TrainERGY project

IO Number: 3

Energy Efficient Operations Virtual Learning Environment through Open Innovation and Co-creation

Requirement analysis for the development of virtual learning environment (VLE) and Scenat i - Supply Chain Environmental Analysis Tool

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1 Introduction

This document provides an overview on the virtual learning environment (VLE) specification development. The VLE is a key deliverable of TrainERGY as it will provide the backbone for implementing the blended Transnational Knowledge Transfer Partnerships (TKTPs) and the co-creation in an open innovation manner.

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2 Overview

Academia, policy makers, industry/SMEs and society are engaged into an virtual learning environment (VLE) for energy efficient operations (EEO) based on an online tool in which various models of business operations systems (supply chains) will be subject to an open debate for improving energy efficiency by all the mentioned stakeholders The VLE will contain all the EEO curriculum as well. The VLE will be linked with SCEnAT which is a supply chain modeling tool that will be used to pilot the VLE materials. However, SCEnAT is decoupled from the VLE in order to ensure maximum efficiency, optimization and user-experience.

The TrainERGY approach to EEO training:

The proposed final goal sustains envisions the VLE as a web platform that will contain the EEO curriculum, open MOOCs, training materials, EEO resources, information feeds from various key EEO players/stakeholders, user feedback/comment facilities, and as central element - access to the SCEnAT tool which will contain, on one hand, business operation processes/ models that can be modeled and that can be used as training (for decision making in EEO for example) and on the other hand the users will be able to create their own business operations models and apply the EEO curriculum in order to test its applicability.

However, the main goal of the VLE (during the project lifecycle) is to enable all primary stakeholders (university and industries/SMEs) as well as the secondary stakeholders (students, policy makers, society)

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to co-create by evaluating applicability of the EEO curriculum for the proposed scenarios/models. This public input from stakeholders is critical for enabling an open innovation approach for enhancing the quality and comprehensiveness of the EEU curriculum for wider targets.

Specifically, all stakeholders will be able to request free access to this VLE platform. As mentioned, the platform will contain best practices for EEO, all the EEO curriculum from O2, samples of models for operations systems, and demonstrations of how the skills gained through the TKTP helped industries/SMEs to achieve EEO through the use of the SCEnAT tool (to demonstrate the initial status of a model's EEO, and the post-intervention status after applying the know-how gained through the TKTP).

Furthermore, the users of the VLE will be able to develop and test their own EEO models, share issues/skill requirements and request EEO curriculum for their own skill requirements. This output will also provide an update for O1 in terms of skill matrix update. Such an open approach (VLE) is deemed to make a greater impact of TrainERGY's findings on the desired target groups and to enable a sustainable outreach of the project leading to innovation outburst through open innovation and knowledge collection, management and improvement (co-creation).

During the software development process, constant interaction with the consortium members will be maintained in order to make sure that the requirements are fully met. The effort for extending SCEnATi to achieve the VLE is minimized - as the core element has been already performed and tested through the PrESS project which was previously undertaken by the academic project partners.

After the VLE has been developed and is fully operational, the platform will be piloted during each transnational TKTP intensive 5-day sessions. At the end of each TKTP session, the co-creation stakeholders will use the VLE to develop EEO models and will apply the skills gained from the EEO curriculum on these models in order to develop a practical application of the taught material. The models will be real cases of the industry/SME that is hosting the TKTP.

Finally, all the feedback gained will be utilized for the primary goal - to improve the EEU curriculum so that academic institutions produce more market oriented knowledge through open innovation and co-creation with industry/SME (and other stakeholders).

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3 Functionality of the VLE

In the current stage the VLE offers the following functionality:

- Download of the slide-set and readings corresponding to the first part of the curriculum
- SCEnATi manual and user-guide
- Templates for the TKTP assignments
- Access to SCEnATi

TrainERGY VLE V1.0:

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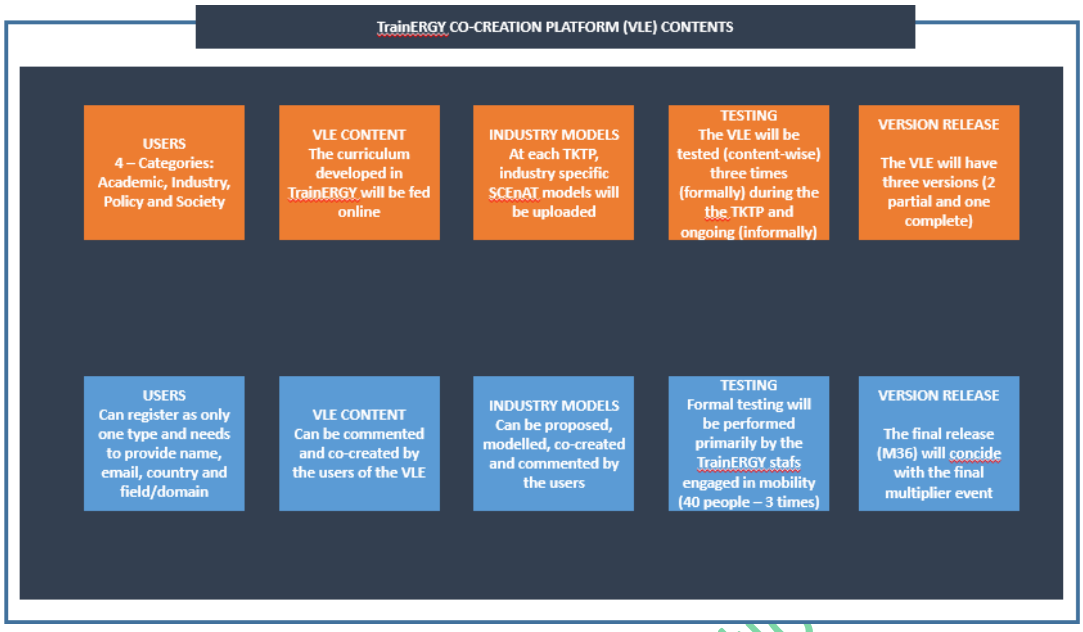
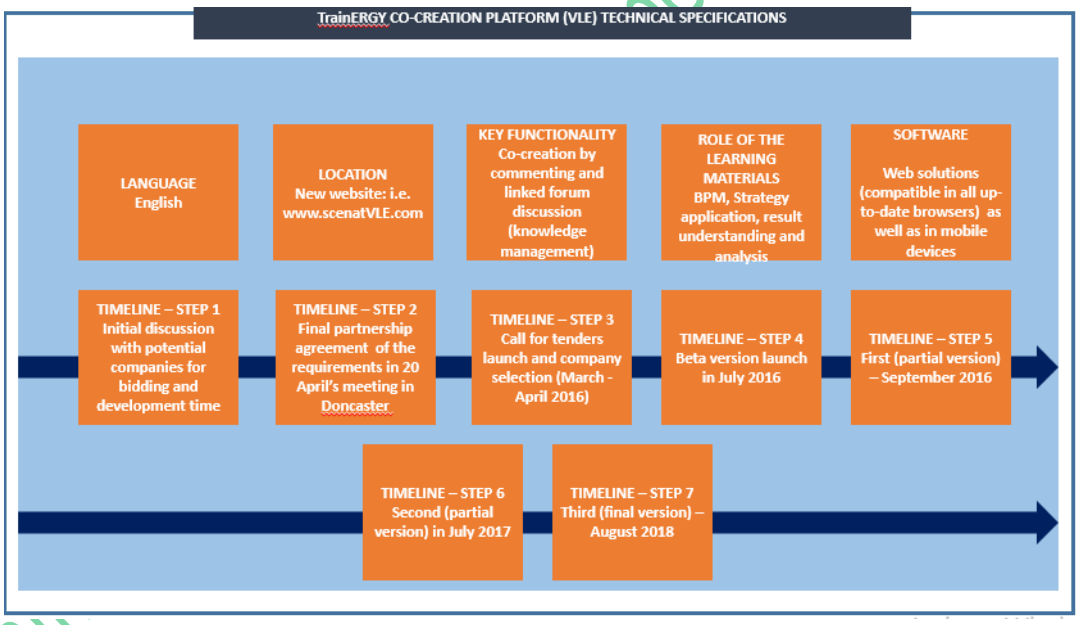


- The following development timetable has been established:



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4 Functionality of SCEnATi

SCEnATi has the following functionality which enables TrainERGY VLE users to pilot their supply chains based on the knowledge gained through the VLE resources.

4.1 First step towards EEO: Creation of supply chain maps with processes and inputs

- Supply Chain products consist of either ***'Inputs'*** and ***'Processes'*** which are linked to the final or reference product
- The following input attributes are supported:
    - ***'Name'*** of the Input
    - The Economic Input-Output ***'Sector'*** that the Inputcan be classed
    - The Economic Input-Output Sub-Sector describing the ***'Classification'*** of the Input
    - Specify the ***'Quantity'*** of Input into the Supply Chain
    - The ***'Unit'*** of the Input
    - The ***'Emissions Intensity'*** of the Input
    - The average ***'Unit Cost'*** of the Input
    - When building a product supply chain, specified ***'Inputs'*** are usually linked directly to the ***'Final Product'*** or linked to a named ***'Process'.*** In the example shown below in Figure 3, ***'Input 1'*** is linked to ***'Process 1'*** which in-turn is linked to the ***'Final Product'***. As shown, ***'Input 2'*** for example is also linked directly to the ***'Final Product'***.

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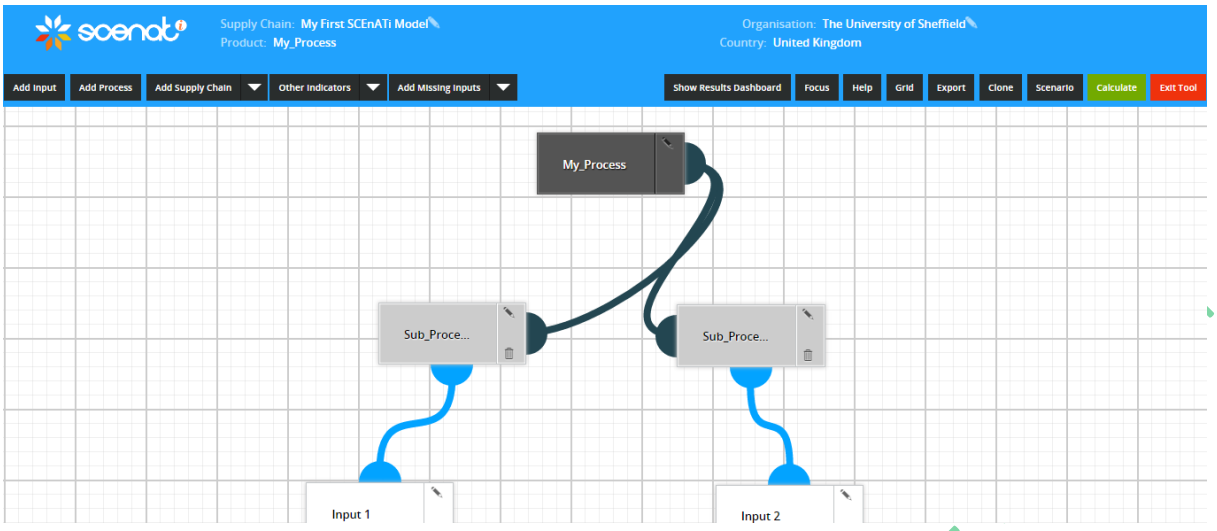

4.2 Second step towards EEO: Supply chain carbon map calculation

SCEnATi obtains the product supply chain carbon map after building the supply chain. The map automatically transforms into a carbon map[1]as illustrated in Fig 4. The Hybrid LCA methodology (an integration of Process LCA and Environmental Input-Output LCA) within a Multi-Regional Input-Output framework is the carbon accounting model built behind SCEnAT*i*.

[1]**Supply Chain Carbon Map:** SCEnAT*i* defines a product supply chain carbon map as a whole supply chain representation of the lifecycle carbon emissions associated with the production of a given product. The supply chain carbon map as shown in Figure 4 consist of both direct and indirect emissions associated with the supply chain, hence it accounts for both Scope 1, 2 and 3 emissions associated with the product supply chain.

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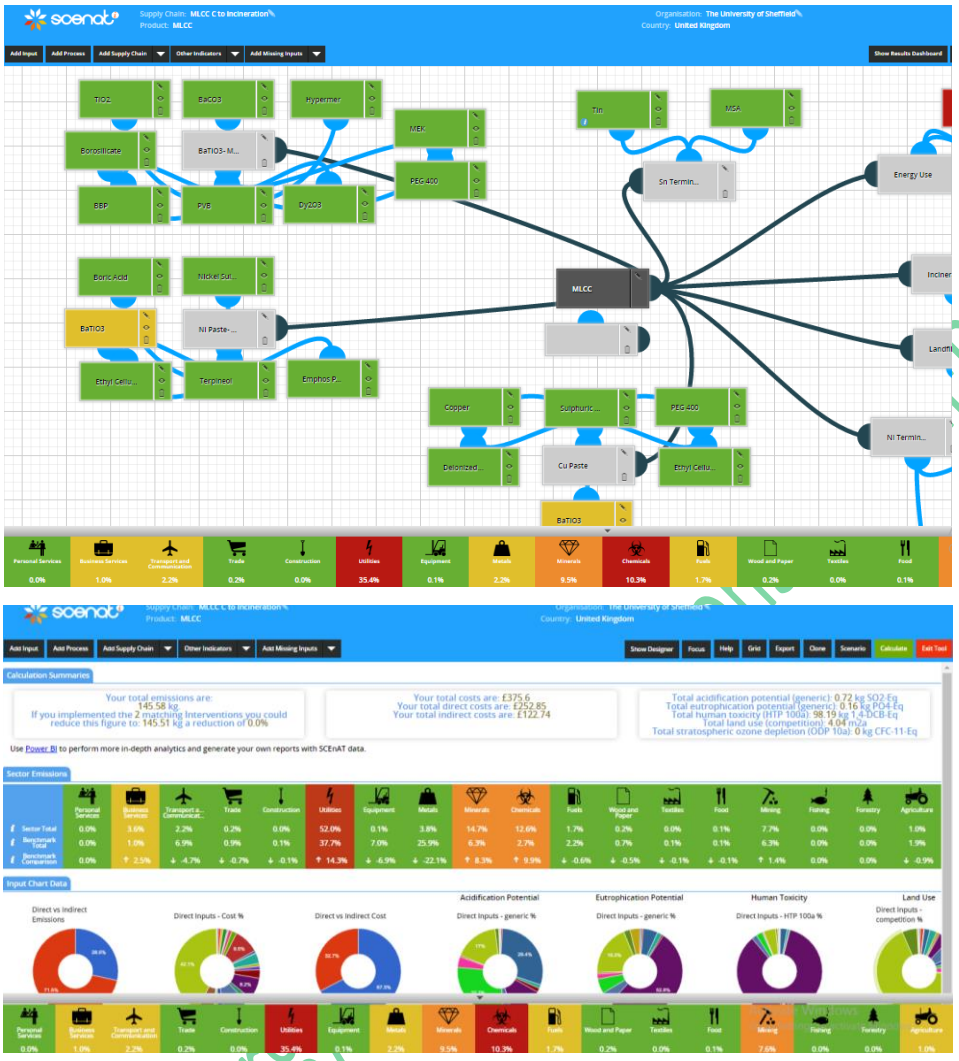

The Product/process Supply Chain Carbon Map has the following characteristics:

- ***Automatic Carbon Hot-spotting:*** High carbon inputs into the supply chain are automatically identified and classed as hot-spots. These hot-spots are relative to the total lifecycle emissions. For example ***'Inputs'*** with emissions greater that 10% are automatically tagged with the colour ***'RED'.***
- ***Direct Emissions:*** The Direct Emissions associated with the product supply chain are presented on the main grid of the mapping screen.
- ***Indirect Emissions***: The Indirect Emissions associated with the product supply chain from the wider economy are represented at the bottom of the supply chain carbon map across 18 aggregated sectors. Refer to Appendix I for details of these economic sectors. The relative percentage contributions from each of these sectors are indicated on the carbon map.

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- ***Results in Graphical Form:*** The total lifecycle emissions (direct and indirect) are presented as a pie chart on the left pane.
- ***Automatic linkage to Low Carbon Intervention***: SCEnAT*i* is populated with a number of interventions.

4.3 Third step towards EEO: Performance measurement

Performance measurement towards EEO is done on a set of Key Performance Indicators (KPI) across Economic, Social and Environmental measures as illustrated in Figure 10.

How it Works

- This step in SCEnAT*i* is closely linked to the supply chain mapping/calculation and the interventions stages. A series of performance evaluation measures relevant to each type of intervention are provided in SCEnAT*i*. Within each category, users can select the measures they think to be relevant. The user can select indicators within each category by simply ticking the relevant box. The inbuilt mechanism of this step is so flexible that each user can customise the performance measurement system.
- The user defined performance measurement system, would produce the set of KPIs across which SCEnAT*i* would evaluate the supply chain.
- A performance measure is associated with each KPI. These measures can be evaluated at each level within the supply chain: (the user should specify, after the selection of the KPIs, if they want to measure them at a focal firm or at a whole supply chain level)
- At the end of this step, the user would be able to visualize an impact table and impact charts (percentage impact of interventions on associated KPIs) for each tested intervention.

4.4 Fourth step towards EEO: Business intelligence

About the business intelligence capability of SCEnAT*i*

- SCEnAT*i* enables you to make better use of your full data underlying your already mapped supply chain in order to understand what implications do the revealed findings (i.e. carbon map, indicators, etc) have on the wider business context (i.e. business intelligence).

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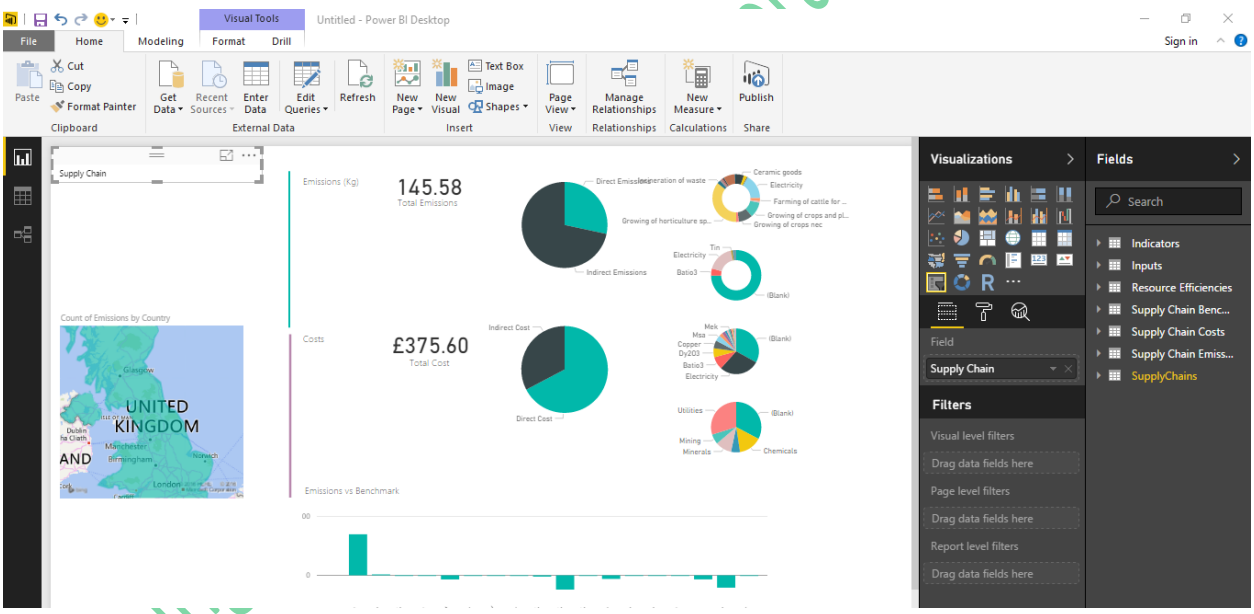
- Such action is being done in conjuncture with the Microsoft Power BI tool which uses big data analytics to reveal key intelligence from your model.
- The big data analytics process is being done based on cutting-edge algorithms focused on data clustering and extraction of intelligence factors from the wide amount of available information.
- The key intelligence is being displayed in a highly managerial manner with concrete and visually appealing charts, dashboards and geographic information systems (GIS) maps to show the global benchmark of your supply chain.
- You can then use these features in order to either take informed and intelligent decisions and corrective measures for your supply chain or simply to show these cutting-edge findings and reports to your management team or clients.



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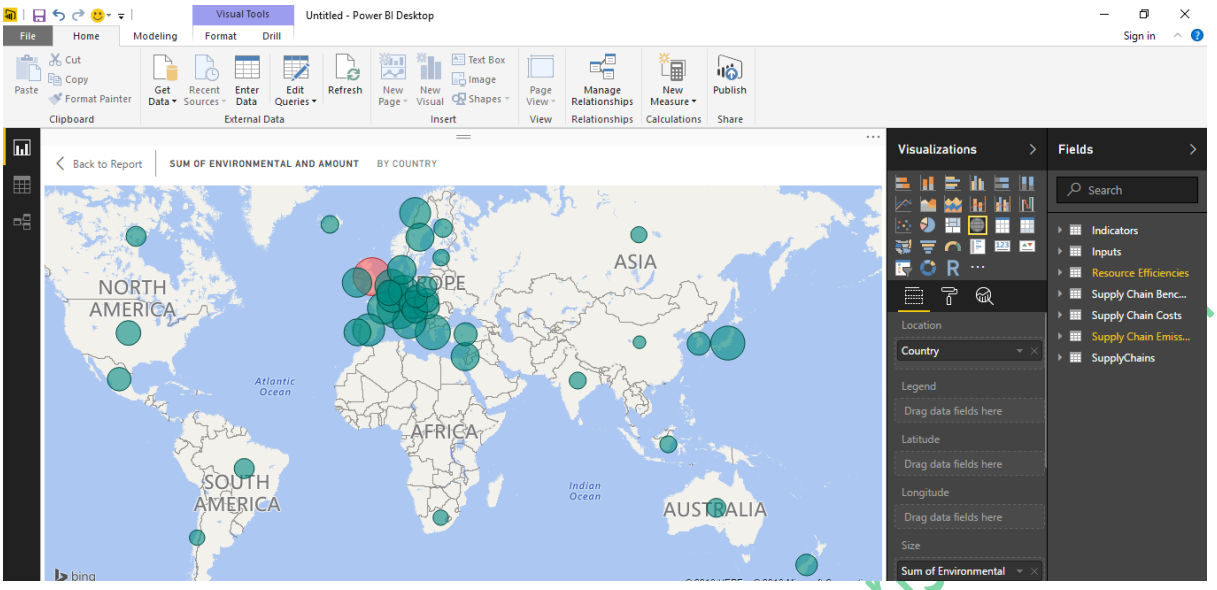

5 Technical specification of the VLE and SCEnATi

Technical features of the VLE:

- Mobile and touch device compatible
- Secure (password restricted in order to properly register all users)
- Fully digital and updated
- Easily accessible

Technical features of SCEnATi:

- Big data analytics
- Geographic information system visualisation
- Improved security, scalability and future proof integration via our Microsoft Cloud platform and its proven system and data analytics technology
- Microsoft Cloud, Azure and Power BI infrastructure, integration and interface
- Automated data capture (from Office 365 (e.g. Microsoft Excel) integration link
- Touch devices fully compatible and scalable

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Appendix A – Global VLE benchmarking sources

Best practices for the VLE development have been collected from:

https://moodle.org/

https://www.udemy.com/

http://www.rcampus.com/

http://www.learnopia.com/search/

https://www.p2pu.org/en/

http://oaeproject.org/

https://www.edx.org/

http://iversity.org

https://www.futurelearn.com/

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