The Driver Report

The driver report presents the documentation necessary to understand the evolution — past, present and future — of a variable. This document (file or report) presents and explains the dynamics of change, e.g., trends or breaks, as well as the hypotheses for the future of a driver at the time horizon set for the study. The reports correspond to major external and internal drivers for the system under study and often form the "knowledge base" of a foresight exercise.

APPLICATIONS SCOPE

The driver report approach proves useful in organizing, synthesizing and saving documentation. Especially helpful in building scenarios, it provides a researched basis that is as objective as possible for the hypotheses selected for the scenarios. If kept up to date and used with indicators, the set of driver reports on the subject studied can become a monitoring or scanning system.

Domain: All domains.

Number of participants: In many cases, the task of writing the driver reports is assigned to individual working group members (5-15 people) according to their skills or centers of interest. The content is then debated, revised and confirmed by the entire working group. Group discussion of the driver reports, especially the hypotheses, is a crucial step.

TECHNICAL REQUIREMENTS

None, really, other than providing a driver report format and an example.

BASIC CHECKLIST

- Do not start writing reports before completing a list of 10 to 30 factors/drivers to process.

- Set up a specific working group that will be available to (re)read the material.

- Allow two to three months between finishing the initial list and delivering the reports to participants.

- Survey and analyze already existing works with a critical eye.

- Suggest indicators corresponding to changes spotted in both past and future whenever possible.

- Avoid two-page documents (too condensed) as well as 20-page papers (too long, never read).

- Indicate original sources as much as possible.

- Rework ideas from old or available driver reports as needed but not the driver report content; instead, focus on questioning any transformations and not only completing an old data base.

- Adapt content to the scope and subject matter, and avoid duplication or repetition from one driver report to another.

RELEVANCE AND USE IN FORESIGHT

The driver report is employed regularly in European prospective approaches which emphasize the importance of a retrospective, as well as indicators and orders of magnitude plus the formulation of various hypotheses at a time horizon. This tool enables users to capitalize on the information gathered and set up a monitoring system. Insight and megatrend reports are used in foresight approaches and tend to emphasize phenomena.

TIME FRAME

Once documentation is collected, *e.g.,* studies and interviews, one to two days of work (more for complex subjects) are needed to document the report. Time and effort must be allotted to this task when planning a foresight exercise, especially if 20 to 30 driver reports are required. Allow two months minimum between listing the drivers to be documented and making available the content and hypotheses in the driver reports.

TOOL IMPLEMENTATION COSTS

This tool requires time and effort. It often represents from 25% to 30% of the foresight process. Allow for 3 days per driver report, drafted and approved; *i.e.,* 60 days of labor are required for a base of 20 reports.

The Driver Report
Documenting Variables for Foresight Exercises

by Véronique Lamblin*

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Abstract

This document, known as a driver report,[1] brings together the documentation needed to understand the development — past, present and future — of a variable.[2] It presents and explains the dynamics of any developments (trends, ruptures or changes) as well as hypotheses on how the variable will develop with one time horizon.

A report for each variable (driver) is prepared then compiled and often a full set of reports serves as a "knowledge base" for a futures-thinking or foresight exercise.

The drivers documented are those yielding major developments with a direct or an indirect impact on the topic or issue under study. Altogether, these variables and their inter-relations form a system (pragmatically defined here as the sum of all the relevant factors and their interdependencies).

The record for each driver must supply answers to the following three questions:

1) How did the driver develop in the past?

2) What are the current dynamics, notably the logical extrapolation of the trends?

3) What are the potential inflections and breaks which could impact the current dynamics?

The driver report approach proves useful in organizing, summarizing, and maximizing documentation. It becomes particularly helpful in scenario building as it ensures a solid information base for backing up "scientifically" the hypotheses that could be selected in the scenarios.

Note that, if kept up to date, the compiled files with their associated indicators can continue functioning as a monitoring or scanning system for a subject. ■

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1. Note that terminology varies around the world. As no single English term is preferred, "report" with a few synonyms has been used in this document.

2. Similarly, the term driver seems standard but the same items may sometimes be called "variables" as they vary over time. Depending on the research, academics may use "driver", key factor or variable. Practitioners tend to prefer "driver" (for change), a term that reinforces the commitment to search for forces active in changing the future. Herein these terms are used almost synonymously. A driver or variable is often a mix of factor and actor (factors are always moved by actors).

Keywords

Factor ❙ Driver ❙ Actor ❙ System ❙ Variable ❙ Foresight Database ❙
Retrospective ❙ Futures Hypotheses

Description: Format

The report has the driver as its title and the following six sections:
- definition;
- relevant indicators;
- retrospective/background study;
- dynamics of change;
- hypotheses for the future;
- bibliographic references and list of experts or actors interviewed.

This level of documentation and reflection on the drivers differentiates a foresight exercise that observes and measures phenomena with realistic quantitative or qualitative indicators in order to build scenarios from a creative process relying essentially on representations of futures.

Definition

The definition must be shared. One way to ensure everyone has understood the definition is to have it approved by the participants of the foresight working group. Note that a geographic scale often needs to be specified in the definition. Also, it is important to explain the connection between the driver and the subject under study.

Relevant Indicators

The choice of indicators remains key as it enables participants to define the driver precisely. The first question: what are we looking for? This should be asked before starting the documentary research to avoid analyzing the driver with only the information or indicators at hand. Note that when without hard data, interviews with experts provide a practical solution. Similarly, it may be worthwhile mentioning the "ideal" indicator for which no data can be found and analyzing the indirect indicators that can be documented.

Obviously quantified indicators must be handled with care (see insert, p. 5); many qualitative variables, *e.g.,* the "social link" or a "policy", might not have clear-cut established indicators. In this situation, it is best to employ several indicators enabling participants to sketch out the issue.

In dealing with a factor related to the "social link", the facilitator or participants could investigate the percentage of the population involved in local associations, intergenerational redistributions within families or conflicts in organizations. Naturally the research depends on the future topic impacted by the social link. As for the "policy" category, one technique is to draw up a list of events over time, *e.g.,* decisions made, dates of decisions, implemented or not, why implemented or not, plus the actors involved and why.

Beyond choosing relevant indicators, the author of the report must question the reliability of the data; *i.e.,* ensure quality through trustworthy sources. At some point, it may be necessary to cross-reference and compare data culled from different sources.

Retrospective/Background Study

The retrospective or history explains how a factor or driver developed. This is an evolution objectified through the development of its indicators over time. If a foresight exercise uses a

QUANTIFIABLE INDICATORS

An indicator must serve the purpose or subject of a foresight exercise. For example, the completed fertility figures of each generation (average number of children per woman beyond childbearing age) would be the most useful indicator in evaluating the population for any given time horizon while the birth rate (*ratio* between the number of births and the total population in the middle of the year in question) would be a good indicator if the foresight exercise is scoped to shed light on education or maternity ward needs.

Simple indicators should be preferred over composite indicators like the GDP (Gross Domestic Product) or HDI (Human Development Index). Although the latter may be very useful when comparing countries, at one point, these indicators evolving over time do not reveal exactly what is changing. For example, the question arises whether it is household spending or company expenditures in the case of GDP or GDP per inhabitant; life expectancy at birth or level of education in the case of HDI. Composites are also awkward to use when projecting situations in time.

Again, it is important to understand what each indicator is and what it covers, whether simple or composite. For instance, two indicators are required to observe how employment has developed within a region: the employment and unemployment rates. The two indicators make it possible to calculate the population of working age neither employed nor unemployed. Similarly, the GDP is the sum of expenses which may be increased by so-called negative costs, *e.g.,* pollution control/decontamination or the fight against noise pollution, and does not include domestic work or 'free' commons like air or water.

Lastly, in expressing quantified data, volume should be preferred rather than growth rates which are more delicate to handle and especially to compare. ■

Source: Jouvenel Hugues (de), *Invitation à la prospective / An Invitation to Foresight,* Paris: Futuribles (Perspectives), July 2004, pp. 60-64. URL: https://www.futuribles.com/media/filer_private/2012/06/28/invitationalapros pective.pdf. Accessed April 24, 2017.

horizon line of 20 years, then factor analysis should go back at least 20 years. Necessarily the author of the driver report must find or construct long time series of indicators related to the driver or present the main developments and typical events from that past.

The indicators enable participants to analyze how a driver developed over time, so it makes sense in this phase to also analyze why and under whose influence that driver developed. Lack of appropriate causal analysis may lead to absurd extrapolations as the cause of the phenomenon has been exhausted. For example, once households possess one car per adult resident, it becomes ridiculously improbable to extend this trend to each adult owning two or three cars. Another example would be increased life expectancy which for a long time was achieved through a decrease in infant mortality reaching a floor rate of 5‰. Yet, another factor has now taken over: the later age of death. For wealthy countries, uncertainty about the future, the very basis of hypotheses, would be whether or not life expectancy will continue to rise after age 60.

Besides analyzing and understanding the past, the retrospective or historical view may enable participants to detect upcoming uncertainties; namely, i) which factors/actors could change the trend path? (here "trend" is used in the sense of following the past into the future); ii) is there a threshold as seen above in the household car ownership example? ; iii) are there weak signals, a foreign or local example, revealing an inflection point in this factor?

The Dynamics of Change: Strong Trends, Major Uncertainties, Possible Breaks and Weak Signals

Here the goal is to present and justify the various dynamics at work:

◗ Strong trends; *i.e.,* the phenomena found in a more or less distant past, bearing traces of a dynamic that cannot be stopped suddenly. A classic example would be demographic aging in the world.

◗ Major uncertainties; *i.e.,* the fields open to several different futures possibly having a significant impact.

◗ Factors or drivers involving inflections or breaks in trends which have already occasionally happened in the past and could resurface, thus changing the course of events.

Special attention should be paid to the following:

◗ Emerging trends; these are recent trends about which participants remain uncertain as to whether or not they will solidify or reach an inflection point.

◗ "Weak signals", "seed events" or "seeds of change" that appear fairly insignificant during the study but could actually cause a break, bifurcation or disturbance in an existing trend and perhaps herald an emerging trend.

◗ Innovations, *e.g.,* social and technological shifts, not necessarily considered today but possibly disrupting the system later.

The above elements flow from logical reasoning and reasoned imagining. In other words, both sides of the brain must be activated to build futures hypotheses, as seen below.

Hypotheses for the Future

Retrospective analysis often enables practitioners to project a trend hypothesis for the driver. Basically, this hypothesis is a projection of the driver which continues in the same way as in the past with the time horizon set for that particular foresight exercise. This hypothesis, at least for quantified variables, closely resembles the hypotheses generated by forecasters using mathematical models that extend evolutions from the past to tomorrow.

Actually, a trend hypothesis with distant time horizons is often not the most probable simply because things do change. Nonetheless, this hypothesis remains a convenient reference point as it reflects a known past that is extended.

Hypotheses of change, unlike trend hypotheses, are called contrast hypotheses. The best way to build and back up these hypotheses is to start asking questions like those listed below:

◗ Is there a threshold beyond which the factor or driver develops differently?

◗ Are there potential changes in the interplay among actors or in the geographic scale?

◗ Do different situations exist in other regions?

◗ Can analogies with other fields help?

The goal here is to get ideas flowing freely.

Each hypothesis covers the full field of the factor or driver. In other words, the hypotheses must be exclusive from one another other, thus each incompatible with any other. Expressed differently, if one hypothesis is true, the other hypotheses are not possible. As a general rule, two to

five hypotheses are prepared for each driver. Each hypothesis is composed in a few lines which summarize the rationale enabling the author or working group to assert that the development envisioned is indeed possible. This is especially important for the contrast hypotheses. Utilizing another driver from the foresight system under study should be avoided in this justification unless it is well substantiated. If a hypothesis does depend exclusively on another factor in the system, that must absolutely be specified.

Step-by-Step Application

Identify and Select Drivers

The length and complexity of the foresight exercise depend on the number of driving factors or drivers selected. For instance, in choosing which drivers merit a report, facilitators or participants must deconstruct the system enough to avoid either catch-all factors or an astronomical number that would make serious study impossible. One rule of thumb is to not exceed 40 drivers. With 20 or 25 drivers, the system starts to be sufficiently broken down for the foresight activity to proceed effectively. Lighter systems of 10 to 15 drivers may be possible if these are regrouped in transformation fields or by themes.

Of course, it is no easy task drafting a list of 20 to 25 drivers. Often the first step consists of identifying all manner of drivers either already or potentially influencing the problem under investigation then drawing up a list of those drivers broken down coherently. Usually this list is generated by a working group to avoid excessive subjectivity.

This first draft, often a laundry list of a hundred items, must be whittled down to a manageable number of drivers. There are three ways to weed certain drivers out of the system. The following three criteria should be considered in the selection process:

▶ First, the driver has a secondary influence on the system under study in comparison with other drivers.

▶ Second, the driver is largely inert over time and, given the time horizon set for the exercise, one single hypothesis should be taken into account. This is thus a trend to be considered identically in all the scenarios.

▶ Third, the driver is the logical result of other drivers already taken into consideration within the system. Hence this is a resulting or "result" variable (driver) described in scenarios through deduction, *e.g.,* "population health" may come from drivers entitled "incomes", "access to care" and "types of consumption".

After this selection process, the working group will have in hand a list of the driving or most influential factors which determine how that system develops.

Another possibility for listing drivers is to begin by identifying the major thematic areas of transformation then the relevant factors within them. In practice, it is productive to weave back and forth between both approaches; *i.e.,* start from either drivers or thematic areas.

Analyze the Past and Explore Possible Developments, Driver by Driver

Once the drivers are identified, the team or group can envision how these might develop in the future. There is a two-step process for reflecting on each driver:

◗ Step one involves observing the driver's past in order to identify the dynamics at work which could continue. This retrospective step also identifies the actors who have been a driving force in that driver's history.

◗ Step two consists of applying logical argumentation while using imagination to envision different hypotheses of future development for each driver, according to the time horizon chosen.

Without a doubt, this is the most cumbersome task in a foresight procedure as one report per driver must be completed. Yet, this stage requires the utmost rigor and serious effort because the quality of the rest of the exercise depends on it.

Driver reports are written outside the working group's sessions. If subcontracted, for example to a documentalist, the professional responsible should be told why that factor must be analyzed; *i.e.,* what are the uncertainties, and what are the impacts on the subject of the foresight exercise.

Pool the Analyses, Edit and Consolidate the Contents

Although individual working group members are tasked with preparing the driver reports based on their skills and centers of interest, the entire group must debate the driver reports. Indeed, it is imperative that the group discuss, amend, and confirm collectively the hypotheses for the future. In other words, some agreement must be reached among working group members on the final content of the driver reports and in particular on the hypotheses for the future, prior to considering moving to the next stage of the foresight exercise.

Essentially, discussion of the driver reports boils down to speaking about the hypotheses, or possible futures. This crucial phase provides a forum where points of view can be clearly expressed, and elements not necessarily identified by the individual report authors may be considered.

Consensus on the suggested future hypotheses for each driver is feasible because these hypotheses describe possible developments, and in no way do they plead for what is desirable; in other words, what may create a divergence of opinions.

In practice, discussing the driver reports takes time and must be facilitated in order to stay on schedule. The most efficient technique is to have the entire working group read the reports before the session and to exchange written comments ahead of time. When in session, the author(s) of the driver report may wish to present the material quickly, emphasizing trends, inflections and discontinuities, plus uncertainties affecting the future development of the driver. Their presentation should focus on the hypotheses for the future which they are actually suggesting. These are then discussed and edited by the working group. The facilitator must ensure that the previously mentioned rules on hypotheses are scrupulously obeyed; *i.e.,* hypotheses must be both exclusive from one another and incompatible among themselves.

It is unrealistic to think that a driver or factor report can be properly discussed in under 20 minutes. On the other hand, spending over an hour and a half on one report may lead some working group members to feel that this phase is a boring waste of time. Naturally that reaction would be extremely damaging to the rest of the process.

In a complex system comprised of some 30 drivers, the discussion can easily take 30 hours. If scheduling the entire working group for this amount of time proves impossible, there are two solutions:
— a quick, highly controlled discussion of the hypotheses;
— confirmation of the hypotheses by subgroups and then the group at large.

In any event, time invested in preparing the driver reports yields several advantages, namely:

◗ Research/documentation in the form of driver reports is the only guarantee of any "scientific quality" in the futures hypotheses for each driver; *i.e.,* the basis needed for scenarios. The document itself enables the facilitator or group to argue how each hypothesis is possible. Moreover, the set of reports may be distributed as a support for the study, effectively providing all the details.

◗ Only a documented retrospective of a driver enables participants to measure its inertia or speed of change. As the speed of change for a driver may evolve in the future, it is best to have background material to explain this change.

◗ Experience shows that even experts generate more ideas for hypotheses when they have background documentation at their disposal.

◗ The set of driver reports provides a structured monitoring system easily kept up to date by filling in the "weak signals" of change for each driver while scanning current events.

◗ As a tool, this report falls between i) functional analysis, which enables participants to describe a system of drivers that influence the subject of a foresight exercise, and ii) morphological analysis, which enables participants to build scenario plots based on the hypotheses generated for each driver.

◗ This documentation tool may also serve to analyze any dynamic trend or subject.

Prerequisites

◗ One to two working days (even more) are frequently necessary to document and structure a report properly. Time and effort really must be allotted to this task when scheduling a foresight exercise, especially if 20 to 30 driver reports are foreseen.

◗ Similarly, it is preferable to know who will write the first draft and to budget accordingly if subcontracting outside the working group. In any case, the organizer or facilitator should allow one to two months between building the system of drivers and presenting hypotheses for the future in individual driver reports.

◗ Note that a possible shortcut is to have participants construct future hypotheses for each driver during group sessions on the basis of what the participating experts have in mind.

Tips and Best Practices

◗ Graphics for the indicators in long series, if available, enable the writer(s) to focus on explaining the "why" and "by whom" in writing the retrospective component of the report.

◗ Forecasts or hypotheses for the future readily available in the literature should be welcomed and reused. However, that does not exclude critiquing them. It may be beneficial to add a rubric entitled "Existing Futures Studies" within the section on the dynamics of change.

◗ For quantified hypotheses, two hypotheses must take into account the most extreme orders of magnitude possible.

Errors to Avoid

◗ Do not produce a 15-page driver report that will never be read. Aim for summaries with references to full source documents.

◗ The reports must not become the property of any single author, even if an expert. Instead, the reports pool all contributions as long as they may be justified as possible within a given time horizon. Hypotheses of future developments for each driver must be systematically debated.

Frequently Asked Questions (FAQs)

◗ Where to find the data?

In this Internet age especially, ensure the data have been drawn from trustworthy sources. Whenever possible, primary sources should be used. It is advisable to cross-reference and compare information from different sources, too. The key: find data that extend back in time, preferably long series, and may be projected forward into the future. Besides official sites, technical publications and studies of all sorts may serve as sources of facts and ideas. Some judgment is needed because a blog may be the source of an idea to confirm collectively but not the source of reliable data. It is always best not only to check sources and the validity of information, but also to take into account the possible normative bias of actors or authors.

It is worth bearing in mind that for qualitative factors linked to delicate subjects, *e.g.,* "governance", a couple of interviews with "knowledgeable sources" (expert or ex-actor) will enable an author to prepare a driver report.

◗ Which actors are associated with this driver?

Most of the time, a driver is a mix of a factor and the actor(s) acting on it. Participants in a foresight exercise should reflect on the drivers according to key actors in order to explain how the retrospective or background data evolved. In fact, assessing the actors may lead to complementary sources of data on the driving factor and even divergent ideas about the future, if several actors express their views on the same subject. These ideas then become sources for alternative hypotheses for the future.

◗ How much time per factor/driver report?

Even for a professional, it is very difficult to finish a draft report in under one workday. Besides collecting data on the variable, the author must condense and summarize to understand the past trend (and possible inflections), explain its evolution, then continue it into the trend hypothesis. The vagaries of the past, changes in an actor's behavior, the thresholds set, analogies... all of these become sources for ideas leading to alternative hypotheses. Relevant "weak signals" in current events can be spotted, monitored, and used to support the possibility of these alternative hypotheses. All in all, it is not unheard-of to spend more than two days writing a driver report.

Further Reading

Actor Report

For some foresight subjects or futures issues, the weight of both actors and their strategies plays a determining role. In this case, creating actor reports may be useful.

The format for the actor report resembles the driver report (sometimes called key factor report) with minor adaptations. The actor report has a title and the following five sections:
• definition;
• goals/missions of the actor plus motivations, stated objectives;

- prior behavior and problems encountered, means of action including alliances and partnerships;
- potential developments pinpointed: factors possibly affecting the actor, a change of role in the system, possible "rules of the game" for the future;
- bibliographic references and list of experts interviewed.

Insight Report/Key Question Report/Megatrend Report

The driver or variable report approach is highly developed in analytical foresight processes aiming for an exhaustive description of the main factors of a system and the compilation of a solid knowledge base for the past and future of those drivers.

Driver reports cover factors of change; whereas, other approaches, *e.g.,* by insight, key question or megatrend, deal directly with the actual changes or inertia. What follows is a quick overview of these other approaches with examples.

◗ **The subject of an insight report is usually a powerful idea for the future worded as a key message.** For example, a driver report would have as its subject "Fertility Dynamics in Sub-Saharan Africa, Horizon 2040" and present a history of the subject plus a variety of hypotheses for the future. The insight report, however, would have as subject line "Towards a Rapid Decrease in Fertility Related to Urbanization in Sub-Saharan Africa by 2040". The insight report would then provide evidence (concurrent phenomena) to support this hypothesis expressed as a key message. Each insight report thus supports one single future hypothesis.

Here are a few key ideas/messages later developed as insight reports. All have been drawn from *The Future of Aid INGOs in 2030,* a study published in particular by the IARAN (Inter-Agency Regional Analysts Network):[3]

1) Change/key idea: "By 2030, displaced people will become the fastest growing group with the most acute humanitarian needs."

2) Change/key idea: "There will be a consistent increase in the impact of natural disasters and an exacerbation of the humanitarian consequences". With increased urbanization (including coastal zones) the natural disasters such as earthquakes and tsunamis will be more and more devastating.

3) Inertia/key idea: "Political instability will be endemic in chronically fragile states". By 2030, the countries of the main humanitarian crises linked with political issues will primarily be the same as in the 2010-2015 period: Chad, Niger, Mali, Democratic Republic of the Congo, Central African Republic, [North]Sudan and South Sudan, Yemen, Palestine, Syria, and Afghanistan.

A fine example of an insight report in which the hypothesis "growth in Africa" is supported by a series of concurrent phenomena may be found on the Future Agenda site http://www.future agenda.org/insight/africa-growth. Future Agenda is a non-profit futures program open to contributions from experts.

◗ **Key questions reports have a subject worded as an interrogative, ending with a question mark.** The question probes i) a major phenomenon which, given uncertainties, remains open to change, possible breaks (ruptures) and new, emerging paradigms or ii) a topic considered controversial among experts or actors. For example, here are subject lines from key question reports taken from a futures exercise on healthcare: "Tomorrow, all doctors?" and "Tomorrow, all centenarians?"

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3. About IARAN, see: http://www.iris-france.org/iaran/

Key question reports include content that takes into account the various dynamics of the specific subject and surrounding controversies thus providing context for the reader. The reports present some proof allowing participants to answer 'yes' to the titular question as well as the concurrent phenomena which, on the contrary, refute the underlying hypothesis.

❱ **Megatrend reports focus on deep changes likely to affect the entire futures analysis.** These are considered global shifts, reshaping the world in which we live. For example, a megatrend report might have as title "Urbanization and the Urban as a Dominant Lifestyle Model" or "The Spread of the Cooperative Economy". Here the megatrend report subject is an extension of the trend culminating in a vision of the future; *i.e.,* "The Spread of the Cooperative Economy", which would be debated in the report.

In 2017, the following megatrends were mentioned the most: individual empowerment, new attitudes toward gender, digitalization and digital culture, the spread of the sharing or cooperative economy, development of the knowledge economy, urbanization, and climate change.

When megatrend reports present not only a trend but also the impact of that trend on the subject under study, they are called trend impact reports. One example of a trend impact report had as subject "Proximity". It revealed the deep trend, its origins and indicators, current manifestations and consequences. Built during a futures study on tomorrow's food behaviors completed in January 2017, this report may be found on the site of the French Ministry of Agriculture: http://agriculture.gouv.fr/etude-prospective-sur-les-comportements-alimentaires-de-demain

The content of the above-mentioned types of report (insight, key question, megatrend) usually is more "engaged" than that of a driver report because one single hypothesis or future vision is analyzed and debated. The main dynamic of a change is put forth rather than the various possible developmental hypotheses. Note that these three approaches (insight, key questions, megatrends) are used primarily in the English-speaking world.

The reports produced and these approaches have the advantage of supporting communication and mediation efficiently without needing to go so far as to draft full scenarios. Their disadvantage? They present merely one part of the work needed in analyzing the past (retrospective) and future (*prospective*) and fail to open up a variety of hypotheses on the future.

All of these reports may be prepared by a working group, actor or expert, and in this last case, the author's specific vision of major change is affirmed.

Basically, any efforts at analyzing material and drafting reports should keep in mind these three aspects:

• the origins of future dynamics;

• useful proof and indicators, notably current situations, emergent situations, or weak signals that may herald change, and potentially controversial elements;

• possible impacts on the topic under examination, notably in the format of megatrend and trend impact reports.

Example of a Driver Report about International Agreements

This report was prepared within the framework of the European project FEUFAR (*The Future of European Fisheries and Aquaculture Research, Horizon 2020*) implemented between January 2007 and August 2008 by a consortium of experts from IMARES (Wageningen Institute for Marine Resources and Ecosystem Studies, Netherlands); CEFAS (Centre for Environment, Fisheries and Aquaculture Science, UK); Ifremer (Institut français de recherche pour l'exploitation de la mer, France); Futuribles (France); the Marine Board-ESF [European Science Foundation] France; Fiskenforskning (Norway) and HCMR (Hellenic Centre for Marine Research, Greece).

For more details, see the link: http://cordis.europa.eu/project/rcn/84064_en.html

Thematic Area: World Context.

Driver: International Agreements.

Author: Futuribles, Draft no. 2, November 5, 2007.

Driver Definition

Agreements between two or more countries (including EU) regulating access to fishing grounds and stocks and modes of fishing, fish production and trade. Agreements are not permanent; cyclical negotiations are frequent. International agreements include conventions, agreements, pacts, accords, protocols, and declarations. They can either be:

— bi- /tri- /multilateral;

— and characterized by the consecutive mechanisms of adoption, ratification, entry into force.

Concerning fisheries and aquaculture, the most important International Agreements focus in direct guiding fisheries (such as the FAO [Food and Agricultural Organization] Code of Conduct for Responsible Fisheries), or with a direct bearing on fisheries and aquaculture, such as regulations and protocols deriving from the Kyoto Protocol and the Johannesburg Declaration, or have a more general orientation, yet do impact on fisheries and aquaculture for example by regulating trade, as under the WTO (World Trade Organization).

The open access nature of many fishing grounds means that the rights and responsibilities of resource users are not well defined and competition among fishers intensifies as the resource becomes scarcer. Even where clear laws and regulations that define rights exist, enforcement is a challenge for developed and developing countries alike, often resulting in conflicts among different user groups. In this context, fisheries resources are difficult to manage effectively and prone to the 'tragedy of the commons'. These issues are compounded by the subsidization of distant water fishing fleets. Countries that do not subsidize their fisheries and restrain their total fish catch to maintain the resource lose the extra catch to countries that do otherwise. Competition from subsidized distant water fleets can make it economically infeasible for developing countries to expand their own fisheries and realize the full benefits of their jurisdiction over their 200-mile exclusive economic zone (EEZ).

Relevant Indicators

◗ Environmental

• Type of agreements: principle declarations, objectives with or without implementation plans, objectives with legal bindings.

• Identification of the parties involved.

• Level of adherence: number of countries adhering.

◗ Maritime access

• Number of agreements (national agreements + EU agreements), duration, cost (sanction or implementation). Regional Fisheries Management Organisation (RFMO)'s regulations.

• International agreements/United Nations Conference on the Law of the Sea (UNCLOS).

• Trade agreements:

— trade agreements about fish and fish products; quality (health and safety) or environmental requirements included in these agreements;

— reports from negotiations;

— barriers to international trade and investment.

Retrospective Study (Last 20 Years, What, How and Who) and Dynamics of Change

◗ General International Law of the Sea

The main modern landmark in International Law of the Sea history is the result of the United Nations Conference on the Law of the Sea (UNCLOS). The resulting Convention, generally known as "Montego Bay Convention", went into effect in 1994.[4]

This Convention is the foundation of a written International Law system for the sea, coming after centuries of custom law, mainly based on the "freedom of the seas" principle (Grotius *mare liberum* concept), except for the coastlines and the belt of water from it to the "cannon shot" three nautical miles limit.

Remark: The United States is not part of the convention, claiming it is clearly damaging for the US economy. But they are part of the additional "Agreement for the implementation of the provisions of the Convention relating to the conservation and management of straddling fish stocks and highly migratory fish stocks."[5]

The convention set the limit of various areas, measured from a carefully defined baseline. (Normally, a sea baseline follows the low-water line, but when the coastline is deeply indented,

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4. Available at: http://www.un.org/Depts/los/convention_agreements/texts/fish_stocks_agreement/CONF164_37.htm. Accessed December 8, 2017.

5. In the Convention, straddling stocks is defined as "stocks of fish such as pollock, which migrate between, or occur in both, the economic exclusion zone (EEZ) of one or more states and the high seas". Highly migratory species (HMS) defined in Article 64 of the UNCLOS (Annex 1) lists the species considered highly migratory by parties to the Convention, *e.g.,* tuna and tuna-like species (albacore), marlin, swordfish, and oceangoing sharks, dolphins and other cetaceans. Highly migratory species can be compared with straddling stock and transboundary stock. Straddling stock range both within an EEZ as well as in the high seas.

has fringing islands or is highly unstable, straight base-lines may be used.) The areas are as follows:

• **Internal waters:** This is water and waterways on the land-ward side of the baseline. The coastal nation is free to set laws, regulate any use, and use any resource. Foreign vessels have no right of passage within internal waters.

• **Territorial waters:** Out to 12 nautical miles from the base-line, the coastal state is free to set laws, regulate any use, and use any resource. Vessels were given the right of "innocent passage" through any territorial waters. Fishing, polluting, weapons practice, and spying are not allowed.

• **Contiguous zone:** A further 12 nautical miles beyond the Territorial waters, the contiguous zone, is an area in which a state could continue to enforce laws regarding activities such as smuggling or illegal immigration.

• **Exclusive Economic Zones (EEZ):** Extends 200 nautical miles from the baseline. This is the main point, regarding fishery, of this convention: within this area, the coastal nation has sole exploitation rights over all natural resources. The EEZ were introduced to halt the increasingly heated clashes over fishing rights. EEZ creation has had a significant influence in the shift of fish production in favor of developing countries.

FIGURE 1. NATIONAL TERRITORIAL LIMITS: FROM INTERNATIONAL WATERS TO INTERNAL WATERS

Source: UNCLOS.

• **Continental Shelf:** Continental shelf is defined as natural prolongation of the land territory to the continental margin's outer edge. State's continental shelf may exceed 200 nautical miles until the natural prolongation ends, but it may never exceed 350 nautical miles. States have the right to harvest mineral and non-living material in the subsoil of their continental shelf, to the exclusion of others.
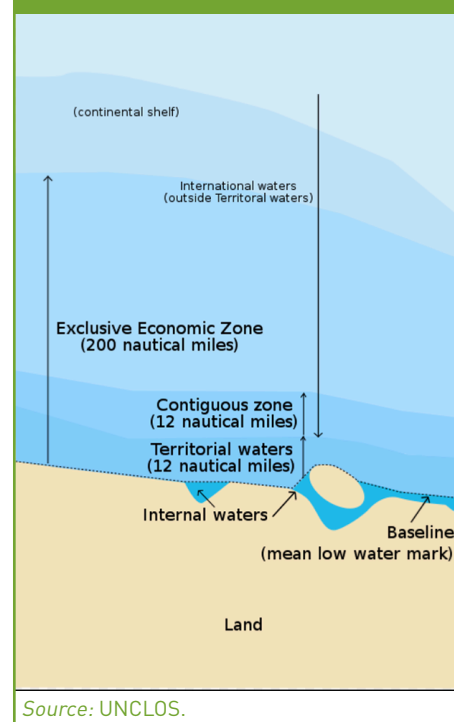
Aside from its provisions defining ocean boundaries, the convention establishes general obligations for safeguarding the marine environment and protecting freedom of scientific research on the high seas, and also creates an innovative legal regime for controlling mineral resource exploitation in deep seabed areas beyond national jurisdiction, through an International Seabed Authority, which is the part that the US never accepted.

◗ **Specific International Agreements about Fishing**

First of all, we should remember that the current value of global fish trade is close to US$60 billion, compared to about US$15 billion in the early 1980s. Developing countries hold approximately 50% of the global export value of fish and represent 18% of the global import value.[6]

• **Convention on Fishing and Conservation of Living Resources of the High Seas:** Opened for signature 29 April 1958; came into effect 20 March 1966. This was the first international agreement on that issue. It was designed to solve through international cooperation the problems involved in the conservation of living resources of the high seas, considering that because

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6. AHMED Mahfuz, *Market Access and Trade Liberalisation in Fisheries,* ICTSD Natural Resources, International Trade and Sustainable Development Series Issue Paper No. 4, June 2006, ICTSD (International Centre for Trade and Sustainable Development), 57 pp., Geneva. URL: https://www.ictsd.org/downloads/2010/02/market-access-and-tradre-liberalisation-in-fisheries.pdf. Accessed December 8, 2017.

of the development of modern technology some of these resources are in danger of being overfished.

• **FAO Code of Conduct for Responsible Fisheries:** It was elaborated by the FAO Committee on Fisheries (COFI) and adopted by the FAO Conference in 1995. The Code of Conduct for Responsible Fisheries is a voluntary instrument, and it is the first international instrument of its type to have been concluded for the fisheries sector. The Code has 12 articles. However, the substantive articles of the Code are found in articles 7 to 12.

— Fisheries Management: Article 7 on fisheries management contains many subheadings concerning management objectives, management framework and procedures, data gathering and management advice, the precautionary approach, capacity management measures, implementation and financial institutions. The need for fisheries management to be based on effective data is stressed.

— Fishing Operations: Article 8 deals with fisheries operations and it has provisions on the duties of flag states and port states, as well as provisions on harbors protection of the environment and the abandonment of structures and reefs. The overall objective of this article is to promote a framework that would encourage sustainable development, foster protection of the aquatic environment and the maintenance of biodiversity while making a significant contribution to the safety of fishing operations.

— Aquaculture: Article 9 contains provisions on aquaculture development (which includes both aquaculture and culture based fisheries).[7] The Code urges States to establish a framework for promoting responsible aquaculture development, including initiating regular oversight and review to ensure minimal adverse impacts and ecological change. States should implement international codes of practice to ensure genetic diversity of the farm stocks and prevent introduction of non-native species.

— Coastal Area Management: The Integration of Fisheries into Coastal Management, covered in Article 10, contains provisions relating to the institutional framework, policy measures, regional cooperation and implementation. The Code calls for the promotion of the precautionary approach for coastal area management and stresses the need to consider the fragility of coastal ecosystems, consult those involved in the use of resources, value coastal resources, plus the need for the exchange of information.

— Post-Harvest Practices and Trade: Article 11 deals with post-harvest practices and trade and has provisions dealing with responsible use of fish including measures to protect consumer health, responsible international trade and laws and regulations relating to fish trade.

— Fisheries Research: Article 12 deals with fisheries research. It stresses the importance to responsible fisheries of the availability of a sound scientific basis to decisions concerning fisheries management.

In March 2005, FAO adopted guidelines for the eco-labeling of fish and fishery products including the need for reliable, independent auditing, transparency of standard-setting and accountability, and the need for standards to be based on good science.

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7. Fisheries are concerned with fish or shellfish, mainly catching, processing, and selling fish. Aquaculture, however, does not pertain only to cultivating and harvesting fish. Aquaculture is a science that involves all aspects of marine life, thus aquatic animals and plants. Commercially, aquaculture may also be called "fish farming which involves the natural or controlled cultivation of shellfish, fish, and seaweed in freshwater and marine environments. Methods include aquaponics and integrated multi-trophic aquaculture. Farming implies intervention in the rearing process to enhance production, plus individual or corporate ownership of the stock. For details, see: Difference Between Aquaculture and Fisheries | Difference Between. URL: http://www.differencebetween.net/miscellaneous/difference-between-aquaculture-and-fisheries/ - ixzz4ppsmiWdM. Accessed December 8, 2017.

However, measures to control over-fishing and curb destructive fishing practices are increasingly hampered by the widespread incidence of illegal, unreported, and unregulated fishing.

▶ **Trade Agreements Impacting Fisheries**

• **Main WTO Agreements with Special Significance to Fish Trade:**

— Agreement on Sanitary and Phytosanitary Measures;

— Agreement on Technical Barriers to Trade;

— Agreement on Subsidies and Countervailing Measures;

— Agreement on Import Licensing Procedures;

— Anti-Dumping Agreement;

— Agreement on Rules of Origin;

— Agreement on Safeguards.

Negotiations facilitated by the GATT (General Agreement on Tariffs and Trade) succeeded in reducing average tariffs for fish trade by 25%. After the Uruguay Round, the average tariff on fish produce was 4.5% for developed countries and below 20% for developing countries. These initial reductions, however, were balanced by pervasive tariff peaks and tariff escalation that are predominantly applied to processed or value-added fish products in key import markets.

Globally, only 3% of fish imports are subject to peaks greater than 15%. The average tariffs for industrialized countries are lower than those of developing countries by approximately 6.2% for raw fish foods, 8.6% for intermediate seafood products, and 10.2% for processed seafood. While tariffs on fish and fishery products are generally higher in developing countries, tariff structures vary significantly between countries. Average tariffs for developing countries are 19.4% for raw foods, 22% for intermediate products and 23.8% for processed food.

But the main obstacles to fish products trade are now non-tariff barriers. Major importing regions and countries have set stringent standards and regulations to cover trade in endangered species, labeling of origin, traceability, chain of custody, and zero tolerance for certain veterinary drug residues. Certain importers, such as the EU, are increasing the number of notifications of standards and technical regulations to the WTO. In 2003, the EU made 545 notifications for fish, crustaceans and molluscs compared to 480 in 2002 and 232 in 2001. These notifications accounted for almost one third of all the EU food notifications. The use of non-tariff barriers is a major subject of negotiations in the WTO Doha Round.

• **Technical Barriers to Trade** are a major issue now as seen in the following three examples:

— <u>Sanitary and Phytosanitary Measures:</u> These cover food safety, animal and plant health measures. They also involve inspection, examination and certification procedures.

— <u>Certification and Labeling</u>: "Eco-labeled products, though not yet prominent in any market, may become increasingly important as consumers refer to these standards in response to increasing environmental awareness.[8] There is also the risk that eco-labels may impose unjustifiable barriers to trade since the organization and management of eco-labels are likely to be discriminatory in nature. However, there is currently a lack of internationally agreed guidelines on product labeling and certification, choice of information and transparency of process. The relationship between WTO rules and voluntary labeling schemes, including organic and 'fair trade' labeling, needs to be clarified."[9]

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8. ROHEIM Cathy A. and SUTINEN Jon G., *Trade and Marketplace Measures to Promote Sustainable Fishing Practices,* ICTSD Natural Resources/The High Seas Taskforce, ICTSD Series Issue Paper No. 3, 2006, Geneva/Paris.
9. AHMED Mahfuz, *op. cit.*

— Traceability (or 'product tracing') and country of origin labeling.

Moreover, the Doha Agenda underlines the importance of providing technical assistance and capacity-building to developing countries to adjust to WTO rules.

◗ **Other International Agreements with Impacts on Fishing**

● **Johannesburg**

The 2002 Johannesburg Declaration initiated a Plan for implementation of the World Summit on Sustainable Development. According to the latter the achievement of sustainable fisheries requires that stocks be maintained at levels or restored to levels that can produce the maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible no later than 2015. The EU Member States signed up to limit fishing to sustainable levels by maintaining or restoring stocks with levels that can produce the maximum sustainable yield. The agreement reached at the Summit also committed Signatories to strong action against illegal, unreported and unregulated fishing which is a priority for the Union and the subject of an EU Action Plan."[10]

According to ecological concepts, maximum sustainable yield (MSY) is theoretically the largest yield/catch that can be taken from a species' stock over an indefinite period. MSY is extensively used for fisheries management, where it depends largely on the life history of the species and the age-specific selectivity of the fishing method.

Fishing at MSY levels means catching the maximum proportion of a fish stock that can safely be removed from the stock while maintaining its capacity to produce maximum sustainable returns in the long term.

Errors in estimating the population dynamics of a species can lead to setting the maximum sustainable yield too high (or too low), as was the case for New Zealand orange roughy fishery.

● **Bilateral Agreements**

Fishing agreements (FAs) and Fisheries Partnership Agreements (FPAs) are arrangements between two governments or between a government and private sector companies or associations in order to gain access to fishing rights within the Exclusive Economic Zone (EEZ) of a particular country.

There are a number of different types of fishing agreements:

— fishing agreements with regional economic organizations (EU fishing agreements and fisheries partnership agreements with ACP countries; *i.e.,* the African, Caribbean and Pacific Group of States);

— individual government to government fishing agreements, including agreements between governments within a region (Mauritius and Seychelles; Senegal and Mauritania);

— agreements between governments and private companies (private agreements with Mauritania and the Irish fishing company; Madagascar's agreements with Spanish fishing associations; Seychelles agreements with Japanese fishing associations);

— agreements between governments and public sector/parastatal/public-private partnerships, for example some of the historical agreements between Mauritania and foreign state-owned companies. Some of the agreements with PR China may also fall into this category.

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10. "Questions and Answers on Maximum Sustainable Yield (MSY)", Memo/06/268, 5 July 2006, Brussels. URL : http://europa.eu/rapid/press-release_MEMO-06-268_en.pdf. Accessed December 8, 2017.

The first FPA was signed in 2005, and the main differences between FPAs and FAs relate to the way the financial contribution is calculated and the change from targeted actions to support for defining and implementing a sectorial fisheries policy. FPAs are an attempt to move beyond purely commercial agreements and contribute more effectively to sustainable fisheries management.

In the international context, it is important to consider access to both the international waters and the way in which this is regulated, and the access of European fleets and operations to other than EU-waters, as for example under the Fisheries Agreements. The EU currently has fishing agreements with 17 developing countries (Cape Verde, the Comoros, the Ivory Coast, Gabon, Guinea, Guinea-Bissau, Kiribati, Madagascar, Mauritania, Mauritius, the Federated States of Micronesia, Morocco [started 2006], Mozambique, São Tomé and Príncipe, Senegal, the Seychelles and the Solomon Islands) which are intended to give the EU rights to the "surplus" marine resources of these countries in return for financial compensation (ranging from around €400,000 to €86,000,000 per country per year). Over the past five years the annual compensation payments made through fisheries agreements have averaged €150 million.

The EU's first fisheries agreement was with Senegal in 1979. The number of agreements rose sharply in the 1980s (Figure 2), following the ratification of UNCLOS and the accession of Spain and Portugal to the EU in 1986. These two countries brought with them several bilateral agreements with other countries, particularly in West Africa. The number of agreements peaked in the early 1990s, but then started to decline as several agreements were cancelled or not renewed in the 1990s (*e.g.,* Mozambique, Tanzania, Gambia, Morocco). In recent years, despite the loss of previously important agreements in Senegal and Angola, the number of agreements has increased, due mainly to the new agreements being signed in the Pacific.

In January 2007, 84% of agreements (16 out of 19) were with developing countries.

FIGURE 2. NUMBER OF EU FISHERIES AGREEMENTS WITH DEVELOPING COUNTRIES OVER TIME

Evolution of the number of EU access agreements

Source: European Commission.
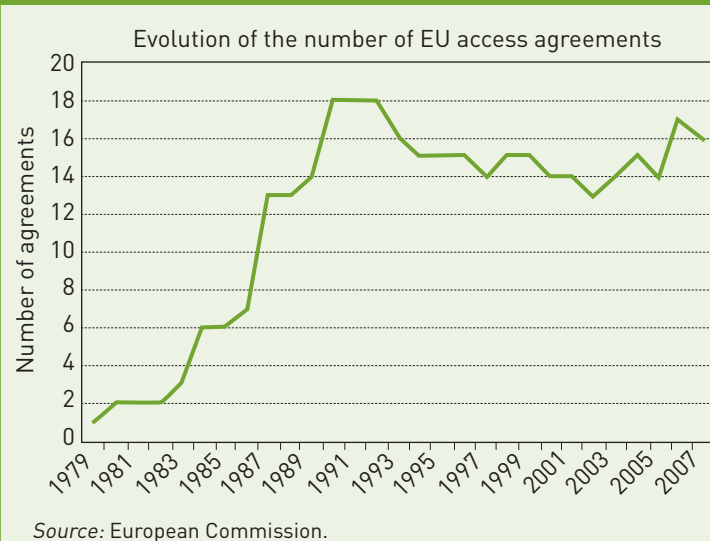
• **Kyoto**

Under the United Nations Framework Convention on Climate Change and its 1997 Kyoto Protocol, which took effect on 16 February 2005, more than 30 industrialized countries are bound by concrete and legally binding emission reduction targets (an 8% reduction compared to 1990 for EU Member States) during the period 2008-2012. The future of Kyoto, after 2012, agreement is under discussion, but the EU decided unilaterally to reduce greenhouse gas emission by 20% from now to 2020. The ocean is a natural carbon sink but it is thought to reach the emission target also by capturing and storing CO_2 in deep sea saline aquifers. Furthermore, oceans are also a source of renewable (and non-renewable like methane hydrates) energy: marine energies include wave, off shore wind, currents and tides.... and microalgae (that could substitute for oil use). The climate change mitigation could thus lead to a more intensive use of oceans.

◗ **Specific Trends Affecting International Agreements about Fishery**

Automatic ship identification systems: As the result of an initiative by the International Maritime Organization an international consultation aimed at establishing a worldwide automatic ship identification system is underway.

Viewed schematically, the automatic ship identification system would use a ship's own navigation and communications systems to calculate and transmit the ship's position to local authorities. Despite its origin in the world of maritime safety, there is a consensus that such a system, when operational, could be used for other purposes, such as vessel monitoring for customs or fisheries protection purposes. One could envisage that such a system could provide invaluable data on the international movements of vessels, particularly those that, because of their questionable activities, would tend to avoid fisheries which required Vessel Monitoring System compliance.[11]

Vessels in this category would be those registered under flags of convenience to avoid regulation by responsible flag states. In this respect, an automatic ship identification system would be a valuable tool. Other vessels whose movements would attract the attention of authorities and whose activities could be tracked, at least partially, by automatic ship identification systems, would be those engaging in now illegal activities such as drift net fishing.

Unfortunately, to date, agreement is still required on the necessary approach, technology or standards to implement automatic ship identification services. When these issues are resolved, perhaps the basis will exist for some cooperation, or even homogenization, of Vessel Monitoring System and automatic ship identification, but it is too early to make such an assertion.[12]

Hypotheses for the Future (2020)

Considering the previous international agreements analyzed above, the main uncertainties for the future come from trade agreements and multilateral or bilateral agreements to access fishing grounds.

◗ **Hypothesis 1: New Protectionism from Both Sides**

Doha negotiations cycle failure, leading to a major growth of non-tariff barriers in international fish trading.

Media and political groups spread suspicion about "foreign" products: using a true problem, they employ this issue to build an efficient new form of protectionism, using quality and sanitary protection. Mainly sanitary and phytosanitary measures: zero tolerance for bacteria, antibiotics...

Decrease in bilateral agreements for both trade and access to fishing grounds.

◗ **Hypothesis 2: Free Trade in Fishing**

Doha negotiation cycle finally succeeds in 2010.

Reduced Non-Tariffs barriers in fishing trade on the basis of a Most-Favoured Nation (MFN) clause (WTO).

Increasing inter-regional agreements to access fishing grounds, using financial compensation tools — ex: EU with Economic Community of West African States (ECOWAS), NAFTA with Mercosur.

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11. On VMS, see: https://ec.europa.eu/fisheries/cfp/control/technologies/vms_en. Accessed December 8, 2017.

12. *FAO Technical Guidelines for Responsible Fisheries,* Rome: FAO, 1998. URL: http://www.fao.org/docrep/003/w9633e/w9633e00.htm. Accessed December 8, 2017.

◗ **Hypothesis 3: Johannesburg ++ /Automatic Ship Identification Systems**

General political agreement about data sharing in ship identification and navigation is signed on a multilateral basis.

All bilateral agreements signed by EU to access fishing grounds abroad thus include sharing satellite data among countries and true capacity building support (boats or financial helps) to enforce the maximum sustainable catches decided. Increase of bilateral agreements.

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