AUTONOMOUS SHIPS OR UNMANNED SHIPS: HOW THE FUTURE SHIP WILL INTERACT WITH HUMANS?

OceansTrends

29-30 August 2018 - Malmö, Sweden

VILLENEAU ROHART SIMON

AUTONOMOUS/UNMANNED SHIPS:

NO CREW ON BOARD

IS THERE A DIFFERENCE BETWEEN UNMANNED AND AUTONOMOUS?

UNMANNED SHIP : A SHIP WITHOUT A CREW CONTROLLING THE SHIP.
THE SHIP MAY BE REMOTE CONTROLLED FROM THE SHORE.

AUTONOMOUS SHIP : A SHIP ABLE TO RELY SUFFICIENTLY ON ARTIFICIAL INTELLIGENCE TO SAIL ON HER OWN. THE REMOTE CONTROL FROM THE SHORE IS MINIMAL (NOT TO SAY NON-EXISTENT).

DIFFERENT LEVELS OF AUTONOMY.
MANY CLASSIFICATIONS PROPOSED, E.G. :

- SHERIDAN AND VERPLANK (1978) LEVELS OF DECISION MAKING AUTOMATION (ROLLS ROYCE'S AAWA POSITION PAPER BASED ON IT);

- LLOYD'S REGISTER CODE FOR UNMANNED MARITIME SYSTEMS;

- MUNIN (MARITIME UNMANNED NAVIGATION THROUGH INTELLIGENCE IN NETWORKS);

- SARUMS (SAFETY AND REGULATIONS FOR EUROPEAN UNMANNED SYSTEMS;

Guidelines for Autonomous Shipping

December 2017

Guidance Note
NI 641 DT R00 E

Table 16 : Level of autonomy

Level of autonomy		Definition	Acquisition	Analysis	Decision	Action
0	Human operated	Human makes all decisions and controls all functions	System Human	Human	Human	Human
1	Human directed	System suggests actions Human makes decisions and actions	System	System Human	Human	Human
2	Human delegated	System invokes functions Human can reject decisions during a certain time	System	System	System Human	Human
3	Human supervised	System invokes functions without waiting for human reaction	System	System	System	System Human
4	Fully autonomous	System invokes functions without informing the human, except in case of emergency	System	System	System	System

IN CLASSIFICATIONS, THE ULTIMATE AUTONOMOUS LEVEL IMPLIES THAT THE HUMAN INTERVENTION OR SUPERVISION IS NOT NECESSARY BUT WILL BE ABLE TO IN CASE OF AN EMERGENCY : THE AUTONOMOUS SYSTEM DOES NOT NEED TO BE CONTINUOUSLY SUPERVISED BY A HUMAN.

SELECTED ISSUES:

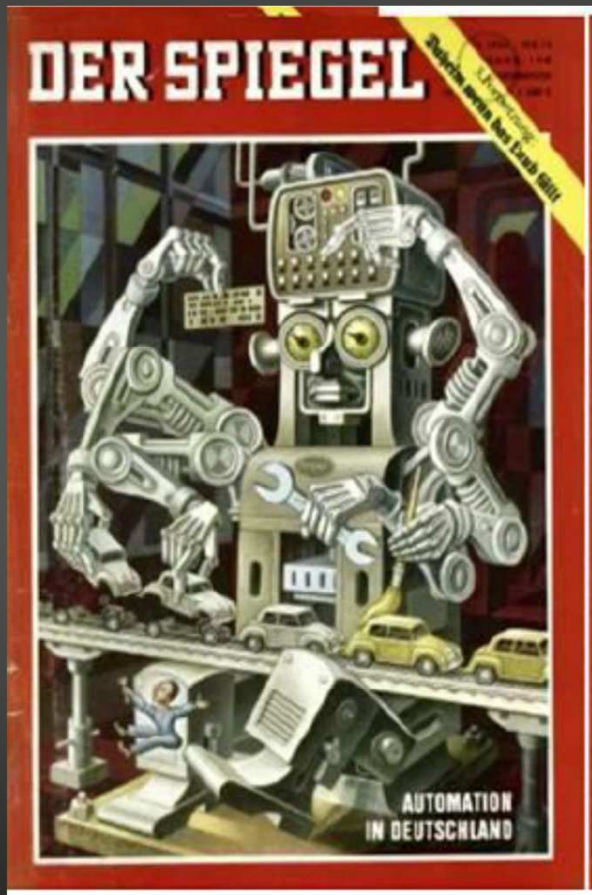
I/ IMPACT ON SEAFARERS

II/ IMPACT ON OTHER PEOPLE (PASSENGERS AND PEOPLE IN DISTRESS)

III/ IMPACT ON LIABILITY : HOW TO TREAT IT WHEN THERE IS NO HUMAN INTERACTION?

I. SEAFARERS

IS AI REPLACING HUMANS ON BOARD?



1964

1978

2017

NOT YET!!

"Autonomous vessels will still need human input from land, making connectivity between the ship and the crew crucial."

Rolls-Royce

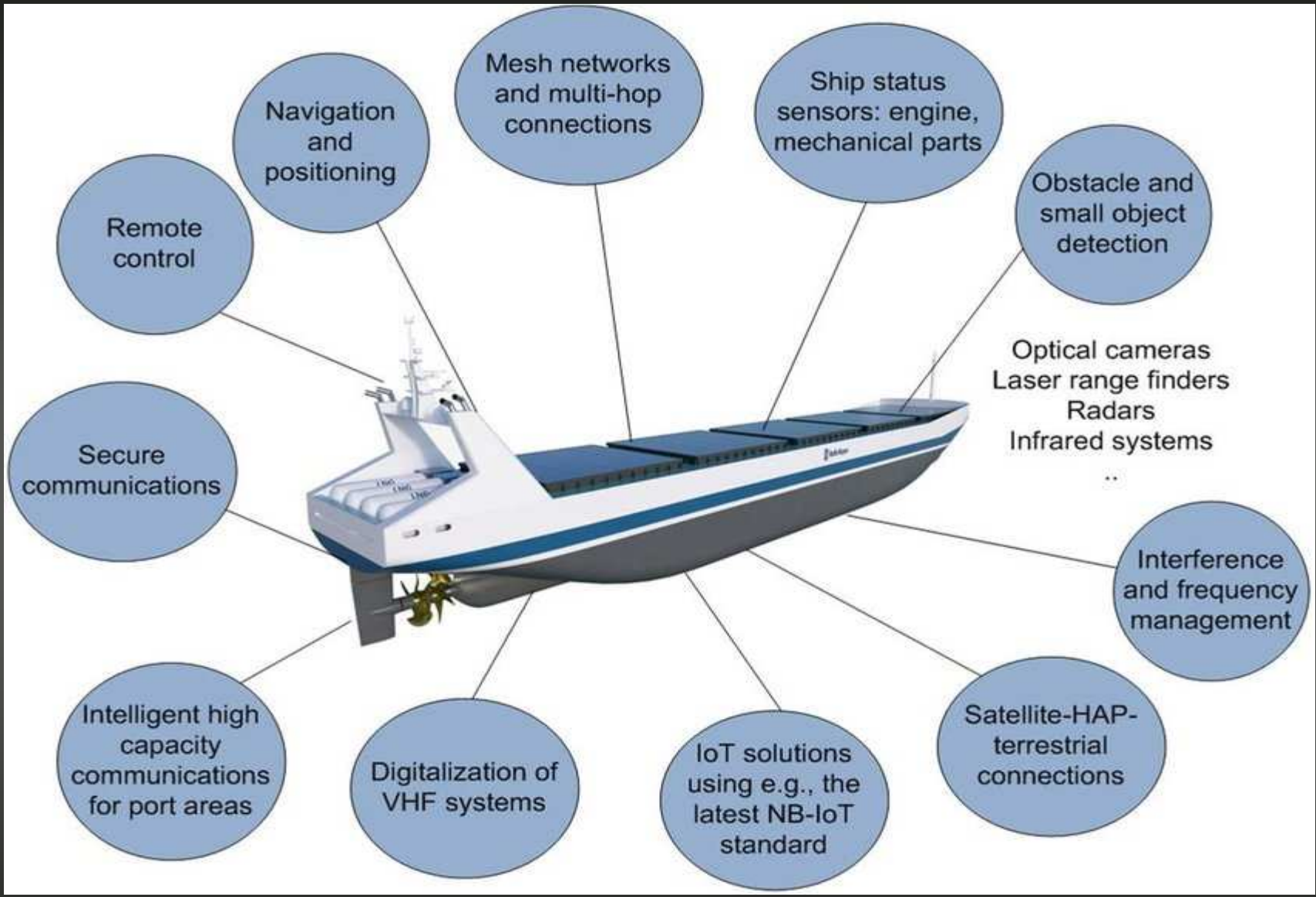
"AUTONOMOUS SHIPS THE NEXT STEP"

THE DEVELOPMENT OF UNMANNED/AUTONOMOUS SHIPS RELIES ON 3 FACTORS:

1. EXPONENTIAL GROWTH OF COMPUTING POWER.

2. MORE AND MORE DATA GATHERED BY SENSORS.

3. ALGORITHMS: ADVANCED MACHINE LEARNING, DEEP LEARNING.



« CONNECTIVITY FOR AUTONOMOUS SHIPS: ARCHITECTURE, USE CASES, AND RESEARCH CHALLENGES » WWW.REASEARCH GATE.NET/PUBLICATION/319900769

AUTOMATION ON SHIPS IMPLIES THAT THE JOB OF A SEAFARER WILL CHANGE RADICALLY.

- **SHORE CONTROL CENTRES (SCC) WILL EMERGE.**

- **NEW JOBS WILL BE NEEDED : SHIPS' REMOTE CONTROLLERS OPERATING FROM THE SCC, "TECH JOBS".**

THE CURRENT REGULATION WILL HAVE TO BE AMENDED:

MARITIME LABOUR CONVENTION 2006 (IMPLEMENTED IN THE EU BY DIRECTIVE 2013/54):

"*Seafarer means any person who is employed or engaged or works in any capacity on board a ship to which this convention applies*"

ARTICLE 2(F)

STCW CONVENTION.

"The convention shall apply to seafarers serving on board sea-going ships entitled to fly the flag of a party"

(ARTICLE 3)

NOT ONLY THE INTERNATIONAL REGULATION BUT ALSO THE NATIONAL ONES.

SEE E.G. "*REPLIES OF FRENCH MARITIME LAW ASSOCIATION TO THE CMI QUESTIONNAIRE ON UNMANNED SHIPS*"

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LEGISLATION WILL HAVE TO LOOK AT WHETHER A SHORE EMPLOYEE IS A SEAFARER.

THE SEAFARER JOB AS WE KNOW IT IS LIKELY TO DISAPPEAR WITH THE RISE OF AUTONOMOUS/UNMANNED SHIPS.

THE REAL CHALLENGE IS ABOUT HAVING SEAFARERS OR APPLICANTS IN THE SHIPPING INDUSTRY ABLE TO EMBRACE THIS CHANGE.

THIS IS A SOCIO-ECONOMIC CONSIDERATION RATHER THAN A LEGAL ISSUE.

« The most obvious implication of our analysis is the need for increased investment in education and skills to help people adapt to technological change throughout their careers… Governments, business, trade unions and other organisations … all need to play their part here in helping people to adapt to these new technologies. »

AN INTERNATIONAL ANALYSIS OF THE POTENTIAL LONG TERM IMPACT OF AUTOMATION
PWC UK, FEBRUARY 2018

EU HAS A ROLE TO PLAY.

EUROPEAN PARLIAMENT RESOLUTION OF 16TH FEBRUARY 2017 WITH RECOMMENDATIONS TO THE COMMISSION ON CIVIL LAW RULES ON ROBOTICS.

24. Underlines that autonomous transport covers all forms of remotely piloted, automated, connected and autonomous ways of road, rail, waterborne and air transport, including vehicles, trains, vessels, ferries, aircrafts, drones, as well as all future forms of developments and innovations in this sector;

27. Takes the view that the switch to autonomous vehicles will have an impact on the following aspects: civil responsibility (liability and insurance), road safety, all topics related to environment (e.g. energy efficiency, use of renewable technologies and energy sources), issues related to data (e.g. access to data, protection of data, privacy and sharing of data), issues related to ICT infrastructure (e.g. high density of efficient and reliable communication) and employment (e.g. creation and losses of jobs, training of heavy goods vehicles drivers for the use of automated vehicles); emphasises that substantial investments in roads, energy and ICT infrastructure will be required; calls on the Commission to consider the above-mentioned aspects in its work on autonomous vehicles;

Education and employment

41. Draws attention to the Commission's forecast that by 2020 Europe might be facing a shortage of up to 825 000 ICT professionals and that 90 % of jobs will require at least basic digital skills; welcomes the Commission's initiative of proposing a roadmap for the possible use and revision of a Digital Competence framework and descriptors of Digital Competences for all levels of learners, and calls upon the Commission to provide significant support for the development of digital abilities in all age groups and irrespective of employment status, as a first step towards better aligning labour market shortages and demand; stresses that the growth in the robotics requires Member States to develop more flexible training and education systems so as to ensure that skill strategies match the needs of the robot economy;

EUROPEAN GROUP ON ETHICS IN SCIENCE AND NEW TECHNOLOGIES, STATEMENT OF 9 MARCH 2018 ON ARTIFICIAL INTELLIGENCE, ROBOTICS AND AUTONOMOUS SYSTEMS

ETHICAL PRINCIPLES AND DEMOCRATIC PREREQUISITES:

“D) Justice, equity and solidarity”

“We need a concerted global effort towards equal access to ‘autonomous’ technologies and fair distribution of benefits and equal opportunities across and within societies. This includes the formulating of new models of fair distribution and benefit sharing apt to respond to the economic transformations caused by automation, digitalisation and AI, ensuring accessibility to core AI technologies, and facilitating training in STEM and digital disciplines, particularly with Respect to disadvantaged regions and societal groups.”

II. OTHER KINDS OF HUMAN PRESENCE ON BOARD OF UNMANNED/AUTONOMOUS SHIPS

NO SEAFARERS DOES NOT MEAN NO HUMANS AT ALL:

- **PASSENGERS**
- **PEOPLE IN DISTRESS AT SEA**

A PASSENGER REMAINS A PASSENGER UNDER THE EXISTING REGULATIONS:

- **REGULATION (EU) NO 1177/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF 24 NOVEMBER 2010 CONCERNING THE RIGHTS OF PASSENGERS WHEN TRAVELLING BY SEA AND INLAND WATERWAY.**

- **REGULATION (EC) NO 392/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF 23 APRIL 2009 ON THE LIABILITY OF CARRIERS OF PASSENGERS BY SEA IN THE EVENT OF ACCIDENTS**

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NO SPECIFIC HURDLE IN THESE TEXTS REGARDING AUTONOMOUS/UNMANNED SHIPS.

THE CARRIER IS LIABLE WHETHER THE SHIP IS UNMANNED/AUTONOMOUS OR NOT.

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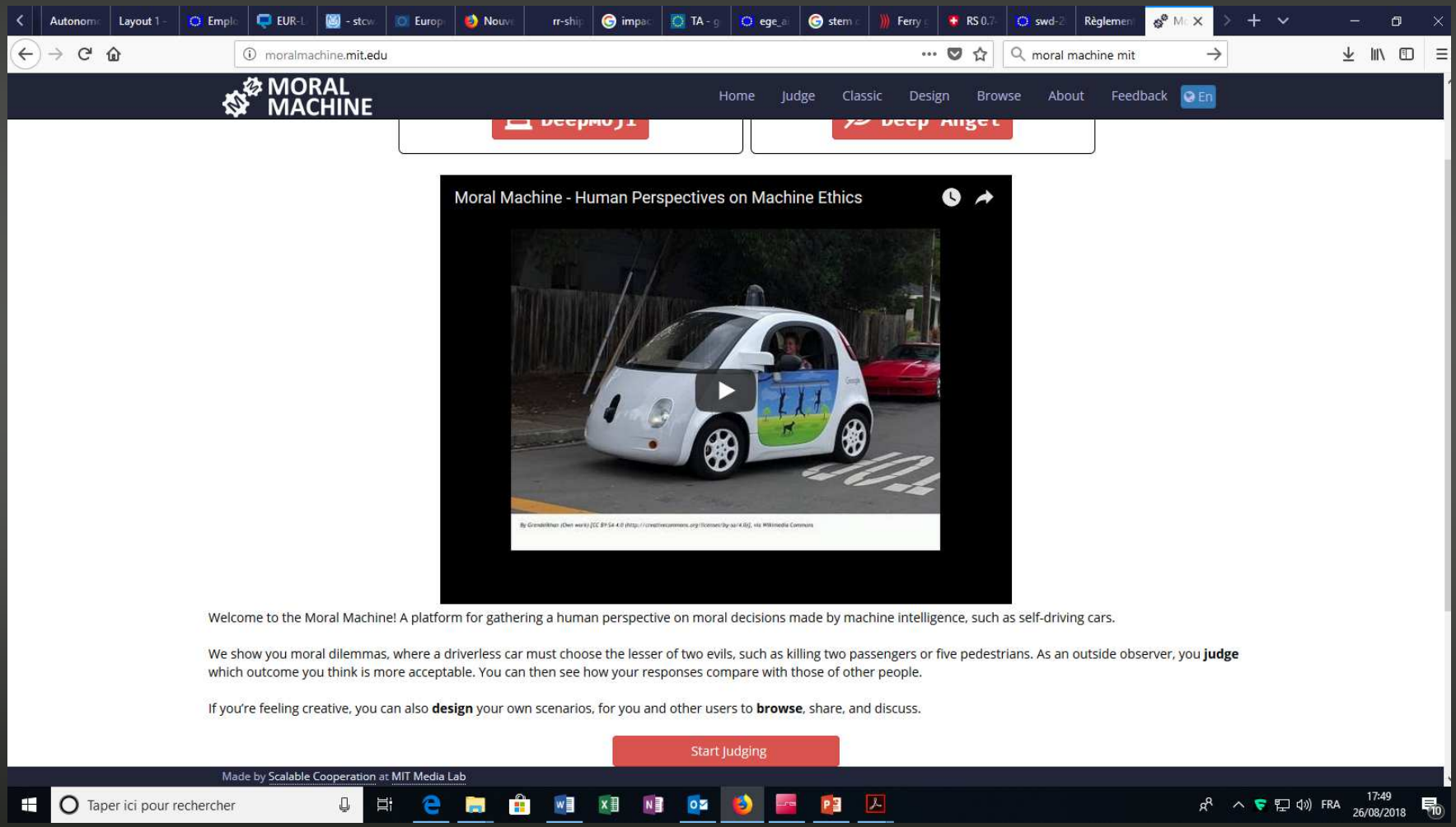
SOCIAL ACCEPTANCE ISSUE?

WILL PASSENGERS ACCEPT TO GET ON BOARD OF UNMANNED/AUTONOMOUS SHIPS?

WWW.MORALMACHINE.MIT.EDU



PEOPLE IN DISTRESS AT SEA.

MUST AN UNMANNED/AUTONOMOUS SHIP BE DESIGNED TO BE ABLE TO WELCOME PEOPLE IN DISTRESS AT SEA?

ARE UNMANNED/AUTONOMOUS SHIPS RELEASED FROM ANY ASSISTANCE DUTY JUST BECAUSE THEY ARE DESIGNED NOT TO HAVE ANYONE ON BOARD?

SEE CMI POSITION PAPER AND RULE 33 OF SOLA CHAPTER V.

III/ THE LIABILITY ISSUE.

HOW UNMANNED/AUTONOMOUS VESSELS WILL COPE WITH CONGESTED WATERS?

JUST LIKE OTHER UNMANNED/AUTONOMOUS VEHICLES, UNMANNED/AUTONOMOUS SHIPS MAY BE INVOLVED IN ACCIDENTS.

HOW DO YOU ADDRESS THE LIABILITY ISSUE?

UNMANNED/AUTONOMOUS SHIPS RELY ON AI.

AI RELIES ON ALGORITHMS.

ALGORITHMS ARE RECIPES: THEY ARE BASED ON A LANGUAGE (E.G. PYTHON)

```
In [8]: age = 14
        if age >= 18:
            print 'Adult'
        else:
            if age >= 13:
                print 'Teenager'
            else:
                print 'Child'

        Teenager
```

Being a Programmer

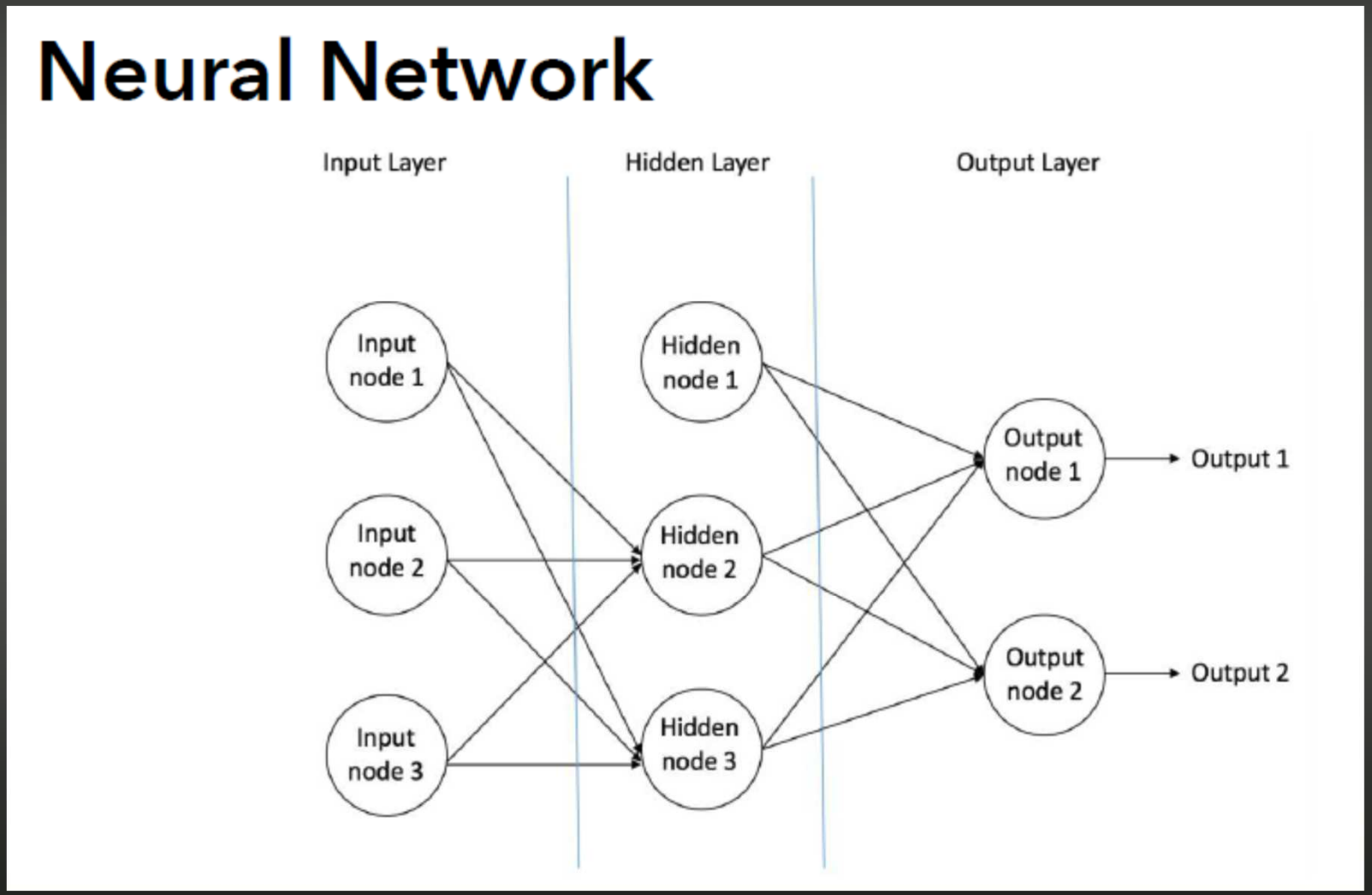
Mom said: "Please go to the shop and buy 1 bottle of milk. If they have eggs, bring 6"

I came back with 6 bottle of milk.

She said: "Why the hell did you buy 6 bottles of milk?"

I said: "BECAUSE THEY HAD EGGS"

“DEEP LEARNING” IS THE MAIN FIELD OF AI AND RELIES ON NEURAL NETWORKS:



WHO IS AT FAULT IF YOU CANNOT EXPLAIN HOW IT HAPPENED?

WHO PAYS WHEN AN AUTONOMOUS SYSTEM CAUSES A COLLISION? THE USER? THE PRODUCER?

EUROPEAN
COMMISSION

Brussels, 25.4.2018
SWD(2018) 137 final

COMMISSION STAFF WORKING DOCUMENT

Liability for emerging digital technologies

Accompanying the document

Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions

Artificial intelligence for Europe

{COM(2018) 237 final}

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THANK YOU

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