ENGineering and INdustry Innovative Training for Engineers (ENGINITE)

PROJECT NUMBER
2017-1-CY01-KA202-026728

A2 course

Project Management in Action

Prepared by CUBEIE LLC

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Table of Contents

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1. Part A – General information

Title:	A4- Project Management in Action
Keywords:	Project Management, Problem based learning, Engineering, Scheduling
Author(s):	Developed by Panayiotis Andreou & Andreas Andreou
Duration:	1 day online reading/study on Google Classroom and 1 week face to face (f2f)
Language of materials	English and Greek
Type & number of sessions:	Online schedule: • Online day1 online reading/study on Google Classroom. Relevant material and questioner will be provided for the preparation of the F2f sessions. Face to Face schedule: • f2f day 1 (3-hours session): presentation of the problem scenario, grouping, identification of learning issues within the groups, class-wide discussion of learning issues. • f2f day 2 (3-hours session): group work, interviewing process, progressing on learning issues and solutions. Explore PM scheduling tools (e.g MS Project). • f2f day 3 (3-hours session): group work, interviewing process, present new constrains and information that affecting the Project Management (PM) scheduling & outcoming. • f2f day 4 (3-hours session): group work, interviewing process for completing the PM deliverables, providing final guidance for the presentation. • f2f day 5 (3-hours session): submission of the technical report & presentation (per group) of the progress and main outcomes for the given problem scenario. Self-evaluation and cross challenging for selecting the best PM approach.
Number of participating engineers:	20-25 engineers.
Groups' setting	Mixed gender, multidisciplinary groups of engineers, 5-7 members in each group (as per guidelines of PBL literature) Each team group will select its own leader.

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2. Part B – Module Overview & Key Learning Outcomes

2.1. Overview

The course aims to enrich engineers' knowledge and capabilities in Project Management (PM) and enable them to successfully participate in or lead complex projects with tight schedule, limited resources, yet with high quality results. Besides in real-world industrial workplaces, parameters constantly change and problems have to be overcome, thus the engineers need to be properly trained. For this purpose, real industrial projects in combination with the Problem Based Learning (PBL) approach will be used during the course, to equip the engineers with the required skills. Great organizational and analytic skills, understanding of leadership, management and teamwork, along with a holistic grasp of the project-at-hand are just some of the capabilities that engineers need and will acquire through this course. Good practices and user-friendly software will also be available as participants' tools.

2.2. Key learning outcomes:

Upon completion of the course, participants should be able to:

- Apply Project Management design and development in real projects
- Recognize the important elements of efficient team working and leadership in project management
- Manage effectively any project in terms of cost, timeframes, quality, and deliverables.
- Perform risk assessment for the main parameters of the project.
- Learn how to monitor project activities and assess progress
- Define and monitor Key Performance Indicators (KPIs) as well as take corrective measures for the project success
- Employ scheduling software productively along with applied technics.

2.3. Course Material / Software

- All participants need to use their own PCs/laptops/tablets.
- ProjectLibre - Project Management (Opensource) or Microsoft Project software will be used for the scope of the course.
- ProjectLibre Manual

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3. Part C – Learning Scenario

3.1. Problem-based learning scenario

New bottling era for AP Finest Water Co

The movement against the usage of plastic is getting more power and ban laws and EU legislation are following the same direction. Perhaps, France is the first country in the world that took the initiation and establishing a new law against the disposable plastic cups and plates and the use of new biologically-sourced materials[1].

AP Finest Water Co is the leading water bottling company in your country, with most of its products contained in plastic. The anti-plastic matter drags the attention of the CEO of the company that strongly believes that this is a major opportunity for its company to evolve the bottling procedure and the materials used, but also to highlight the strategic social & environmental responsibility of his firm. The EU announced that any company that wish to update the production line of bottling with a material free of plastic or with reduced percentage of plastic material may be eligible for funding. The amount of the funding is up to 85% of the total expenses – terms and conditions are applied.

You are the responsible Engineer for the production lines at the AP Finest Water Co manufacturing plant and during the last weekly meeting, the CEO shared with you his vision of creating a new bottling solution and era for the mineral water. He has assigned you, along with your team, especially hired by the AP Finest Water Co, to study the situation/problem, indicate the best alternative bottling solutions in cooperation with the firm and also to provide a roadmap for the new bottling solution in the production line.

The timeframe is strict, and you have less than 1 week to come up with a 3 months roadmap and implementation plan. You have to prepare a comprehensive presentation and a technical report in order to provide to the CEO all relevant information.

The project is confidential since the final product will be supported by a marketing campaign in order to increase the market share in your country but also to present your proposal to the upcoming food & beverage fair.

[1] France becomes first country to ban plastic cups and plates, By Sophie Eastaugh, for CNN, 20/10/2016

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Tips for the facilitator/instructor:

1. The technical report should include at least the information below:
    - Analysis of the project,
    - Required steps/activities/resources
    - Execution plan/scheduling of the project,
    - Risk management,
    - The overall cost estimation,
    - The benefits of using a plastic free material or reduced percentage of plastic material

    The facilitator should strategically guide the engineers how to secure the required information and data. The final report structure is given on Part F: Post Module (post-training).

2. The scenario/problem given above can be slightly modified and refer to a different manufacturing process/industry. For example, instead of using the bottling industry 'problem', a different manufacture's scenario may be employed. Examples are given below. However, if the scenario is altered, the given reference background and other reference information should be updated accordingly.
    Examples:
    - AP plastic cups production LTD. Industry which produce plastic cups is seeking to move to plastic-free single-used cups.
    - AP plastic bags production LTD. Industry which produce plastic bags is seeking to use a new plastic-free and environmental friendly supermarket bags.

3. The below changes and extra information can be used in order to challenge the prescribe problem scenario. In this way, the given problem became more authentic since at the real working environment the information, data, and scenarios are constantly being changed.

    Challenges:

    I. **Purchasing options -** You have 2 options regarding the required bottling machines/modules:
        (a) purchase a new bottling module that costs approx. 450 000 € and can be installed within 3 months after ordering or

        (b) purchase a used one that costs 70% less and can be install in just 3 weeks but this expenditure budget cannot be covered by the EU funding and no guarantee is given.

        Explain and support sufficiently your choice. This should be included in the technical report.

    II. **Delay in time** - The graphic designer (GD) of the new container is very busy he is asking an extension of 10 working days.

    III. **Selected material issues** - The usage of glass, as an alternative material, results in heavier bottle which affect the transportation and distribution of the bottles. Asses the risks that are possible to be caused is such a case. How can you manage and eliminate the risk?

    IV. **Budgeting / resources** - For the EU funding, a grant application is required. Although, you can outsource the preparation of grant proposal and documentation, yet 30 working days

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are required for the whole procedure and it will cost 15000€. Does this affect you project? in which ways? How can you eliminate the negative impact if any?

V. **New requirement (extra time and cost)** - The new bottling material require new wrapping packing design free of plastic or with reduced percentage of plastic as well and suitable for carrying number of water bottles. Therefore, you have to consider extra time and cost for the packaging as well. Does this affect you project? in which ways? How can you eliminate the risk(s) and the negative impact if any?

VI. **New requirement (Marketing and technological requirement, extra time and cost)** A dynamic QR-code is required in the new container so that will divert the user to a multimedia experience. The CEO did not specify what he means by the 'experience' so you need to include 2 options with the relevant timeframes and recourses may be required.

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Relevant Images

https://www.google.com.cy/imgres?imgurl=https%3A%2F%2Fc1.staticflickr.com%2F7%2F6122%2F6003366145_c3e21354c6_b.jpg&imgrefurl=https%3A%2F%2Fwww.flickr.com%2Fphotos%2Farmydre2008%2F6003366145&docid=de8C2yG6AoZVCM&tbnid=LlTbaWALzZtZrM%3A&vet=10ahUKEwiv1rTfxJHbAhXKLVAKHSlnDhEQMwjwASgVMBU..i&w=1024&h=768&bih=685&biw=1536&q=plastic%20bottle&ved=0ahUKEwiv1rTfxJHbAhXKLVAKHSlnDhEQMwjwASgVMBU&iact=mrc&uact=8

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https://unsplash.com/photos/Vmd15q3Nwpc

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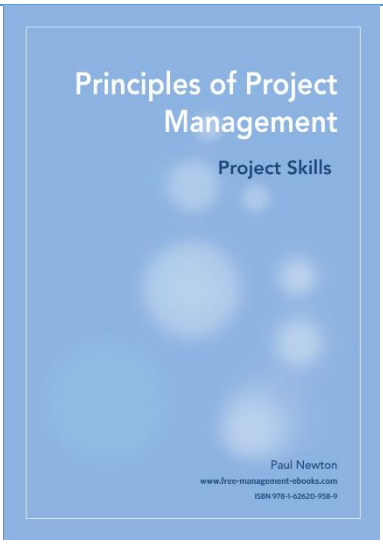
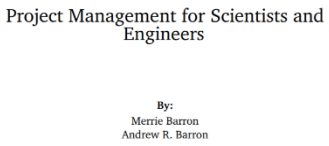
4. Part D: Pre-module preparation

4.1. Background information

The table below provide the sources of information that Engineers may refer for enchasing their knowledge in Project Management.

4.1.1. PROJECT MANAGEMENT MATERIAL	
Title	**Link**
PM Material Resources for Project Management (in Greek)	http://kkir.simor.ntua.gr/resources.html
http://www.free-management-ebooks.com/dldebk-pdf/fme-project-principles.pdf	 http://www.free-management-ebooks.com/dldebk-pdf/fme-project-principles.pdf
Project Management for Scientists and Engineers	 https://textbookequity.org/Textbooks/Barron_pmscieng.pdf

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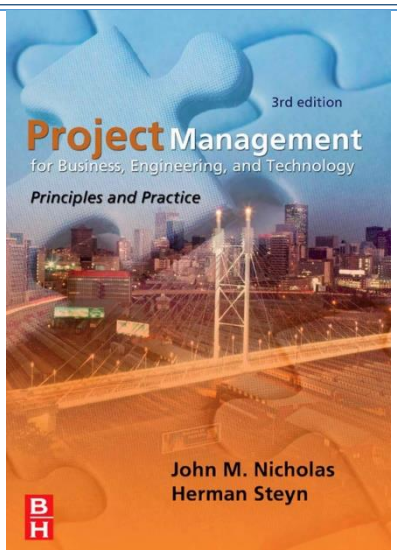
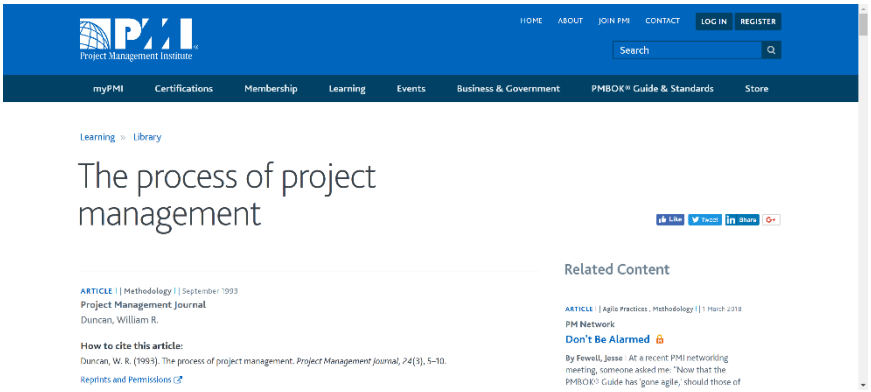
Project Management for Business, Engineering, and Technology	 http://197.14.51.10:81/pmb/CHIMIE/Project%20Management%20for%20Business%20%20Engineering%20%20and%20Technology.pdf
Project Canvas (It can be used by the instructor for the presentation)	http://www.projectcanvas.dk/project-canvas.pdf http://www.projectcanvas.dk/project-canvas-manual.pdf
What is Project	https://www.managementstudyguide.com/what-is-project.htm
What is Project Management?	https://www.managementstudyguide.com/what-is-project-management.htm
Who are Project Managers?	https://www.pmi.org/about/learn-about-pmi/who-are-project-managers
The process of project management	 https://www.pmi.org/learning/library/basic-process-project-management-2114

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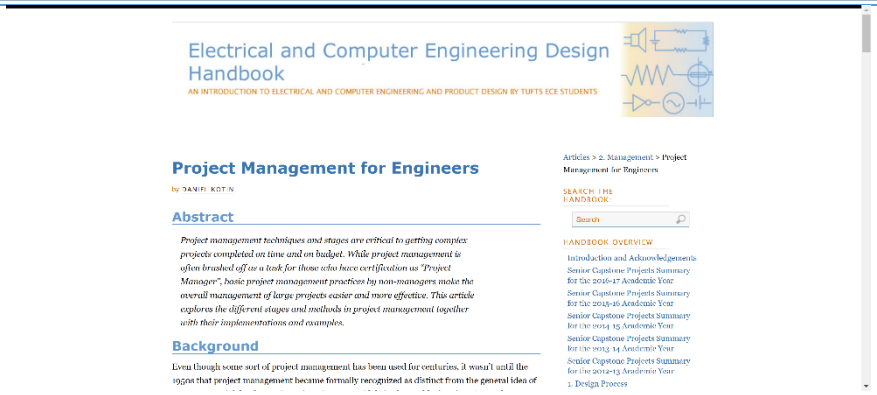
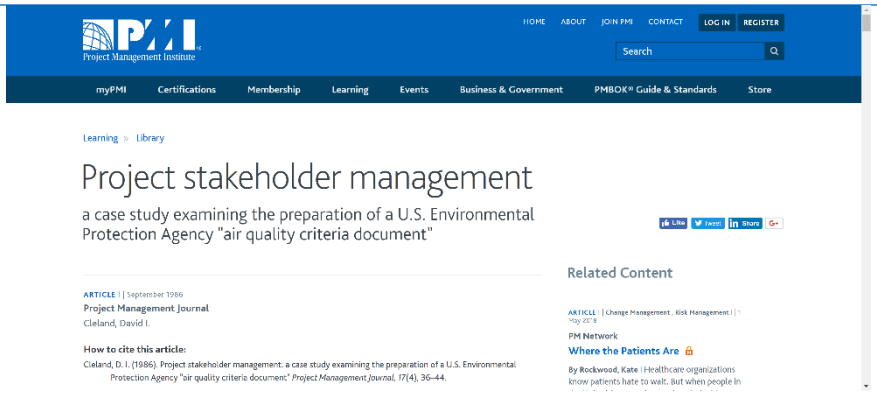
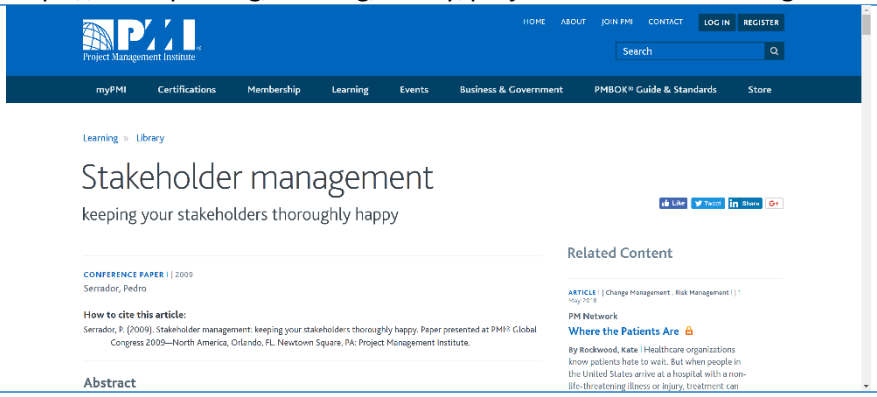
Project Management for Engineers	 https://sites.tufts.edu/eeseniordesignhandbook/2013/project-management-for-engineers-2/
How project strategy is used in project management: Cases of new product development and software development projects	 https://www.sciencedirect.com/science/article/pii/S0923474812000185?via%3Dihub
Project stakeholder management	 https://www.pmi.org/learning/library/project-stakeholder-management-5216
Stakeholder management keeping your stakeholders thoroughly happy	

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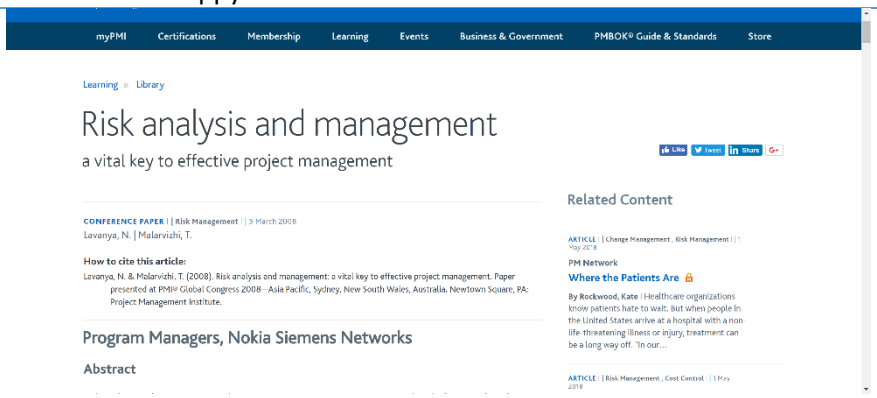
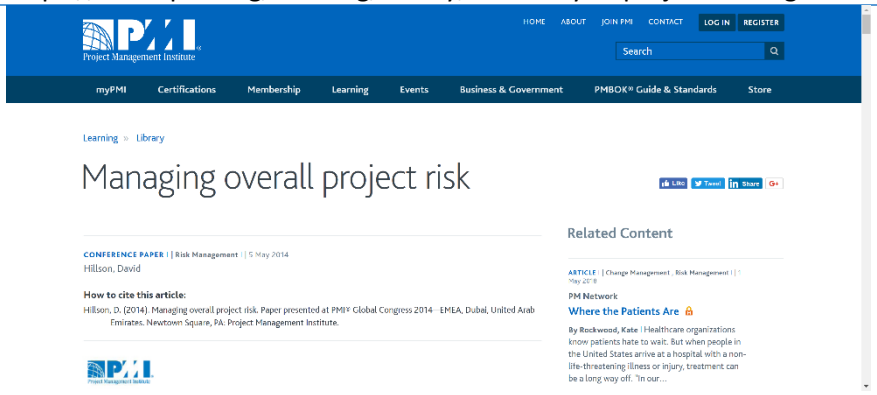
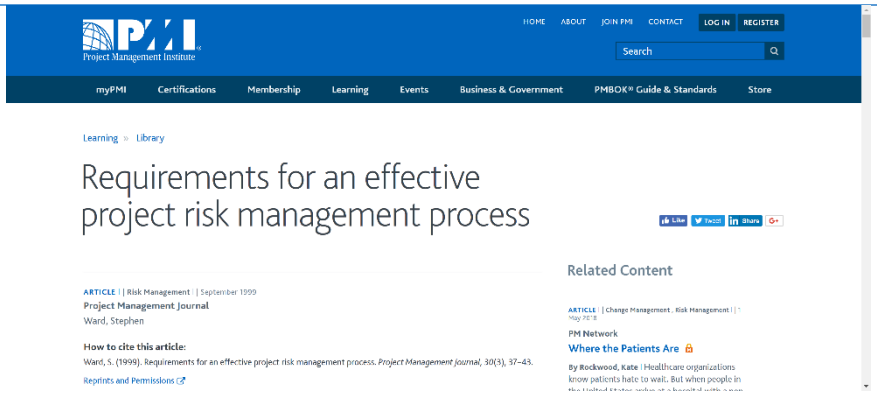
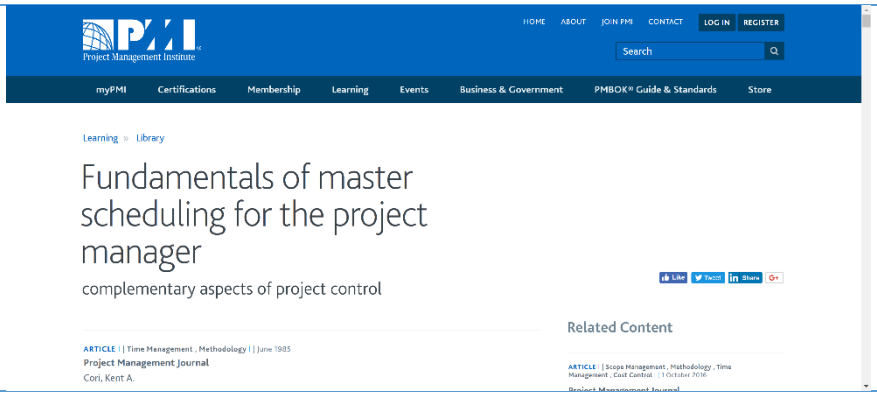
	https://www.pmi.org/learning/library/stakeholder-management-keeping-stakeholders-happy-6697
Risk analysis and management	 https://www.pmi.org/learning/library/risk-analysis-project-management-7070
Managing overall project risk	 https://www.pmi.org/learning/library/overall-project-risk-assessment-models-1386
Requirements for an effective project risk management process	 https://www.pmi.org/learning/library/effective-project-risk-management-process-5311
Fundamentals of master scheduling for the project manager	

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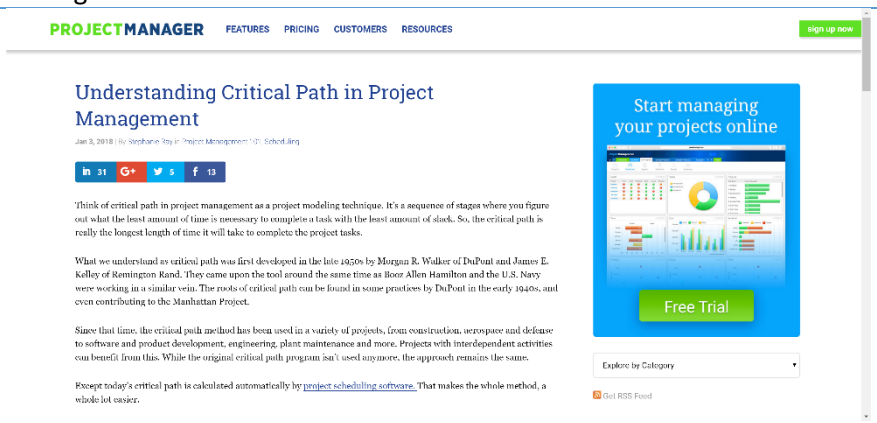
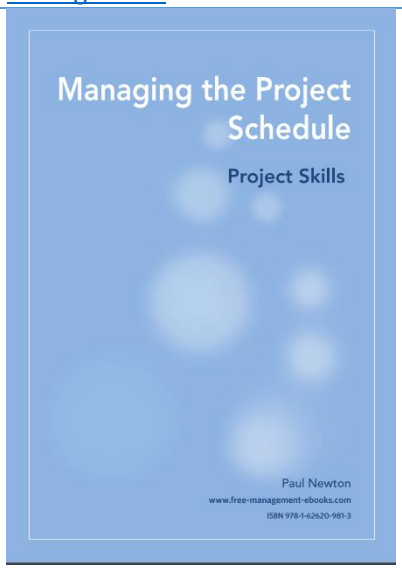
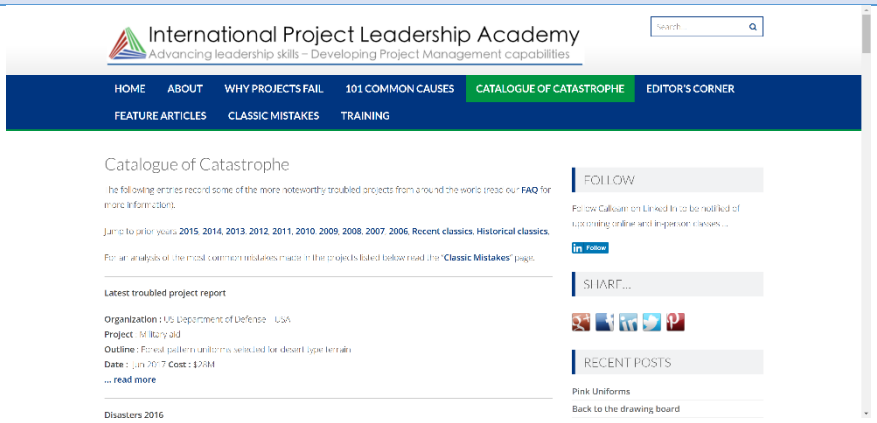
	https://www.pmi.org/learning/library/fundamentals-master-scheduling-project-manager-1809
Understanding Critical Path in Project Management	 https://www.projectmanager.com/blog/understanding-critical-path-project-management
Understanding Critical Path in Project Management	 http://www.free-management-ebooks.com/dldebk-pdf/fme-project-schedule.pdf
4.1.2. LEARNING FROM FAILED PROJECTS	
Catalogue of Catastrophe	 http://calleam.com/WTPF/?page_id=3#2015

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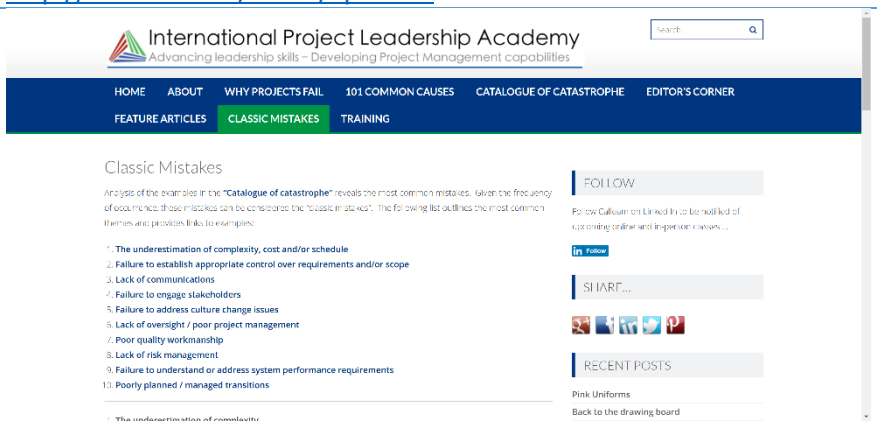
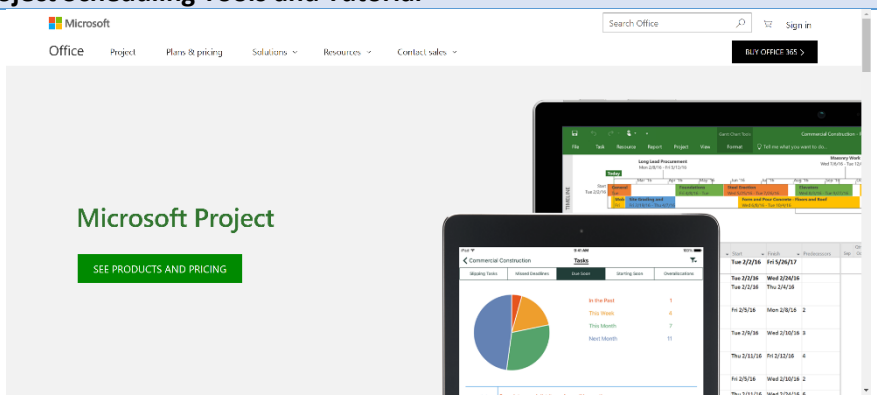
	Volkswagen: http://calleam.com/WTPF/?p=7666
Classic Mistakes	 http://calleam.com/WTPF/?page_id=799
21 Shocking Project Management Statistics That Cost Business Owners Millions Each Year	 http://blog.mavenlink.com/21-shocking-project-management-statistics-that-explain-why-projects-continue-to-fail
4.1.3. Project Scheduling Tools and Tutorial	
Microsoft Project	 https://products.office.com/en-us/project/project-and-portfolio-management-software
Tutorial	https://www.tutorialspoint.com/ms_project/ms_project_tutorial.pdf

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MS Project 2010	

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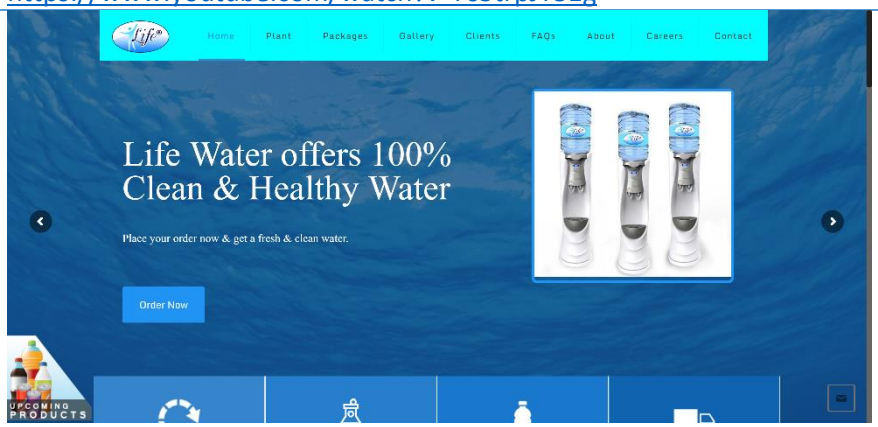
4.2. Case study additional material

The table below provide the source of learning material and information related to the PBL senario that Engineers need to discover in order to provide their solution to the given problem.

4.2.1. BOTTLING PROCEDURE	
Title	**Link**
Bottled Mineral Water: How It's Made	https://www.youtube.com/watch?v=gqvJHz7WqyM https://www.youtube.com/watch?v=Fs3trpJY31g
Mineral Water bottles informations	 http://www.lifewaterpk.com
4.2.2. PLASTIC FREE – THE EU INTENTION AND VISION FOR THE PLASTIC BOTTLES	
Title	**Link**
Independent British festivals commit to banning plastic bottles and straws by 2021	 https://www.theguardian.com/music/2018/apr/19/independent-british-festivals-commit-to-banning-single-use-plastic-by-2021

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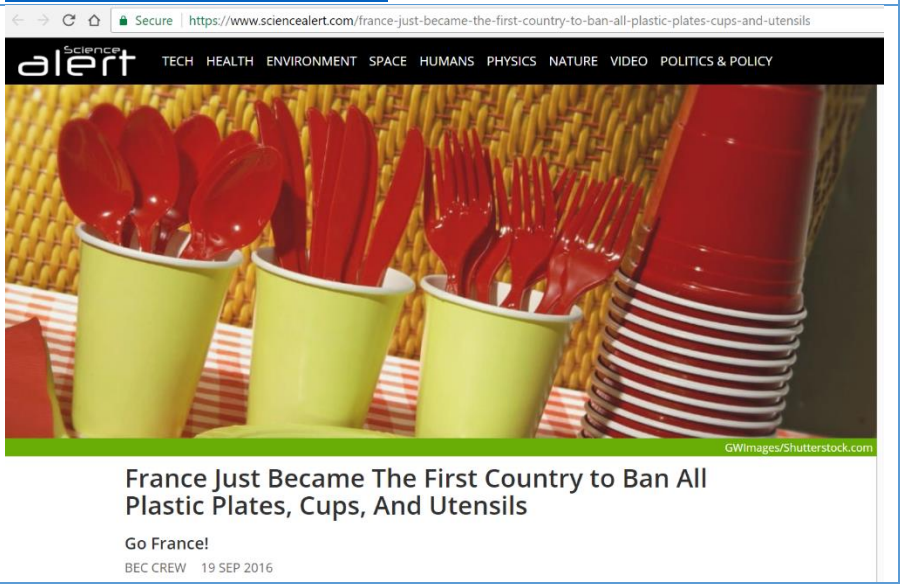
Could New York City Parks Be Going Plastic Bottle-Free?	 https://www.nytimes.com/2018/04/20/nyregion/nyc-plastic-bottle-ban-proposed.html
Balearic Islands to ban plastic by 2020 in bid to clean its beaches	 https://www.telegraph.co.uk/news/2018/01/17/balearic-islands-ban-plastic-2020-bid-clean-beaches/
France becomes first country to ban plastic cups and plates	

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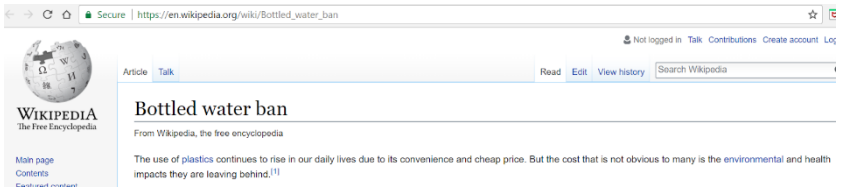
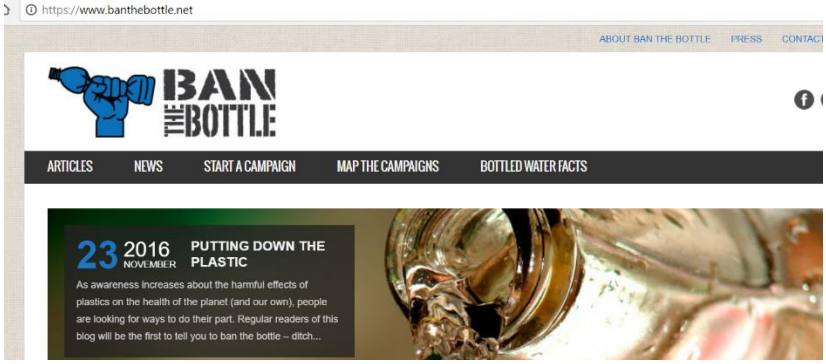
	https://edition.cnn.com/2016/09/19/europe/france-bans-plastic-cups-plates/index.html
Plastic bans worldwide will dent oil demand growth, says BP	 https://www.theguardian.com/business/2018/feb/20/plastic-bans-worldwide-will-dent-oil-demand-growth-says-bp
Bottled water ban	 https://en.wikipedia.org/wiki/Bottled_water_ban
Ban The Bottle	 https://www.banthebottle.net/
Zero waste Europe	

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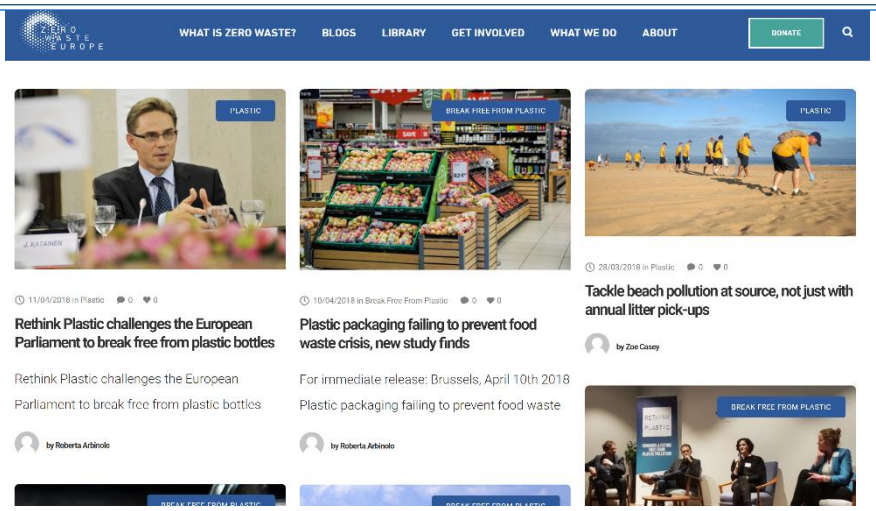

https://zerowasteeurope.eu/category/plastic/

New law for deposit on plastic bottles

http://nehandaradio.com/2016/07/26/new-law-deposit-plastic-bottles/

EU sets challenging packaging targets in new strategy

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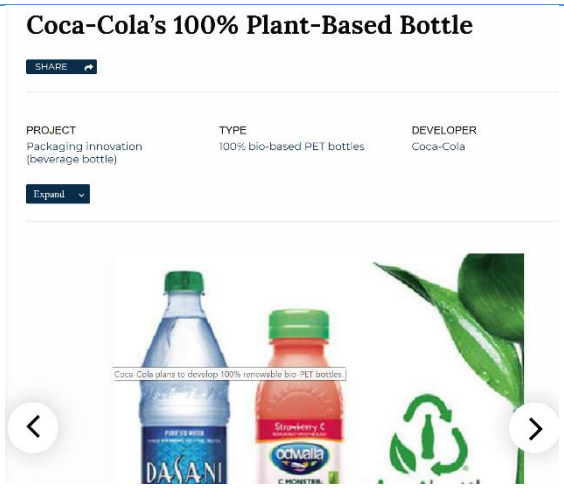
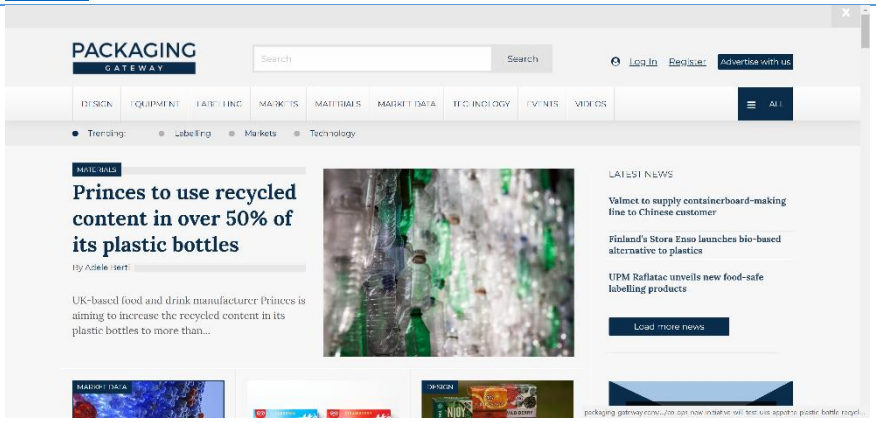
	https://www.packagingnews.co.uk/news/materials/rigid-plastics/new-eu-strategy-targets-plastic-packaging-16-01-2018
Coca-Cola's 100% Plant-Based Bottle	 https://www.packaging-gateway.com/projects/coca-cola-plant-based-bottle/
Packaging-gateway	 https://www.packaging-gateway.com/
The edible solutions to the plastic-packaging crisis	 https://www.theguardian.com/environment/shortcuts/2018/apr/09/the-edible-solutions-to-the-plastic-packaging-crisis

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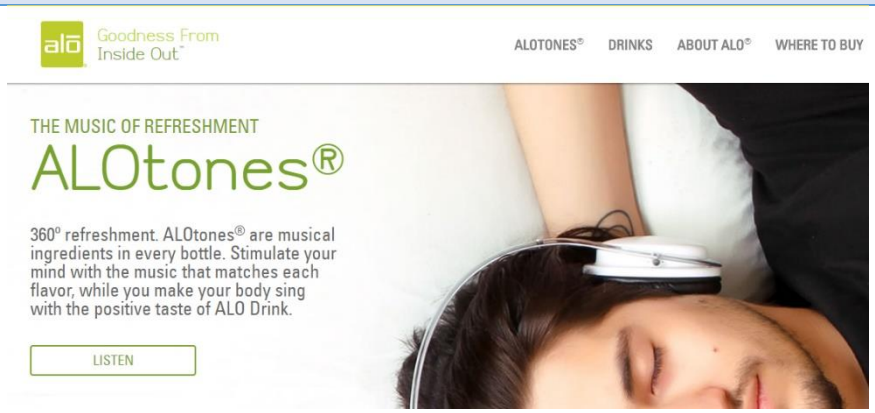
New biomaterial could replace plastic laminates in packaging	 http://www.climateactionprogramme.org/news/new-biomaterial-could-replace-plastic-laminates-in-packaging
Video Karmenu Vella: 'We were encouraged by EU ban on plastic bags'	https://www.euractiv.com/section/circular-economy/video/karmenu-vella-we-were-encouraged-by-eu-ban-on-plastic-bags/

4.2.3. INTERACTIVE EXPERIENCES IN FOOD & BEVERAGE INDUSTRY

The music of refreshment	 http://alodrink.com/alotones/

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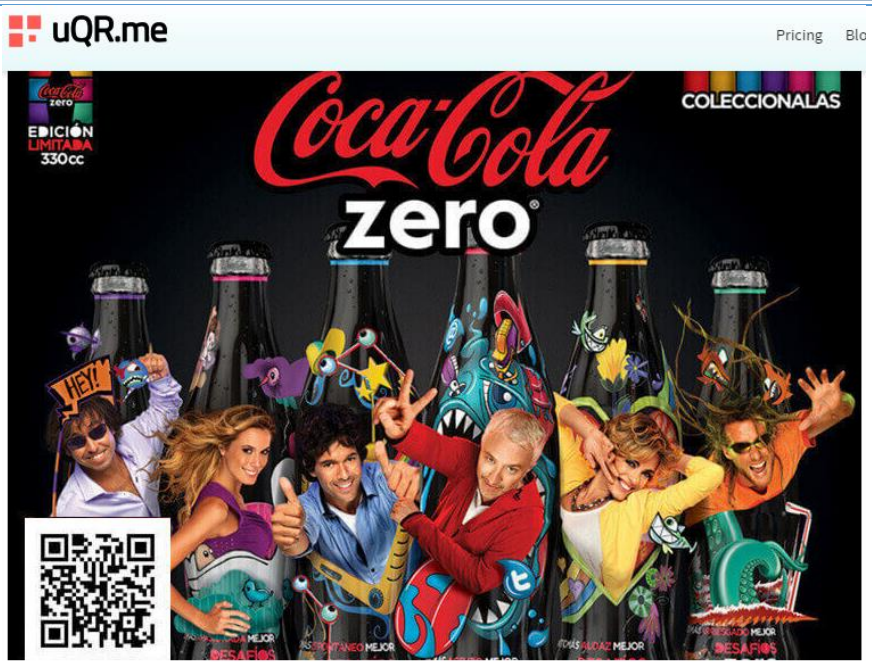
Coke Zero bottle collection with QR codes by uQR.me	 https://uqr.me/blog/coke-zero-qr-code/

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5. Part E: Module overall presentation

5.1. Introductory-presentation

Refer to the Power Point document for the Introductory presentation

5.2. Discussion questions

- What is the problem that your team had to solve? What is the purpose of the project you need to manage?
- Why PM is needed for solving the aforementioned problem? Describe 4 positive impacts of employing PM for delivering successfully your project.
- What are the criteria for the success of your project? What (goals / targets) should be achieved in order the project to be successful?
- Who are the stakeholders of your project? Who is the most important?
- Describe the phases of the project lifecycle in relation to your project.
- What are the risks you are expecting to have during the execution phase and what are the measures you will take to minimize or avoid the risks?
- What is the overall cost of your project?
- Additional key questions are given on the table below (categorize per project phases)

Table: Key questions divided at each phase of the project:

Initiation (i)	Planning (p)	Execution (e)	Closure (c)
What is a Project? What is the problem that I need to be solve? What I need? What are my options?	How do you define the scope of the project? What planning needs to be done? What does it need to be done? How much will it cost?	What risk do I need to consider? How do I engage with stakeholders? How do I communicate with and lead my team? Am I doing the project right?	Where the original objectives of the project delivered? What do I need to measure? How will I give and receive feedback? Do I understand the PM Journey?

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5.3. Useful Resources /References.

- A Guide to the Project Management Body of Knowledge (PMBoK®)
- Project Management Journal (Wiley – PMI)
- Project Management: A quick reference guide (Andreas Solomou – ISBN 978-9963-2208-1-6)
- PMP® Project Management Professional Study Guide, Eighth Edition (Kim Heldman - ISBN 978-1-932-73565-9)
- PMP® Exam Prep, 8th Edition (Rita Malcahy - ISBN 978-1-119-17967-2)
- Managing Successful Projects with PRINCE2® (OGC - ISBN 978-0-11-331059-3)

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6. Part F: Post-Module (Post-training)

6.1. Reflective questions related to the problem-based investigation. Below a set of reflective question are given which the facilitator can use in order to ask the engineers for the self-reflection phase.

- Describe the stages of a project. Which of these stages you cover during your scenarios?
- What are the most important skills for the Project Manager?
- Describe some of the difficulties you faced by applying the PM for the given problem/project. How you managed to overcome these difficulties?
- How do you define the stakeholders of a project? Do all stakeholders have a positive attitude to the project? Describe the 3 most important stakeholders for your project.
- Why the time scheduling is an important stage for the project management? What is the critical path and how is being defined? What are the factors you took into accord regarding you project?
- Explain why the understanding of the project's scope is important. What was the scope of your project?
- How do you define, manage and minimize the risks in PM.
- How do you validate the given and/or provided data/information?
- How do you plan to apply the gained knowledge during this hand-on course?

6.2. The modules assessment

Each team should submit a technical report and prepare a comprehensive presentation regarding the given project/problem. The content of the report should be structured as illustrated below:

Guidelines for the technical report

1. Background (Set the plot – this step is very important)
2. Stakeholder analysis
    - Identify all stakeholders (groups or individuals) and analyze the 4 most important (identify their motivations and requirements)
3. Scope
    - Include all important deliverables (associated with milestones)
    - Specification of the most important deliverable
4. Work break down structure
    - Do diagram
    - Identify work packages
5. Project organization
    - Organization diagram
    - Identify who will take key roles and explain why (make sure you link the organization diagram with the WBS)
6. Schedule tasks (Gantt chart)
    - Identify critical path

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- Show key milestones
- Minimum number of tasks on Gantt chart = 25

7. Resource usage diagram
    - No overtime is allowed
8. Project costs and revenues (no need to use MS project)
9. Risk identification and risk management plan
    - Identify and assess at least 6 risks
    - Develop a risk map and a risk management template
    - Identify 3 most important risks and describe in detail how to manage

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7. Annex

7.1. Pre-course questioner (online phase)

The scope of the questions below is to gather information regarding of the participants background and learning needs.

Please provide short responses for the queries below.

- What are you expecting to learn during the course in terms of knowledge?
- Which skills you are expecting to develop/improve during the course?
- In which ways do you think that the course will help you for your future career?
- What is afraid / worry you regarding the course subject?
- Have you participated a relevant course during your undergraduate studies? If yes mention what additionally expect to learn from this course.
- Are you familiar with the Problem Based Learning philosophy (PBL)?
- Provide any additional information/ comments you may think is important

7.2. A Project Management Technical Report Example

Refer to the separated document below:

ENGINITE-A Project Management Report Example 13052018

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8. Consortium

This document has been produced by the consortium of the ENGINITE project

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P2-AALBORG UNIVERSITET [AAU]

P3-CUBEIE L.L.C. [CUBEIE]

P5-TECHNICAL UNIVERSITY OF CRETE [TUC]

P6-GRANTXPERT CONSULTING LTD [GrantXpert]

P7-USEFUL SIMPLE PROJECTS LTD [ThinkUP]

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