Engenharia Naval e Oceânica

Prof. Dr. Gustavo R. S. Assi

DEPTO. DE ENGENHARIA NAVAL E OCEÂNICA – ESCOLA POLITÉCNICA DA USP

Recepção dos novos alunos POLI-USP

Engenharia Naval

13/04/2021

NAVAL 1º Semestre

Grupo do WhatsApp

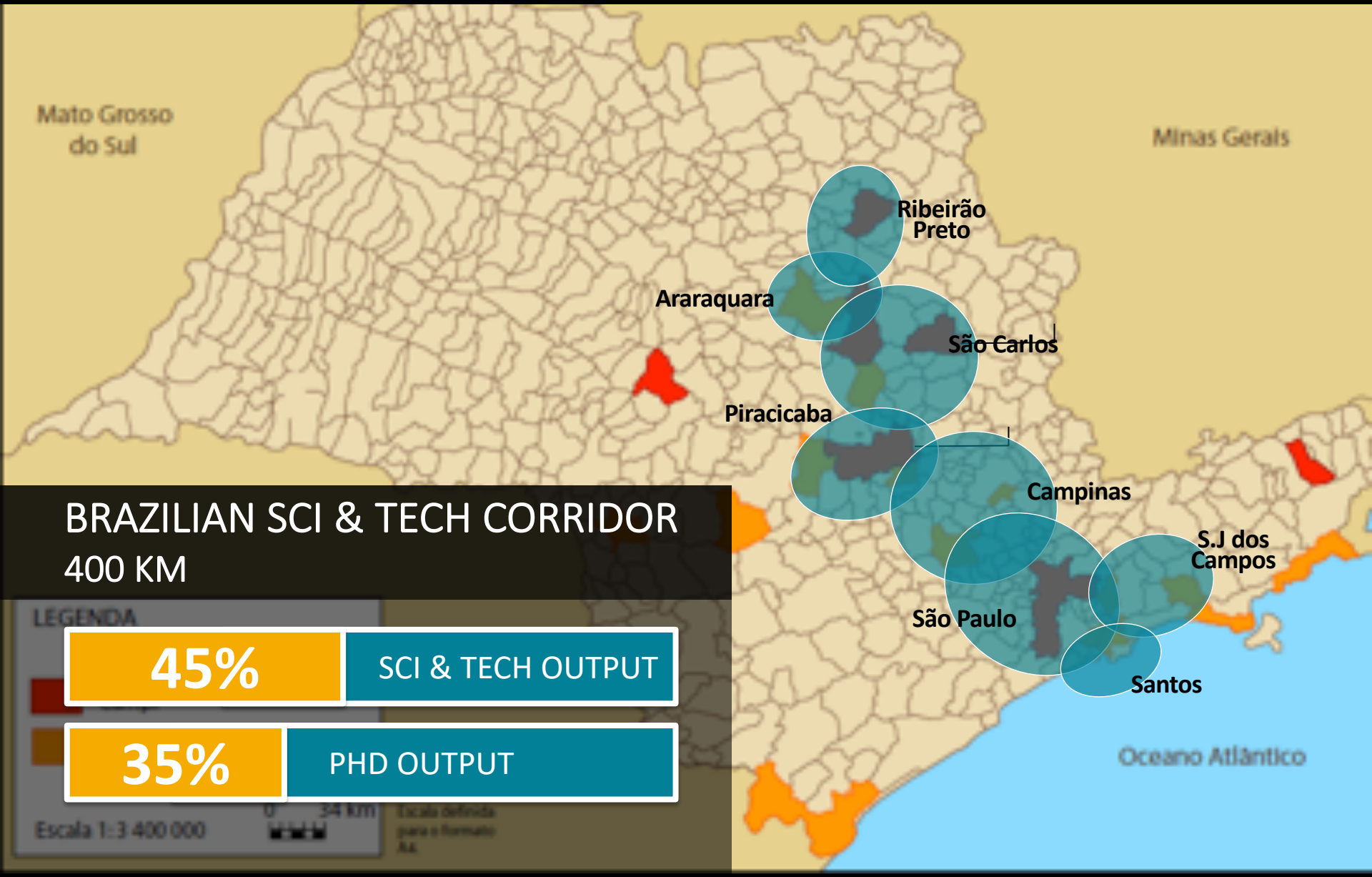
Escaneie ou carregue esse código QR usando a câmera do WhatsApp para entrar neste grupo

USP

UNIVERSIDADE DE SÃO PAULO
BRAZIL

STATE OF SÃO PAULO

Total area	248,222 km^2 2,9% of Brazil, slightly larger than UK
Population	45 million 22% of Brazil, larger than Argentina
GDP	2,0 trillion BRL 34% of Brazil 20th world economy



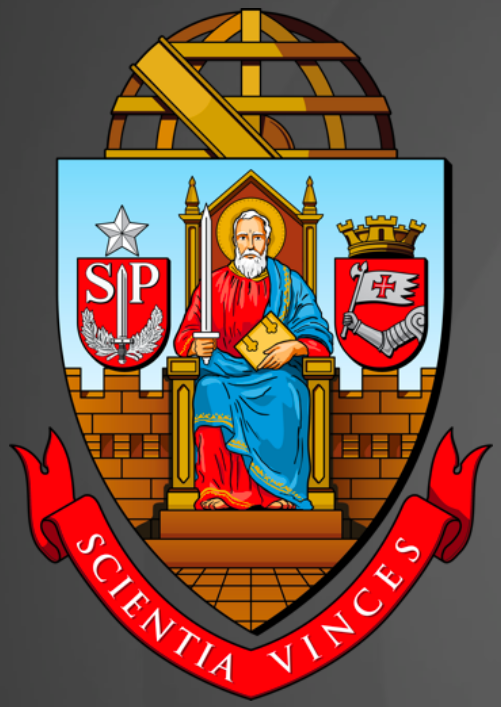
BRAZILIAN SCI & TECH CORRIDOR

400 KM

45%	SCI & TECH OUTPUT
35%	PHD OUTPUT

1934
USP – UNIVERSIDADE DE SÃO PAULO

1960
USP – Capital Campus



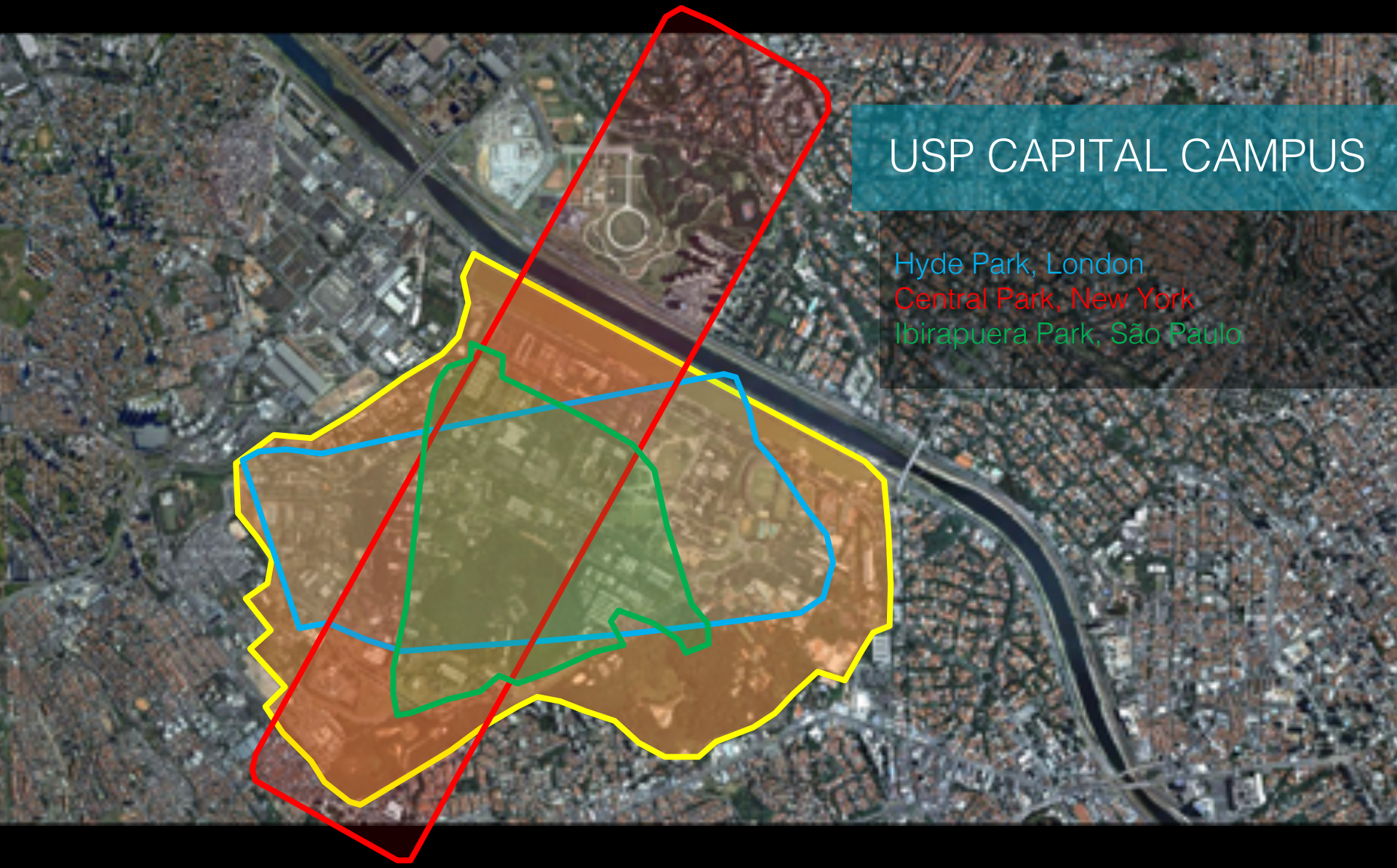
117,100 PEOPLE

58,800	37,500	5,900	14,900
UNDERGRADS	POSTGRADS	FACULTY	STAFF

23% OF BRAZILIAN SCIENTIFIC PAPERS

ANNUAL BUDGET: 1,2 BILLION USD

UNIVERSITY OF SÃO PAULO
BRAZIL

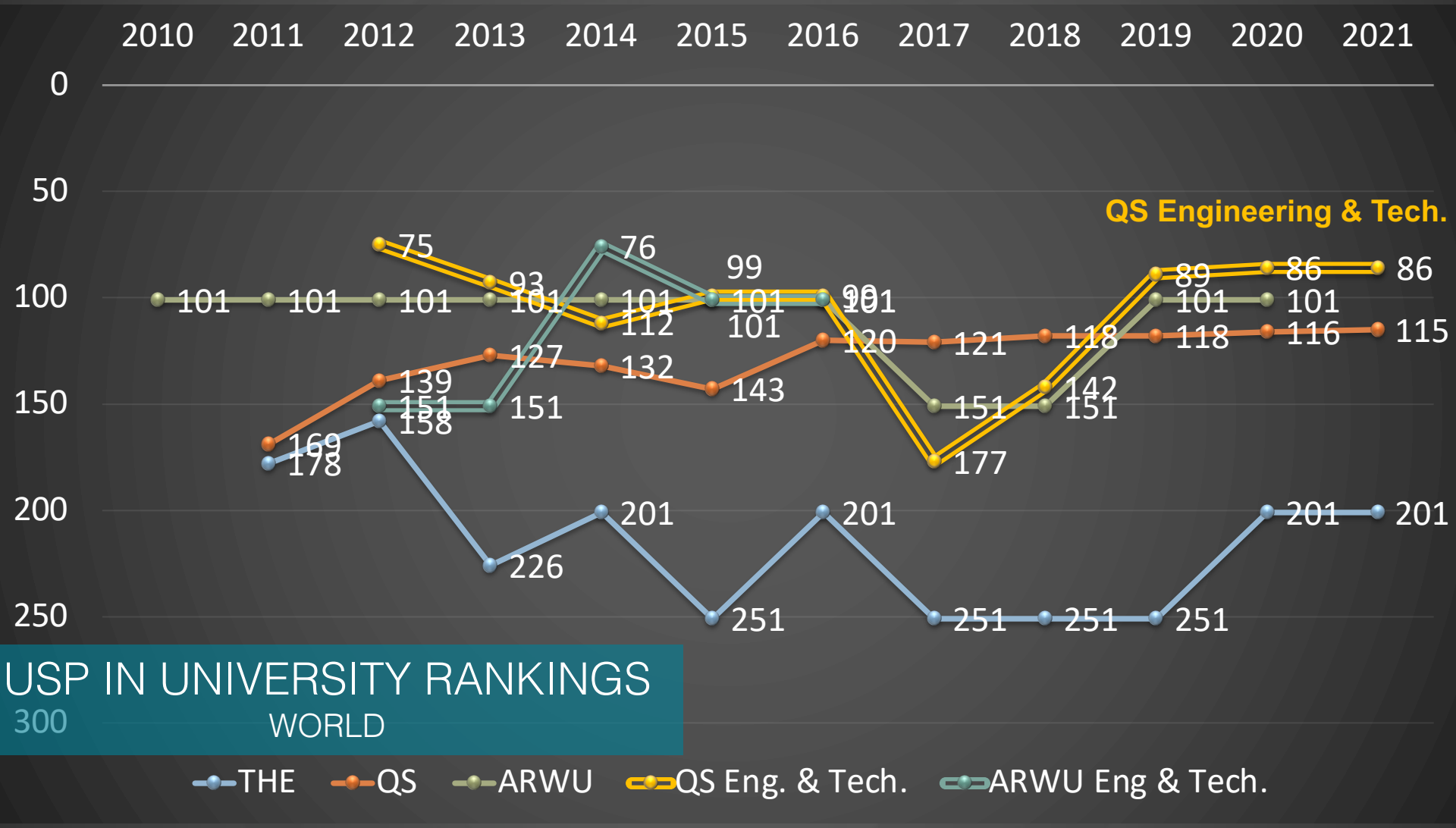

USP CAPITAL CAMPUS
Hyde Park, London
Central Park, New York
Ibirapuera Park, São Paulo

USP CAPITAL CAMPUS
Hyde Park, London
Central Park, New York
Ibirapuera Park, São Paulo

MAC

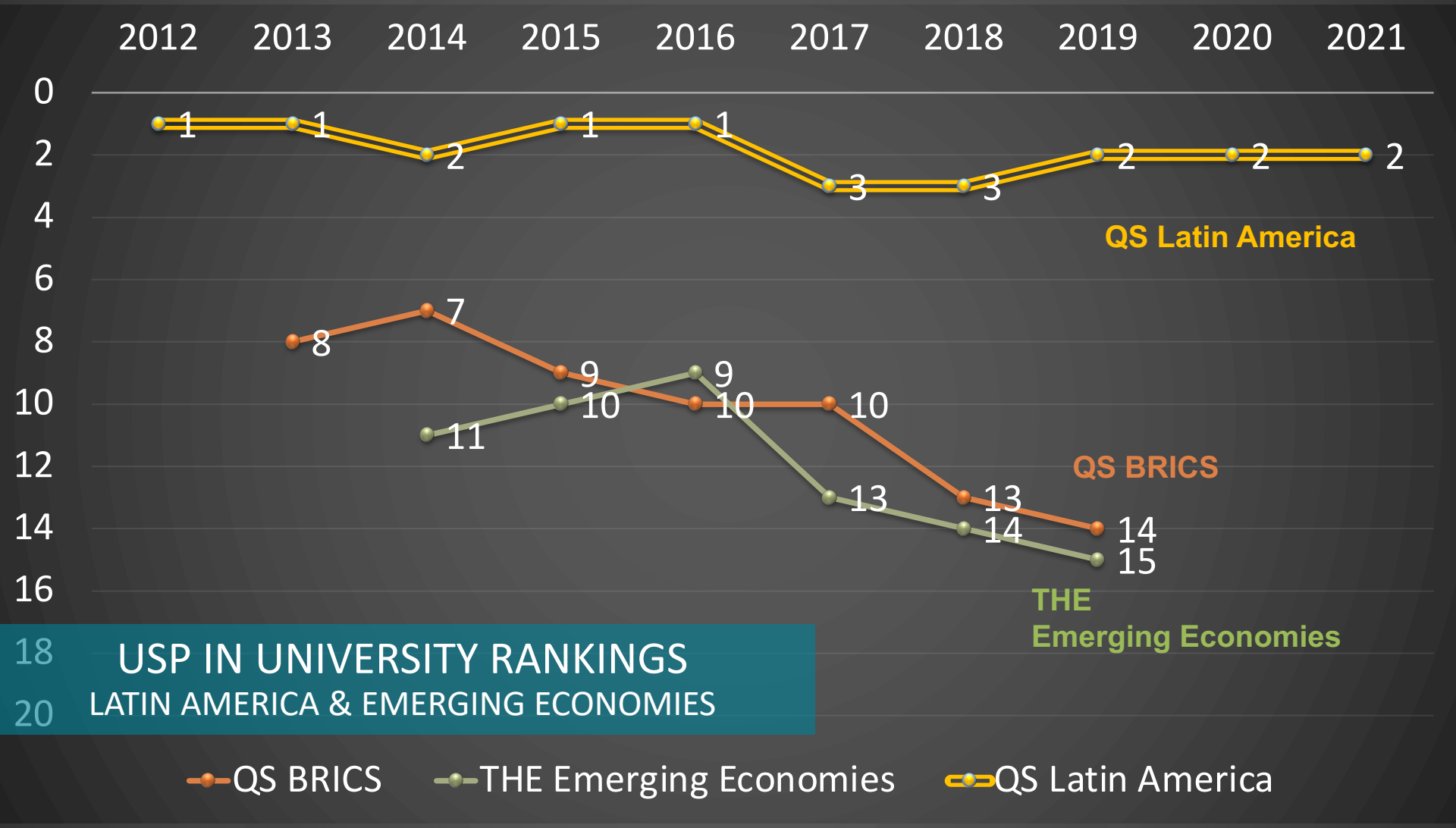
CULTURA

MAC
USP
UNIVERSIDADE DE SÃO PAULO
BRAZIL



USP IN UNIVERSITY RANKINGS

WORLD


2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
0
2
4
6
8
10
12
14
16
18
20
QS Latin America
QS BRICS
THE
Emerging Economies
USP IN UNIVERSITY RANKINGS
LATIN AMERICA & EMERGING ECONOMIES
QS BRICS
THE Emerging Economies
QS Latin America

USP – Capital Campus
Cidade Universitária Armando de Salles Oliveira

UNIVERSIDADE DE SÃO PAULO
BRAZIL

NAVAL 1º Semestre

Grupo do WhatsApp

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A bit of our history...

Founded in 1893

1894
Marquês de Três Rios manor house
First building

1908
Paula Souza Building
New headquarters

POLI USP

15 teaching and research departments

Civil	Civil Construction Engineering - PCC Structure and Foundations Engineering - PEF Hydraulic and Sanitation Engineering– PHD Transportation Engineering – PTR
Electrical	Electrical Energy and Automation Engineering– PEA Computer and Digital Systems Engineering– PCS Electronic Systems Engineering– PSI Telecommunication and Control Engineering– PTC
Mechanical	Mechatronics and Mechanical Systems Engineering– PMR Mechanical Engineering– PME Naval and Ocean Engineering– PNV Industrial Engineering– PRO
Chemical	Chemical Engineering - PQI Mining and Petroleum Engineering - PMI Metallurgical and Materials Engineering– PMT

POLI from “Polytechnic”

14,000
students

1,000
staff

4,500
UNDERGRADS

2,500
POSTGRADS

7,000
EXTENSION STUDENTS

500
faculty members
(97% PhD)

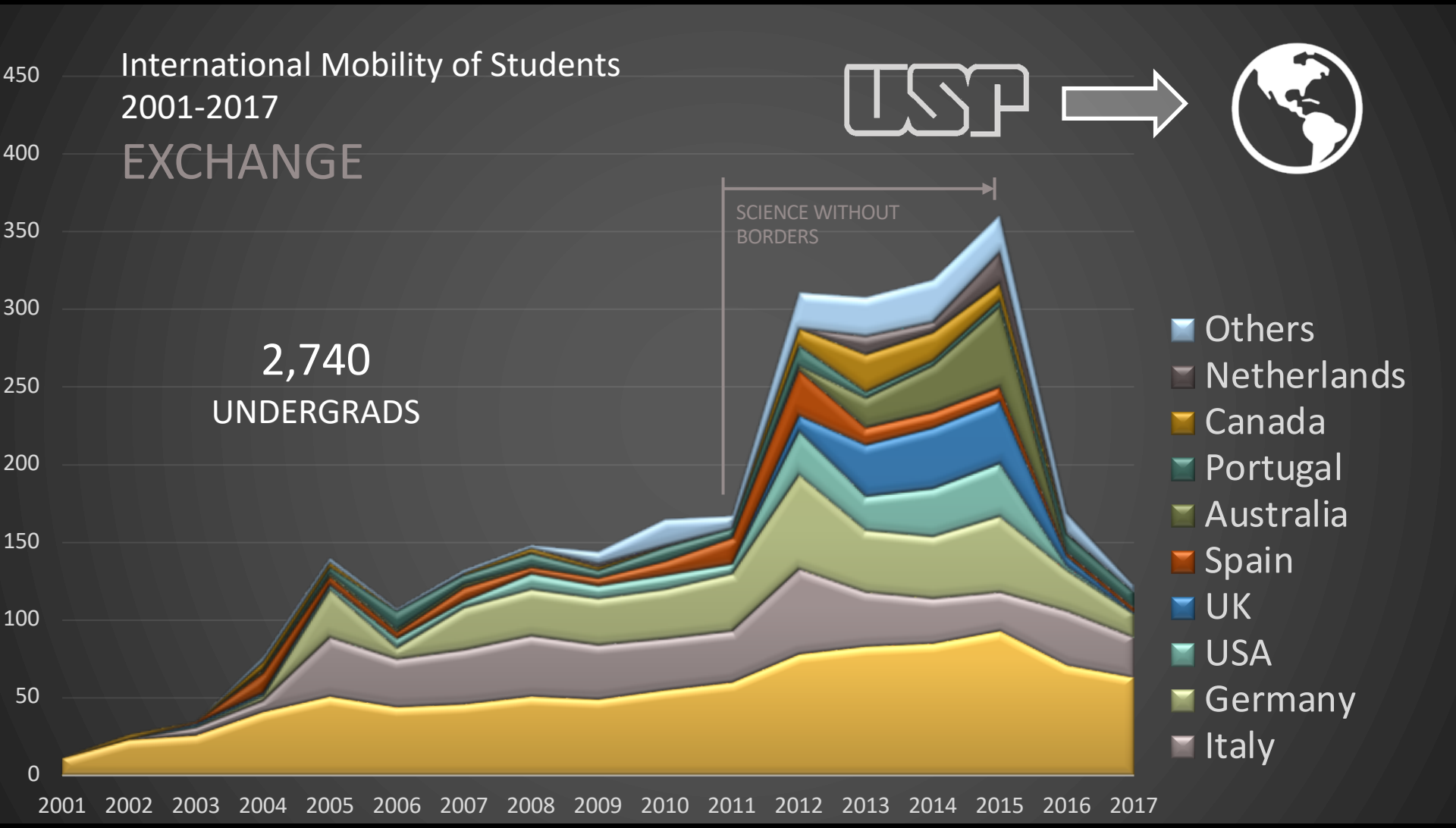
500
admin & tech staff

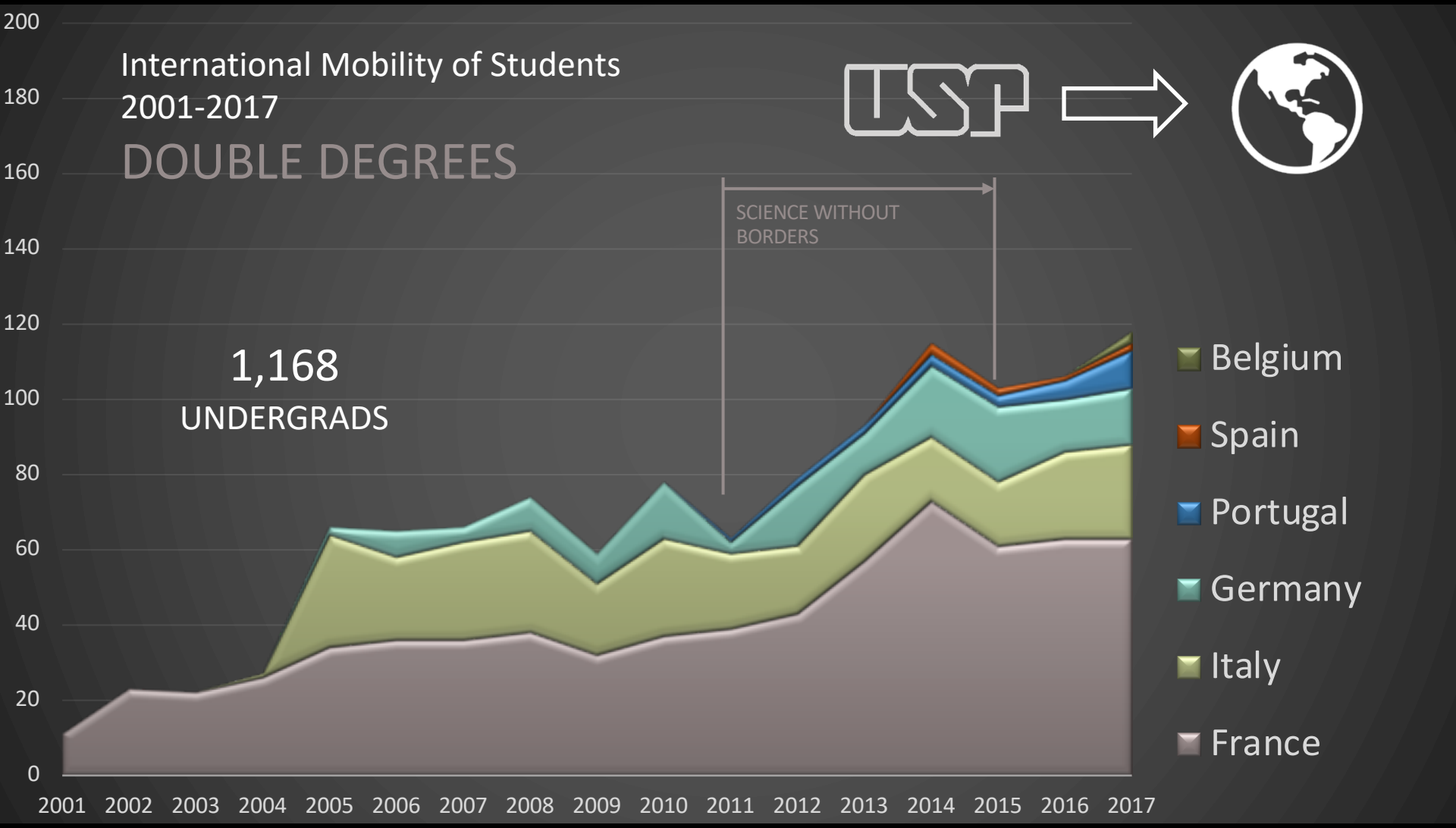
17
Eng. courses

11
MSc prog.

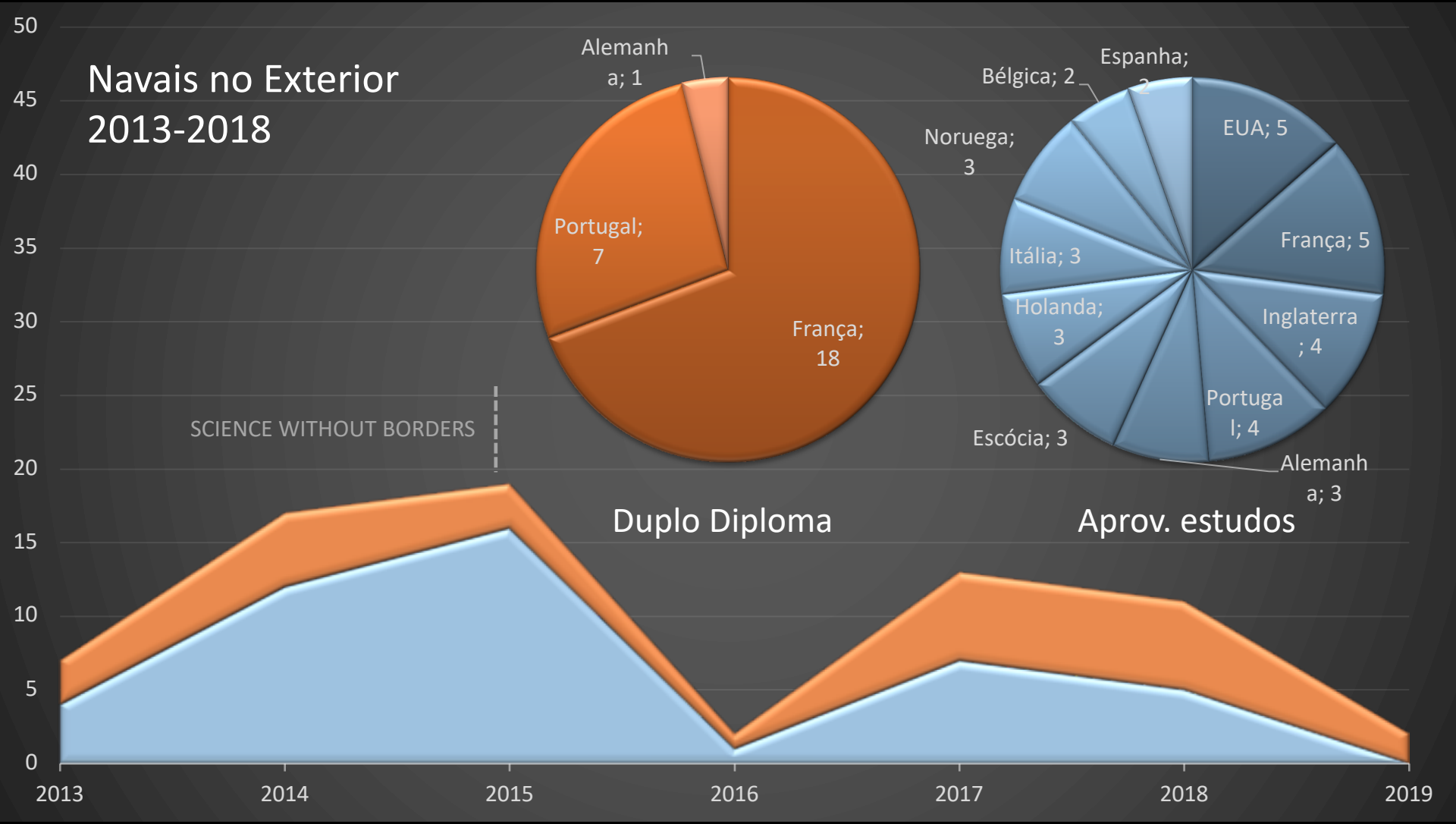
9 PhD prog.

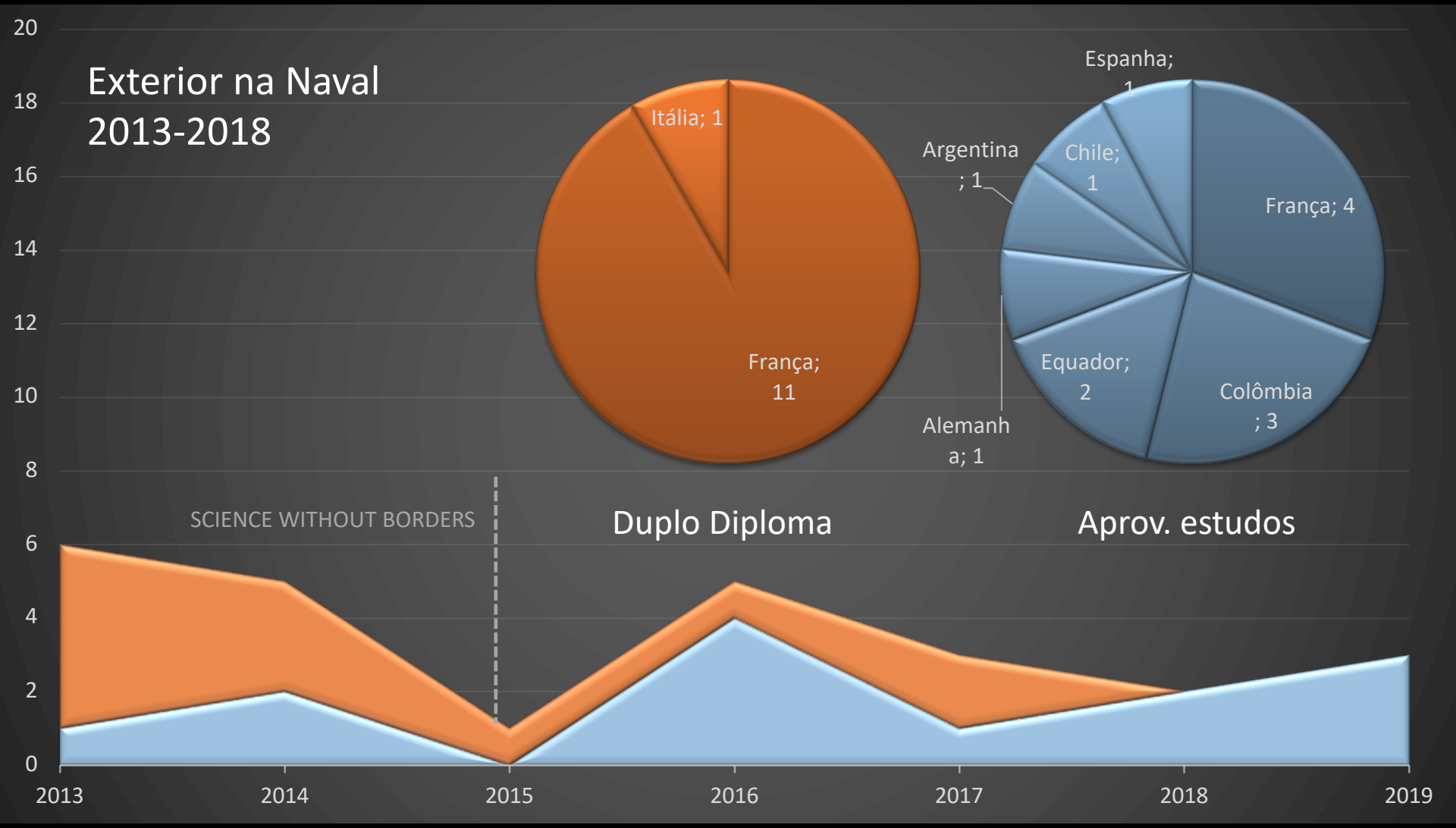
12
MBA-like courses


International Mobility of Students
2001-2017
EXCHANGE
USP
SCIENCE WITHOUT BORDERS
2,740
UNDERGRADS
450
400
350
300
250
200
150
100
50
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Others
Netherlands
Canada
Portugal
Australia
Spain
UK
USA
Germany
Italy


International Mobility of Students
2001-2017
DOUBLE DEGREES
USP
SCIENCE WITHOUT BORDERS
1,168
UNDERGRADS
200
180
160
140
120
100
80
60
40
20
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Belgium
Spain
Portugal
Germany
Italy
France

Navais no Exterior 2013-2018




Exterior na Naval
2013-2018
Itália; 1
França; 11
Espanha; 1
Argentina ; 1
Chile; 1
França; 4
Equador; 2
Colômbia ; 3
Alemanha; 1
SCIENCE WITHOUT BORDERS
Duplo Diploma
Aprov. estudos
20
18
16
14
12
10
8
6
4
2
0
2013
2014
2015
2016
2017
2018
2019

Naval Architecture and Ocean Engineering

PNV USP

Department of Naval Architecture and Ocean Engineering

Naval Arch. & Ocean Engineering at USP

1950 1960 1970 1980 1990 2000 2010 2020

1934
USP

1893
POLI

GOLDEN AGE
of Shipbuilding in Brazil.

World's 3rd largest.

COLLAPSE of the Brazilian Naval Ind.

OIL & GAS
Continuous growth of E&P.

Deep & Ultra-deep waters.

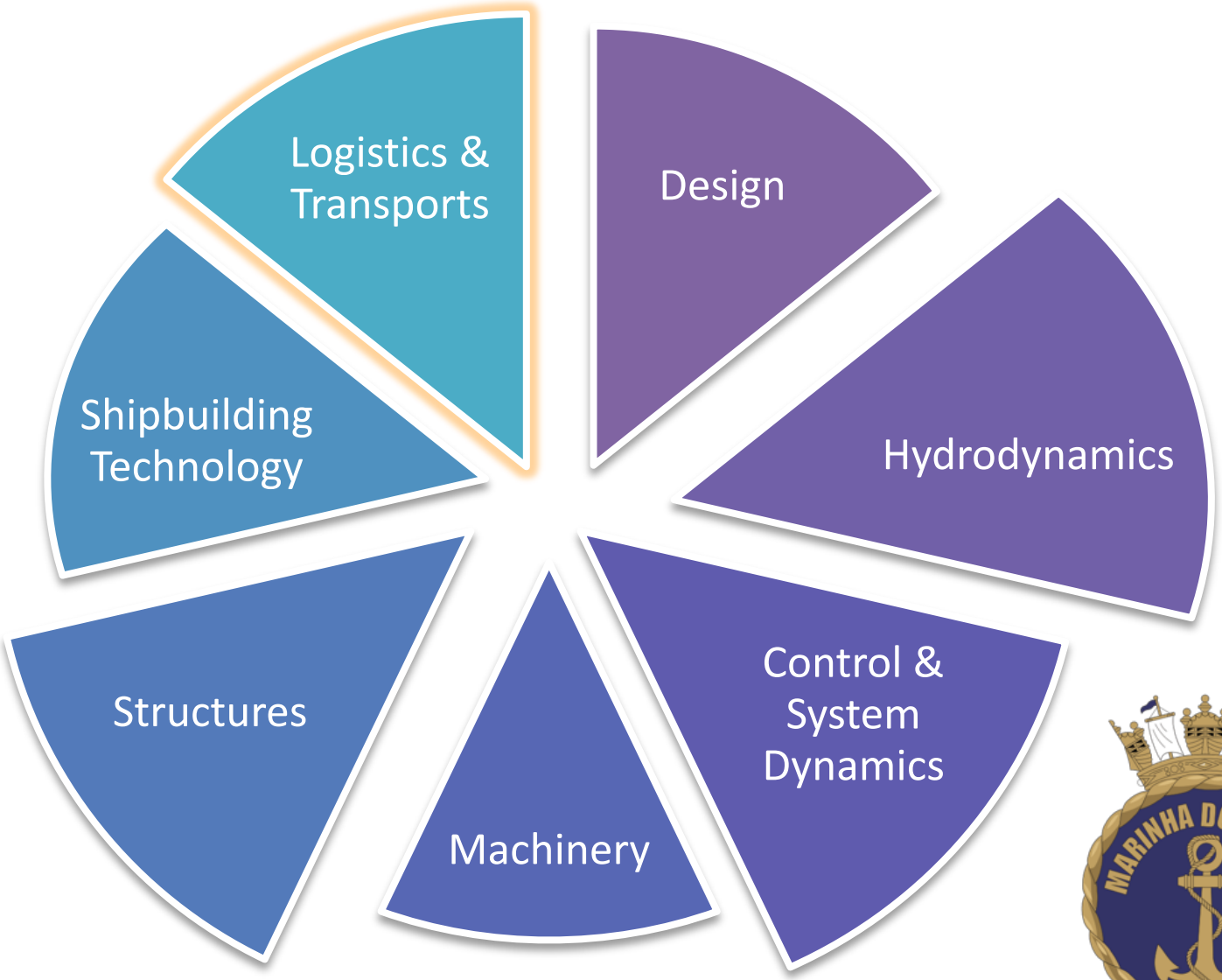
?

1956
Naval Arch.

1980
Ocean Engineering

Traditional Disciplines

1960-90

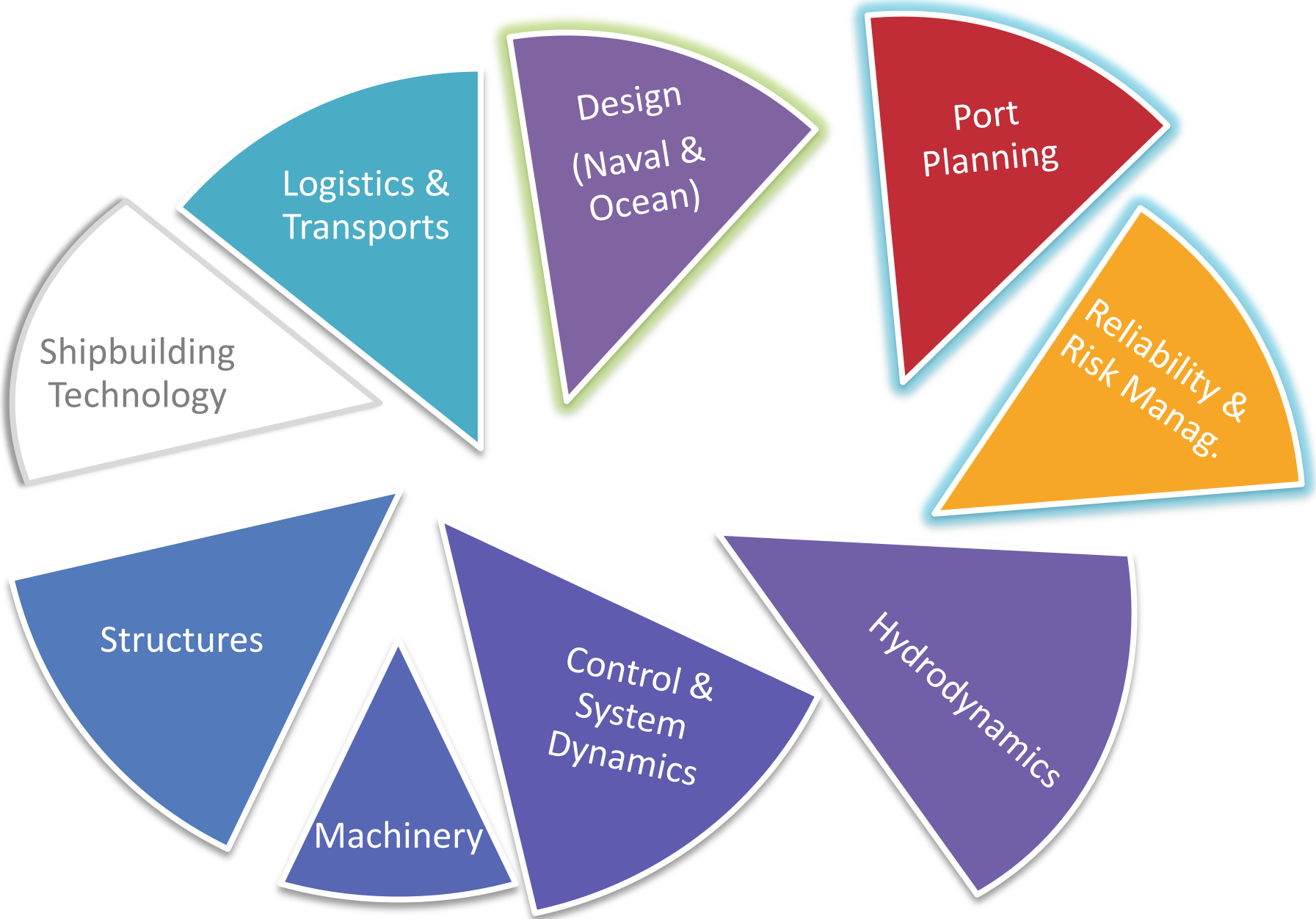


Offshore exploration

1990

Current Disciplines

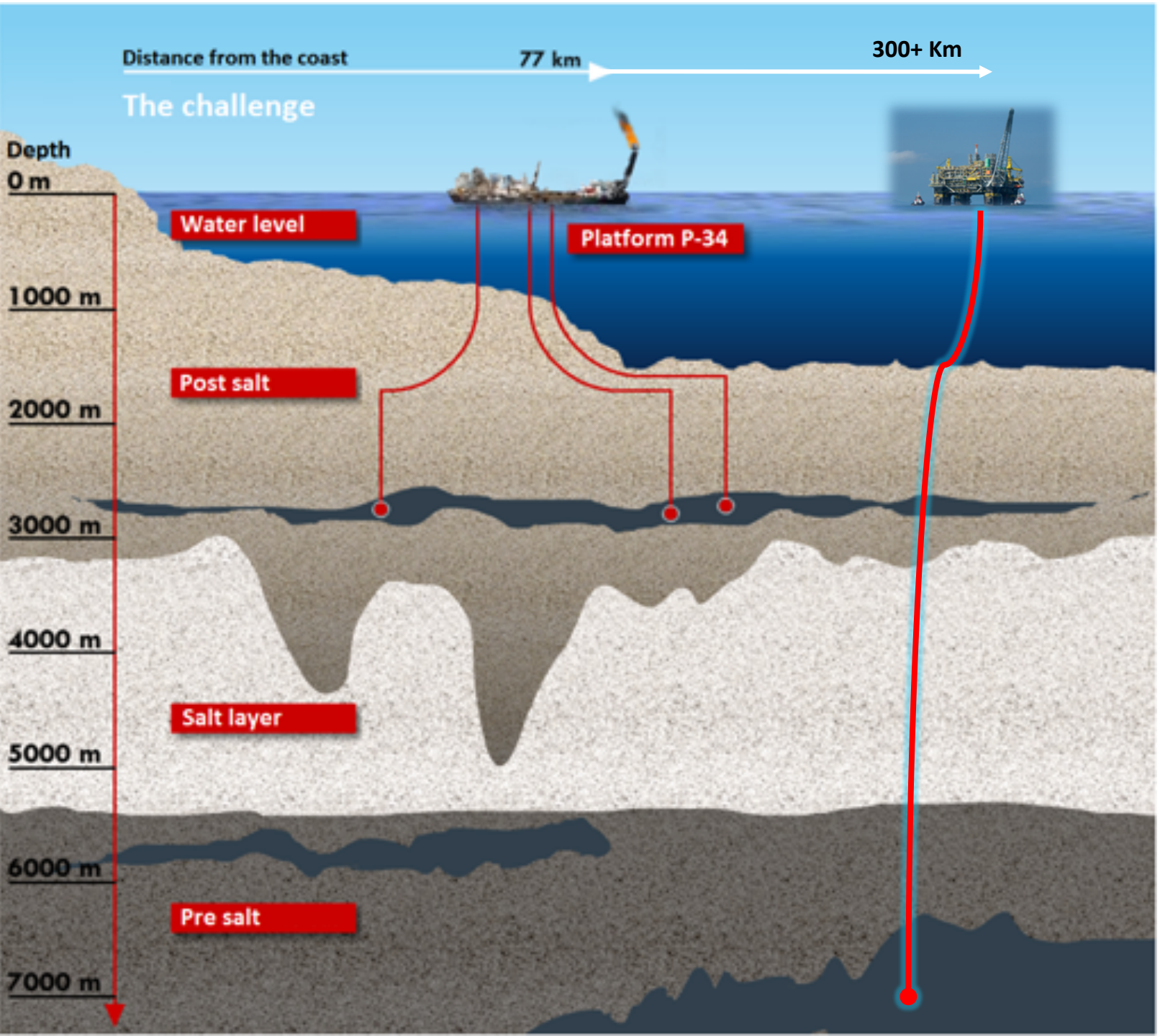
2000

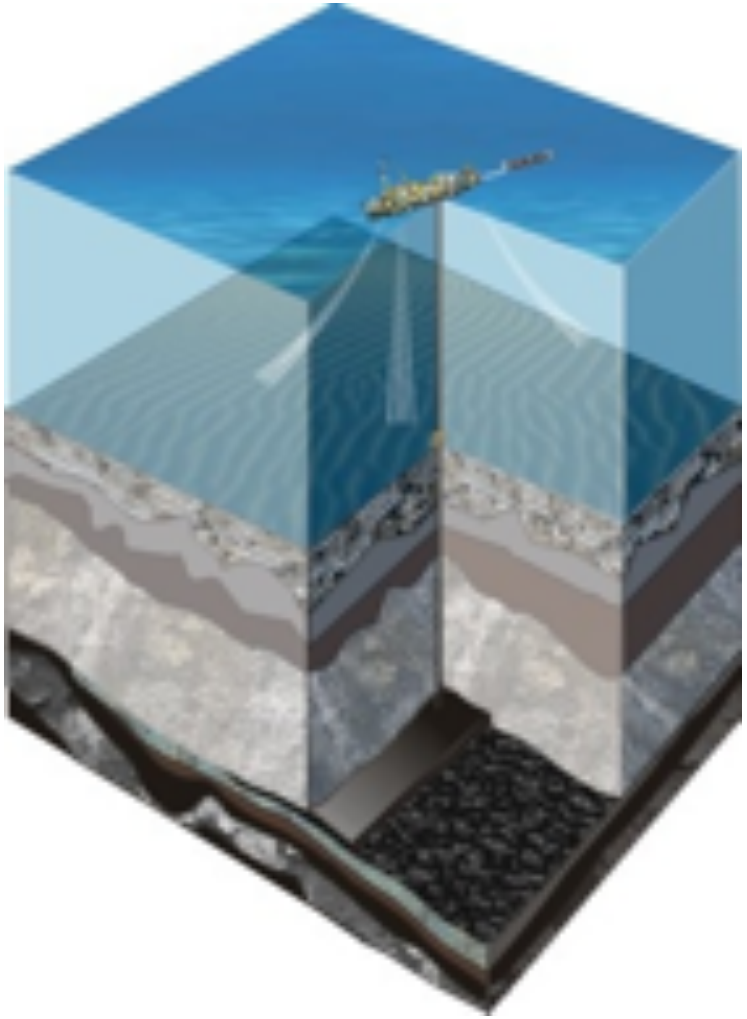


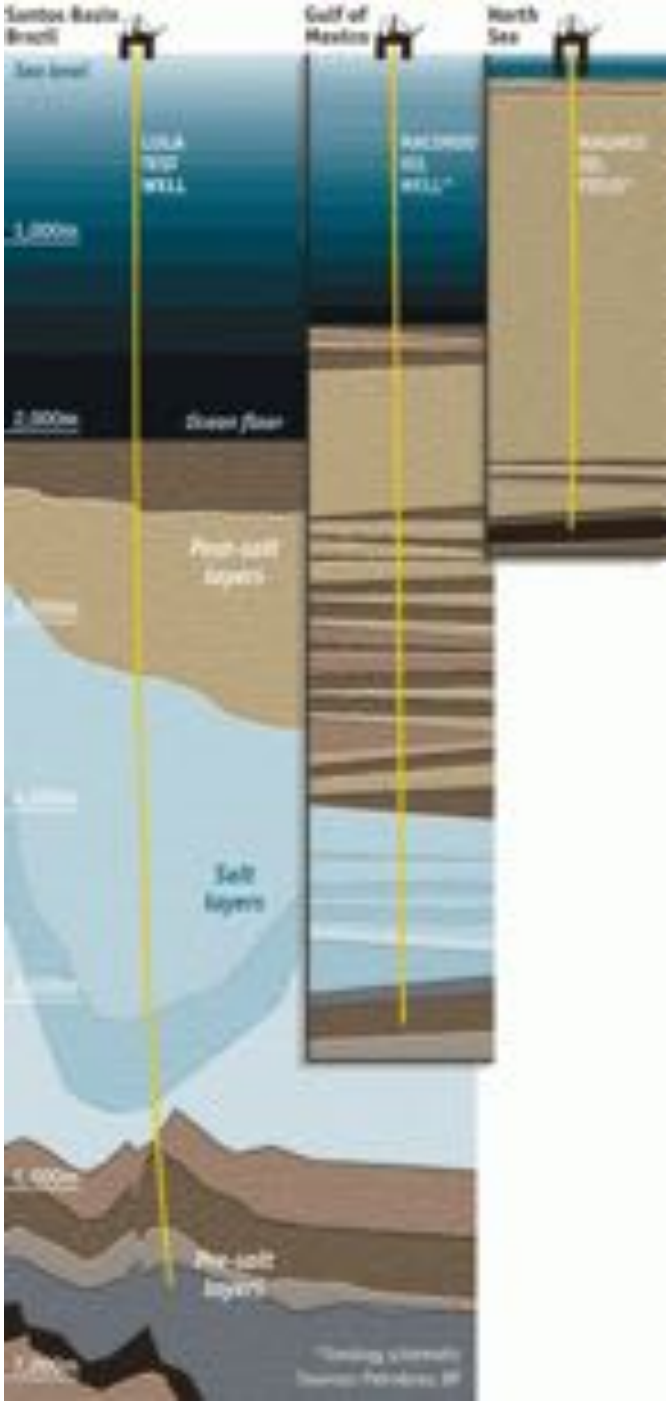
Produção de Petróleo Offshore

2008

The pre-salt-layer challenge






Santos Basin
Brazil
Gulf of
Mexico
North
Sea
Ocean floor
Post-salt
layers
Salt
layers
Pre-salt
layers

2008

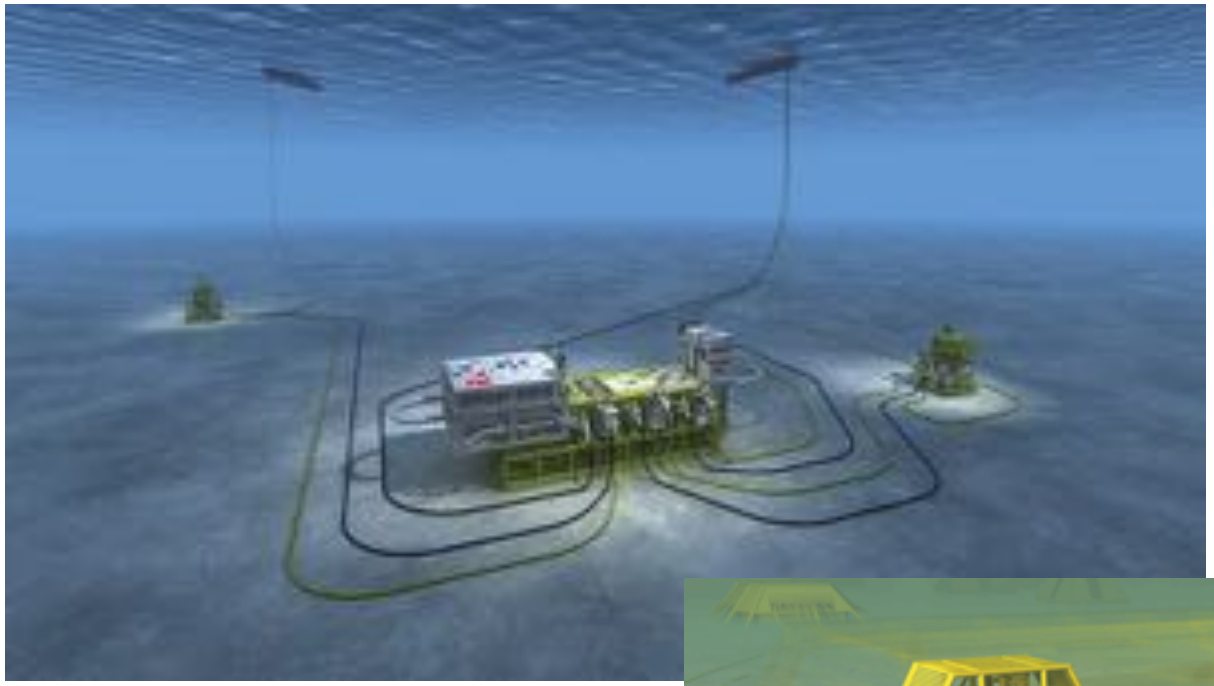
Petrobras P-51

2008

Petrobras P-52

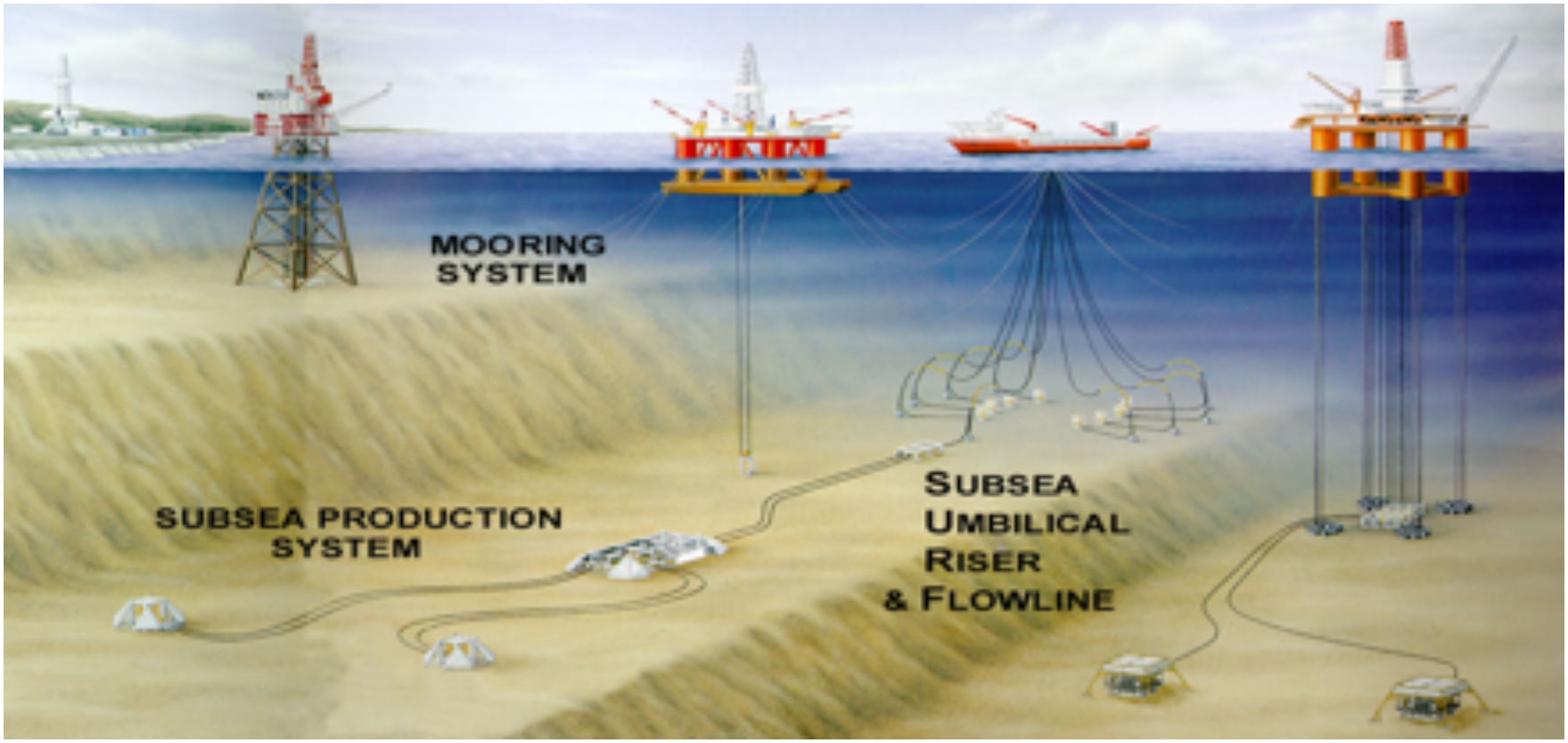
2008

Sistemas submarinos



www.fmctechnologies.com

Sistemas offshore



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Naval Arch. & Ocean Engineering at USP

1950 1960 1970 1980 1990 2000 2010 2020

1934
USP

1893
POLI

GOLDEN AGE
of Shipbuilding in Brazil.

World's 3rd largest.

COLLAPSE of the Brazilian Naval Ind.

OIL & GAS
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Deep & Ultra-deep waters.

SUSTAINABLE OCEAN EXPLORATION

2021-2030
UN OCEAN DECADE

1956
Naval Arch.

1980
Ocean Engineering

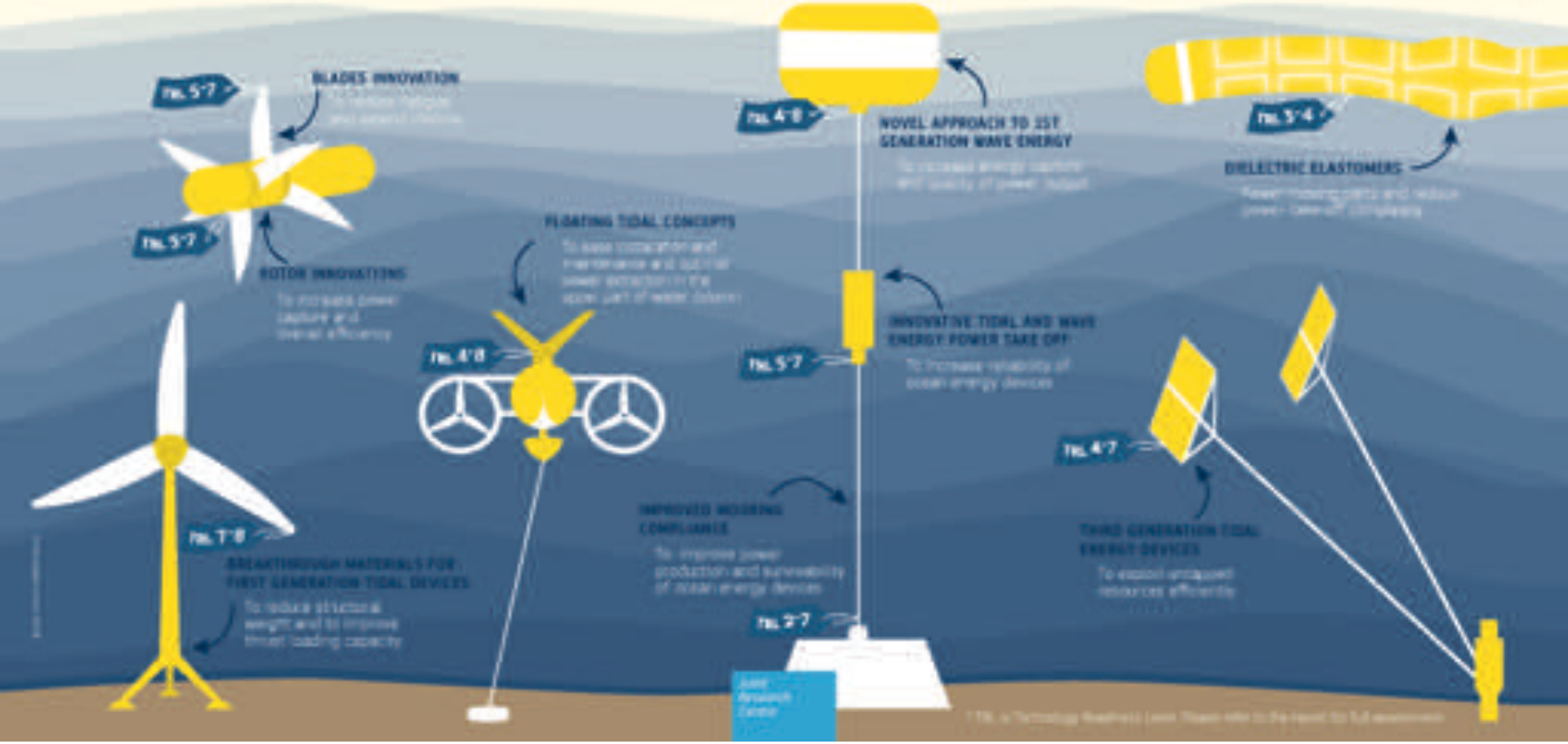
The Science We Need for the Ocean We Want

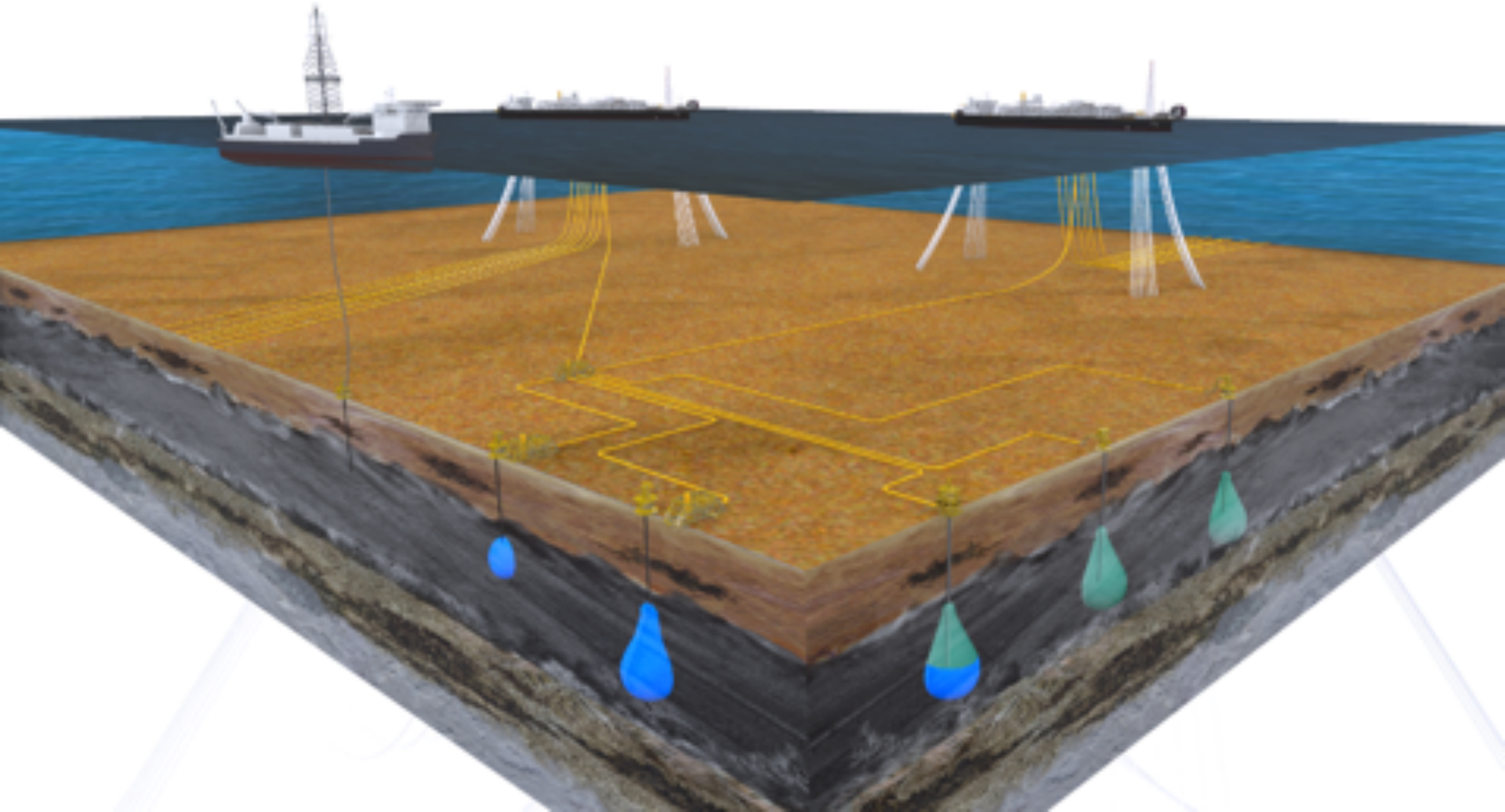
The United Nations
Decade of Ocean Science
for Sustainable Development
(2021-2030)

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

How is research tackling the need for **cost reduction** and **reliability** of ocean technologies?





NAVAL 1º Semestre

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ENSINO

Naval Architecture

Ocean Engineering

Marine Engineering

Principal característica

Curso de graduação

Diversidade e Inovação

CILIP

Research Centre for Gas Innovation

LabRisco

NDF

gero energia renovável do oceano POLI - USP

Tanque de Provas Numérico

NAMEF

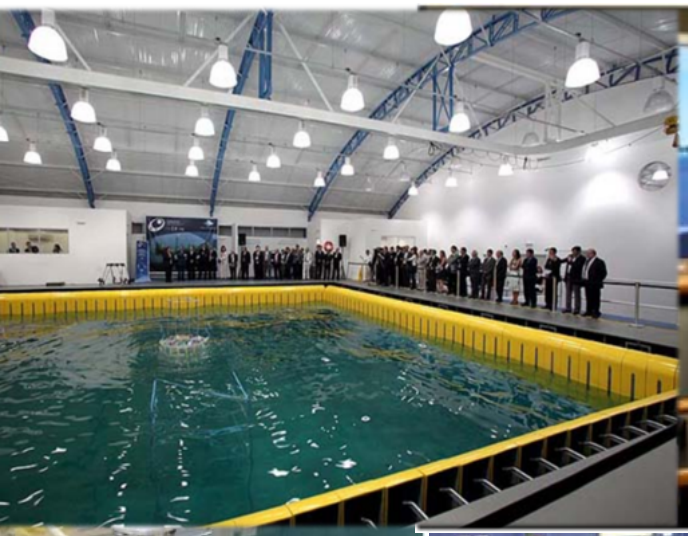
Dinâmica & Controle

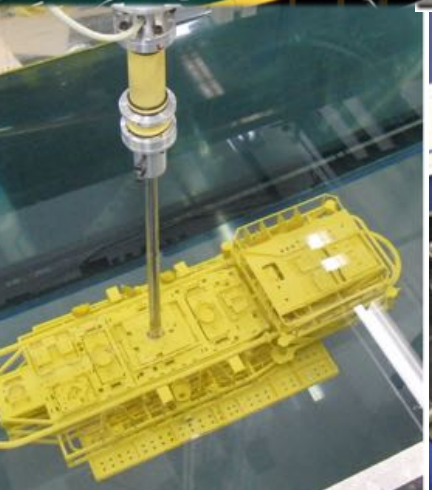
MARINHA DO BRASIL

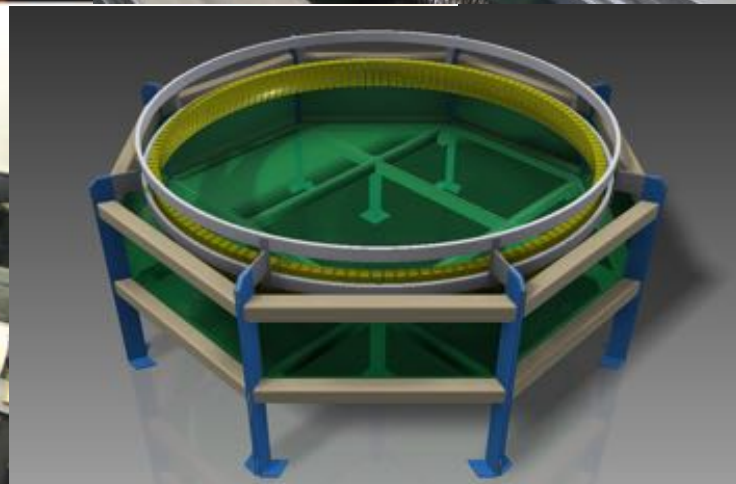
Flexibilidade

Integração

Grupos de pesquisa e laboratórios







Integração

Industry and Institutes

PETROBRAS
bp
Statoil
INPEX
IHI
Kawasaki
MITSUBISHI HEAVY INDUSTRIES, LTD.
JGC
TOKYO GAS
Keppel
Technip
PRYSMIAN CABLES & SYSTEMS
FMC
JMU
BUREAU VERITAS
ipt INSTITUTO DE PESQUISAS TECNOLÓGICAS
Lloyd's Register
ClassNK NIPPON KAIJI KYOKAI

Internacionalização

Global Industry = Global Education

- Exchange of students
- Double-degree programmes

INGENIERÍA NAVAL Y OCEÁNICA

UNA INGENIERÍA DE ESCALA GLOBAL

COOPERACIÓN ACADÉMICA EN AMÉRICA LATINA

Alianza Académica de Ingenieria Naval y Oceánica en la América Latina

Universidade de São Paulo, Brasil
Universidad de la República, Uruguay
Universidad de Buenos Aires, Argentina
Universidad Austral de Chile, Chile
Universidad Nacional de Ingeniería, Peru
Escuela Superior Politecnica del Litoral, Ecuador
Universidad Tecnológica de Bolívar, Colômbia
Universidad Industrial de Santander, Colômbia
Universidad Tecnológica de Panamá, Panamá
Universidad Veracruzana, México

Alianza Académica de Ingeniería Naval y Oceánica en la América Latina

COMPLEMENTARIEDAD – INTERNACIONALIZACIÓN – DESARROLLO REGIONAL

Alianza Académica de Ingeniería Naval y Oceánica en la América Latina

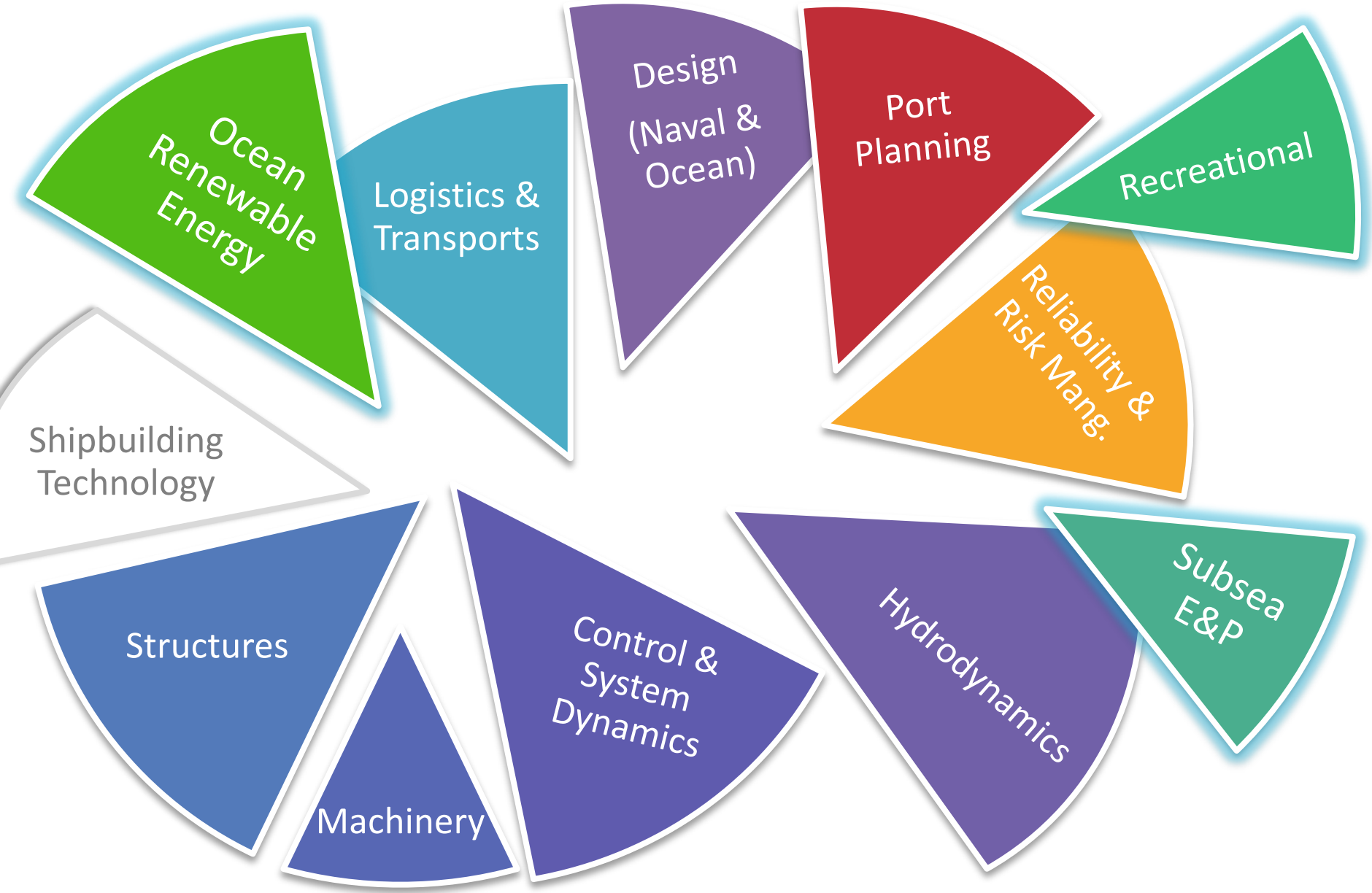
COMPLEMENTARIEDAD – INTERNACIONALIZACIÓN – DESARROLLO REGIONAL

Alianza Académica de Ingeniería Naval y Oceánica en la América Latina

COMPLEMENTARIEDAD – INTERNACIONALIZACIÓN – DESARROLLO REGIONAL

New Disciplines

2015-20



New Curriculum: EC3
(started in 2014)

Undergraduate and Graduate studies

Undergrad
Engineer
5 years

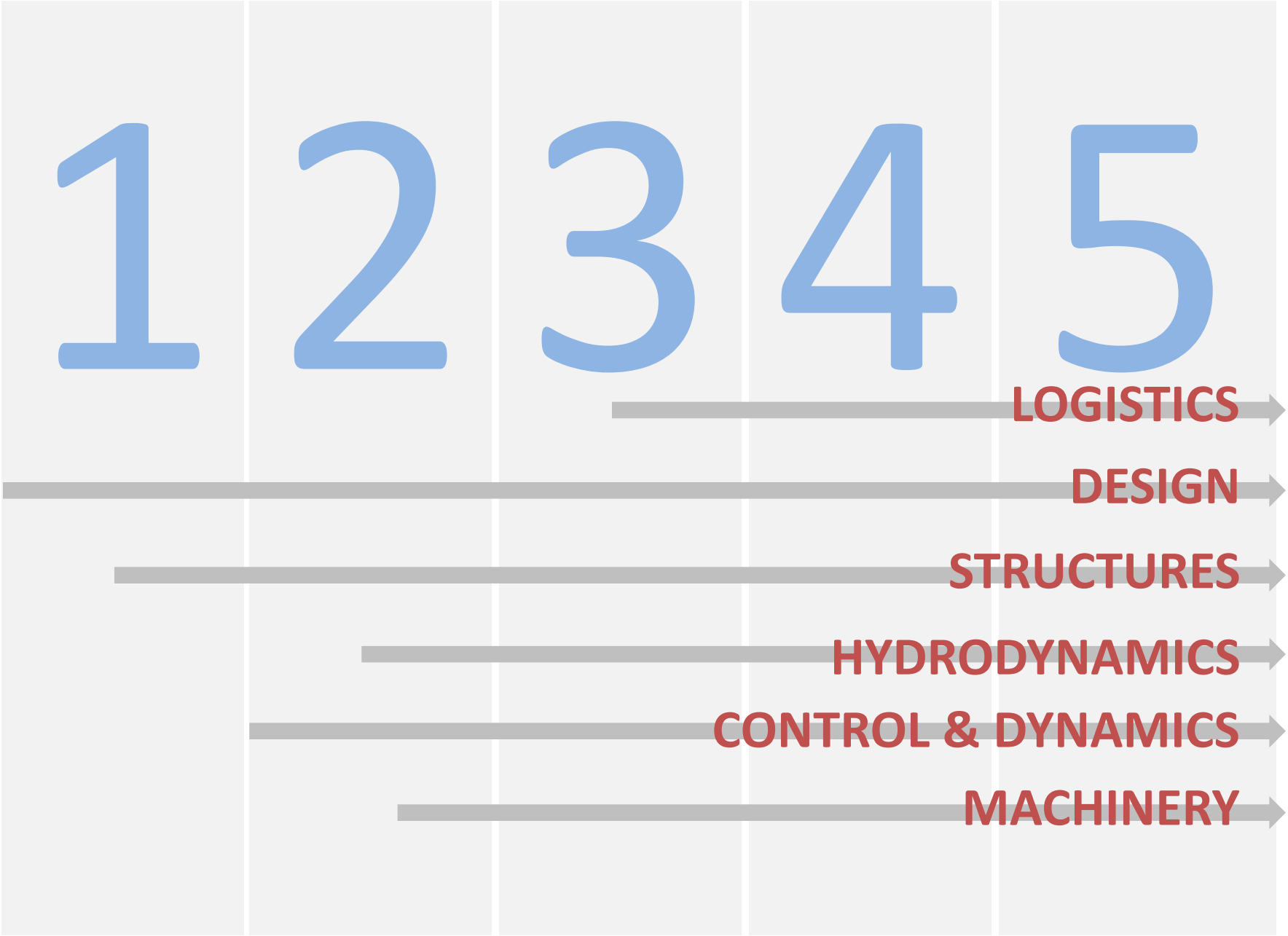
MSc (2 years)

PhD (3 years)

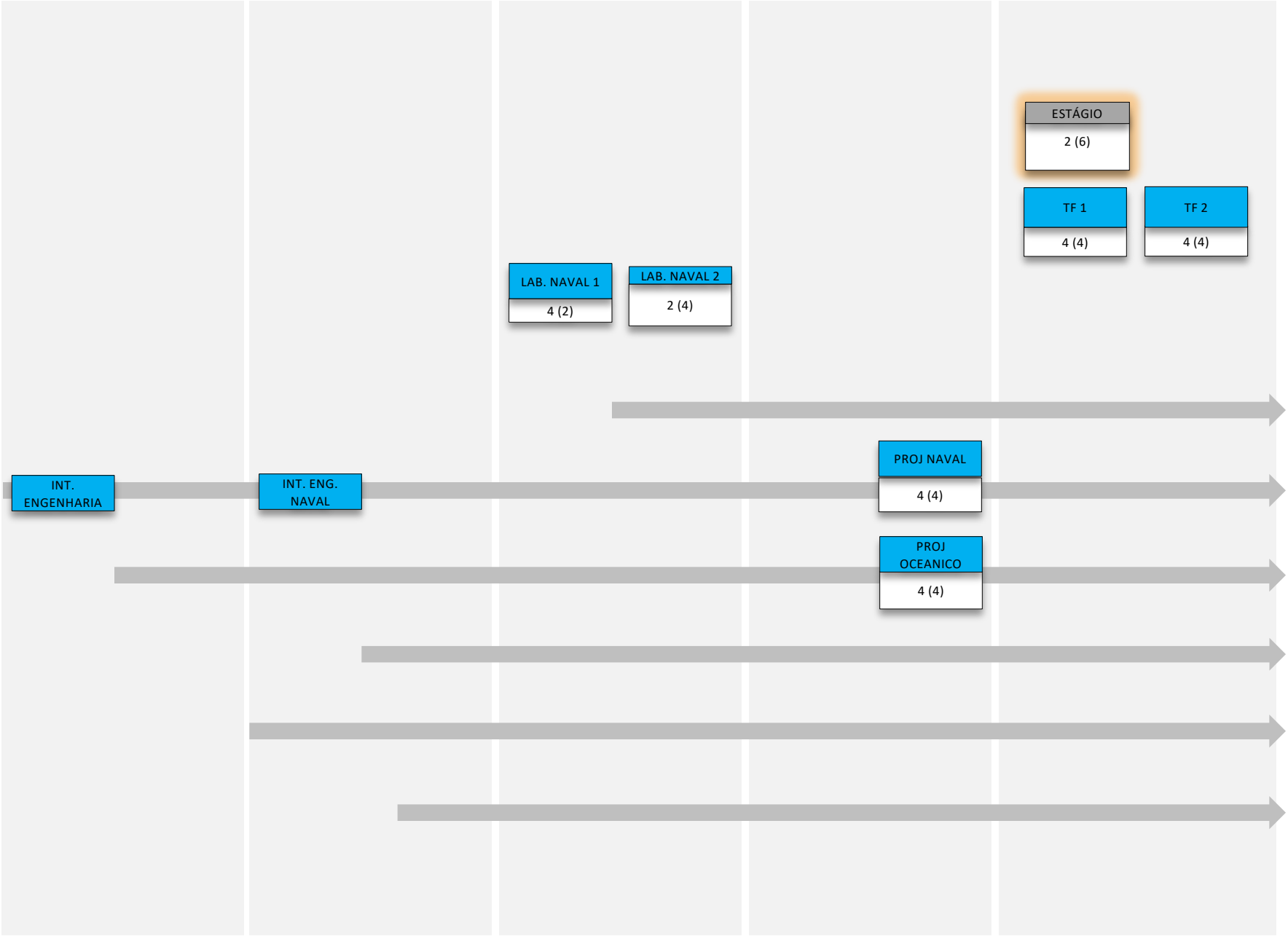
Undergrad
Engineer
5 years

PhD
4 years

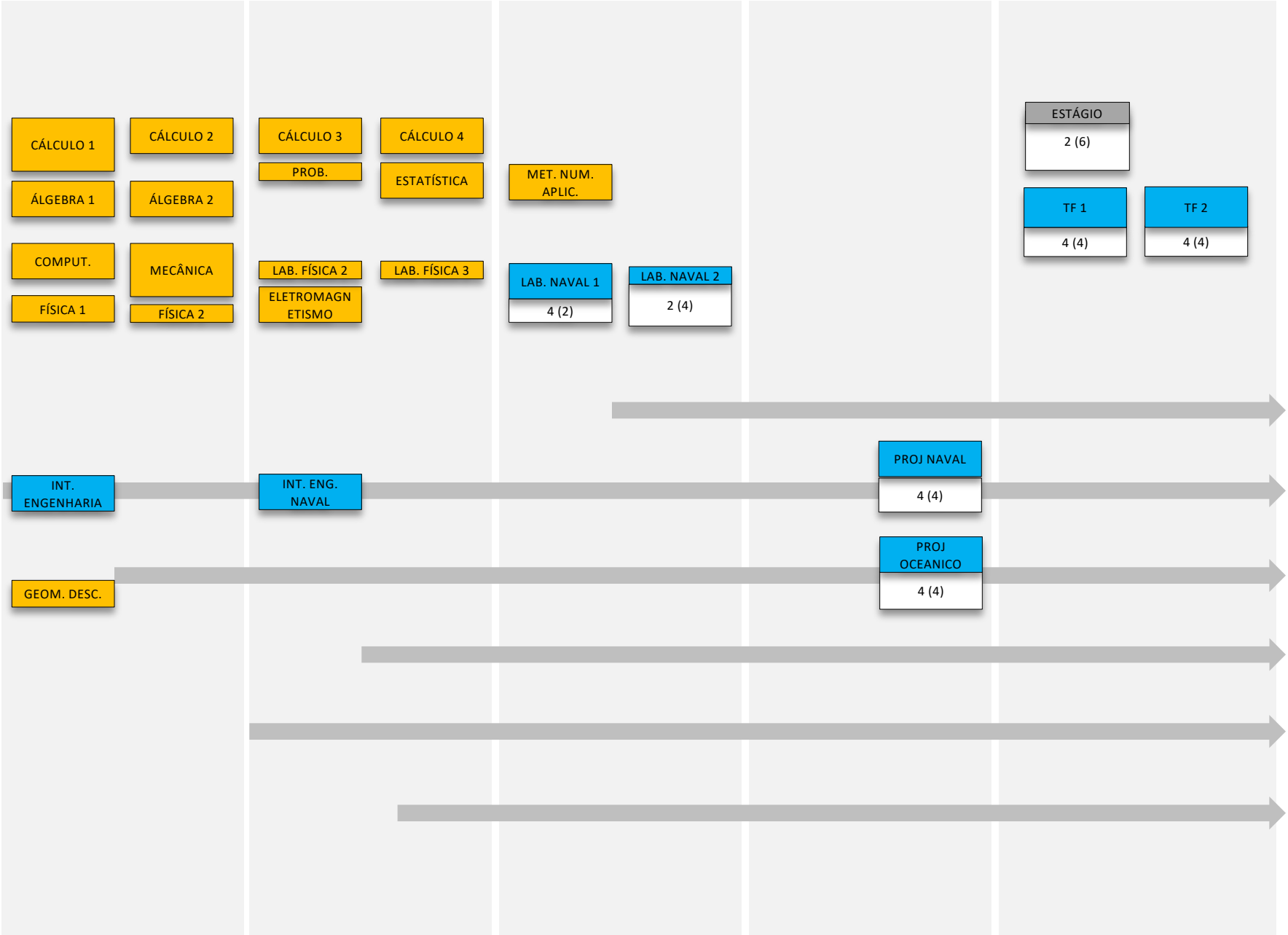
Disciplines



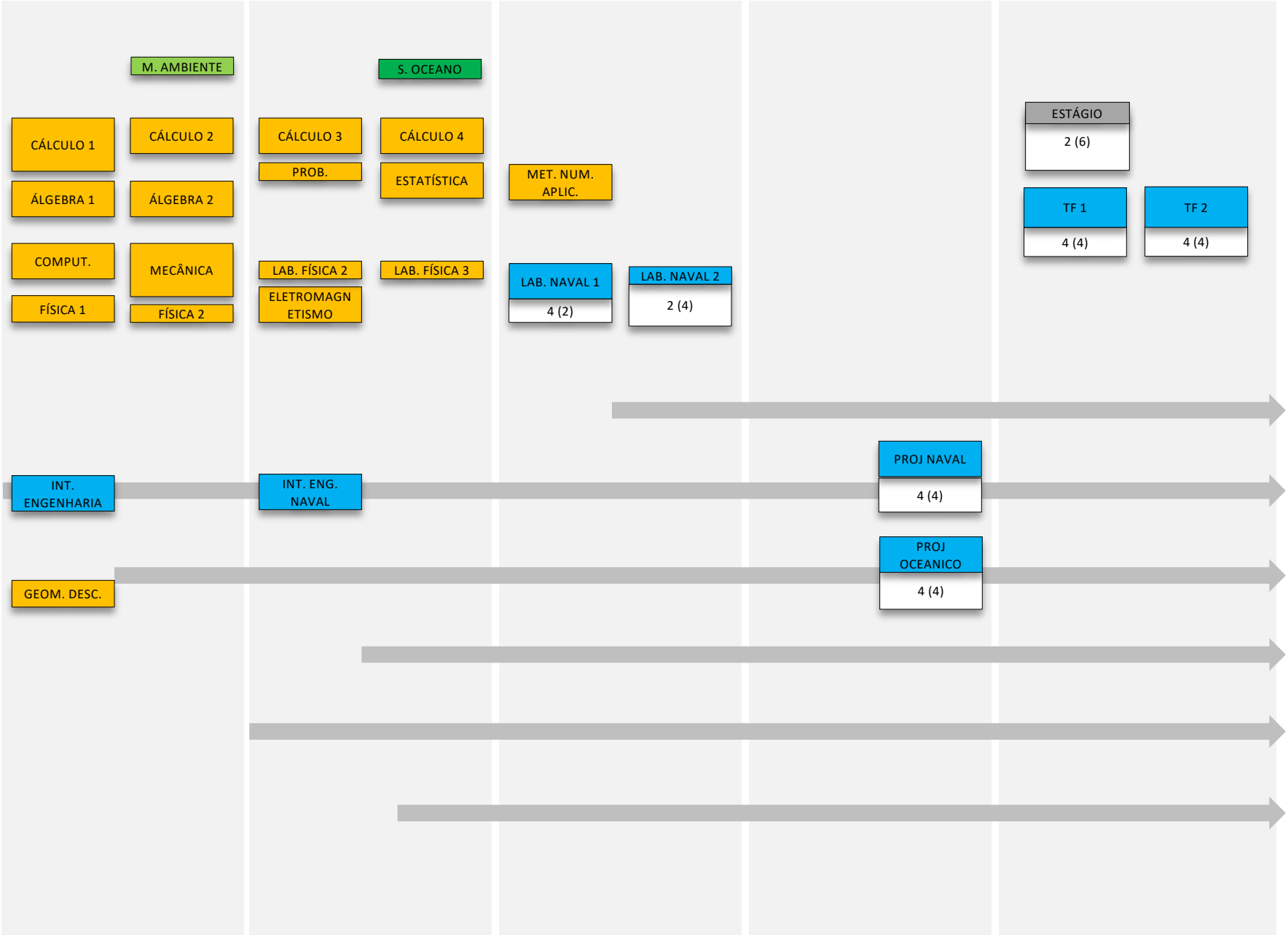
Core


ESTÁGIO
2 (6)
TF 1
4 (4)
TF 2
4 (4)
LAB. NAVAL 1
4 (2)
LAB. NAVAL 2
2 (4)
PROJ NAVAL
4 (4)
INT. ENGENHARIA
INT. ENG. NAVAL
PROJ OCEANICO
4 (4)

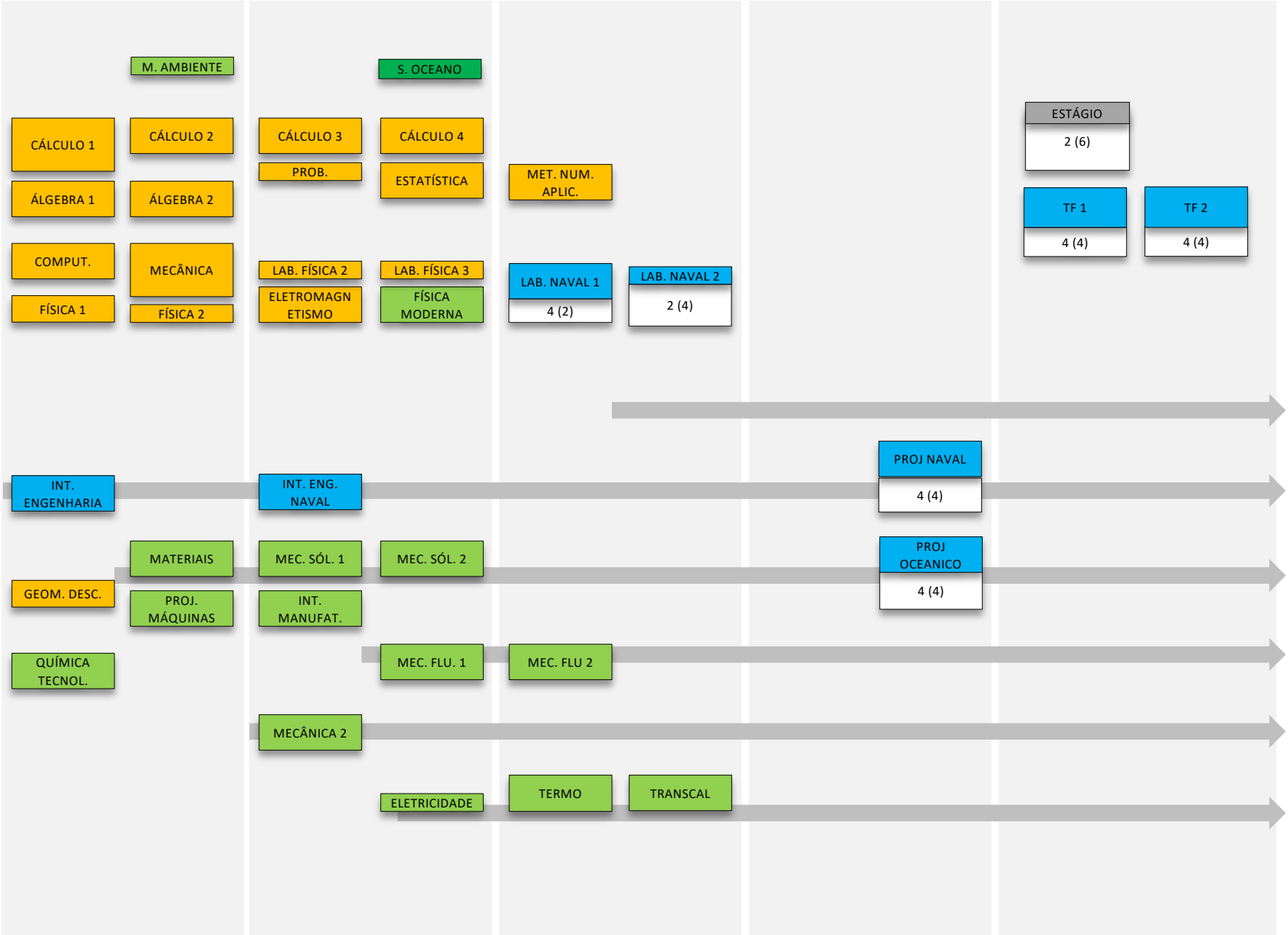
Fundamental Sciences: Calculus, Algebra, Physics…



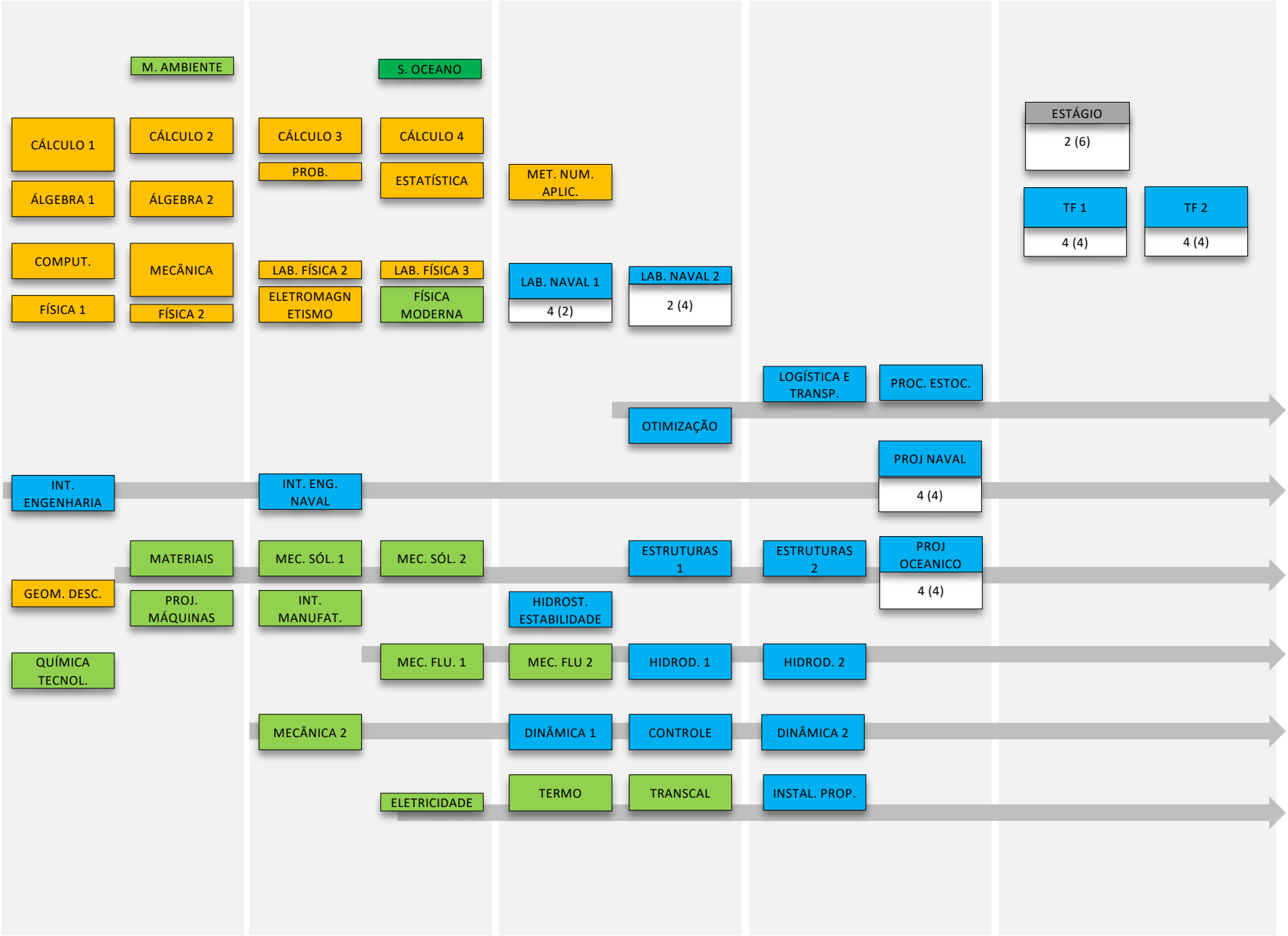
Environmental + Oceanography



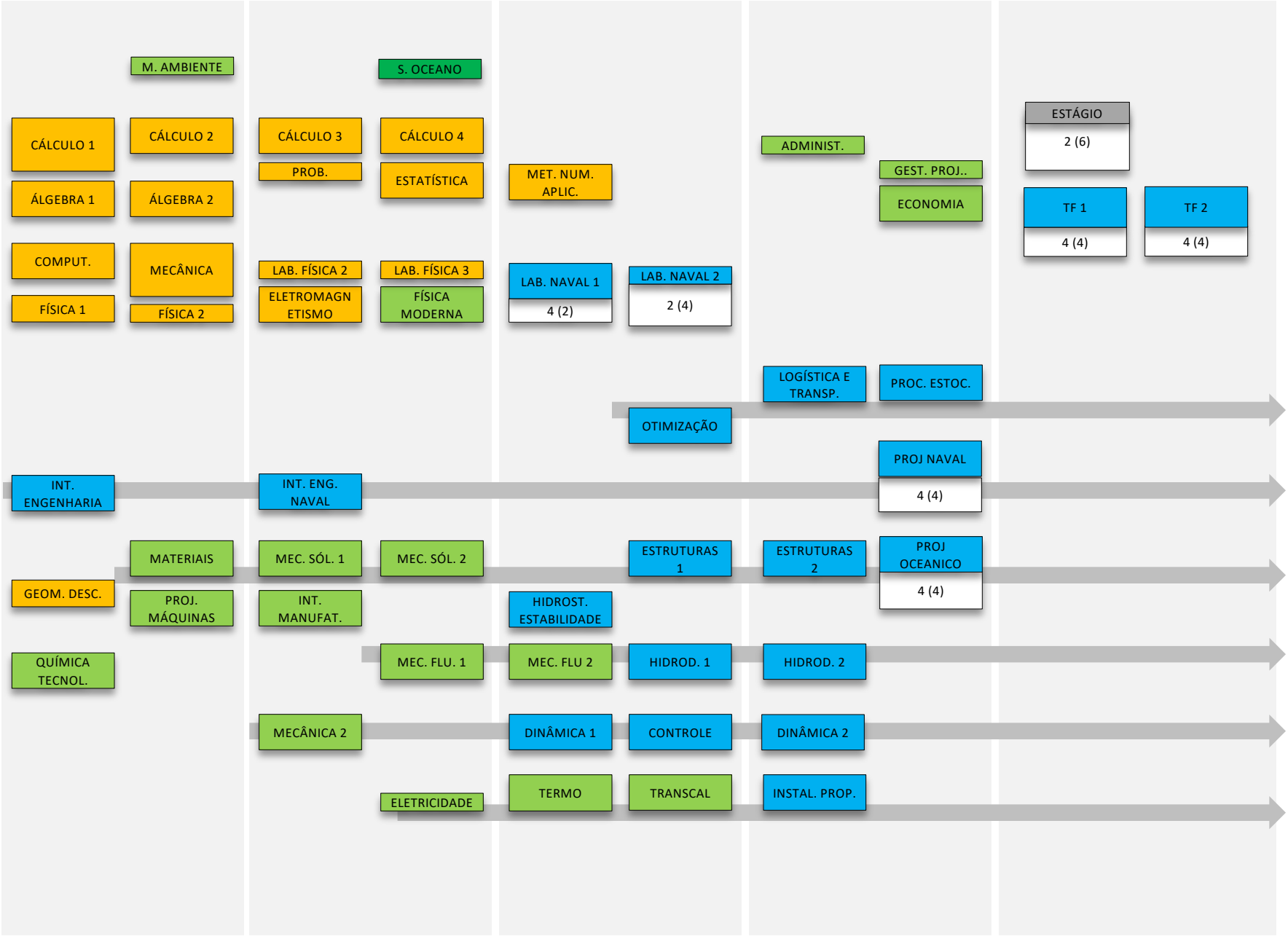
Engineering Sciences: Fluids, Solids, Mechanics, Thermo…



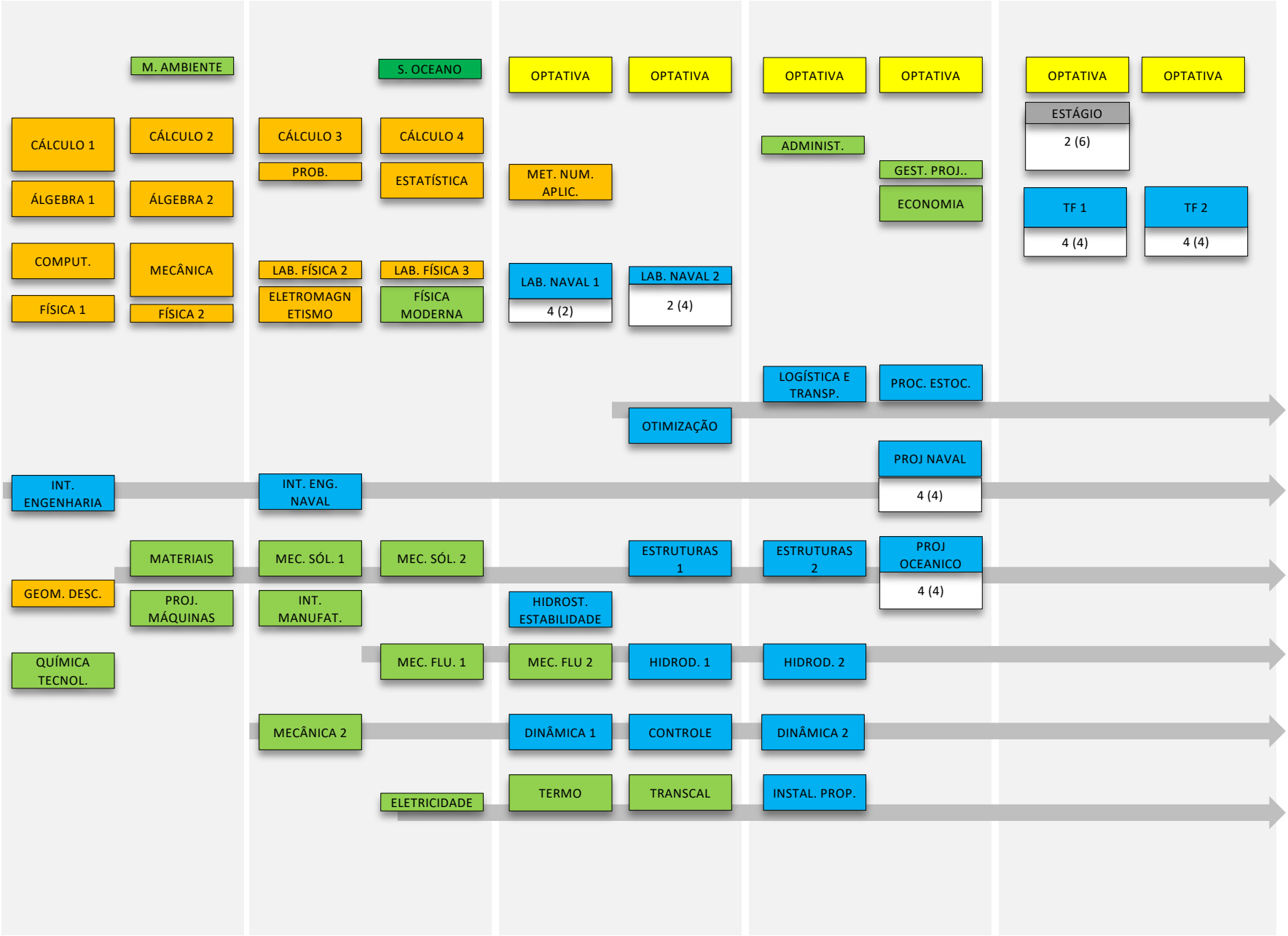
Naval Architecture & Ocean Engineering



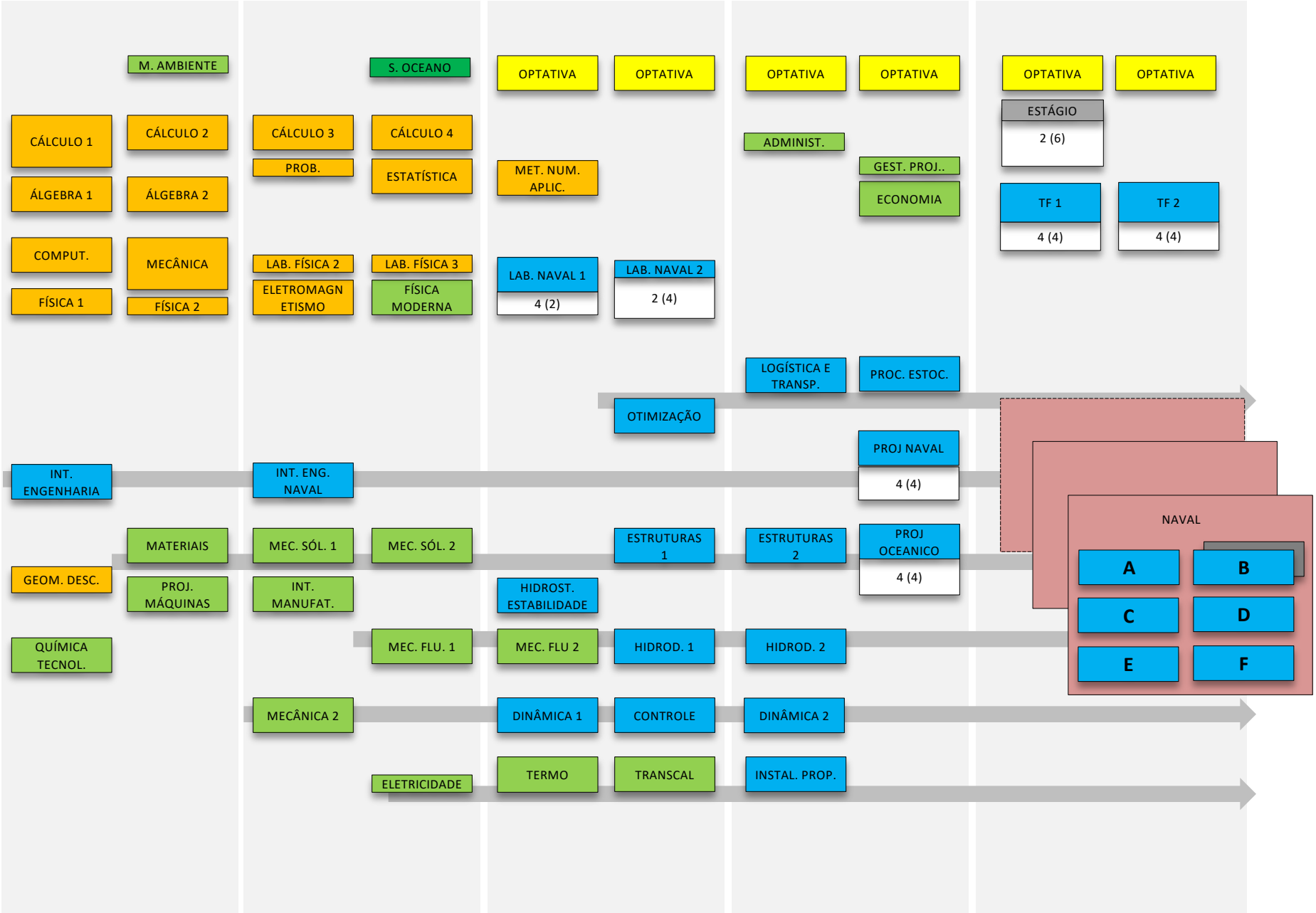
Business + Economics + Project Management



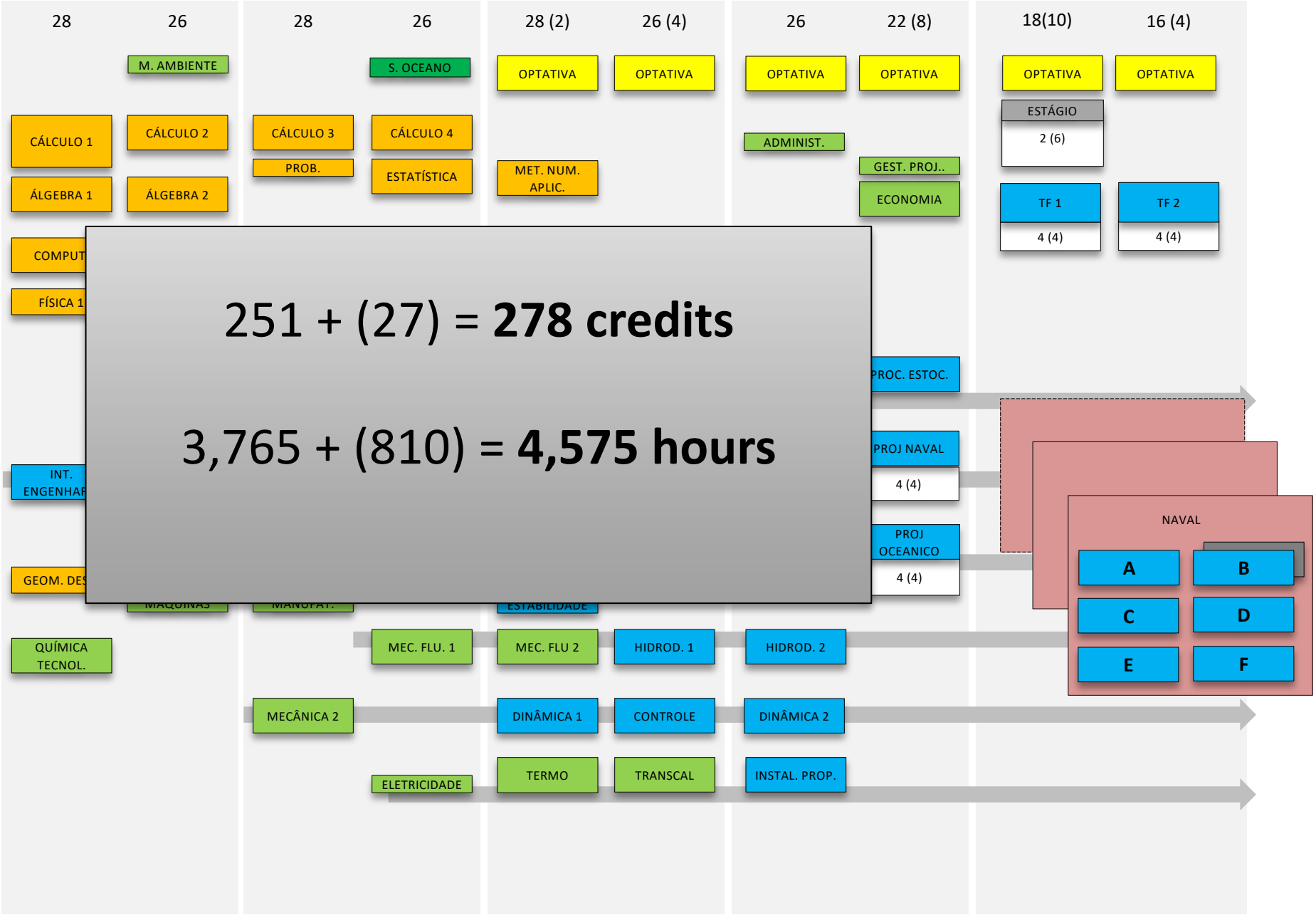
FLEXIBILITY: elective subjects of free choice (USP and abroad)



FLEXIBILITY: elective modules in Engineering (2 in Naval & Ocean)

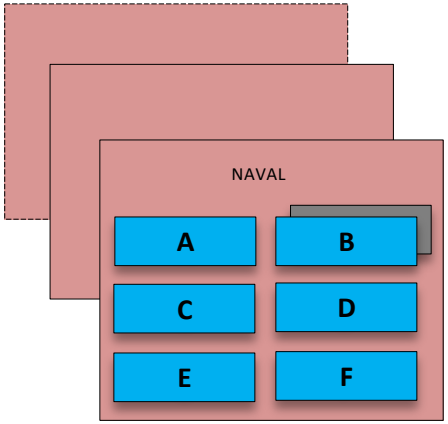


Full-time undergraduate course



Módulo de quinto ano (bloco vermelho)

Engenharia Naval



SISTEMAS OCEÂNICOS

TRANSPORTE MARÍTIMO E FLUVIAL

Engenharia Naval e Oceânica
6 disciplinas de Graduação

PNV3521

Tecnologia de Veículos Marítimos

PNV3522

Exploração de óleo e gás

PNV3512

Planejamento e operações de sistemas logísticos

PNV3523

Energia Renovável do Oceano

PNV3511

Operações de apoio à exploração e produção de petróleo

PNV3513

Planejamento e operações de sistemas portuários

Estudos avançados (3G + 3PG)
Sistemas Oceânicos

PG1	PG2	PNV3521 Tecnologia de veículos marítimos
PG3	PNV3522 Exploração de óleo e gás	PNV3523 Energia renovável do oceano

Estudos avançados (3G + 3PG)
Transporte Marítimo e Fluvial

PNV3511

Operações de apoio marítimo à prospecção e exploração do petróleo no mar

PNV3512

Planejamento e operações de sistemas logísticos

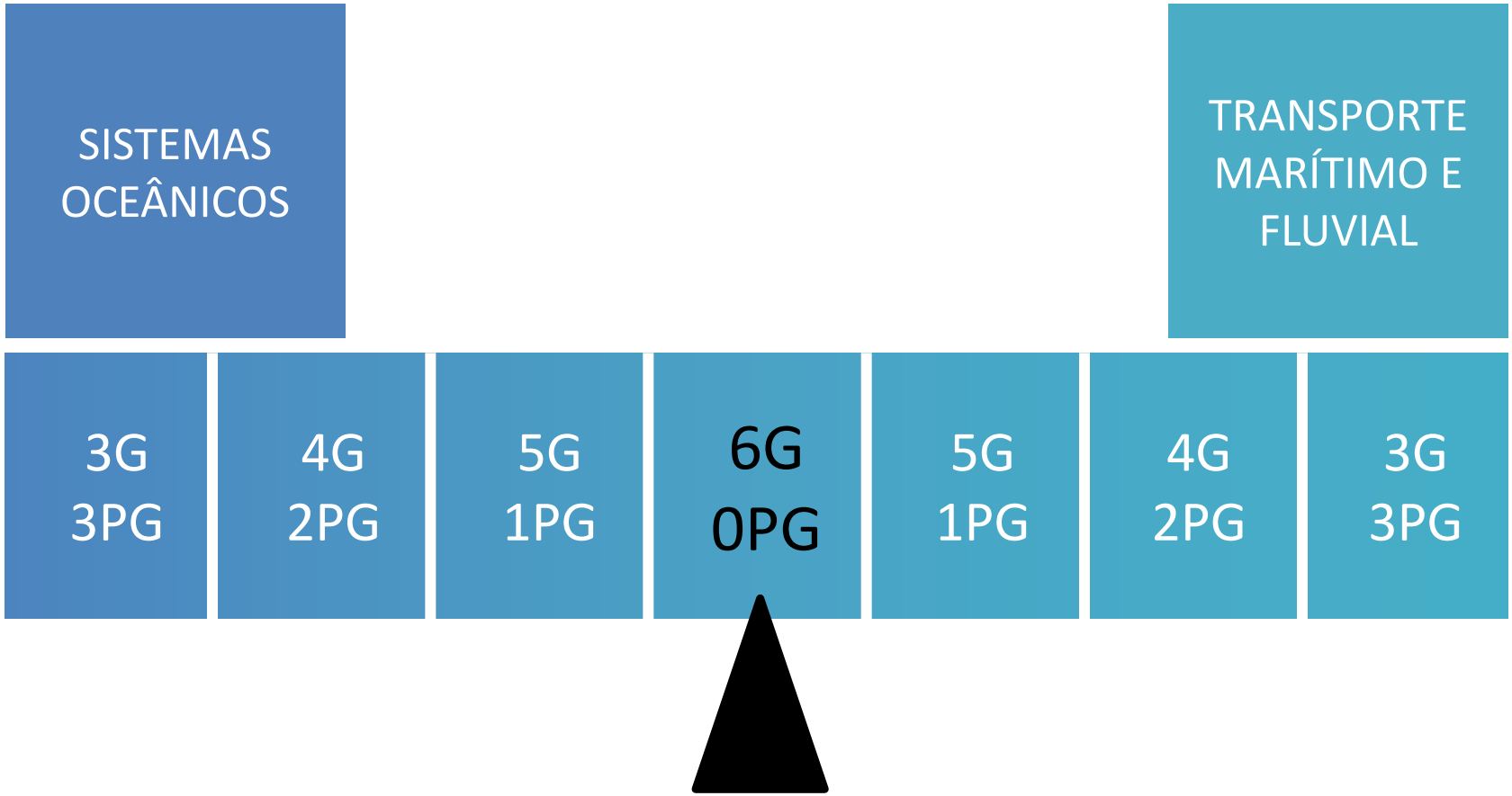
PG1

PNV3513

Aspectos da Operação e da Avaliação de Empreendimentos Portuários

PG2

PG3


SISTEMAS OCEÂNICOS
TRANSPORTE MARÍTIMO E FLUVIAL
3G 3PG
4G 2PG
5G 1PG
6G 0PG
5G 1PG
4G 2PG
3G 3PG

Pré-Mestrado em Engenharia Naval e Oceânica

PG1

PG2

PG3

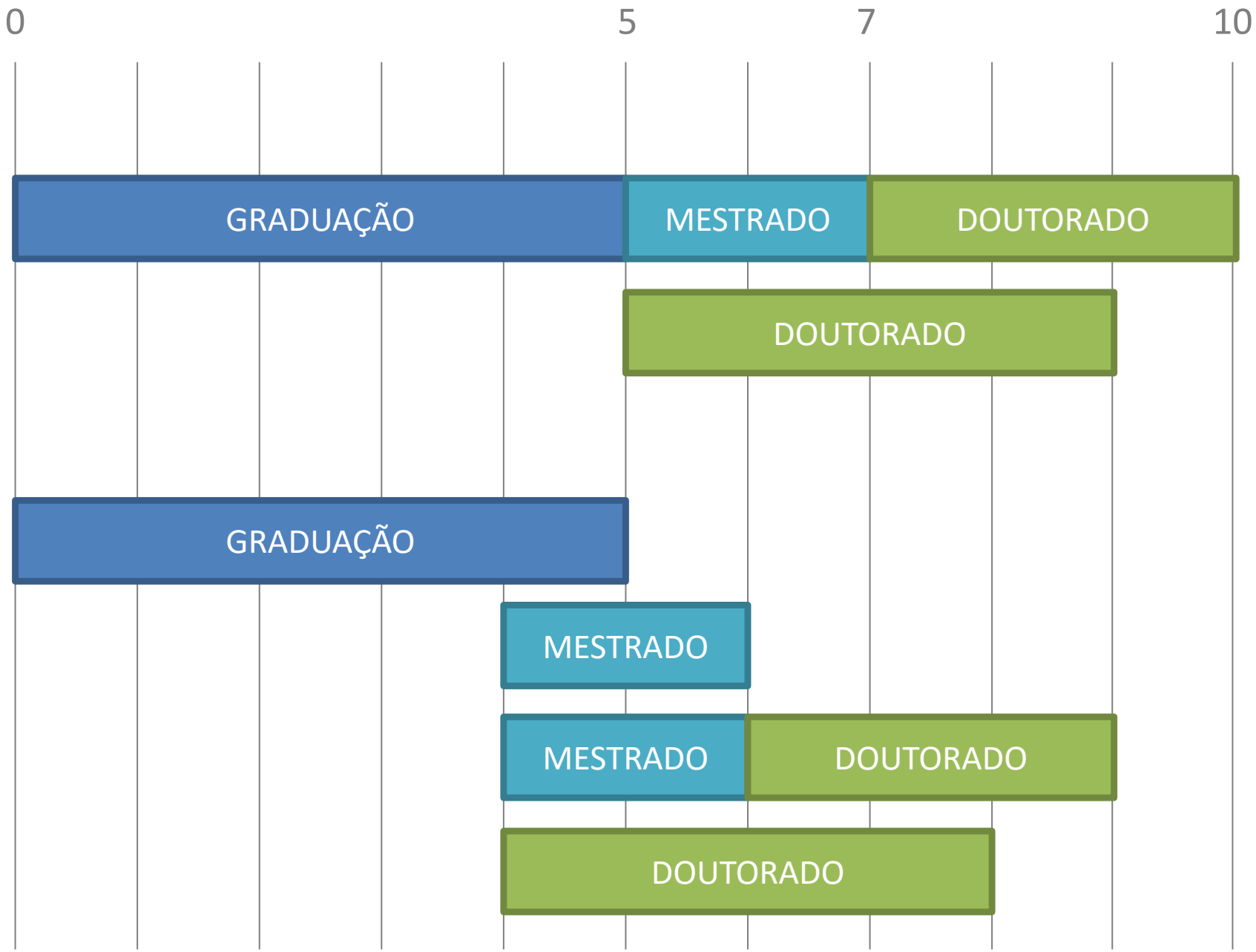
PG4

PG5

PG6

Pré-Mestrado em Engenharia Naval e Oceânica

- Pré-orientador do PPGEN
  - Definição do tema
  - Escolha das disciplinas
  - Acompanhamento
- Iniciação Científica
- Duas disciplinas de acompanhamento
  - Substitui as duas optativas do 5º ano
- Trabalho de Formatura alinhado com o tema de PM
- Continuação no PPGEN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GRADUAÇÃO
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NAVAL 1º Semestre

Grupo do WhatsApp

Escaneie ou carregue esse código QR usando a câmera do WhatsApp para entrar neste grupo

PESQUISA

POLI 19

VELEIRO PARAOLÍMPICO

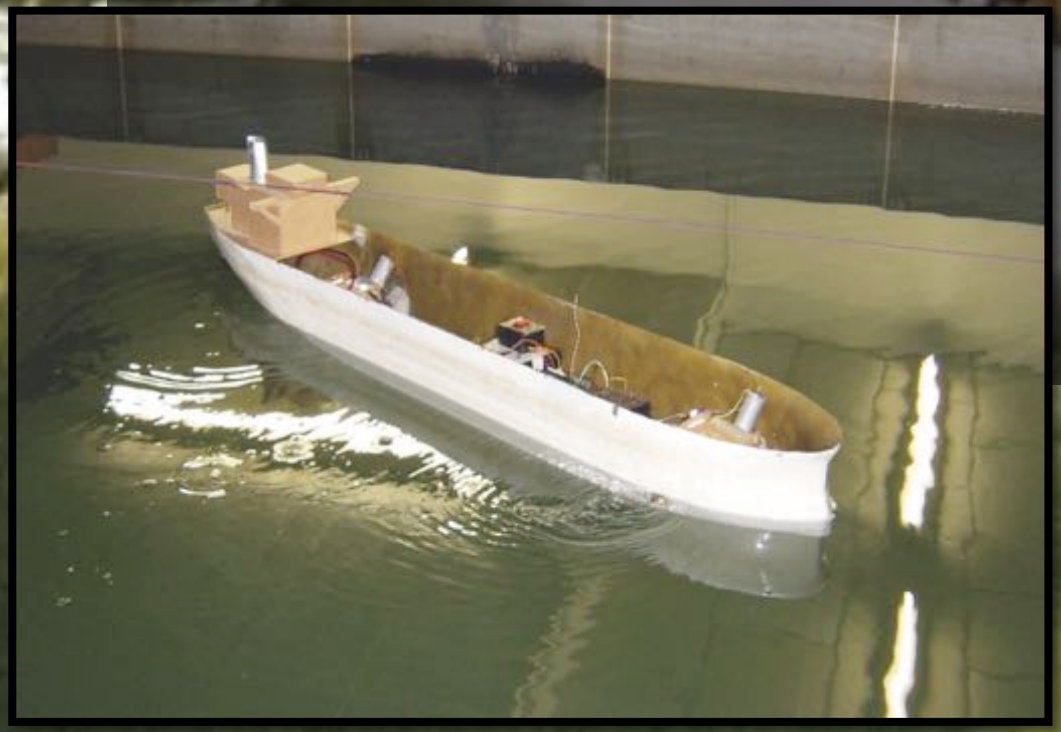
LABRISCO Risk Management

- Reliability of complex and/or critical systems.
- Evaluation and risk management.
- Human error contribution.

www.labrisco.usp.br

LabRisco

Dynamics & Control

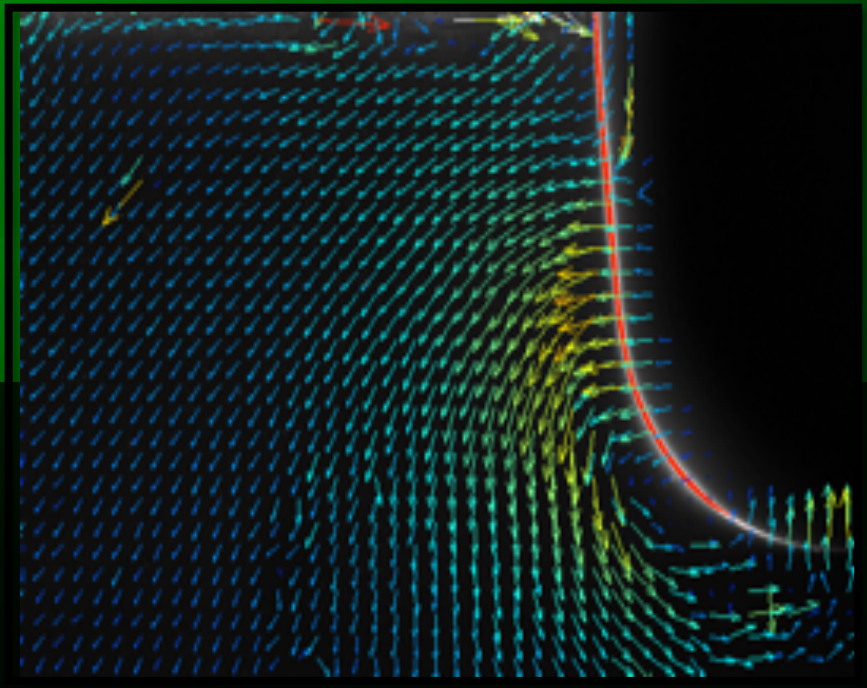


- Advanced models of the dynamics of floating and submersible systems.
- Non-linear dynamics.

Dinâmica & Controle

LabNUMERAL

Numerical Methods in Engineering



NAMEF Fracture Mechanics & Structural Integrity

- Fracture and fatigue
- Structural integrity and defect assessment
- High-performance structures: welded steel, nuclear reactors, pressure vessels, pipelines, offshore platforms, naval vessels, etc.

CEGN

Centro de Estudos em Gestão Naval

Port Management

Port and terminal logistics.

Support for governmental policies and private strategies.

CILIP

Innovation in Logistics and Port Infrastructure

- Analysis of complex logistics systems.
- Transport systems by sea, river, offshore and coast.
- Queuing theory, simulation of probabilistic techniques, heuristics, economic modeling.

LOOPIN Laboratory of Optimization and Integrated Design

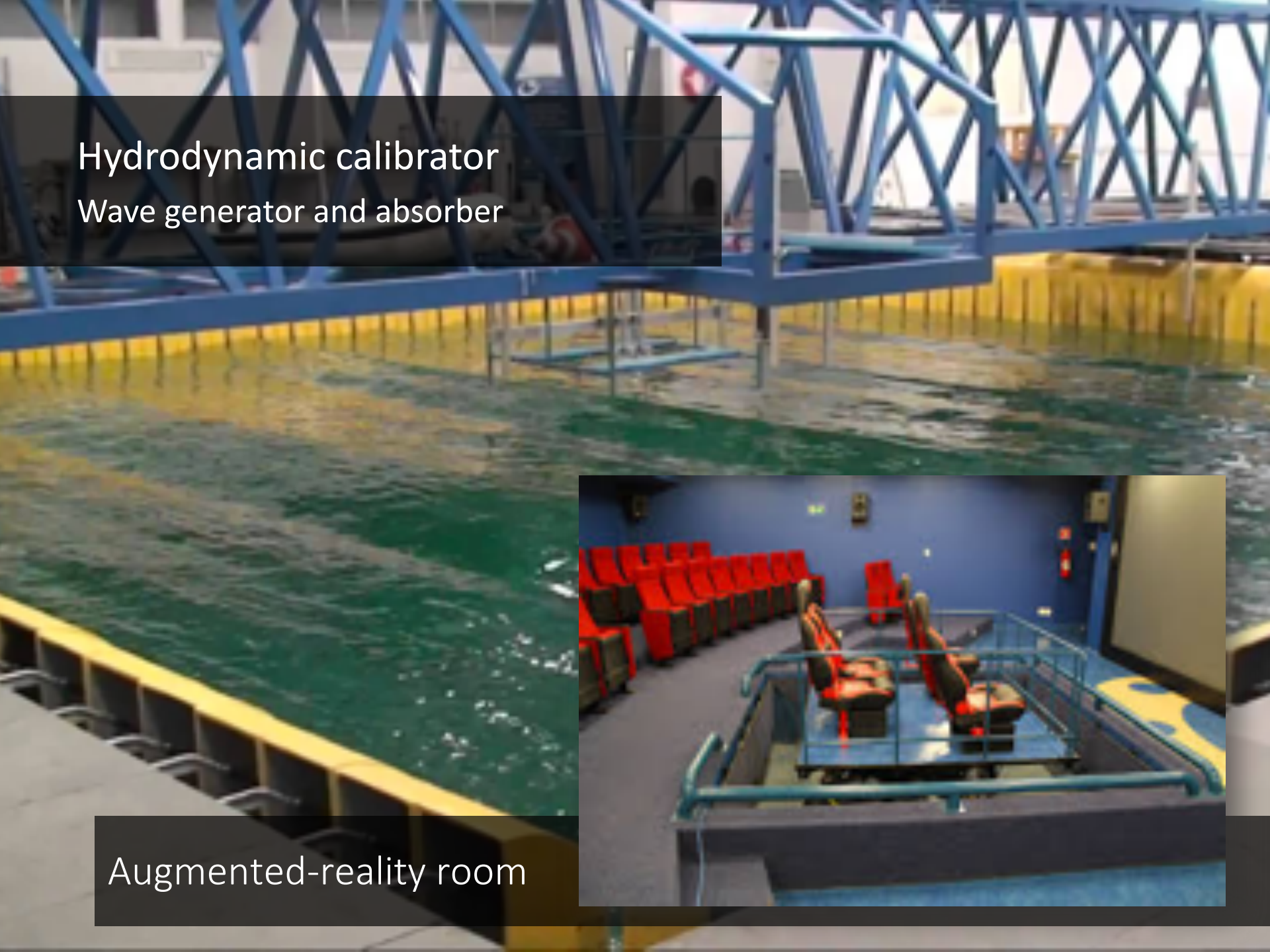
- Vessel design optimization
- Parametric representation of ocean systems
- Synthesis models

Tanque de
Provas Numérico

TPN Numerical Offshore Tank

Design and dynamic simulation of complex floating systems

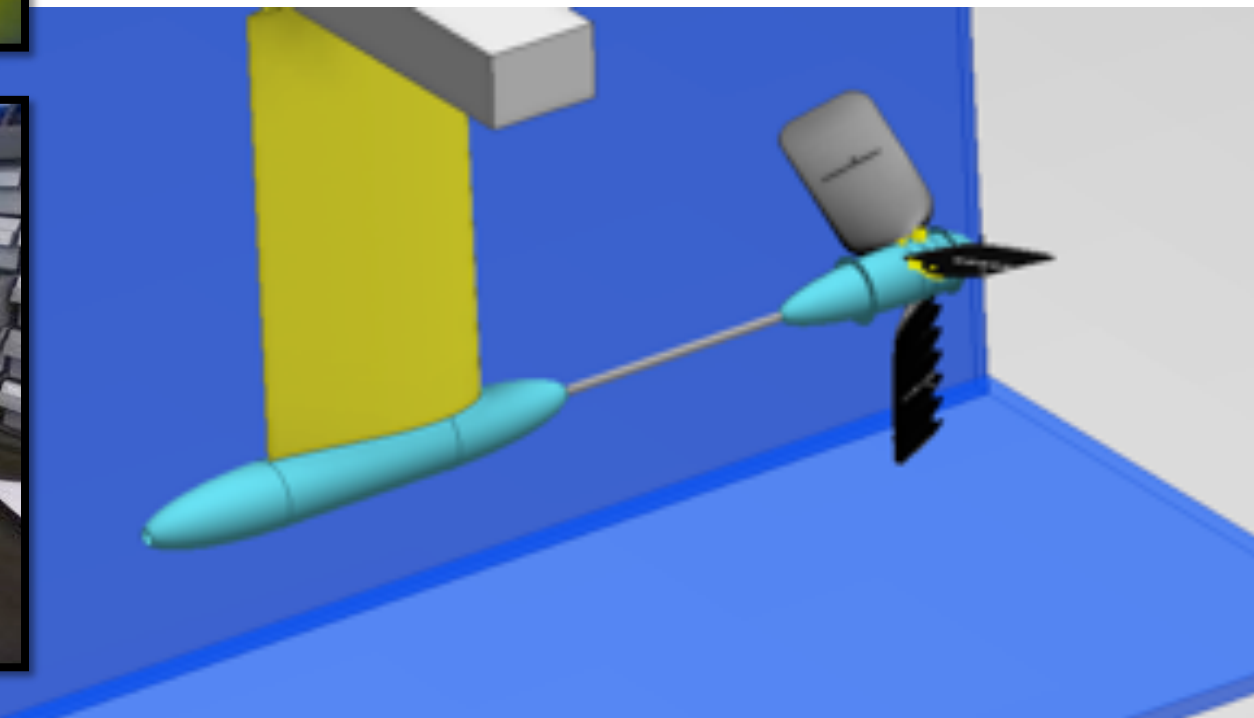
www.tpn.usp.br


Hydrodynamic calibrator
Wave generator and absorber
Augmented-reality room

gero

energia renovável do oceano

POLI - USP



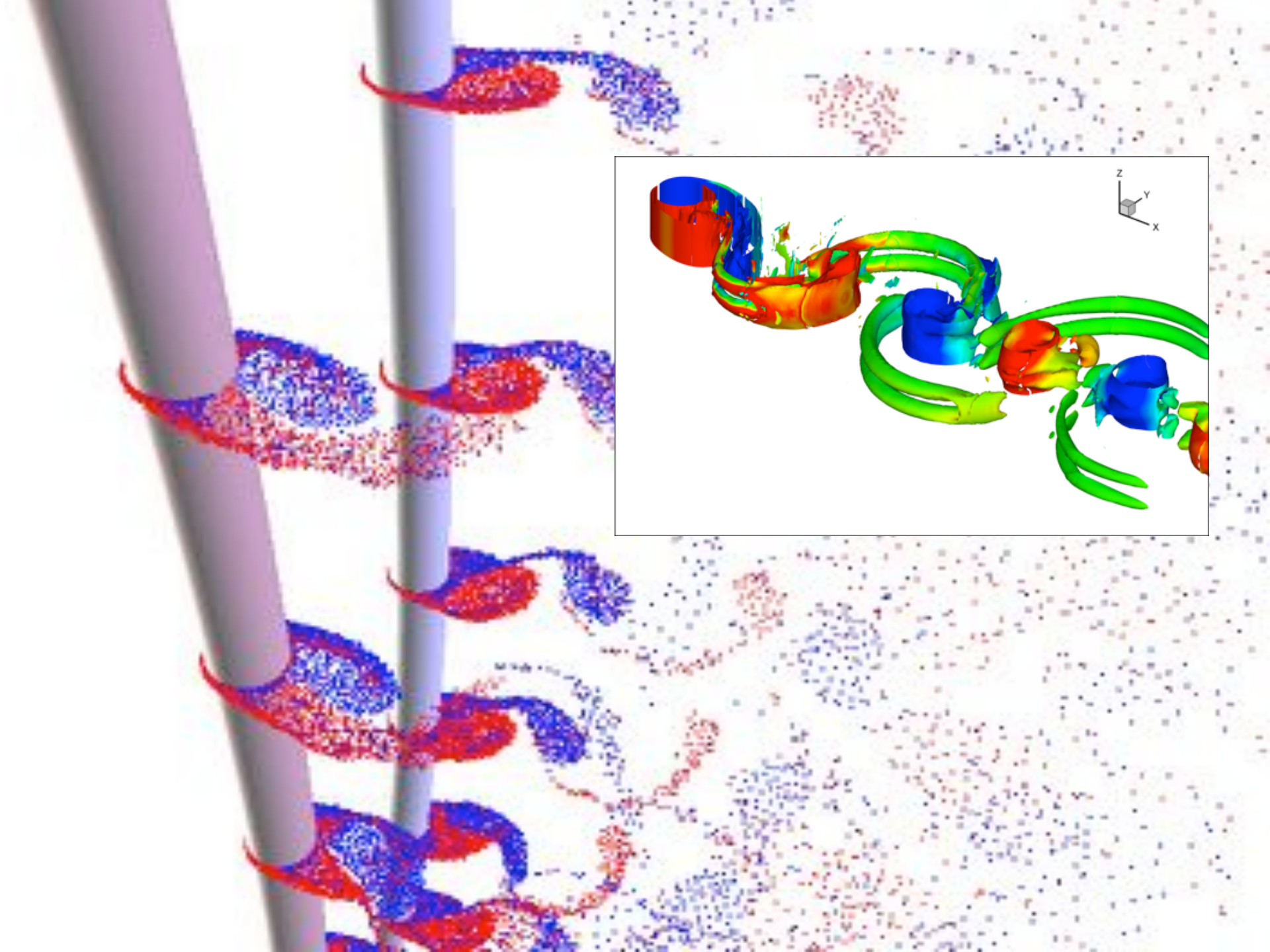
FLUIDS & DYNAMICS RESEARCH CENTRE

www.ndf.poli.usp.br

ANALYTICAL

EXPERIMENTAL

NUMERICAL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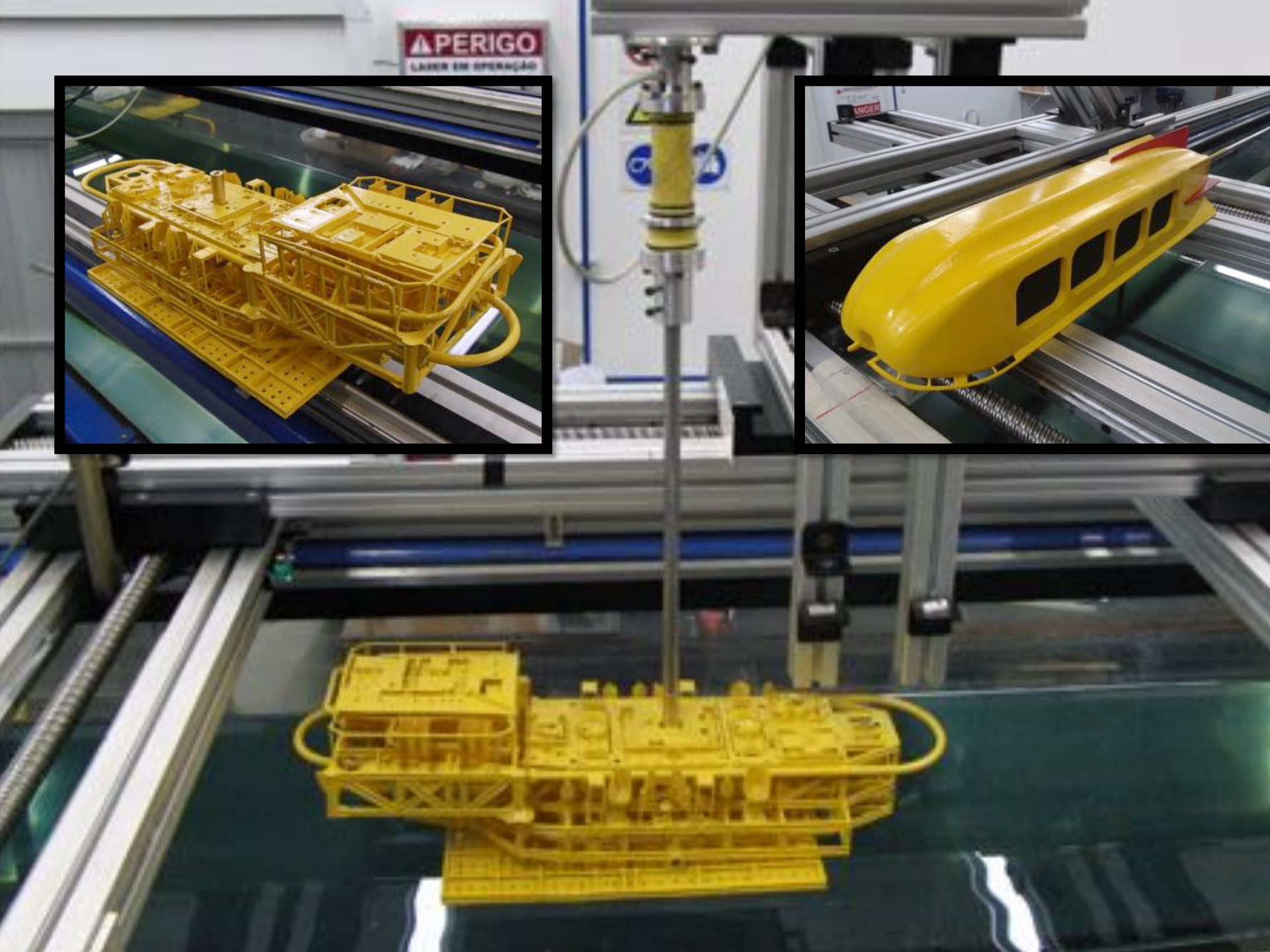
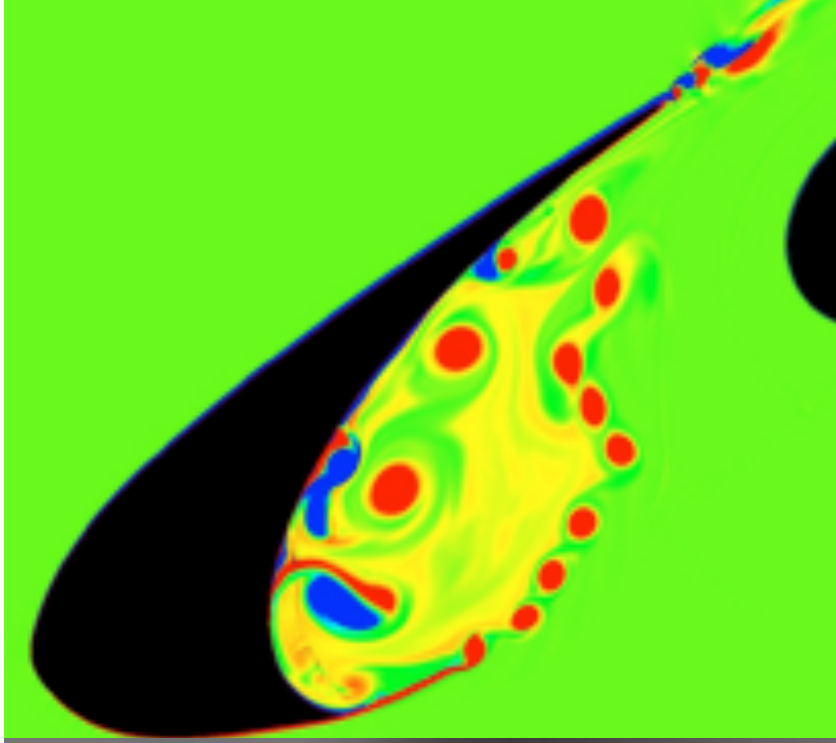

PERIGO
LASER EM OPERAÇÃO

www.silentaircraft.org

EMBRAER



Research Centre for Gas Innovation

RESEARCH
INNOVATION
DIFFUSION OF KNOWLEDGE

www.rcgi.usp.br

FAPESP

Shell

NAVAL 1º Semestre

Grupo do WhatsApp

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Outras informações

- Optativas
- Disciplinas de PG
- Atividades extracurriculares

- Tutoria

- Artigo...

Não entrem em Artigo!

Regimento Geral da Universidade de São Paulo

Artigos 75

Cancelamento de matrícula... se o aluno não se matricular por dois semestres consecutivos... e se o aluno não obtiver nenhum crédito em dois semestres consecutivos

Artigo 76

...o aluno que não obtiver aprovação em pelo menos 20% dos créditos cursados nos dois semestres anteriores ... tem a matrícula condicionada à análise da CG

Artigo 80

O aluno que for excluído pode requerer reingresso uma única vez em até cinco anos da exclusão.

PNV USP

INICIAÇÃO CIENTÍFICA

Iniciação Científica

A Naval tem a meta de manter 40% de seus alunos em programas de Iniciação Científica

Bolsas de agências de fomento

- FAPESP
- CNPq / PIBIC
- FDTE
- FUSP
- Amigos da POLI
- AEP
- PRH (ANP, Petrobras)

Laboratórios e Grupos de Pesquisa

LabRisco
LOPIN
LabNumeral
CEGN
CILIP
TPN
NavFrac
Otimização
Dinâmica de Sistemas e Controle
NDF
GERO

Apresentação organizada pelo CEN

PNV USP

INTERCÂMBIO ACADÊMICO

Intercâmbio Acadêmico

Há três tipos de Programas de Intercâmbio no Exterior:

Programas de diploma duplo

- França
- Itália
- Alemanha
- América Latina

Pacote fechado
(2 anos)

Aproveitamento de créditos

- Longa lista...

Aproveitar como optativas livres
(de 6 a 18 meses)

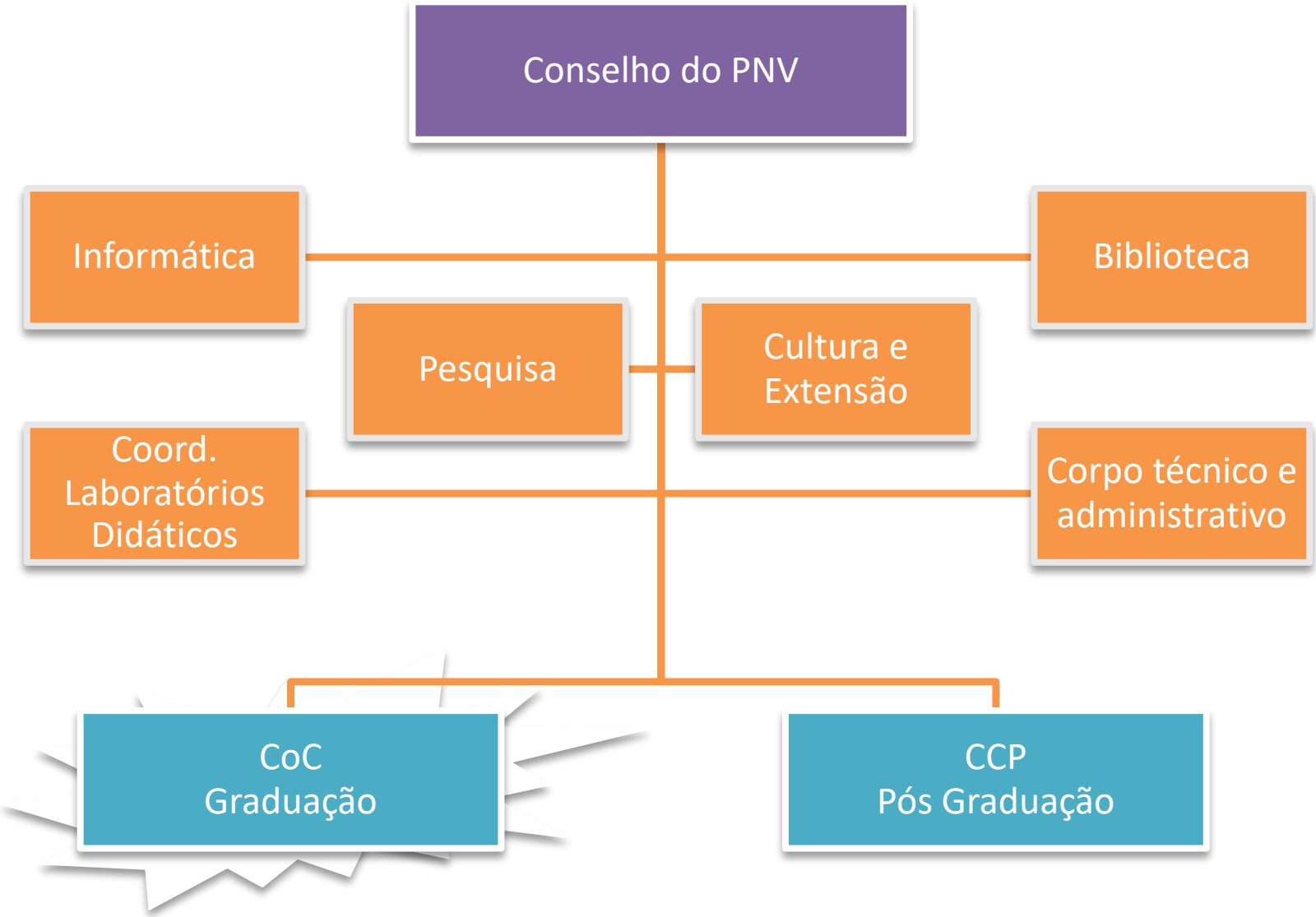
Programas independentes

- Consultar a CRInt

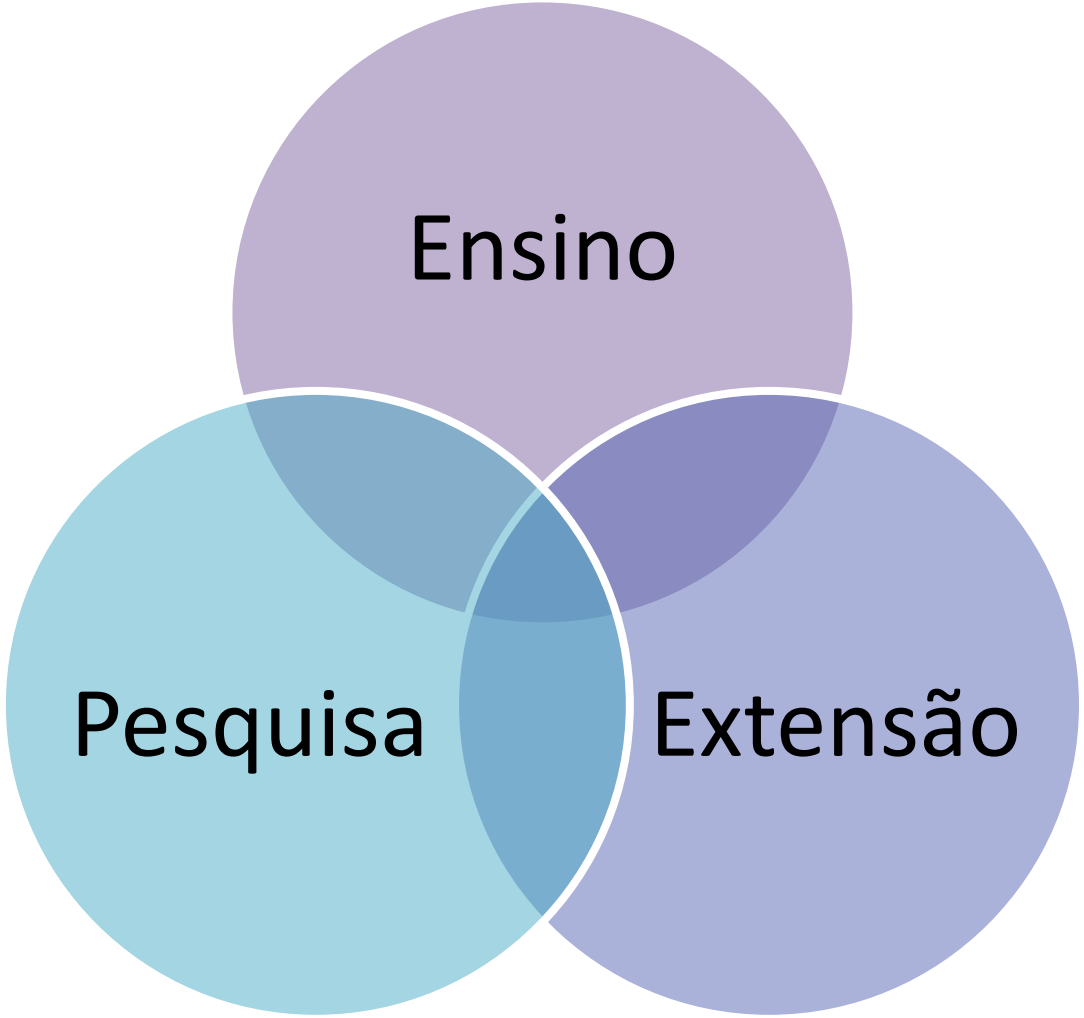
PNV USP

DEPARTAMENTO DE ENGENHARIA NAVAL E OCEÂNICA

Organização do Departamento



Organização do Departamento



Corpo docente

Alexandre Nicolaos Simos

André Bergsten Mendes

Bernardo Luis Rodrigues de Andrade
Chefe do Departamento

Claudio Mueller Sampaio Prado

Claudio Ruggieri
Diego Felipe Sarzosa Burgos

Gustavo Roque da Silva Assi
CoC Naval – Graduação
CRInt

Hernani Luiz Brinati

Hélio Mitio Morishita
Vice-Chefe do Departamento

Jessé Rebello de Souza Junior

Kazuo Nishimoto

Marcelo Ramos Martins
CCP Naval – Pós Graduação

Marco Antonio Brinati

Marcos Mendes de Oliveira Pinto

Toshi Ichi Tachibana

Miguel Santoro

Corpo técnico e administrativo

Secretaria

- Lânia
- Marli
- Adenilson

Laboratórios e oficina

- João Alcino
- Márcio Firmino

Participação discente

A participação dos alunos é de extrema importância!

Escolha bem seus representantes no

- Conselho
- CoC Graduação
- CCP Pós Graduação

OUTRAS INFORMAÇÕES

Seminários de Pesquisa e Desenvolvimento

SEMINÁRIO

Investigação numérico-experimental do escoamento ao redor de cilindros fixos e inclinados com condições de extremidade não simétricas

Guilherme Franzini
Universidade de São Paulo
POLI – PNV – NDF

31/10/2012, quarta-feira
11h30, Sala ET-03

PNV
USP

Seminários de Pesquisa
Para receber informações envie um email para Prof. Dr. Gustavo Assi (g.assi@usp.br) ou acesse www.pnv.poli.usp.br/seminarios.php

Departamento de Engenharia Naval e Oceânica
Escola Politécnica da Universidade de São Paulo

SOBENA – Sociedade Brasileira de Engenharia Naval

Fundada em 1962

Periódico

Marine Systems & Ocean Technology

pnv.poli.usp.br

@navalpoliusp

NAVAL 1º Semestre

Grupo do WhatsApp

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Sejam bem-vindos!
Obrigado pela atenção.

Prof. Gustavo R. S. Assi
g.assi@usp.br