AALBORG UNIVERSITY
DENMARK

2 THE PROBLEM-SOLUTION CANVAS

ESSENCE – CHAPTER 3 & 4

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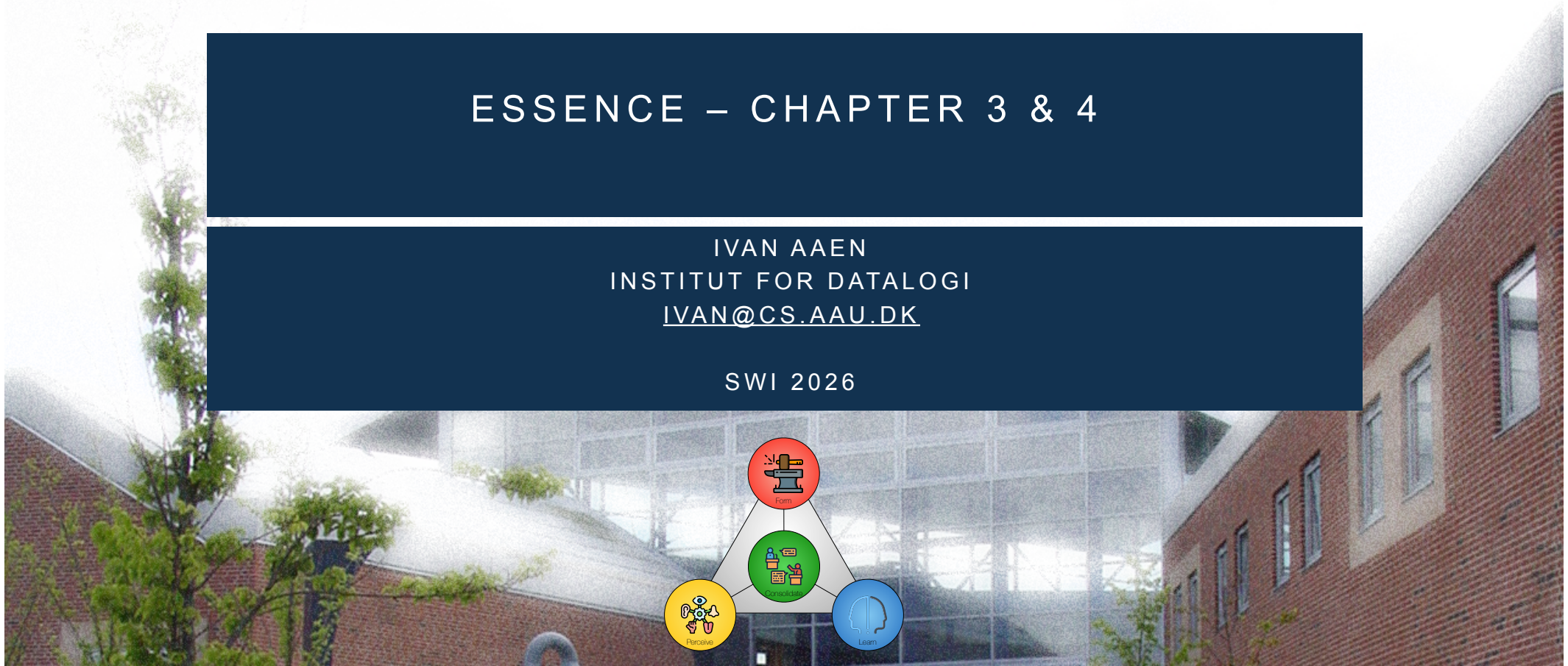
SWI 2026



Exam (with mini-project)

- The mini-project is not graded but serves as a basis for the oral exam.
- You will give a five-minute presentation on the mini-project. Following this, the exam will cover any part of the syllabus.
  - Preferably, the discussion will be related to the mini-project.
- You may use examples and illustrations from the mini-project during the oral exam.

See Moodle for detailed and updated description

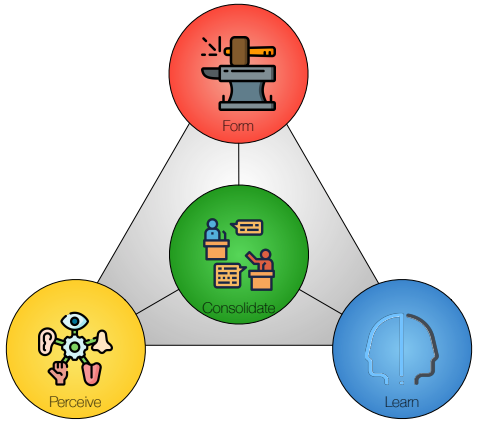
Exam (no mini-project)

- You will randomly draw a question related to the topics from the exercises.
  - This list of topics will be updated simultaneously with the exercises.
- You will give a five-minute presentation about the selected topic. The exam will then cover any part of the syllabus.

See Moodle for detailed and updated description

Agenda

- Exercise 1 Follow-up.
- Four Core Activities.
- The Canvas Building Blocks.
- The Problem-Solution Canvas.
- Hypotheses.
- Fulcrums.
- Next time:
  - Exercise 2: Start on PSC.
  - Lecture 3: Rationale and Problem.

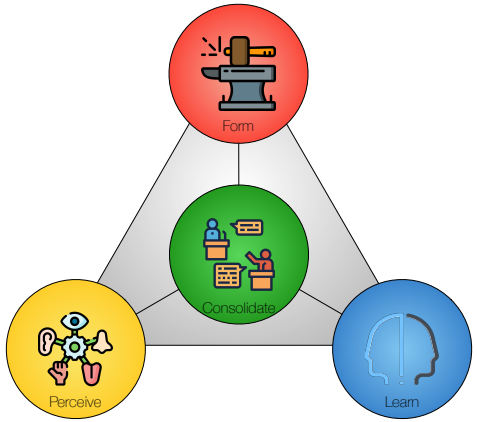


Follow-up: Exercise 1

Exercise 1 (Innovation in your project)

Exercise 1 is a follow-up to Exercise 0. In this exercise, we will consider your semester project:

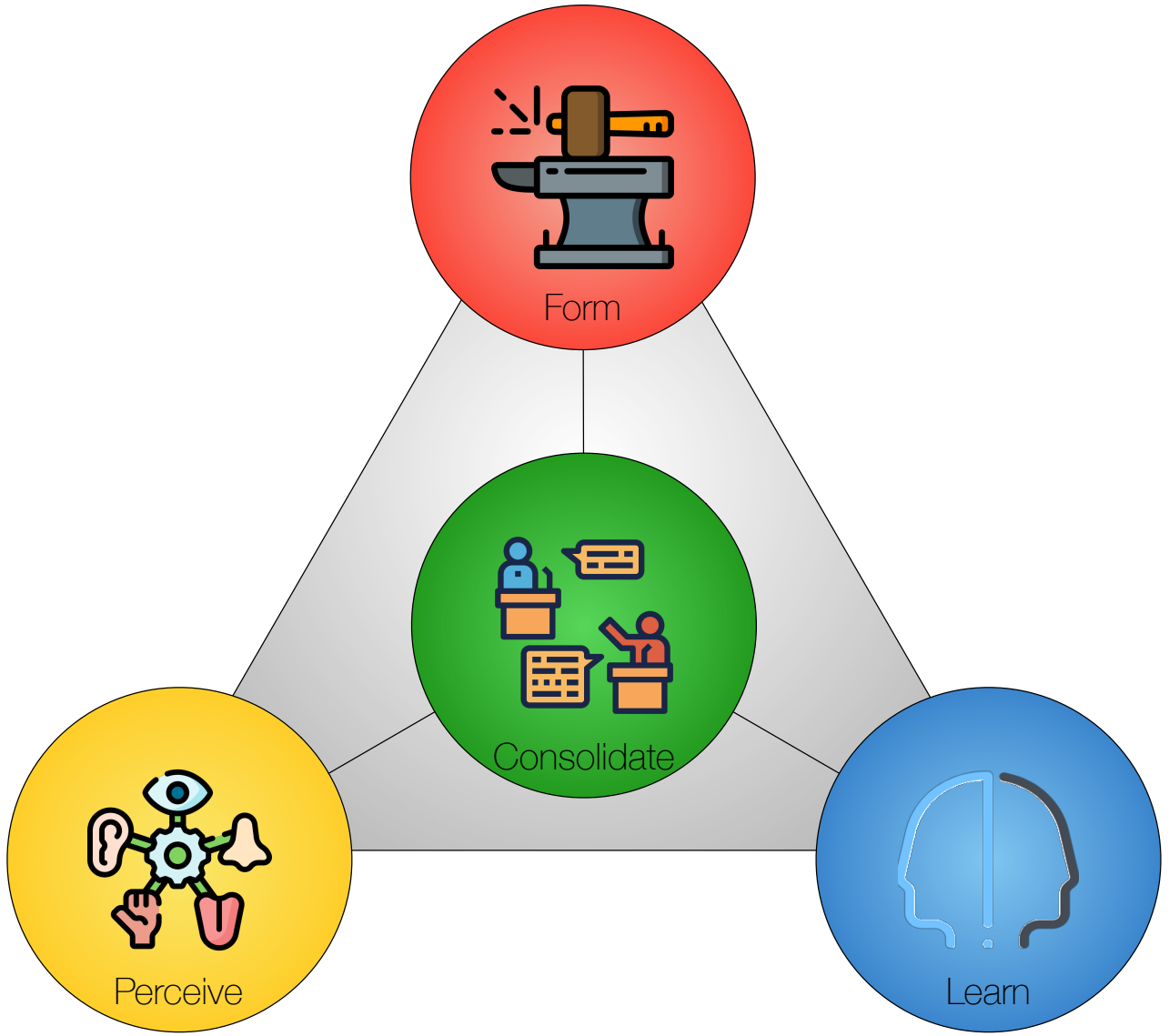
- What problem are you working on?
- Explain what type of innovation you aim for (Table 1.1 in Essence).
- What will be the keystones in your design? What will make your design stand out?
- Who will benefit from it? What value will you create?
- Where will it be used? How will it create change?
- Characterize your problem or solution challenges in terms of volatility, uncertainty, complexity, and ambiguity (Section 1.2 in Essence).
- Do you consider your project to be mainly demand-pull or technology-push? (Section 1.2 in Essence)
- Will roles be relevant? How? When? What are the pros and cons of roles?



Four Core Activities

Four Core Activities

- *Perceive* – understanding the problem and its context.
- *Form* – designing the constructive parts of a solution.
- *Consolidate* – integrating the design contributions into a clear whole that addresses the situation.
- *Learn* – appraising the design.

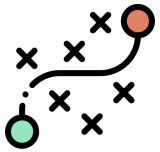


Icons from Flaticon.com

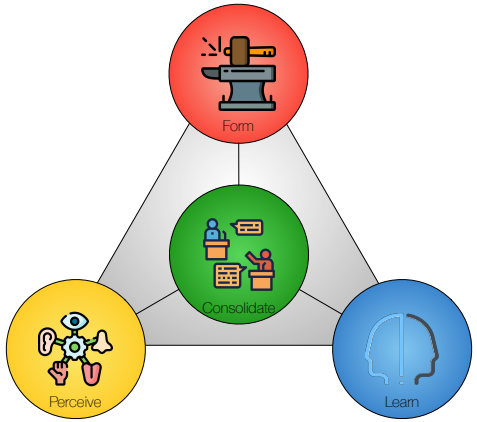
Three Levels of Abstraction

Rationale – the logical basis that makes actions meaningful and helps reason about strategy and tactics for solving the overall problem.

Strategy – the master plan for solving the overall problem, including the scope of the problem, the key components for building the solution, and qualifications regarding limitations and constraints that may affect the utility or acceptability of a solution.



Tactics – actions planned in accordance with the strategy to achieve specific ends.



The Canvas Building Blocks

Building Blocks

Problem

We see a problem as a situation to be handled, where problems appear as manifestations.

Outer Environment

The problem is found in the outer environment. The design is adapted to this domain.

Manifestations

Manifestations are objects, actions, or events that reflect or embody the problem.

Capabilities

Capabilities are the features that are designed to address manifestations.

Inner Environment

The inner environment is what provides the capabilities.

Leverage

Leverage points allow for the most valuable capabilities.

Solution

Why the problem is resolved, why it is important, and why the result is appealing.

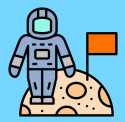
Evolvability

The capacity to adapt to outer environments or to add new leverage points to the inner environment.

Merit

The value offered by the capabilities. The limitations of the solution and why these limitations are acceptable.

Mission



The mission presents the project's tactical objective: to solve the problem.

Potential

The potential defines the project's strategic objective: to create strengths and opportunities.

Horizon

Where might the outcomes of this project lead us? How do they align with the future we aim to be a part of?

Icons from Flaticon.com

Perception Building Blocks

Problem

We see a problem as a situation to be handled, where problems appear as manifestations.

Outer Environment

The problem is found in the outer environment. The design is adapted to this domain.

Manifestations

Manifestations are objects, actions, or events that reflect or embody the problem.

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Forming Building Blocks

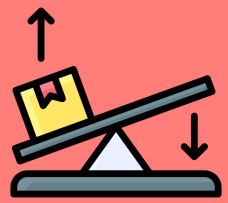
Capabilities

Capabilities are the features that are designed to address manifestations.

Inner Environment

The inner environment is what provides the capabilities.

Leverage



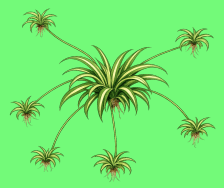
Leverage points allow for the most valuable capabilities.

Consolidation Building Blocks

Solution

Why the problem is resolved, why it is important, and why the result is appealing.

Evolvability



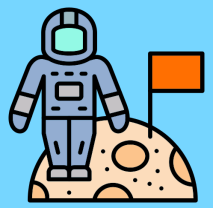
The capacity to adapt to outer environments or to add new leverage points to the inner environment.

Merit

The value offered by the capabilities. The limitations of the solution and why these limitations are acceptable.

Learning Building Blocks

Mission



The mission presents the project's tactical objective: to solve the problem.

Potential

The potential defines the project's strategic objective: to create strengths and opportunities.

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Where might the outcomes of this project lead us? How do they align with the future we aim to be a part of?

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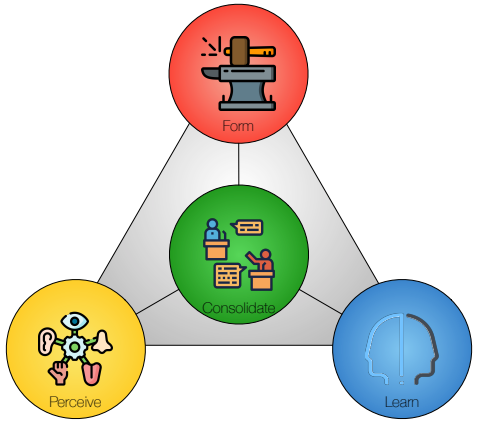


The Problem-Solution Canvas

Illustration: ClusterDetect

	Perceive	Form	Consolidate	Learn
Rationale	**Problem** In crowded areas, safety could be compromised	**Leverage** Technology: AI [DFNet] Components: [Thermal camera] Information: Problem spots Human resources: [On-the-ground staff]	**Solution** Prospect: ClusterDetect reduces congestion and disruption Warrant: Densely populated areas are common and dangerous Backing: The Contribution is effective and inexpensive	**Horizon** The project creates strengths and opportunities - The Problem is understood and generic - The Leverage is future-proof - The Prospect solves the Problem, - The Warrant suggests growth - The Backing suggests motivation to adopt
Strategy	**Outer Environment** External service: [Access control] Implements: Venue information system Repository: Traffic information People: [Informants]	**Inner Environment** Density monitor [Thermal?] Panic and disruption locator General modules for on-the-ground staff and visitors [Customized module for on-the-ground staff]	**Evolvability** Diffusibility: ClusterDetect is highly specialized and has low diffusibility towards new markets Adoptability: ClusterDetect is limited to the current market, but it can address new needs and thereby strengthen existing market positions	**Potential** The design has strategic potential: - Outer Environment is generalized - Inner Environment is near-decomposable - The Qualifications are non-critical
Tactics	**Manifestations** Potential crowding Places of congestion Potential starts of panic Potentially disruptive actions	**Capabilities** Identify and handle crowds Identify and handle congestion Identify and handle panic Identify and handle disruption	**Merit** Value: Locates impediments. Finds and handles crowds, congestion, panic, and disruption Reservation: Requires calibration and clear sight Rebuttal: Many users will accept these limitations in a low-cost system	**Mission** ClusterDetect solves the Problem: - The Manifestations are essential - The Capabilities are efficient and effective - The Value offered ensures sustained use

Icons from Flaticon.com

Perceive & Form

	Perceive	Form
Ratio-nale	**Problem** In crowded areas, safety could be compromised	**Leverage** Technology: AI [DFNet] Components: [Thermal camera] Information: Problem spots Human resources: [On-the-ground staff]
Stra-tegy	**Outer Environment** External service: [Access control] Implements: Venue information system Repository: Traffic information People: [Informants]	**Inner Environment** Density monitor [Thermal?] Panic and disruption locator General modules for on-the-ground staff and visitors [Customized module for on-the-ground staff]
Tactics	**Manifestations** Potential crowding Places of congestion Potential starts of panic Potentially disruptive actions	**Capabilities** Identify and handle crowds Identify and handle congestion Identify and handle panic Identify and handle disruption

Consolidate & Learn

	Consolidate	Learn
Rationale	**Solution** **Prospect** ClusterDetect reduces congestion and disruption **Warrant** Densely populated areas are common and dangerous **Backing** The Contribution is effective and inexpensive	**Horizon** The project creates strengths and opportunities - The Problem is understood and generic - The Leverage is future-proof - The Prospect solves the Problem, - The Warrant suggests growth - The Backing suggests motivation to adopt
Strategy	**Evolvability** **Diffusibility** ClusterDetect is highly specialized and has low diffusibility towards new markets **Adoptability** ClusterDetect is limited to the current market, but it can address new needs and thereby strengthen existing market positions	**Potential** The design has strategic potential: - Outer Environment is generalized - Inner Environment is near-decomposable - The Qualifications are non-critical
Tactics	**Merit** **Value** Locates impediments. Finds and handles crowds, congestion, panic, and disruption **Reservation** Requires calibration and clear sight **Rebuttal** Many users will accept these limitations in a low-cost system	**Mission** ClusterDetect solves the Problem: - The Manifestations are essential - The Capabilities are efficient and effective - The Value offered ensures sustained use

Assumptions

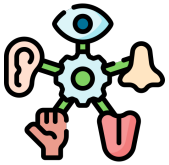
Essence is not based on assumptions about causality, sequence, or process.

Solutions and problems might appear randomly, but a meaningful design eventually provides a unified view of them.

The Problem-Solution Model aims to provide this unified perspective, and the problem-solution canvas is a tool to facilitate this goal.

VIT: Problem-Solution Canvas

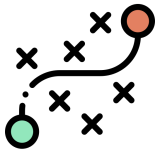
	Perceive	Form	Consolidate	Learn
Rationale	Problem	Leverage	Solution Prospect Warrant Backing	Horizon
Strategy	Outer Environment	Inner Environment	Evolvability Diffusibility Adoptability	Potential
Tactics	Manifestations	Capabilities	Merit Value Reservation Rebuttal	Mission



Essence Terminology: Perceive

Problem – A problem reflects an understanding of a situation. Problems have no objective status.

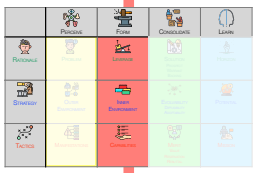
Outer environment – The surroundings in which our problem resides and where the contributions we design will operate.



Manifestation – An object, event, or action that reflects or gives a tangible or visible form to the problem.

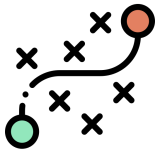
If we mistake the problem, we will not inquire with relevance. If we have no problem, our efforts will be blind groping in the dark (Dewey, 1938, p. 108).

Essence Terminology: Form



Leverage – Keystones of the inner environment that help create a great contribution.

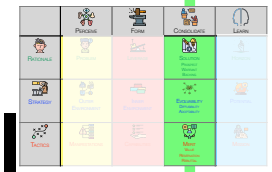
Inner environment – The substance and organization of what we design and implement.



Capability – An ability or facility devised to handle manifestations as part of a solution that provides value.

Leverage is something that can give us an edge over others.

Essence Terminology: Consolidate – Rationale Level



Solution – Why the problem might be resolved by what is to be built, why this is important, and why the result is attractive.

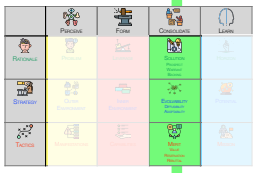
Prospect – What we believe to be a solution if used properly. A prospect reflects our understanding of the problem and how to solve it.

Warrant – Why solving the problem is essential.

Backing – Why the proposed contribution provides an attractive solution to the problem.

A prospect is our overall end-in-view at any given time. A resolution to be put to the test.

Essence Terminology: Consolidate – Strategy Level



Evolvability – The capacity to adapt to outer environments or to add new leverage points to the inner environment.

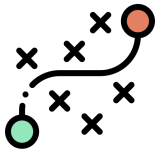
Diffusibility – The ability of an innovation to spread into new environments or to reinvent existing ones.

Adoptability – The capacity of an innovation to be adopted.

Essence Terminology: Consolidate – Tactics Level

Merit – The qualified value of the contributions produced by the current project.

Value – The overall value of the capabilities.



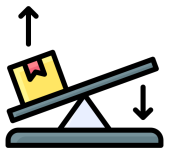
Reservation – Limitations in the solution (why the design might not support a complete solution to the problem).

Rebuttal – Why limitations to the solution would be acceptable anyway.

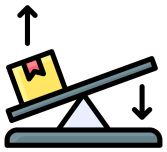
A qualification is a statement or assertion that makes another less absolute.

Project Scope is a Matter of Choice

Outer Environment – What we decide to include in the outer environment reflects how we scope the project, and how we scope it in turn shows how we perceive the problem and what we believe we can do about it.



Leverage – Represents opportunities for enhanced features, lower costs, greater flexibility, increased robustness, or other qualities that distinguish it. Leverage points are crucial for the current project and for preparing the team for future endeavors.



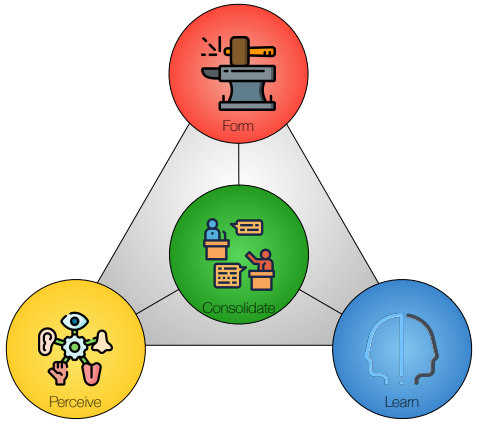
Leverage Taxonomy

- *Technologies* such as scientific knowledge and machinery on which a design might be based.
- *Components* such as equipment, sensors, or actuators accessed via crafted interfaces.
- *Information* for collecting, storing, disseminating, and/or aggregating information to be accessed via crafted interfaces.
- *Human resources* such as users, authorities, social or professional networks, organizations, or other that will have particular roles or functions.

Crafted: Non-trivial interfaces that integrate elements into the design

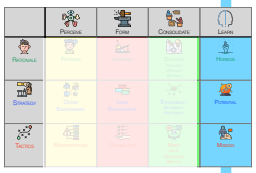
Outer Environment Taxonomy

- *External services*, i.e., services used without modification that reduce what is left for us to deal with.
  - E.g., geographical information, tracking, streaming …
- *External implements* such as equipment, sensors, or actuators accessed via trivial interfaces.
- *External repositories* for collecting, storing, disseminating and/or aggregating information via trivial interfaces.
- *External people* to be reached via trivial interfaces
  - E.g. specific people, stakeholders, organizations …



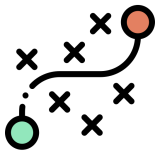
Hypotheses

Essence Terminology: Learn



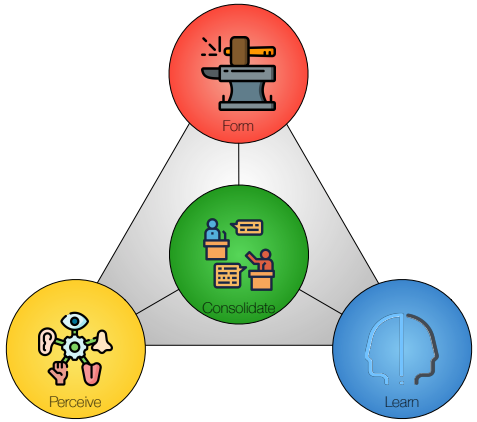
Horizon (Rationale)
Problem: The problem covers the issues faced by key users.
Leverage: Leverage is strategically vital for both current and forthcoming projects.
Solution: The solution answers the key parts of the problem.

Potential (Strategy)
Outer Environment: The external interfaces are *generalized and abstracted.*
Inner Environment: The internal structure is *flexible.*
Diffusibility: The project's results can foster future *growth.*



Mission(Tactics)
Manifestations: The manifestations are *essential to the primary users.*
Capabilities: The capabilities are *efficient and effective.*
Merit: The *cost/benefit ratio is attractive to the primary users.*

Valuation: What we aim for and will look for to know if we succeed.
In Essence, we use **hypotheses** *to judge if we meet our expected standards.*

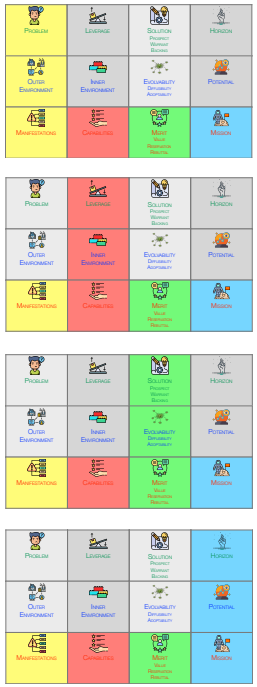


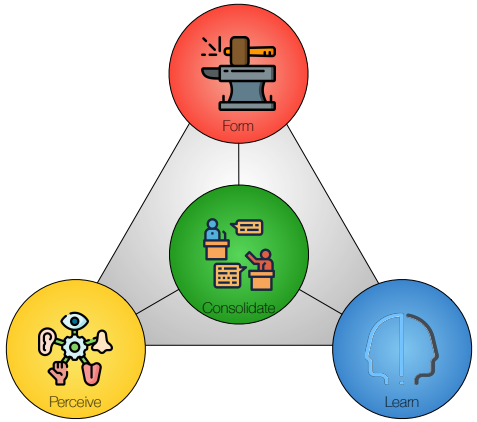
Fulcrums

Give me a lever long enough and a fulcrum on which to place it, and I shall move the world
Archimedes (287 BC – 212 BC)

Fulcrums

- Manifestation Fulcrum
- Capability Fulcrum
- Merit Fulcrum
- Mission Fulcrum





Next Time

Next Exercise and Lecture

- Exercise 2:
  - Choose Fulcrum and start on PSC.
- Lecture 3:
  - Chapters 5 & 6 in Essence: *Rationale* & *Problem*.

Exercise 2 (Start on your PSC)

Use the results from Exercise 1 and the PSC Template in this exercise.

Start on the PSC for your project:

- Discuss and choose Fulcrum (Sections 4.1 – 4.5). Explain your choice.
- Based on your Fulcrum, broadly outline a strategy for your work on the problem and its solution.
- Begin with the key cells in the PSC based on your strategy. Keep it concise.