but very important, factor for decision. today and in future more and more.
23	5/7/2015 12:17:38	Rather disagree	Rather disagree	
24	5/8/2015 16:13:01	Almost agree	Almost agree	.... beeinflusst m.E. insgesamt die Wertigkeit einer Kreuzfahrt!!....
25	5/11/2015 16:32:17	Totally disagree	Totally disagree	It is obvious that the ugliest cruise ships are successful - like Norwegian Epic.
26	5/28/2015 14:48:19	Almost agree	Almost agree	
27	5/31/2015 10:34:18	Rather disagree	Rather disagree	For cruise owners building attractive facilities on board and have as much space as possible for as many passenger as possible is more important.
28	2015-08-19	slightly possible.	Totally agree	
29	9/22/2015 10:58:21	slightly possible.	Almost agree	
30	10/13/2015 11:02:25		Totally disagree	

	A	AL
1	**Timestamp**	**Is there any other question that you think would be of relevance, and you would like to share with us?**
2	3/24/2015 15:41:16	
3	3/25/2015 15:32:25	
4	5/5/2015 13:54:32	
5	5/5/2015 17:23:38	wording of some questions!
6	5/6/2015 16:58:32	
7	5/11/2015 15:33:31	considering Cruises like "Swimming Hotels"
8	5/12/2015 13:07:47	
9	6/1/2015 17:04:39	Development of power suply facilities in harbours Increasing acceptance of the market at destinations/increase benefits for destinations approached by cruise operators
10	6/11/2015 10:47:24	
11	6/15/2015 23:50:01	
12	6/25/2015 15:16:02	Designing cruise ships for maximum (perceived) security might be an issue to look at, given that especially elderly people tend to feel insecure in bigger cities and in unfamiliar environments. Another point of interest is "smart" technology on board - like smart homes connected to the Internet of things. A cruise ship looks like the ideal testing ground for these things.
13	7/6/2015 9:50:46	
14	5/6/2015 11:19:55	

15	5/8/2015 11:22:06	Der Personalbedarf steigt immens, woher kommen die Leute? Wie wird ein Arbeitsplatz, die Lebensbedingungen an Bord für die Crew in der Zukunft auf einem Kreuzfahrtschiff aussehen (nautisch, Hotelbereich). Wie sieht es mit Nachhaltigkeit bei der Personalentwicklung aus. Die Mehrheit der Mitarbeiter wird in der s.g. 3. Welt rekrutiert -für 10 Monate am Stück. Die machen Vieles mit, da die Familie daheim das Einkommen benötigt. Ist das ethisch in Zukunft noch vertretbar? Muss man in der Zukunft überhaupt noch Kreuzfahrten machen, oder kann man nicht am PC virtuell in 3d die Welt bereisen, eine Kreuzfahrt simulieren und mit Webcams nahezu live vor Ort sein?
16	5/18/2015 12:14:04	
17	5/19/2015 17:45:38	
18	5/29/2015 8:35:58	

	A	AL
1	**Timestamp**	**Is there any other question that you think would be of relevance, and you would like to share with us?**
19	6/9/2015 13:50:35	
20	6/22/2015 14:37:14	
21	6/22/2015 20:28:58	
22	5/5/2015 14:52:29	
23	5/7/2015 12:17:38	
24	5/8/2015 16:13:01	Inwieweit wird es neue gesetzliche Regelungen geben?? Schadstoffausstoss.... Sicherheitsfragen für sehr große Schiffe (nicht nur technische Machbarkeit).....
25	5/11/2015 16:32:17	The queen or king of the cruise industry is the lady or man who's able to explain to the deciders in this branch what will be the next balcony cabin. The launch of ships with balcony cabins hat turned modern top vessels into old pieces of iron over night. Only a few (Artania, Mein Schiff) have got balconies after they had beean launches, while Deutschland, Astor and a couple of carnival and costa ships lost a big part of their attractivity by this step. No other new feature has "killed" as many cruise ships (except SOLAS 2010), as everything else (show kitchen, wellbeing areas, additional rstaurants) can be built in when the ship is in the shipyard. But Balcony cabins are too expensive, too heavy, need space... What will be the next feature that becomes so important within a couple of years that passengers don't like their favourite ship anymore and choose a younger one? That's the basic question for the cruise or, to be exact, the ship building future.
26	5/28/2015 14:48:19	Natürlich; aber momentan nicht relevant.
27	5/31/2015 10:34:18	
28	2015-08-19	The condominium model has so far been tested only half-heartly. No matter if I like it or not: the industry will have to try and build up on this.
29	9/22/2015 10:58:21	On large ships it will not make a huge difference to have some cabins occupied on a permanent basis but for smaller ships it will.
30	10/13/2015 11:02:25	

7.4. Appendix 4: Unsorted submissions (Delphi round II)

Submission Date	duration	No Label 3	Please enter your email	List of current factors (Please drag to change the ranking)	List of future factors	"Germany is the big Player in Europe, but Europe in general is going back due to crisis. America hasn't growing at all over the last years. Asia and Australia are the big new kids on the block with a huge	[Translated from German] ~ "Asia is just starting, [...] in Germany many providers fill already their capacities with an international audience: in 15 years there will be no more German market, German providers should compete in European market. In 2030 the Americans will feel more unsafe in the world (fear	"US and Canada have been showing signs of market saturation in the past few years, and I don't think this was a temporary phenomenon. Latin America's affluent upper classes are limited in size and don't seem to grow much in numbers of households, so not much new demand can be expected from their either. Asian
							for terrorism, Russians, Chinese, pi- rates	
2016-11-05 07:59:37	0.714583333	Yes, I would like to be informed about the final results of the second round.	gmckay@sharj ah.ac.ae	Routing Price Amenities onboard Recommendations Ads and commercials On-board society	Pressure to innovate Over capacity Destinations Green cruising	3	4	4
2016-10-11 09:49:52	1309			Price Destination Ads and commercials Recommendations Brand Freedom and individualism Amenities onboard Quantity of experiences On-board society Routing Terminal accessibility Ship's architecture Safety reputation	Green cruising Destinations Ports and terminals Pressure to innovate Energy prices Digitaliztion Yield management Customization Over capacity Safety Corporate Identity	4	2	3
2016-08-29 07:06:28	4:14							
2016-08-16 10:09:52	964	Yes, I would like to be informed about the final results of the second round.		Price Routing Amenities onboard Destination Brand Ship's architecture Terminal accessibility On-board society Recommendations Ads and commercials Quantity of experiences Freedom and individualism Safety reputation	Ports and terminals Over capacity Pressure to innovate Green cruising Yield management Destinations Safety Energy prices Customization Digitaliztion Corporate Identity			
2016-08-15 10:03:34	12:24	Yes, I would like to be informed about the final results of the second round.	ulf.sonntag@ni t-kiel.de	Price Destination Quantity of experiences Routing Recommendations Brand On-board society Safety reputation Freedom and individualism Amenities onboard Ship's architecture Ads and commercials	Pressure to innovate Customization Destinations Ports and terminals Green cruising Energy prices Yield management Over capacity Safety Digitaliztion Corporate Identity	2	3	4

				Terminal accessibility				
2016-08-07 14:57:32	150:11	Yes, I would like to be informed about the final results of the second round.	nstengel@fhdresden.eu	Routing Price Ads and commercials Destination Amenities onboard Brand Recommendations	Green cruising Destinations Ports and terminals Yield management Safety Over capacity	5	3	4
2016-08-04 09:56:53	6:32							
2016-07-29 11:52:16	15:01	Yes, I would like to be informed about the final results of the second round.		Price Destination Recommendations Routing Brand Amenities onboard On-board society Freedom and individualism Quantity of experiences Ship's architecture Terminal accessibility Safety reputation	Green cruising Energy prices Destinations Safety Ports and terminals Over capacity Pressure to innovate Digitaliztion Customization Yield management Corporate Identity			
2016-07-29 07:34:23				On-board society Routing Amenities onboard Destination Ship's architecture Quantity of experiences Terminal accessibility Price Brand Freedom and individualism Recommendations Ads and commercials Safety reputation	Ports and terminals Energy prices Destinations Customization Pressure to innovate Yield management Over capacity Green cruising Corporate Identity Digitaliztion Safety	4	2	4
2016-07-06 16:56:55	89:06	Yes, I would like to be informed about the final results of the second round.	mvogel@hsbremerhaven.de	Routing Price Recommendations Ads and commercials Amenities onboard Brand	Pressure to innovate Over capacity Destinations Green cruising	4	3	5
2016-06-27 11:00:02	21:54	Yes, I would like to be informed about the final results of the second round.		Recommendations Destination Brand Routing Ads and commercials	Over capacity Green cruising Pressure to innovate Digitaliztion Destinations	4	3	5
2016-06-23 11:25:49	20:46			Price On-board society Destination	Green cruising Destinations			
2016-06-17 11:35:35	10:02	Yes, I would like to be informed about the final results of the second round.	nadine.marasc hi@msccruises.de	Routing Price Brand	Over capacity Ports and terminals Yield management	5	5	5

2016-06-17 06:50:37	20:05	Yes, I would like to be informed about the final results of the second round.	ruwoldt.christiane@ebchochschule.de	Ship's architecture Amenities onboard Quantity of experiences On-board society Freedom and individualism Routing Destination Brand Recommendations Price Ads and commercials Safety reputation Terminal accessibility	Green cruising Pressure to innovate Energy prices Customization Destinations Yield management Over capacity Digitaliztion Ports and terminals Safety Corporate Identity	5		
2016-06-14 01:58:10	22:45			Routing Price Ads and commercials Destination	Over capacity Green cruising Safety Corporate Identity			
2016-06-13 11:31:19		Yes, I would like to be informed about the final results of the second round.	roemer.maik@ gmx.de	Destination Routing Price	Green cruising Over capacity Pressure to innovate Destinations	4	5	3
2016-06-13 03:11:54		Yes, I would like to be informed about the final results of the second round.	zentrale@dmarinaconsult.de	Price Amenities onboard Brand Destination Recommendations Quantity of experiences Routing Ads and commercials Freedom and individualism On-board society Safety reputation Ship's architecture Terminal accessibility	Ports and terminals Safety Pressure to innovate Energy prices Green cruising Destinations Yield management Digitaliztion			
2016-05-29 07:18:59		Yes, I would like to be informed about the final results of the second round.	jonasw@snafu.de	Price Routing Amenities onboard Quantity of experiences Recommendations	Pressure to innovate Yield management Energy prices Green cruising Customization	3	5	4

Submission Date	Please enter your own reasons and / or select those reasons other experts have entered.	"I would expect that the size of the vessels will still increase but at a lower rate and at the same time smaller vessels with higher standards will become more popular."	"[...] I think the maximum of size is reached. Even now there is the problem that those large ships can't go to every port they would like to."	"There is a market for all tastes. So there will be mega ships which will be highly popular as well as the more tranquil choice of small ships. I can imagine that even larger ships than the Oasis or Allure of the Seas can be built which reach up to 10,000. The question will be though where they can disembark passengers in a comfortable way, as they might not have sufficient infrastructure in ports. Even when the Oasis was built, cruise ports had to	"It is going to be technically difficult for mega ships to disembark in [only] one day, and ports are not fully equipped to accommodate 10 thousand	MEGA TRENDS	Please support your choice with a comment
2016-11-05 07:59:37	There are no reliable criteria for ships´ exterior aesthetics	5	5	3	3	18: Urbanization , 12: Knowledge-Based Economy, 06: New Patterns of Mobility,13:Business Ecosystems,	Given (1) the urban rise in co-housing as a building type and as a way of life, (2) the new development of a single monthly subscription allowing residents to access apartments in various cities around the world, and (3) IT and media occupations that are not locationdependent, it is possible that within 15 years cruise liners could offer travelling accommodation to a new type of worker.
2016-10-11 09:49:52	It will make the ships even more expensive. Technical reasons is the biggest barrier. Arroganz: der Markt läuft und hat Potential, da muss man nicht mehr als unbedingt nötig investieren The average customer is mostly driven by a decision by price, so aesthetics do not matter that much	5	5	5	3	07: Digital Culture , 01: Demographic Changes, 06: New Patterns of Mobility , 08: Learning From Nature, 15: New Consumption Patterns , 16: Upheavals in Energy And Resources , 15: New Consumption Patterns, 03: Social and Cultural Disparities , 05: Changes to Gender Roles	The wold is changing to the worse, and many travelers try to behave more sustainably.
2016-08-29 07:06:28							

2016-08-16 10:09:52	There are no reliable criteria for ships´ exterior aesthetics Arroganz: der Markt läuft und hat Potential, da muss man nicht mehr als unbedingt nötig investieren					08: Learning From Nature, 04: Reorganization of Healthcare Systems , 15: New Consumption Patterns , 13:Business Ecosystems,	
2016-08-15 10:03:34	It will make the ships even more expensive. Arroganz: der Markt läuft und hat Potential, da muss man nicht mehr als unbedingt nötig investieren	**5**	**1**	**5**	**3**	01: Demographic Changes, 09: Ubiquitous Intelligence	barrierefreiheit wird wichtiger
2016-08-07 14:57:32	It will make the ships even more expensive. There are no reliable criteria for ships´ exterior aesthetics	**4**	**2**	**2**	**3**	01: Demographic Changes, 07: Digital Culture , 11: Globalization 2.0 , , 19: New Political World Order , 20: Global Risk Society	
2016-08-04 09:56:53							
2016-07-29 11:52:16	It will make the ships even more expensive. Technical reasons is the biggest barrier.					01: Demographic Changes, 06: New Patterns of Mobility , 11: Globalization 2.0 , 03: Social and Cultural Disparities , 07: Digital Culture , 10: Technology Convergence, 13: Business Ecosystems, 14: Changes in the Work World	
2016-07-29 07:34:23	It will make the ships even more expensive.	**5**	**4**	**5**	**3**	01: Demographic Changes,15: New Consumption Patterns, 03: Social and Cultural Disparities	First and most important aspeczt: Money rules the world. Presently, the generation of retired people has money, and they have time to travel. One generation later, the majority of them will be poor and unable to book cruises. This is the first aspect to influence the market and the character of the ships.
2016-07-06 16:56:55	It will make the ships even more expensive. Technical reasons is the biggest barrier.		**2**	**5**	**2**	04: Reorganization of Healthcare Systems , 20: Global Risk Society, 13:Business Ecosystems,	04: The cost of assisted living and nursing homes are rising faster than the cost of cruising. I imagine that large cruise ships will carry complete hospitals, offer surgeries and a broad range of medical therapies and become a destination for medical tourism. 20: If current trends prevail and the world will become more uncertain, fewer people may want to travel to distant places. Homeland cruising or similar might surge like after 9/11.
2016-06-27 11:00:02	It will make the ships even more expensive. Technical reasons is the biggest barrier. Arroganz: der Markt läuft und hat Potential, da muss man nicht mehr als unbedingt nötig investieren	**4**	**4**	**4**	**5**	01: Demographic Changes, 06: New Patterns of Mobility , 11: Globalization 2.0 , 10: Technology Convergence, 15: New Consumption Patterns , 17: Climate Change and Environmental Impacts , 19: New Political World Order , 16: Upheavals in Energy And Resources , 07: Digital Culture	
2016-06-23 11:25:49	It will make the ships even more expensive. Cruise companies are not aware of customer's demand for a better exterior appearance.					14: Changes in the Work World, 17: Climate Change and Environmental Impacts , 01: Demographic Changes	
2016-06-17 11:35:35	Technical reasons is the biggest barrier.	**5**	**5**		**5**	01: Demographic Changes, 08: Learning From Nature, 17: Climate Change and Environmental Impacts , 07: Digital Culture , 11: Globalization 2.0 , 14: Changes in the Work World	
2016-06-17 06:50:37	Cruise companies are not aware of customer's demand for a better exterior appearance. Arroganz: der Markt läuft und hat Potential, da muss man nicht mehr als unbedingt nötig investieren	**5**		**3**		01: Demographic Changes, 04: Reorganization of Healthcare Systems , 05: Changes to Gender Roles , 07: Digital Culture , 09: Ubiquitous Intelligence , 10: Technology Convergence, 14: Changes in the Work World, 15: New Consumption Patterns , 16: Upheavals in Energy And Resources , 12: Knowledge-Based Economy	

2016-06-14 01:58:10	There are no reliable criteria for ships´ exterior aesthetics					01: Demographic Changes, 02: Individualization Reaches a New Stage ,13:Business Ecosystems, 07: Digital Culture , 11: Globalization 2.0 , 17: Climate Change and Environmental Impacts	
2016-06-13 11:31:19	Cruise companies are not aware of customer's demand for a better exterior appearance. Arroganz: der Markt läuft und hat Potential, da muss man nicht mehr als unbedingt nötig investieren	5	1	2	2	13: Business Ecosystems, 20: Global Risk Society, 06: New Patterns of Mobility , 07: Digital Culture	Der demografische Wandel ist eher ein lokales Problem in Deutschland, Individualität ist im Massenmarkt eher begrenzt. Soziale Unterschiede werden über verschiedene Angebote gefiltert, kulturelle Unterschiede werden im internationalen Markt verwaschen.
2016-06-13 03:11:54	It will make the ships even more expensive. Cruise companies are not aware of customer's demand for a better exterior appearance.					01: Demographic Changes, 14: Changes in the Work World, 20: Global Risk Society, 19: New Political World Order , 17: Climate Change and Environmental Impacts , 18: Urbanization	
2016-05-29 07:18:59	It will make the ships even more expensive. Cruise companies are not aware of customer's demand for a better exterior appearance. There are no reliable criteria for ships´ exterior aesthetics	5	3	4	4	02: Individualization Reaches a New Stage , 03: Social and Cultural Disparities , 07: Digital Culture , 14: Changes in the Work World, 20: Global Risk Society	Highly standardized and optimized cruise products with maximum offers at minimum price will loose their share in the overall market. New highly individualized maritime products for life, work and leisure at sea will appear, supported by digitalization. Social and cultural disparities in combination with global risks and new political orders will lead to divergent, regionalized maritime cultures. Future travelers will mirror future societies in their fragmentation and heterogeneity.

Submission Date	No Label 6	Please support your choice with a comment 2	click to select , drag to reposition	Please support your choice with a comment 3	drag the right slider for plausibility in %, left slider for likelihood in %	Drag the right slider for plausibility in %, left slider for likelihood in %	Drag the right slider for plausibility in %, left slider for likelihood in % 2
2016-11-05 07:59:37	06: New Patterns of Mobility , 14: Changes in the Work World, 12: Knowledge-Based Economy	Ships designed for the market I mentioned in my answer to the previous question, would have familiar amenities akin to those of an upmarket apartments and small town rather than exotic attractions and activities designed for families. Neighbourhood and community may become design drivers.	15: New Consumption Patterns 02: Individualization Reaches a New Stage	In the US we see retired persons leading mobile lifestyles with say an SUV and two or more mobile home parks. Some rich people may already spend a large portion of their time on cruise liners as a way of life. People may want to spend time on a cruise liner for reasons other than mass tourism and overspecialisation of the architecture in that direction may limit their possibilities. Already I can see this happening.	35%;100%	10%;100%	10%;100%
2016-10-11 09:49:52	05: Changes to Gender Roles , 03: Social and Cultural Disparities , 06: New Patterns of Mobility , 16: Upheavals in Energy And Resources , 17: Climate Change and Environmental Impacts , 18: Urbanization , 01: Demographic Changes	I think many of these phenomena will lead to catering niche markets.	01: Demographic Changes 07: Digital Culture 17: Climate Change and Environmental Impacts 16: Upheavals in Energy And Resources 10: Technology Convergence		9%;64%	0%;30%	23%;100%
2016-08-29 07:06:28					23%;100%	23%;100%	23%;100%
2016-08-16 10:09:52	02: Individualization Reaches a New Stage , 08: Learning From Nature, 15: New Consumption Patterns , 03: Social and Cultural Disparities		01: Demographic Changes 02: Individualization Reaches a New Stage 07: Digital Culture 13: Business Ecosystems 15: New Consumption Patterns		30%;100%	41%;100%	23%;100%
2016-08-15 10:03:34	02: Individualization Reaches a New Stage , 07: Digital Culture , 08: Learning From Nature		01: Demographic Changes		75%;100%	26%;100%	50%;100%
2016-08-07 14:57:32	02: Individualization Reaches a New Stage , 11: Globalization 2.0 , 17: Climate Change and Environmental Impacts , 20: Global Risk Society		01: Demographic Changes 02: Individualization Reaches a New Stage 04: Reorganization of Healthcare Systems 07: Digital Culture		25%;75%	5%;50%	0%;0%

2016-08-04 09:56:53					23%;100%	23%;100%	23%;100%
2016-07-29 11:52:16			01: Demographic Changes 03: Social and Cultural Disparities 11: Globalization 2.0 16: Upheavals in Energy And Resources 17: Climate Change and Environmental Impacts 08: Learning From Nature 19: New Political World Order		30%;100%	23%;100%	23%;100%
2016-07-29 07:34:23	08: Learning From Nature, 07: Digital Culture , 20: Global Risk Society	Learning from nature is trendy, but is much more popular in the upper class that ca afford this new luxury feature. Therefore, it will influence the market, but only in a niche.	03: Social and Cultural Disparities	The majority of space on cruise ships is covered with the passenger cabins. Therefore, the social class they come from answers the question what will influence the ship's architecture.	50%;80%	80%;95%	10%;20%
2016-07-06 16:56:55	09: Ubiquitous Intelligence , 04: Reorganization of Healthcare Systems , 17: Climate Change and Environmental Impacts	04: see question 6 09: Cruise ships are complex sociotechnical systems whose coordination and support via intelligent infrastructure will have a profound impact on cruise experience, cruise economics and the way 17: Environmental legislation in wealthy countries will force cruise lines to reconsider the importance of distance and speed (fuel consumption, emissions) for their products. Will cruise ships become more stationary? Like slow-moving islands harbouring a fleet of smaller, faster vessels for mini-cruises?	20: Global Risk Society 13: Business Ecosystems	19: Maybe this is only my wishful thinking, but if connectivity can be guaranteed, why should cruise ships/islands not include co-working spaces or similar? 20: Cruise ships or cruise islands are/will be an attractive target for terrorists. In uncertain times, their mobility is a great advantage. ISPS turned them into gated communities, but in the future this may not enough. They will have to withstand (and be able to defend themselves against) armed attacks.	80%;85%	75%;85%	76%;85%
2016-06-27 11:00:02	01: Demographic Changes, 05: Changes to Gender Roles , 07: Digital Culture , 02: Individualization Reaches a New Stage , 14: Changes in the Work World		01: Demographic Changes 07: Digital Culture 02: Individualization Reaches a New Stage 15: New Consumption Patterns 05: Changes to Gender Roles 10: Technology Convergence		50%;54%	80%;98%	40%;46%
2016-06-23 11:25:49	03: Social and Cultural Disparities , 04: Reorganization of Healthcare Systems , 15: New Consumption Patterns , 17: Climate Change and Environmental Impacts		01: Demographic Changes 05: Changes to Gender Roles		46%;51%	52%;52%	35%;50%
2016-06-17 11:35:35	01: Demographic Changes, 03: Social and Cultural Disparities , 15: New Consumption Patterns		02: Individualization Reaches a New Stage 03: Social and Cultural Disparities		23%;100%	23%;100%	23%;100%
2016-06-17 06:50:37	01: Demographic Changes, 06: New Patterns of Mobility , 07: Digital Culture , 08: Learning From Nature, 10: Technology Convergence, 16: Upheavals in Energy And Resources , 17: Climate Change and Environmental Impacts , 20: Global Risk Society		01: Demographic Changes 05: Changes to Gender Roles 04: Reorganization of Healthcare Systems 16: Upheavals in Energy And Resources 18: Urbanization 02: Individualization Reaches a New Stage		50%;100%	20%;100%	32%;100%
2016-06-14 01:58:10	01: Demographic Changes, 03: Social and Cultural Disparities , 04: Reorganization of Healthcare Systems , 15: New Consumption Patterns , 17: Climate Change and Environmental Impacts , 16: Upheavals in Energy And Resources		01: Demographic Changes 02: Individualization Reaches a New Stage 10: Technology Convergence		50%;100%	51%;100%	41%;100%

2016-06-13 11:31:19	01: Demographic Changes, 04: Reorganization of Healthcare Systems , 08: Learning From Nature, 16: Upheavals in Energy And Resources , 17: Climate Change and Environmental Impacts	Demografie: für Deutschland ev. betreutes Reisen (schwimmendes Altersheim) Nachhaltigkeit wird ein Thema	02: Individualization Reaches a New Stage 08: Learning From Nature 16: Upheavals in Energy And Resources	Ausweitung des Ship in Ship Konzepts (wie von NCL eingeführt)	100%;100%	100%;100%	30%;100%
2016-06-13 03:11:54	01: Demographic Changes, 06: New Patterns of Mobility , 08: Learning From Nature, 14: Changes in the Work World, 18: Urbanization , 19: New Political World Order , 20: Global Risk Society		01: Demographic Changes 05: Changes to Gender Roles 18: Urbanization 20: Global Risk Society		75%;100%	78%;100%	72%;100%
2016-05-29 07:18:59	06: New Patterns of Mobility , 08: Learning From Nature, 09: Ubiquitous Intelligence , 17: Climate Change and Environmental Impacts , 18: Urbanization	Various new types of ships will emerge as results of the massive changes that the planet is facing. Maritime transport will manage global refugee flows in a human manner. Climate refugees live on floating islands. Global companies will relocate to offshore facilities. Floating services (healthcare, food, shelter) operate from ships. Rising sea levels will force urban agglomerations to expand towards the sea. Rich people become well-equipped boat people, celebrating life-style and freedom at sea.	08: Learning From Nature 02: Individualization Reaches a New Stage 14: Changes in the Work World 07: Digital Culture 01: Demographic Changes	Future mega cruisers will probably loose their boring appearance as "machines" for the efficient delivery of vacation experiences. Interior and exterior design will be much more diverse and heterogeneous, maybe mirroring a small- or medium-size city in its diversity.	50%;90%	60%;95%	45%;100%