S3 - ANALYSIS & DEVELOPMENT PROJECT

“Embrace the challenges of today to forge the possibilities of tomorrow. In the face of adversity, we find the strength to shape a world where resilience, unity, and innovation light the way toward a brighter future.”

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1. Project context within the curriculum

This project is the full and only assignment for the semester 3 module “Analysis and Development project” (6 ECTS). **No retake is possible for this module.** This is a group assignment.

This document serves as the baseline for the assignment. Any and all modifications will be communicated through the Leho platform.

This is a **group assignment.** You’ll be assigned into a predetermined group by the lecturers. **Changing groups** during the course of the project is **not possible**.

2. Summary

The year is **2084**.

Build a startup centered around a single launch product which will lead to a better life on **Adria**, the new colony on Earth after the Global Disaster in 2064.

You are/determine/build/create the future on our blue planet.

Take a moment to think about the following challenges/restrictions

- **Climate-Resilient Cities**: Many coastal cities need to been redesigned to withstand rising sea levels and extreme weather events. Buildings need to be constructed with advanced materials and technologies to resist damage from storms and floods.
- **Sustainable Energy**: Renewable energy sources such as solar, wind, and hydroelectric power have become the only energy sources. Advanced energy storage systems ensure a stable power supply.
- **Green Transportation:** we need to invest in efficient and eco-friendly public transportation systems.
- **Sustainable Agriculture**: To ensure food security, vertical farming, and hydroponics have become popular methods for growing crops in urban areas. Genetic engineering and precision agriculture have improved crop yields and reduced the need for pesticides.
- **Technological Advancements:** Advances in artificial intelligence, robotics, and nanotechnology have led to innovations in healthcare, education, and manufacturing. These technologies have played a crucial role in rebuilding and improving society.
- **Environmental Restoration**: Large-scale reforestation and habitat restoration efforts are underway to restore ecosystems and biodiversity. Efforts to clean up polluted areas and protect endangered species are a top priority.
- **Education and Awareness:** Education needs to become a cornerstone of rebuilding society. People are educated about sustainability, environmental conservation, and disaster preparedness from a young age.
- **Resilient Infrastructure**: Critical infrastructure, including power grids, communication networks, and transportation systems, has been fortified to withstand future disasters. Redundancies and decentralized systems are in place to ensure continuity of services.
- **A New Mindset**: The global population has adopted a more mindful and sustainable way of life. People prioritize the well-being of the planet and future generations, making conscious choices to minimize waste and resource consumption.

3. Deliverables

3.1. What do we expect?

You will be given three repositories on the http://gitlab.ti.howest.be space.

- A **documentation** repository
- A **client** repository
- A **server** repository

These will hold all deliverable content, except for the peer assessments, retrospections and reflections.

We expect **all** of the following deliverables:

- **D1: Business case including financial analysis** **documentation repo**
  Document describing in detail how you'll handle the launch of your first product and how you'll meet solvency requirements. This should be a Google Doc based on the LEHO Business Case template document, which you link in the readme of the repo.
  Details on the contents of this document will be handled in the input sessions *"Business Case and documentation"*

- **D2: Project website** **documentation repo**
  Marketing website showcasing your company and launch product. There is also a blog part that contains the daily-standups of your project. Link and admin credentials are provided in the readme of the repo.
  This is a Wordpress-site. Details on the contents of this website will be handled in the input sessions *"Business Case and documentation"*

- **D3: Analysis document** **documentation repo**
  Document describing in detail the full analysis of your first product. This should be a Google Doc based on the LEHO Analysis template document, which you link in the readme of the repo.
  All necessary information about the scope of your product (concept / personas / user stories / feature list) are provided as well as the schematics (flow charts / C4 diagrammes /UCD / ERD ….) to describe the project. Clickable wireframes and visual designs documenting the extent of the project including **user testing reports**.
  Use the Ethical Decision Making framework to argument at least 2 ethical dilemmas.
  Finally there should also be security risk assessment where you identify, assess and give recommendations for the key controls in your product/applications..
  All this will span the full renege of your concept's scope, which will be far more extensive than the POC implementation thereof. Link this file in the readme of the repo.

- **D4: Client/server knowledge quiz/exam** **Leho & exam repo**
  Over the course of the first 5 weeks, you will acquire knowledge of both client and server basic technologies related to the project through a combination of input sessions, knowledge clips, and self-study. In the first project week, you will complete an **individual** quiz/exam to assess their acquired knowledge. This will serve as a foundation, allowing you to confidently and smoothly transition into the development phase of the project.

- **D5: Proof of Concept (POC)** **client & server repo**
  Proof of concept of the software system with a working version of the project. Scope determined after approval of feature list proposal.
  Provide also a publicly accessible API documented by an OpenAPI and/or asyncAPI spec for consuming your application.

- **D6: PM work in GitLab and blog** **documentation & client & server repo**
  All your project management epics(=user stories)/issues/tasks (both technical and otherwise) must be created and assigned in gitlab. You will create **at least** 6 milestones/sprints in gitlab (see planning dates) to plan your work and where your issues will live.
  Each Team member will log their work time they perform under the correct issue (if it's > 15 minutes).
  BLOG – daily standup

- **D7: Various peer assessments and reflections** **Leho**
  Throughout the course of the year, we will implement various peer assessments and reflections. These will be collected on Leho.

- **D8: Presentation for investors jury**
  Final presentation of your work, where you'll convince a jury to invest in your product.

!Omission of a single deliverable will result in a failing score for the entire module!

4.Conceptual requirements

Your application needs to contain **all conceptual requirements below**. One requirement may take a larger focus than another, yet all are imperative. **Failure to comply will result in a failed project!**

Carefully consult with your group mentor to assert compliance.

All requirements are specified as generic as possible to optimally serve your imagination. **User stories** (in gitlab, on group level) are ideal to organise the way you wish to meet these requirements

4.1.1. Innovative aspect

Key to this new world is that your solution makes the life of the people better in the broad sense of the word. Learn from the past! Your product must be **innovative** that improves the quality of life and well-being of people on earth, big or small.

4.1.2. Visualisation component

Medium to large amounts of **data** need to be **presented in a visually attractive way**. These can be immersive gallery experiences, graphs, maps, …

Be creative!

4.1.3. User data collection

Your application needs to **collect data from the user**. Exactly which data, how much and how you'll query for the necessary details, is up to you. The data needs to be stored server side, by means of one or more data stores.

In the POC, you get an SQLite database for your application, but for your concept, you may use as many different data stores as appropriate.

4.1.4. Usage incentive

We need a **compelling reason for our users to keep using the application**. Intrinsic motivation is the best kind of incentive, try to find out how for your application.

5.Context - restrictions

The year is **2084**.

After starting colonisation on Mars in the fifties, disaster has struck Earth. A series of catastrophic disasters led to an apocalypse in 2064 in which most of the population became extinct. Some were still able to emigrate to Mars (current population of Mars: 7 500 000), while others were evacuated by spacecrafts, The Titanic Spaceships (each carrying 20 000 passengers and crew). In 2068, a group of pioneers returned to Earth and started rebuilding. In doing so, they faced a number of challenges: sea level rose by 2 metres, only solar energy, clean water is scarce, ... Yet, ten years later, they managed to allow colonisation again on a place called **Adria**. Meanwhile, there are already 100 000 inhabitants on Ardia and they are ready for full expansion.

Your task is to think of **a product that will enhance Adria's lives** and serve as **a way forward to shape a new civilisation** on our blue planet.

Mind you that we are focusing on **reshaping civilisation as we know it.** On Adria, we get a fresh start. It is not bound by Terran laws. The only law that is in effect, is maritime law[1].

The Aether Council serves as the guardian of fundamental rights and ethical principles in the newly colonized world of Adria. Comprising wise leaders and visionaries, the Council is dedicated to ensuring justice, preserving individual freedoms, and fostering a harmonious society. Through thoughtful deliberation and guidance, they aim to protect humanity's dignity and promote sustainable coexistence in this new era.

Your company, product, service - or all of the above - has the power to attribute to this new way of living and create a better version of humanity.

[1] Maritime law states that land cannot be owned, it belongs to the whole of the community. However, whatever is on or within the land can (i.e. mining, foraging, …). The owner of the resources has the right to defend his possessions with necessary measures.

5.1. Earth: current settlements in 2084

5.1.1. The Entry Station

The Entry Station is the **single point of entry** for all lifeforms seeking residency on Adria, the first colony on Earth since the Global Disaster. There is a crew manning the station around the clock, but otherwise it is largely populated by “passer-by”s.

Quarantine procedure will require people to stay for a short period of time, both traveling on and off-planet. This means you’ll get a **short engagement** from many users, but never for more than a couple of weeks. The **range of people reached** with any type of advertising is **highest** here.

5.1.2. Adria: the First colony

Adria, the First colony is where the magic’s at. This **fully-operational colony** is a small indicator of what life will be again on Earth.

Complete with extensive medical facilities, schools for the youngest, lush greenhouses, robuust research lab and extensive R&R amenities, this is the heart of Earth. There is **need for expansion and diversification**. The colony is looking for new souls and ideas to shape the Adria’s identity.

5.1.3. The Other colonies

Where Adria is fully operational, other colonies around the world are built to obtain the same objective. For now, those places are under construction.

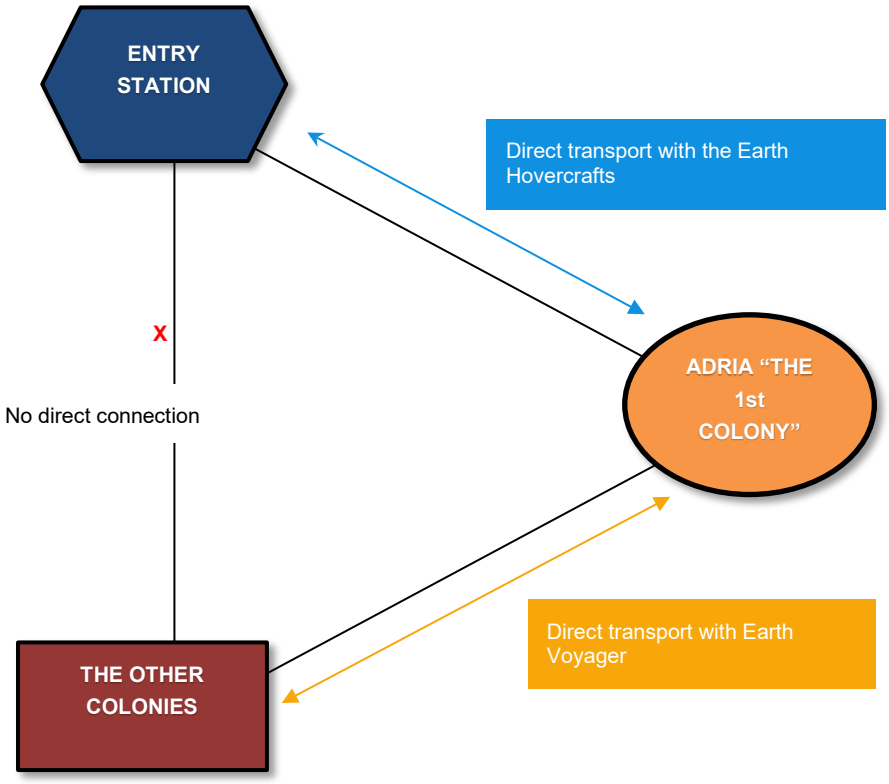
People stay there for extended periods, lacking all the comfort from Adria, only the basic needs provide, sometimes for months. **Work is the main focus** of the populace, with medium breaks for much needed R&R[2], **after travelling by the Earth Voyager** to the Adria Colony.

5.1.4. Relations between settlements

Each settlement has their **own type of residents** as well as **general line of activity** and "type" of **environment**. It is imperative you take these into account when creating your product/service.

5.1.4.1. Travel restrictions

Travel is only possible in the directions of the diagramme.



[2] R&R: Rest and relaxation

5.1.4.2. Population groups

Each habitation has a unique demographic composition, with its own focus.

5.1.5. The Entry station inhabitants and specifics

Demographics		
Entry station officers (communications officers, control, …)	Entry station crew (Maintenance workers, stevedores and foremen, technicians, …)	Medical staff
Sizeable security force	Travellers (quarantined and passing through)	Flight crew (pilot, flight attendants, …)
Community characteristics		
High pass-through rate	Efficiency is key	Only way to enter Earth and Ardia
Medical facility focused on quarantine related diagnostics and treatment	Separate facility for storage of personal belongings as well as corporate holdings (cargo, colony supplies …)	Quarantine quarters

5.1.6. Adria: the First colony inhabitants and specifics

Demographics		
Builders	Programmers	Technicians
Maintenance workers	Researchers	Botanists
Children	Dedicated cooks	Any demographic you can think of!

Community specific properties		
Large colony	Some resemblance of true society with mix of social groups	Large, well-equipped medical facility
Substantial R&R facilities	Schools	Nurseries
Expansive research hub	Immersive greenhouses	No more of space to expand
Access to communications satellites and lines for comms with quarantine station and the other colonies	Station for the Earth Voyager	

5.1.7. The other colonies inhabitants and specifics

Demographics		
Stable crew (officers, technicians, maintenance workers…) which stays for prolonged periods of time (weeks or months on end)	Minimal medical staff	Absolutely no children!
Community characteristics		
Confined living quarters	Small R&R facilities	Everything is focused on the job i.e.
Medical facility focused on injuries only	Location achieved by taking the Earth Voyager which docks at set times to arrive at the colony	

5.2. Conventions and terminology

You may assume the following about current Adria's life:

5.2.1. AdriaOS - One OS to rule them all

Do not concern yourself over compatibility between devices. There is one OS to rule them all, AdriaOS, which supports all resolutions for Adria's approved devices. The hardware across these devices is consistent.

5.2.2. Adria's devices

All people (on Earth, on Mars, on the space station) have **an implanted chip** that is used for identification and monitoring (vital signs, localization, …).

Upon arrival all Adrians are given **a device which can project an interactive interface of any size on any surface** (or even lacking surface). They can also act as **a trigger to activate nearby sensors** to interact with the environment. It comes in the shape of a wristband, with the projection unit on top.

5.2.3. AdrianID

Every Adrian has an ID integrated into their chip and connected wristband. The individual's identity is validated upon arrival and encoded into the chip. As a result of this, **all applications in the Adrian environment are required to use AdrianID for authentication.** Registration or Login forms are forbidden by Adrian law!

5.2.4. Currency: the AdriaCoin

All currency on Adria is handled via the blockchain-based AdriaCoin (ADCO). For calculations you can use the conversion of 1 ADCO = 1 EURO.

6. Deliverables: specific requirements

Below you'll find specific requirements for each of the deliverables listed at the start of this document.

6.1. Business Case (D1)

The following items need to be covered in detail in the business case document, which consists of two parts: a "conceptual section" and a "financial section".

Important note: you are allowed and even encouraged to use AI to finetune and flesh out your ideas. However, you must keep all the prompts and add them as an appendix to your business case document.

6.1.1. Conceptual section

6.1.1.1. Your concept/product/service

Here you will detail what your concept is: what are you going to do and build (or provide as a service)? Make sure to **include all the items specified in chapter 5** (yes, you need to cover everything we've listed there). Don't be restricted to text for this. Illustrate with charts, figures, whatever you need to get the message across.

Make sure your concept stands out!

In this section you should also explain how you came up with the idea: a short summary of the design thinking exercise.

6.1.1.2. People

In this section, describe the organisation of your company in more detail:

- who will do what within the company?
- will you be working with freelancers?
- are you going to look for additional employees in the near future (or maybe say goodbye to specific employees after a specific period of time)?
- how are you going to handle all of this?
- …

6.1.1.3. Risk management

Setting up a project and/or enterprise brings with it certain risks. You will define the most important risks you might encounter and how you will handle/mitigate them, should they occur.

In your risk management plan, you will define the various risks associated with your project and how to mitigate (reduce) or eliminate them. How can you avoid the consequences of said risks?

Adria remains a perilous environment (e.g. toxic atmosphere, …). Should the IT systems be corrupted, there might even be a risk of loss of life. Therefore, you should think carefully about this aspect of the project.

You will need to define at least two scenarios that might result in a security breach and one that might result in a system failure.

What data could be stolen? What systems could be impacted? How will you handle this?

You will also need to identify 2 additional risks, bringing the total of risks to review/build an action plan upon to 5. Per risk, identify its severity, impacts, action plan, etc. Use the tools and templates provided as part of the Risk Management class to do so.

6.1.1.4. Strategic partners

Your Adrian enterprise is not an island: you will work together with other parties, such as key partners, suppliers, … To a certain extent, you will even depend on them. Therefore, you will need to identify these parties as well as the required resources provided by them.

How can they help you? Or how can you help each other? Make sure to also think about other Adrian enterprises (i.e. project groups) that can function as a strategic partner or supplier.

6.1.1.5. Marketing & Sales

How will you attract customers & users?

Write down a marketing strategy based on the marketing mix (4 P's):

1. Product: what are the different layers of your product?
2. Price strategy: what is the smartest price?
3. Place: how will your product be distributed?
4. Promotion: how will you spread the word?

6.1.2. Financial section

6.1.2.1. Financial calculations

We expect you to work out a financial plan for your business in which you estimate the revenue and the costs. The aim is of course to make profit in the long run, because natural selection of companies is universal.

The new Earth (since 2064) is unexplored territory, also in the area of accounting and law, so you can make use of your financial creativity (no taxes on Adria, so this is not equal to tax evasion!): think of disruptive innovations such as basic income, virtual banks, blockchains, crowdlending, etc, ..

As a minimum you need a calculated financial plan for 3 years on a monthly basis covering following topics:

- **Revenue = P x Q**

P = Based on the P of Price in your marketing plan, you can of course combine strategies

Q = This is the most difficult part of the calculation. Try to base your estimates on information that is as objective as possible. The main goal is that you are credible in front of the investors and that you are able to defend your numbers. Use comparisons with terrestian examples, use credible references/market studies, don't exaggerate, …
You can also make use of different scenarios to make your prediction of the future more realistic.

- **Costs = Fixed Costs + Variable Costs**

- Fixed Costs
    - ★ Sum up the necessary investments and calculate the monthly depreciation
    - ★ Think of other fixed costs such as electricity, rent, wages, ...
- Variable costs
    - ★ Variable costs are costs that are dependent on the Q. This is not always easy to find but add as a minimum one variable cost to your calculation. (e.g. server costs)

- **Break-even analysis**

  Based on your summary of revenue and costs, do the following 2 break-even analysis:

  - ★ **How much** do you have to sell to be profitable?
  - ★ **When** will you be profitable?

- **Finance mix**

  Probably you don't have enough savings to do the necessary investments, so you have to look for external money. Explain your finance mix.

6.1.3. Appendices

You may add various appendices to support your business case document.

As mentioned earlier, it is mandatory to at least include an appendix with all AI prompts (ChatGPT, Copilot, …) you used to enhance your ideas.

6.2. Project website (D2)

6.2.1. About the website

Using a self-hosted instance of WordPress, you will build a website. This website has two parts, targeted towards two separate audiences:

- Public part: presenting yourself as a company to the world
- Secured part: this should be a blog, containing your daily standups. Also, a link to your deployed application is included.

The website is an integral part of the project assignment. Layout (is everything displayed in a clear fashion, do you adhere to your company branding, …) and content (relevancy, …) will be graded, but you are not allowed to code the entire website itself manually using HTML/CSS/JS or server-side technologies.

There is no need to use paid hosting either.

Tip: use the Combell hosting offered through Academic Software. One project member per group can register a domain name with associated webhosting through this channel and that can then be used throughout the project.

6.2.2. Public part

Basic concept and approach

What will you build and **why** are you building it?

Get across a clear picture of what your product is and what it'll do. It is not necessary to go into as much detail as in the business case document itself. Think about the message you want to convey to potential customers or investors.

Website page you should build as a result of this exercise:

- Home page
- Products/services page
- About us

Human resources

In this part, you will define the organisational structure of your Adrian enterprise:

1. How will you be organising your team?
2. Task distribution: who will do what?

Website pages you should build as a result of this exercise:

- Our team
- Job offers
- Contact us

6.2.3. Secured part

Blog posts

In the secured part (only accessible using specific login credentials: see below), you should add a short blog post per daily standup.

Deployed application

There should also be a link towards the deployed version of your application

AI prompts

AI can and should be used to assist in the generation of proper content (text and media) for the website. Therefore you must keep track of the AI prompts you used and include them in this section of the secured website.

Login credentials you need to setup:

Username (mandatory): **lecturer**

Password (mandatory and unique per group): *will be communicated to the group members by the lecturers through automated mail*.

You need to include these login credentials in the Gitlab documentation repo's README (see earlier).

6.3. Analysis document (D3)

The following items need to be covered in detail in the analysis document.

Important note: you are allowed and even encouraged to use AI to finetune and flesh out your ideas. However, you must keep all the prompts and add them as an appendix to your analysis document.

6.3.1. Scope of product

Determine the scope of the concept of your product using the following tools:

- Create **at least 3 persona** for your concept. For each target group, you create a different persona. Don't forget: persona get a face and an identity, and in so doing **bring back the human factor** into the design process.
- Write **minimum 4 user stories** for each persona. A user story is a short statement or abstract that identifies the user and their need/goal. It determines who the user is, what they need and why they need it. There is usually 1 user story per user persona per task. **User stories should be created as epics in gitlab.**
- Based on the user stories the **feature list** for your applications is determined. Make a MoSCoW list and Feature Priority Matrix to define. **Clearly mark** in the feature list which features will be included in the POC.

6.3.2. Schematics

Describe the **full concept** in a collection of schematics, which can be suited to your needs. We expect at the very least:

- **Minimum 3 flow charts** for the most common flows a user will have for your solution. Mind that we **do not want application descriptors** (no press this button, then fill out that field), but generic actions/choices which span much further than just the interface interaction. Interaction is part of it, but not the whole. The level of detail is more global (remember Application Prototyping)

- A **C4 diagramme** featuring **at least a context and deployables diagramme**. You may add component diagrammes for the items you find necessary, or omit them all together. Remember: the objective here is to get the message across, not to over-document

- **One or several UCDs** based on **user stories. Those user stories should be created as epics in gitlab. Refer to those from your UCD's**

- An **ERD** describing the information model of the software system

- Any other schematic you may find useful to explain the concept. This does not need to be anything class-taught. If you find it useful, and it gets the message across, include it. Even if it's concept art. (we like concept art)

Clearly mark on your documentation which elements will be included in the POC.

6.3.3. Interactive wireframes and visual designs

The wireframes deliverable will hold interactive wireframes for the **full concept,** so your wireframes will be **far more extensive than your POC**. They are clickable, high-fidelity and created in Figma (mandatory).

For the visual designs you will use the Material Design system (mandatory). You add the visual designs to the Figma file of your wireframes.

Depending on your concept, you will need to design several interfaces. You need to create **all necessary interfaces to elaborate your concept**.

In 2080, we don't think in "sizes", but in "settings". Most solutions will have a combination of several settings. We **require at least two different settings**, but depending on your concept, you might need more. Make sure you **name every interface appropriately.**

Consider the following use cases:

Example 1 Bad: Your concept is an event platform. Users can browse and pick events to attend. Choose a resolution that best fits the information you wish to display to the user.

Wireframe deliverable: A single wireframe, one with the full-fledged event browser, on a resolution of your choice -> **Insufficient!!** There's only one setting here, expand the concept to fit multiple settings!

Example 1 Good: The concept is the same as above, but your application *also* offers users a way to connect with friends **during the event**. It will display a mini map of the event grounds, with your friends highlighted, including the route towards them.

Wireframe deliverable: Two wireframes, one with the full-fledged event browser, on a resolution of your choice (=high focus context in a primary setting) and another for the mini-map interface (notification-like context in secondary setting)

Example 2: Your concept is an incident logger for maintenance equipment in one of the subterranean facilities. There are two settings in this case: the first, where the worker logs the incidents on site. A small resolution is suitable for this, given the cramped environment in which the worker works, though he will be in high focus (many interactions, complex material, …)

The second setting for your solution is the overview dashboard, which is consulted by an overseer elsewhere in the facility (not down in the ducts), while the workers are logging the status of the machinery and possible incidents. S/he can initiate incident response procedures. This is also an interface which requires high focus.

Wireframe deliverable: Two wireframes, one for the worker logging setting and one for the dashboard overseer setting.

Example 3: Your concept is a rover rental service. The primary setting is an interface with features such as vehicle selection, rental dates, etc. A secondary setting also applies, as once the user is in the vehicle there's a live "in air" assistant, which projects lifesize (un)docking instructions, route and other contextual information.

Wireframe deliverable: Two wireframes, one for rental setting and one for the driving setting.

As you see, the actual **pixel size of the "screen" is irrelevant,** as it can shrink and grow to your needs. Instead of thinking of size, think of context and setting first and adjust size accordingly. That is the size you'll be developing for.

6.3.4. User testing reports

Your clickable mockups need to be validated by end users. Therefore, you are required to perform at least one user test with **4 different users** that represent your target users determined in the personas. A template will be made available to jot down your findings and determine appropriate scenarios.

A minimum of **three scenarios** needs to be tested, but you can always include more should you see fit.

6.3.5. Ethical questions

Use the Ethical Decision Making framework to argument **at least 2 ethical dilemmas** according to the 5 taught principles including a final conclusion per dilemma.

6.3.6. Security risk assessment

Provide a security risk assessment where you identify, assess and give recommendations for the key controls in your product/applications. The focus should focus on the possible security defects and vulnerabilities.

6.3.7. User flow demonstration

Demonstrate the **most important user flows** by a **screen recording** while navigating / using your visual design. Make as many as are needed and provide them with a clear title.

You may precede the user flow screencast with a short explanation, textual or by means of graphics / flowcharts / … if you find this necessary.

6.4. Client/server knowledge quiz/exam (D4)

A Leho quiz which tests if you have enough knowledge of the **client** will be available on the first day of the first project week. The questions will focus on Vue.js and push notifications from the input sessions.

On the same day there will be a **server** exam in which you will need to add some basic features to the start code of the server in a structured manner. You must use the Gitlab server of TI to submit. A start repository will be available.

The quiz and exam are individual. More details about the quiz & server exam are on Leho.

6.5. Proof of Concept (D5)

The application contains a web client to handle user interaction and a server to power the back end.

6.5.1. Mandatory requirements for all projects

1. Coding guidelines: use all good practices from previous and current other courses. Don't forget:
    - Create readable code
    - No redundant code
    - Small functions
    - Functions do 1 thing
    - No duplication
    - Refactor code!
2. The web client is a **Vue.js application**. You use Vuetify as UI framework. No other Javascript frameworks are permitted. The usage of libraries to extend the functionality is permitted, **however only limited technical support will be offered when choosing a library not offered in the curriculum.**
3. The server is a **Java server** which uses the **vert.x** library to provide the necessary building blocks for the communication of JSON between both platforms. The startup project is written in predefined structure. The student must work in this structure. No

boilerplate code cannot be removed except for everything todo with the included todoApp. No other Java libraries or frameworks are permitted, except by explicit confirmation of the group mentor.

4. A **Web API** built according to OpenAPI (http) ospecs is mandatory for data exchange between client and server.
5. A **SQLite** database holds the user collected data.

6.5.2. Customisable requirements

Additionally, to the mandatory requirements, you need to implement some other technologies / principles listed below. Customisation is to fit the needs of your application.

Caution: proper feature integration into product is required! Again, don't add these as an afterthought, but as a useful contribution to your product.

You need to complete at least **2 of the class-taught topics** and a **total of 2 points for the self-study topics**. The level == point worth. (E.g. implementing one level-2 topic == 2 points, implementing two level-1 topics == 2 points)

Any deviations need to be consolidated with the group mentors.

Class-taught topics:

Push notifications	Support for notification sent by the server.
Graphs (Canvas, SVG and/or Chart.js)	Interactive client-side graphs that enable the user to have an immersive data experience
Maps (Leaflet)	Interactive maps via OpenStreetMap which at the very least use the geolocation feature (which for Adria can obviously be spoofed). Add markers, routes, area descriptions… whatever fits your need

Self-study topics:

Level	**Topics**
Level-1 Small enhancements	● Native drag 'n drop ● History API ● Fullscreen API ● Vibration API ● Sensor APIs (accelerometer, gyroscope, proximity sensor, ambient light sensor...)

Level-2 Useful features	● CSS animations (consistent across all pages and components, not just a single animation!) ● MediaStream ImageCapture API ● Connected hardware via IoT (e.g. raspberry PI, …)

6.5.3. Server side tests

Testing is not optional. There should be no need to fire up the client to test your code!
Only test the application layer and domain layer.

Develop the tests as you're writing the code. **Adding them as an afterthought is pointless and waste of valuable resources...** As usual, we will be integrating **SonarQube** for automated code quality checks, for client as well as server code.

Aim for a **server-side code coverage of > 95%**
A levels for bugs, vulnerabilities, and code smells on both client and server side.
Duplication should always be below 2%.

6.5.4. Bonus grades

Projects who go the extra mile will be awarded bonus points. This is a scoring measure that is applied on top of the already existing score, ignoring any penalties that may be in effect.

Bonus grades will not be quantified beforehand, as they strongly depend on the level of implementation (detail and quality). The exact amount will be determined ad hoc.

We'll be allocating bonus grades for:

- Teams who manage to get their **POCs to work together** (by using OpenAPI spec integration or based on the asyncAPI spec)
- Usefully implemented client side testing
- Awesome factor

6.5.5. POC scope determination

At the end of week 5, you'll need to submit a POC scope suggestion by means of a feature list proposal. **The jury** will help you align objectives and **definitively set the scope for the POC**. During development, always consult with your group mentors to modify the POC scope, wider or more narrow.

No modifications to the scope are allowed without the explicit consent of the group mentors!

6.5.6. Publicly accessible API

Document your publicly accessible API according to the OpenAPI . These will be taught in the “Information Systems” module.

Remember that you are documenting the entirety of the concept here. The objective is to consider which aspects of your solution you will expose to the public and how. ***Not all endpoints or channels*** *written in the API Spec* ***will be implemented****. The implemented end points depend on the POC scope.*

Unimplemented endpoints will automatically be documented as ‘not implemented’ when using the openAPI spec (https://vertx.io/docs/vertx-web-openapi/java/#_not_implemented_error). For asyncAPI specs, for messages that are not implemented in the POC the payload in the spec should state 'not implemented'.

6.6. Project work (D6)

6.6.1. PM on Gitlab

All work, communication, deadlines, branching, … needs to be handled on the school’s provided Gitlab repositories according to the best practices taught in current and past Applied Computer Sciences classes. If things are rusty, get out your old course material and brush up on your knowledge in order to comply with our rules.

In the first year, you were handed the milestones (=sprints) and the epics (=user stories). This year, you will need to create these **yourselves** in gitlab (on your group level).

6.6.2. Daily standups

At the start of each project day, the groups should have a "daily standup". You will discuss the following allocating an average speaking time of 1 minute per person:

- What did I work on previously and what is its state (Finished / still in development)?
- Did I experience any difficulties with it? If so, which?
- What will I be working on today?
- Do I expect any difficulties / will I be needing some help with a certain topic?

A team member with expertise in the element in question can already indicate this and can be an aid at a later stage.

In the project weeks the daily standups take place every day, during the regular class weeks every Thursday.

You'll need to submit a summary of your daily standup in the secured part of your site as a blog post. You can choose to either take notes, or record the standup itself and upload it as a video in the post. Don’t forget to add a title and every post should also have a ‘picture of the day’ with all the group members. The post should be published at the latest at 10:30am every project day.

6.7. Retrospections and peer assessments (D7)

We’ll be posting several retrospections and peer assessment assignments via Leho, which need to be completed.

6.8. Presentation (D8)

Read and apply the guidelines of the semester 2 presentation techniques course "Beter presenteren, is dat echt nodig?"

- Allocated time for the presentation is 20 mins and an additional 10 minutes question time
- Your audience consists of potential investors (private and government). Keep this in mind!
- Your presentation is in English. Questions can be answered in Dutch.
- Your presentation has the same look and feel as your application.
- You are free to choose which tools used to build the presentation (i.e. you are not limited to powerpoint slides). Conveying the story is the primary objective.
- You make sure the presentation is clear and only contains information that is relevant and interesting for your audience.

A few more tips:

- Everyone participates equally in the presentation.
- You bring a coherent story and you try to anticipate the audience's questions.
- You have a neat appearance, but don't exaggerate: you must still be yourself to some extent.
- Your attitude is of course very important; this means no ringing cell phone, no chewing gum, being polite, enthusiastic, … .
- The way in which you address the public is also important! Greet the investors, thank them for their attention and calmly answer questions, even if they may be formulated rather directly.
- You defend your project if you feel it is appropriate. However, when necessary you admit you made a mistake or you admit you do not know the answer to a specific question. The following sentence is always helpful in this kind of situation: “I have not yet looked at the matter from this point of view but that is certainly a valuable suggestion. (Don't overuse it ;).
- You use your non-verbal communication correctly and efficiently.

The entire group must participate in the planned trial presentations before the Christmas leave. It goes without saying that your test presentation is structured according to the guidelines of the semester 2 presentation techniques course.

7.Concept choice process

7.1. Which software system to develop?

The current people on the Adria colony have already put out a list of absolutely necessary software systems (= Adria's Critical Apps) to be developed. You can do one of two things:

1) Develop one of these Adria's Critical Apps with a pre-set topic
2) Think of a solution yourself

In the second week every group has to pitch their topic.

If there are competing groups **choosing the same topic from the pre-set list**, you will have to pitch your concept in front of a couple of experts, who will determine which group gets to go ahead. The other(s) go back to the drawing board.

Should two groups accidentally come up with **the same/extremely similar software system concept**, those two groups will be pitching against one another as well. The jury will pick the best concept, the others will also go back to the drawing board.

After the pitches have finished, you will get a GO or NO GO. If you get **a NO GO**, you should either be able to choose one of the remaining Adria's Critical Apps or you can still come up with a fresh concept.

7.1.1. List of pre-determined Adria's Critical Solutions

- **AdriaBook:**
  Adria connector application (cfr facebook/other social media) to connect the different people of Adria and other colonies. Connections to intergalactic citizens are not possible (Mars and space station). Earth only.

- **Adria Rover rental:**
  Rent a rover, complete with navigation system, designed to easily find your way around the surface of the Earth and toward the other colonies. Integration with weather app for danger alerts is mandatory. The application comes with a built-in function to simulate driving with the Adria rover and learn how to handle it before taking it out in the field.

- **24/7:**
  Collection app for all events on Adria, what's happening, when and where (and are you invited?)

- **Mapp Store:**
  Adria's App store, collecting all available applications for AdriaOS devices

- **Are you the Adrian I'm looking for?:**
  Looking for a person with a certain skillset? Perhaps he can do a job for you or vice-versa? An upscaled linked-in with instant work opportunities. Think about constraints in this new environment. If a person needs to go under the colony or to another one, transport needs to be arranged etc.

- **Adria's Auction House**
  Produced/minded (and other) materials are available to all creative people of Adria. The auction house is the entry point to sell and buy Adria's materials. Since the Adria's community has a focus on sustainability, restoring/saving resources, this can be extended with suggestions for optimization of materials use.

- **Adria Exchange:**
  The Adria's stock exchange. All these new companies building all these new products will probably be looking for investors. Develop a market place of them to trade, based on Terran stock markets though creative deviations are allowed.

7.1.2. Inspiration

There are plenty more today's Earth based applications you can modify to Adria's needs that haven't been listed above (Fitbit, find that person instead of that device, …) but nicer would be to **look at things from an Adria's perspective** and truly **focus on what this new society needs**.

Maybe you can think along the lines of applications such as **a person's impact on Adria** (everything from your excretion to how many plants you fertilise by it..). Colonisation requires progeny, **how will we handle coupling**? Is a Tinder / Grindr clone what we're looking for or can we match people in a different way? Can you **integrate the physical world into it**?

What about the world around Earth? Maybe there are deepsky objects that require our attention. What value would they have? How do we connect with the people on Mars?

Maybe we want to rethink currency. Who says money has any **value**? What *does* have value on Adria and how will you leverage it?

What about **policing and community voice**? Does this have to be a democracy? Can we organise society in a different way and have technology support this? Maybe an AI can determine the fate of an offender. Experiment, brainstorm, think!

Do not find yourself constrained by current technological limitations and assume the tech can handle it. If you can think of it, it's possible (with the exception of time travel, inter-dimensional travel and zombies – we are not yet in the year 3000).

8.Planning

8.1. Project work planning

There will be **a minimum of 5 sprints (=milestones)** during this project.

You will need to create these milestones YOURSELF for your group in gitlab. Do this immediately (at the start of the project).

You **CAN** create more (intermediate) sprints if that works better for your group (especially during active development) and/or if your coach demands it.

Every sprint starts and ends on Thursday, project day, unless otherwise specified.

A summary of the project planning is as follows:

week	activity	deliverables on deadline?	sprint
W02 26/09/2024	Briefing Meeting group members and mentors Conceptualise idea	Sunday: Concept (submission)	A
W03 3/10/2024	Preparing pitch **Pitching your concept (10:30-12:30)**	Thursday: **Pitch or die**	A
W04 10/10/2024	Start writing BC and analysis document (personas, user stories, diagramme sketches, …) Study client/server	Sunday: Class taught topics & self-study topics (submission)	B
W05 17/10/2024	**Input session 'Design Tips&Tricks' (9:00-10:30)** Continuing BC and analysis document (wireframing, visual designs, UCD, C4 …) Study client/server		B
W06 24/10/2024	Decide on definitive feature list for POC. Continuing BC and analysis document: wireframes, ethical questions, risk assessment, conceptualise architecture (C4, API,..), … Study client/server	Sunday: **POC Feature list proposal** (submission)	B
W07 31/10/2024	AUTUMN HOLIDAYS	Friday 1/11/2024: alpha version Business Case & Analysis document	B

<table>
<tr><td>W08
Project week #1
(4-8/11/2024)</td><td colspan="2">4/11/2024 AM: Client/server knowledge quiz/exam
Start development: start coding

<table><tr><td>Mon 4/11</td><td>Tue 5/11</td><td>Wed 6/11</td><td>Thu 7/11</td><td>Fri 8/11</td></tr><tr><td>Mandatory AM: client/server knowledge quiz/exam
PM: presentation feature list proposal</td><td>User tests with 3rd years</td><td>Feedback alpha version Business Case with 1 key user</td><td>Feedback alpha version Analysis document with 2 key users</td><td></td></tr></table>
Deliverable Monday 11/11/2024: alpha version POC</td><td>C</td></tr>
<tr><td>W09
14/11/2024</td><td>Development part continued
Code review #1 with 3rd years SE</td><td></td><td>D</td></tr>
<tr><td>W10
21/11/2024</td><td>Development part continued</td><td></td><td>D</td></tr>
<tr><td>W11
28/11/2024</td><td>Development part continued</td><td></td><td>D</td></tr>
<tr><td>W12
5/12/2024</td><td>Development part continued
Code review #2 with 3rd years SE</td><td>Sunday 8/12/2024: Beta version of POC on dedicated branch 1-alpha on repositories</td><td>D</td></tr>
<tr><td>W13
12/12/2024</td><td>Present beta version of POC. Jury will help you determine priorities for delivery
Preparing test presentation</td><td></td><td>D/E</td></tr>
<tr><td>W14
Project week #2 (16-20/12/2024)</td><td colspan="2">Finalise all the things!

<table><tr><td>Mon 16/12</td><td>Tue 17/12</td><td>Wed 18/12</td><td>Thu 19/12</td><td>Fri 20/12</td></tr><tr><td>Mandatory test presentation with Mrs. Terryn.</td><td>Code review #3 with 3rd years SE

Mandatory test presentation with Mrs. Terryn.</td><td></td><td></td><td>23:59: Submit all deliverables</td></tr></table></td><td>D/E</td></tr>
<tr><td>Exams final week
Jan 2025</td><td>Presentation</td><td>Final presentation in front of jury with possible external members</td><td>E</td></tr>
</table>

* *Any modifications to the schedule will be communicated through Leho*

Project work always occurs on Thursday as scheduled on your class roster.
All students from each group are expected to be present at each session (not later than 9am arriving AND not before 5pm leaving). During the project weeks you work from Monday until Friday **(not later than 9am arriving AND not before 4:30pm leaving)**.

There are no exceptions! If you have a valid reason to not be present, you need to communicate this with your group mentor and ask for permission for your absence at **least 3 days before** the session (except in case of illness or injuries, of course).

8.2. Additional classes

To assist you with creating all the required documentation, we will be teaching some classes within this course. **Attendance is mandatory.**

The provisional planning is as follows:

	Topic
W02 26/09/2024	Design Thinking, AI and Website
W03 3/10/2024	Requirements definition
W04 10/10/2024	Marketing Vue.js part1
W05 17/10/2024	HR, Risk Management & Strategic partners Push notifications
W06 24/10/2024	Finances Vue.js part2

* *Any modifications to the schedule will be communicated through Leho*

Additional classes always occur on Thursday afternoons as scheduled on your class roster.
All students from each group are expected to be present at each session (1:30pm – 5pm).

If there are no input sessions or the session is finished, you are expected to continue working on your project. There are no exceptions! If you have a valid reason to not be present, you need to communicate this with your group mentors and ask for permission for your absence at **least 3 days before** the session (except in case of illness or injuries, of course).

9.Coaching

There are two types of coaches who will assist you: group mentors and topic experts

9.1. Group mentor

Every group will be assigned one group mentor, who will monitor the group's progress throughout the semester. The group mentor is your point of contact for all non-technical questions. Disputes, conflicts,... also need to be reported to the group mentor. If there is a group member that does not perform adequately, this information needs to be submitted timely to the group mentor, so that s/he can attempt to remedy it. 3 weeks before the project ends is NOT timely.

9.1.1. Summon by group mentor

The group mentor will summon the group on a regular basis to confer. You can interchange ideas, planning, and possible approaches. If there are questions that are too technical, the mentors will relay them to a topical expert.

A summon by the group mentor is a mandatory moment on which every group member's presence is required. Failure to comply will negatively impact your score. The summoning can happen at any time during the week from **Monday to Friday between 9am and 5pm**, it does not have to be on the allocated project working time. You will be notified **at least three hours** prior to its occurrence.

9.2. Topical experts

The topical experts will handle your technical questions in their area of expertise. A schedule will be published with each expert’s skillset and availability. Make sure you plan your questions carefully, as not every expert will be available at all times.

10. Evaluation

10.1. Scoring calculation

When executing a project, any aspect must meet minimal standards. This means that a very low score on any of the deliverables will impact the project vastly. The scoring principles of this course are designed so that your **final score tends towards the weakest link,** i.e. the one with the lowest score of all different items that are scored. Weakest link scoring would be: "your individual final score can't be higher than the lowest score on any of the items".

Your final score is determined based on the different number of deliverables, using the following distribution:

- D1 – Business Case including financial analysis: 15%
- D2 – Project website: 5%
- D3 – Analysis document: 25%
- D4 – Client/server knowledge quiz/exam: 15%
- D5 – POC: 25%
- D6 – PM work on Gitlab & website: 5%
- D7 – Various peer assessments and reflections: 5%
- D8 – Presentation for investors jury: 5%

!Omission or significantly incomplete implementation of a single deliverable will result in a failing score for the entire module!

10.2. Factors influencing the final score

There are many factors weighing on the final score for this module (see 10.1). Each part of the assignment is scored according to specific criteria. This score can be influenced by intermediate as well as end results of a certain portion.

A group score will be determined according to the principles listed above. From this group score, the **individual score** will deviate in positive or negative manner depending on the following factors.

10.2.1. Presentation

The presentation is an individually graded component, with the presentation itself as a baseline. Each group member will be scored individually for his performance during the presentation, measured on a number of factors.

10.2.2. Conduct and contribution

Your general conduct and contribution throughout the semester is monitored by the group mentors as well as assessed by your peers. Deviations, positive or negative, will impact your final individual score.

Inappropriate conduct may be a reason for immediate group exclusion (resulting in zero score for this module). The group mentors may come to this conclusion at his/her discretion, supported by the majority of the other group mentors.

10.2.3. Extreme sanctions

Group exclusion will be immediate in one of the following cases:

- Unprofessional or **inappropriate conduct** (see 9.1.4)
- Repeated signalling from group members to **non- or malfunctioning in the group**, either on a technical or quantitative level of you failing to meet generativity (see 10.2.5 for detailed procedure).
- **After a second unexcused absence**, on a rostered moment, a coaching moment, a presentation moment or any other project related moment where presence was mandatory. You may ask for an excuse for absence to your group mentor, and you're only excused if you have permission to be absent.

Exclusion from the group results in a zero score for the module, which has no retake!

10.2.4. Conduct and contribution

Your general conduct and contribution throughout the semester is monitored by the group mentors, coaches as well as assessed by your peers. Deviations, positive or negative, will impact your final individual score.

Inappropriate conduct may be a reason for immediate group exclusion (resulting in zero score for this module). The group mentors may come to this conclusion at his/her discretion, supported by the majority of the other group mentors.

10.2.5. Aim for generativity

Each student will be granted a generativity score. This score is used for your personal final score. The generativity score is based on your team work, helping others, communicating problems in time, and so forth. We expect everyone to behave as **a team player**: you need to aim for generativity (certainly watch the talk to understand what we are talking about). Generativity is not your personal productivity. On the contrary, it's about how you influence the productivity of others around you.

In the rare case of clear and obvious signs of highly negative generativity one may be excluded for the project, resulting in an individual zero score.

The procedure for exclusion is:

1. The team members have informed you that **they are not ok with your team work and why**. The group mentor is informed about what has been discussed and both parties confirm that this has happened. A plan of action to improve within a defined time frame is set up in the team and this is shared between all team members and the group mentors.

2. If there are no signs of substantial improvement within the defined time frame (confirmed by all other team members and the group mentors): a first official warning is given and the time frame is extended with one more week

3. If there still are no signs of substantial improvement within that week (confirmed by all other team members and the group mentors): the student is **excluded from the project (=zero score)**

4. If there was improvement, but it lasts only for a certain period, and the generativity decreases again (confirmed by all other team members and the group mentors): a second official warning is given and there is one more week to catch up

5. If once again there are no signs of substantial improvement within a week or the improvement is again only temporary (confirmed by all other team members and the group mentors): the student is **excluded from the project**

6. The final score of the remaining group members will be adjusted accordingly, depending on the severity of the case and how negatively the incident has impacted the group work and project progress

GOOD LUCK!