CIEM0000

Master Civil Engineering

TU Delft Delft University of Technology

DRAFT SYLLABUS – UNIT (CIVIL) ENGINEERING SYSTEMS DESIGN (ESD)

STUDY LOAD	4 ECTS
EDUCATION PERIOD	Q1- Module Interdisciplinary Mechanics & Design Start: September 2022
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1 GENERAL INFORMATION

Engineering Systems Design (ESD) is a course enabling students to get from a semi-unstructured multi-stakeholder set of vague and embedding system dimensions (i.e., wicked problems), goals and needs to a well-defined set of requirements to design socio-technical systems, where desirability (human) and feasibility (physics) are integrated. A structured open design systems methodology is followed to model complex interconnected (subject-object) systems to arrive at best fit for common purpose solutions (see Open Design Systems reader/ www.odesys.nl).

The alternative view within this course is to combine mathematical modelling (i.e., multi-objective optimization and preference function modelling) with systems theory (i.e., systems thinking/ systems engineering & integration) in a constructivist way to reflectively simulate a real-life socio-technical design process. Within this open design systems approach the main concepts of systems design/decision making, research & development viewpoints within a ethical embedded systems context are linked with a self-chosen System of Interest (SoI):

1. Systems thinking and design as problem solving & Introduction ODL – System of Interest (SoI) and solution space
2. Complex interconnected systems (hard vs. soft) & Scientific Research versus Engineering Development – the 4Quadrant model
3. Embedding systems dimensions and Ethics – A game of conflicting interests
4. A-posteriori multi-actor design decision systems – Multi-Criteria Decision Analysis, Design compromise and Preference function modelling
5. A-priori multi-actor design decision systems – Multi-Criteria Decision Optimization, Design synthesis: Best fit for common purpose
6. Examples of the best fit for common purpose design methodology - Engineering Asset Management applications
7. Conspection your complex interconnected systems design

1.1 Education concept: Open Design Learning (ODL)

The Open Design Learning concept (ODLc) is an innovative educational concept for higher education. It is a reflective, creative and engaged learning approach that opens human development and unlocks new knowledge and solutions. ODLc stimulates students' curiosity, clarity and creativity. ODLc teachers and students are working in an open spirit levelling relation.
The ODL approach connects the inner personal learning ego and the outer real world eco. ODL integrates the student's learning and development via the U-model with the engineering system development via the V-model. Here the U-model constitutes experiential learning with an open mind, open heart, and open will design approach. The V-model represents an engineering system development process from an open-source, open-ended, and open glass-box modeling design approach. So in other words, the ODL teaching concepts integrates experiential and design based learning.
The students and the teachers cooperate in a living dialogue in- and on-action. This co-reflective dialogue creates an open space where alternative views can co-exist and new insights can be conceived. Students learn via a self-chosen system of interest arriving at an original response demonstrating their individual learning achievements. The ODLc forms the fundamental basis for creating 'open, integrative and persistent learners' concerned about solving future world problems. For more information on Open Design Learning (ODL) and it's concepts, see: www.open-design.school.

For this course the ODLc is implemented as follows. Every week students are asked to study specific concepts and apply these to their self-chosen Service Provider of Interest (SoI) by means of a self-created response and related open-glass-box (computer) models. The teachers incite the ESD concepts as a reflective practitioner using both reference books and dialogue questions from the students. The students have 2 hours of these concept and dialogue sessions and 4 hours of reflective (computer) work sessions per week for a number of weeks. During the work sessions, students can work on their ODL response under supervision of the teacher/constructor. On top of this, masterclasses are used where students and constructors co-reflect on a group's concept translation.

This year's course is structured as follows:

- Each week on Monday we devote the first hour to a dialogue session, the second hour is devoted to the introducing of that week's new concept.
- Each week on Thursday we devote 4 hours to practical computer work sessions. These sessions allow students to work on their ODL response under supervision of the teacher/constructor.
- During the course a number of masterclasses are scheduled that are meant for feedback from the teachers/constructors on the work of selected groups.

After this course students should be able:

- To be familiarized with and understand state-of-the art systems engineering management systems concepts, principles and practices, by (i) *dialoguing* these with the constructors, (ii) *navigating* through the system engineering management reference documents and (iii) *engaging* to a self-chosen real-life System of Interest (SoI).
- To relate and examine these abstract systems engineering management concepts, by (i) *constructing* SoI specific (computer) models, (ii) *dialoguing* with these models and (iii) *experiencing* these with the SoI and its reflective practice.
- To rework and transform the SoI specific systems engineering management concepts observations, by (i) *transforming* and *linking* the dialogues and experiences into new insights and (ii) *developing* improvement results where applicable.
- To form an individual judgement and appraise these new insights/results by means of a *conspection* between these and the original concepts within the specific context of the SoI.
- To create an original Open Design Learning (ODL) response that (i) *integrates* all concepts, (computer) models, new insights and developed results and (ii) *demonstrates* the internalization process of the aforementioned learning goals and *conveys* the ODL achievements.

1.2 Dialogue & introduction: Concept sessions

The session on Monday starts with a dialogue session where the teachers go over the different questions that emerged during the practical work session of the previous week. Students can also upload particular questions by sending an email to **<practical work coordinator xx>** (in advance).
The second part of Monday's session is about introducing the new concept. This new concept is what needs to be translated towards your own SoI. The Monday session is an on campus session (also made available on Collegerama as soon as it is ready).

1.3 Transformation & Reflection (1): Practical work session

The practical work sessions takes place each Thursday (4 hours). First week's practical work session is about: 1) discussing and motivating your SoI with your teachers (both with general and the Domain Experts: DEs) to make sure that it is suitable as a learning vehicle, and 2) getting into mathematical modelling. The remaining sessions students have to work on their ODL response under supervision of different reflective practitioners per track/domain of interest (senior domain experts who can reflect on the SE processes per SoI). The goal is to transform the different concepts to the each group's SoI. Students can receive individual feedback on their open glass box models and logical reviews. These practical work sessions are being organized by these domain experts (DE) and his/her student assistants (SA). Remark: the DEs 1) will be explained in advance (prior to the course) about the SE and glass box model approach by one of the constructors 2) the SAs support them and provide feedback during the week and collect relevant questions for the practical 3) are 1 afternoon per week (in 7 weeks) responsible for this.

1.4 Reflection (2): Masterclass

A masterclass is a short event in which one or more groups share their **work in progress** followed by feedback from the teachers. There is no formal evaluation. The goal of a masterclass is to identify a group's issues, problems, ideas and opportunities that mostly also apply to other groups.
We have experienced masterclasses to be very useful, both by the students who share their work and by the attending students. For this course three masterclass events are planned, one in week 5 (during the practical work session and thus per track coordinated) and two in week 7/8 (during the concept session and max. 3 spread over the tracks and thus coordinated by the overall constructors with the respective DEs).

1.5 Learning vehicle: the self-chosen System of Interest (SoI)

At the start of this course groups of 5 must be formed and each group must choose a System of Interest (SoI), a self-chosen real-life civil engineering system. In order to be able to convert all course concepts it is important that the SoI meets the following criteria:

- The engineering system can be under consideration (early design phase) or has recently been built;
- The SoI should be within the domain of the 6 participating tracks (max. 12 SOIs per track, principle of selection: 'first comes first served')
- The engineering system can be a real estate or infrastructure (transport-, water mngt-., energy) system.
- There should be at least four stakeholders involved that have conflicting interests/objectives.
- The design variables should be non-binary (yes/no problems).
- The students are able to get in touch with practitioners who can provide information about the design/development process or there is ample information on the design/development process available.

In this course the SOIs should be equally distributed over the different tracks/domains of interest (6 tracks with max. 12 groups of 5 students):

1. Construction materials
2. Geotechnical engineering
3. Hydraulic engineering
4. Hydraulic and offshore structures
5. Structural engineering
6. Traffic and transport engineering

Therefore, you firstly have to enroll yourself for your track of interest (incl. a second best option) and then choose an SoI within this engineering domain. The SoI must be approved by the Sessions via upload on Brightspace. The first practical session allows you to discuss the SoI with your reflective practitioner: the DE (and his/her SA). Approval is based on a short document that you upload <latest xx>. This proposal contains a short motivational description of your SoI, how you are connected and how you plan to obtain the required information.

1.6 Deliverable: the ODL response

The deliverable of this course is the so-called Open Design Learning (ODL) response. Students have to work in groups of 5 on creating this ODL response. Finally, one group delivers one ODL response.
The ODL response is an original enabler demonstrating both the group and personal learning and development achievements. For this course students have to deliver one ODL response containing both the general group response (concepts 1 to 6) and an individual response on closing the systems design loop – fit for purpose conspection (final concept 7 and already introduced as system V&V in concept 3). Each student should convert this concept for a particular stakeholder (so the SE for the SoI should contain min. 4 different stakeholders to enable also an individual fit for purpose conspection). So in other words each of the group members has to evaluate and to relatively position the interests of their particular stakeholder.
Note: one group delivers one ODL response covering both group and individual achievements.

All of these (incl. the open glass box model) should be presented in a self-chosen format such as report/ elaborative presentation/ digital audio or video files/ animation/ website…. The ODL response illustrates how the general concepts have been linked and evaluated to the self-chosen SoI using either a: 1) logical review and/or 2) computer model(s).

Some hints for finalizing your response:

- Start your response with a management summary that already catches the imagination of its 'beholder'.
- Take care of your response's signal to noise ratio. For each piece of information, ask yourself: would it hurt the line of reasoning if I left it out? Usually less is more. Note: the response is not a day to day report of what you have done.
- Don't assume that the number of pages correlates with the final grade. In our experience usually the opposite holds as it takes much time to end with the most agile line of reasoning.
- Your final response can be achieved by backwards engineering. After you have translated all concepts you will have enough of an overview to put all parts together into a coherent and well-structured response.
- Do not repeat what is in the reference material. Your text will be unique because you used reference material to link it to your SoI.
- Only use references that support your line of reasoning.

Students should demonstrate how and/or if these concepts are being utilized and the rationale behind its specific use(fullness). **The final ODL response needs to be handed in no later than**
<date xx at the end of week 10>.

1.7 Judgment & Reflection (3): the ODL commendation

The Open Design Learning commendation principle will be applied as a grading rubric for the ODL response. Both the SoI modelling content characteristics, and the student's learning process and open design outcomes are integrated within these commendation principles.
We call it 'commendation' because when we grade your response, we start from a grade of 10 and only deduct points if aspects are missing/only partially worked out.
The final commendation will be executed by the overall constructors, facilitated by the DE's input per participating track (and or the SAs per track). So, the commendation responsible (and execution) lies with the constructors, where the DEs will have an informative role.

Commendation category	**Relates to:**	**Expressed in (the making of) the ODL response:**
Connect	Learning process	Showing courage, being curious, being a creative problem solver. Engagement factor.
Construct	Model / concept transformation, improvement proposals and verification	Showing proper concept conversion, conceptions for improvements, correctness in modeling. Going the extra mile in concept conversion. Content factor.
Conclude & Conspect	Developed results, validation and reflection	Showing a cyclical approach, dealing with completeness, conspection of own work. Overview factor.
Convey	Reporting and presenting the response	Showing a clear line of reasoning. Being concise (signal to noise ratio). Not copying reference material. Straightforward factor.
Convince	Response speaking to / arousing the imagination	Being cogent and demonstrating a critical attitude. Compelling factor.

After handing in the ODL response your will receive your grade. To pass the course your ODL commendation grade should be higher than or equal to 6. After commending your ODL response one plenary open dialogue session(s) (max. 3 hours, somewhere between week 11 and 14) with one of the constructors and with your DE will be scheduled. Only during this session(s) we can reflect on your ODL response: bear in mind, the ouDEome of this reflection can result in a lower/equal/higher grade.

- If your grade is higher than or equal to 6 you can learn the rationale behind this commendation. This does not mean that you can use the provided feedback to improve your response and re-upload to get a higher grade.
- If your grade is below a 6 your will receive (prior to the session) a constructive and written proposal for improving your ODL response with a specific deadline. During the aforementioned session you can discuss this proposal in more detail on how to update your ODL response which will be commended with a maximum grade of 6.

2 WEEKLY COURSE CONTENT: THE ODL CONCEPTS

The course consists in principle of two meetings every week: 1) an incitement, dialogue and/or introduction of the major concepts session (CS) and 2) a reflection and practical work session (PW) and/ or a masterclass session (MC).

WK	Session	Topic	Description	Resources	ODL activity/deliverable
1	CS	Concept 1: Systems thinking and design as problem solving	• Open Design learning concept. • Course practicalities. • Systems thinking. • Mathematical modelling as a form of design systems problem solving.	RW, RB LT	• Students form groups of 5 (max. 360 student: 60 per track, groups of 5, max. 12 groups/6 tracks). • Students enroll for a group on Brightspace (max. 12 groups/track). • Students start to search for self-chosen SoI other than presented SOIs by DEs.
	PW		• Inciting concerning all tracks: introducing track related SoI • Students discuss candidate SoIs with teachers and SAs. • Students work on modelling exercise XYZ problem.	RW, RB LT SvN, SAs	ODL response: The SOI proposal: motivation and explanation: connectivity factor.
2	CS	Concept 2: Complex inter-connected systems (hard vs. soft) Scientific Research versus Engineering Development (4Q model)	• Systems engineering design process models (V-model, eDE.) including V&V. • The difference between engineering development and scientific research and how we can distinguish between 4 quadrants. • The integration of different stakeholder aspects into one overarching viewpoint (eco-purpose, design for -Y).	RB, RW	Students create 4 mini proposals for each quadrant that apply to their SoI. Students determine the (societal) needs and related constraints for the SoI: design for tY.
	PW		• Students discuss for each quadrant their proposals with teachers and SAs. • Students work on creating a prototype linear programming model for which they now have determined the constraints and add the design variables (degrees of freedom).	RW, RB LT SvN, SAs	ODL response: A description of the overarching development statement of the SOI. A demonstration of a set of 2 RQs and 2 DSs relating to subsystems of the SoI linked to the R&D quadrant model (physical and social/ engineering vs. management). A first prototype of the design/decision making model representing the chosen SoI.
3	CS	Concept 3: Embedding system dimensions and Ethics	• How to get from societal needs to spatial development encompassing nature, sustainability, space, logistics, economy and the integration of ethics. • A game of conflicting interests.	LT + xx	Students determine for at least 4 stakeholders how their (societal) needs link to earlier defined operational constraints (at least one constraint for each stakeholder). Stakeholders' interests need to be conflicting. Of the 5 students for each group 4 represent a stakeholder, the 5th is responsible for integrating the stakeholders' constraints into the decision model (system modeler).
	PW		• Students discuss how they determined societal needs for their SoI and how they translated these into operational constraints with teachers and SAs.	All DEs, SAs, RB,DZ	ODL response: The (societal) needs and related constraints for the SoI: for at least 4 stakeholders their (societal) needs into operational constraints (at least one constraint for each stakeholder).
4	CS	Concept 4: A-posteriori multi-actor design/ decision systems	• Dealing with multiple objective functions, constraint method, goal programming, preference measurement, preference function measurement modelling, choice and preference, scales, alternatives, scores, weights, function versus algorithm. Function (arithmetic mean) vs search algorithm (Tetra aggregation).	RW, RB	Read the documents on evaluation/design methods. Preference function modeling. See addendum document example urban planning problem (constrain method) and example shopping mall part I (MCDA a-posteriori evaluation).

	PW		• Students optimize on 4 objective functions, 1 for each stakeholder. • Students enter these 4 alternative solutions in Tetra to find the 'best' group alterative.	All DEs, SAs, RB,DZ	ODL response: The outcomes of each of the 4 optimization runs. The steps to rate each of these on preference (how decision variable values relate to preference ratings). The final outcome of the Tetra a-posteriori analysis.

Week	Session	Topic	Description	Resources	ODL activity
5	CS	Concept 5: A-priori multi-actor design decision systems Best fit for common purpose	• A posteriori sub-optimal vs a priori optimal. Single actor optimal solutions versus group optimal solutions, compromise versus synthesis, preference function modeling aggregated preference rating. Monetarization vs. preference.	RW, RB	Read documents on preference based design and alternative methods for aggregating preferences. See addendum document example shopping mall part II (MCDA a-priori design).
	MC		• Masterclass W5 where 1 group per track (30 min per track) demonstrates the ODL response as work in progress focusing on how SOI has been converted into an open glass box optimization model.	RW, LT, RB, all DEs (optional)	ODL response: The result of a-priori optimizing on overall preference using their optimization model. Reflection on the difference with the previous week's compromise solution. Students start creating an a-priori preference based design model by determining preference curves that relate design variable values to preference ratings.
6	CS	Concept 6: Examples of the best fit for common purpose design methodology Engineering Asset Management applications	• Incitement: Example applications for project delivery and or service operation planning of engineering assets within the context of a service provider.	RW, RB	Explore different design applications (bonus point for an extra application in your ODL response). See addendum document examples of light rail, offshore wind, high voltage network and rail level crossings.
	PW		• Students discuss how they created the multi-criteria decision making model and arrive at the best group design alternative.	All DEs, SAs, RB,DZ	ODL response: Students finalize their a-priori preference based design model by determining preference curves that relate design variable values to preference ratings.
7	CS	Concept 7: - Conspection Complex Inter-connected Design Systems	• Reflection based on overall dialogue questions received. General questions, not SoI specific (no DQs, no session).	RW, RB, LT	
	MC		• Masterclass W7 where 2 groups (60 min.) per track (track 1/2/3) illustrate how they position generated design alternatives in relation to the real-life also including ethics.	RW, LT, RB, 3 DEs (optional)	Students take a step back and look at the system as a whole, especially the real-life SOI, to what extent does it meet the user needs? What is its relative fit-for-purpose position. How were ethics integrated?
8	MC		• Masterclass W8 where 2 groups (60 min.) per track (track 4/5/6) illustrate how they position generated design alternatives in relation to the real-life also including ethics.	RW, LT, RB, 3 DEs (optional)	ODL response: An holistic response on the real-life SOI with respect to its relative position including ethics considerations.

In the following 7 sections practical guidelines (session topics, practicalities, literature, eDE.) are given for each weekly concept mentioned in section 1.1 cq. the above table (the course schedule).

<<The 7 concept descriptions below need to be detailed further>>

Concept 1: Systems thinking and design as problem solving

Systems thinking is a powerful concept where problems are to be solved by looking at systems as being parts of more generic systems instead of looking at elements of the system itself. Mathematical models can be used to represent systems. Such models allow for simulation so that different solutions to problems can be analyzed on their effectiveness of solving the problem at hand. Optimization models are a specific type of models that allow for automatically search for an optimal solution as long as the optimization criterion is well defined. The optimization criterion relates to utility/value/preference. In real life constraints apply that bound the so-called solution or design space.

Reference material: Blanchard chapter 1 and/or Ackoff Part 1.

ODL response building block: see course table.

Concept 2: Embedding the systems dimensions

Having chosen an SOI we need to define the societal needs that the SOI needs to meet as a set of operational constraints: the embedding systems dimensions in an open space, including the ethics integration. For this students need to define the multi-stakeholder solution space.

- Session on how to get from societal needs to spatial development encompassing nature, , sustainability, space, logistics, economy and the integration of ethics.
- Samuel Labi “Civil Engineering Systems”, 2014: https://tudelft.on.worldcat.org/oclc/859253565
- Benjamin S. Blanchard and Wolter J. Fabrycky, "Systems Engineering and Analysis" Print: 5th edition July 2013. Pages 23-53.
- << ethics reference material and or eco-purpose background material >>

Concept 3: Hard engineering systems vs. soft management systems

Solving design and decision making problems is distinct from analyzing them. While the former entails the development of a new system (physical or abstract), the latter entails the research of existing systems. The related processes are formally opposite. Research is directed from the empirical world to the mind (understanding), development is directed from the mind to the empirical world (improvement).
Operations research makes use of systems thinking to model and solve design and decision problems. Classical engineering design problems only incorporate physical variables (all part of the International System of Units). Such problems relate to ‘hard systems’ because the constraints for such problems relate to physics and cannot be changed. When applied to societal systems, involving stakeholders, also psychological variables come into play. Psychological variables are subjective as they relate to a person while physical variables are objective as the relate to an object. This has the implication that constraints of mathematical models that represent social systems are not fixed but negotiable. These systems are therefore called ‘soft systems’.
Societal needs are multi-faceted, in other words, not one size fits all. Taking into account all facets means that the to be designed system needs to meet different sets of design criteria. Whereas Vitruvius limited the set to 3 criteria - aesthetics, robustness and functionality - modern day engineering systems need to be designed against a multitude of design criteria relating to a multitude of stakeholders, this is the starting point for the design for ty’s.

Reference material: Blanchard chapter 2 and Roozenburg Section 3.3 and 5.5, Guideline SE section IV.4.

ODL response building block: see course table.

Concept 4: A posteriori multi-actor design decision systems

It is not uncommon that stakeholders have opposing objectives. If this applies to a design decision making problem then there are multiple objectives to optimize on. This means that there are as many optimization models and solutions as there are objectives. As only one solution can be selected we need a way of finding

which solution is most preferred by the group of stakeholders. For this we make use of multi-criteria decision making and consider each of the solutions as alternatives that needs to be rated on overall preference.
There is however a fundamental problem with current methodologies for measuring preference. Just as in physics, there can only be one correct measuring methodology, no more. Preference function modeling is a new theory of measurement that is based on a strong mathematical foundation. We use Tetra, the software implementation of PFM to find the alternative with the highest overall preference rating.
A limitation of this procedure for finding the group optimum is that all alternatives to choose from are compromise solutions because they are geared towards the interests of one stakeholder.

Reference material: Blanchard chapter 7, and Barzilai chapter 3, Dyme chapter 8.

ODL response building block: see course table.

Concept 5: A priori multi-actor design decision systems

There are alternative ways for solving multi stakeholder problems i.e. goal programming, the constraint method, monetization. These are not without their problems, however. By having the stakeholders express their preferences for 'synthetic' alternatives up front we introduce a preference-based design decision system that works towards synthesis instead of compromise.

Reference material: Zhilyaev and/or Binnekamp chapter 6 and Fisher part II.

ODL response building block: see course table.

Concept 6: titel wijzigen

Linear optimization models consisting of only linear mathematical equations yield a global optimum given the optimization criterion. From a mathematical/logical point of view, this optimum cannot be improved. Non-linear optimization models also contain non-linear equations. Non-linearity means that we cannot be certain that the optimum that is found is the 'real' optimum. Depending on the type of optimization algorithm and its starting point different optima will be found.

Reference material: Incitement Desmet: system theory.

ODL response building block: see course table.

Concept 7: Best fit for common purpose

Engineering systems are always designed to serve a specific purpose. This purpose is derived from a set of, usual vague and messy starting points. These starting points are the needs from society, something that needs improvement or simply cannot be done yet. Systems engineering is a way to methodically make the transition from needs to requirements. The end result of the systems engineering process, the engineering artefact, can be verified using the stated requirement and validated given the needs.

Reference material: Blanchard chapter 6 and/or Zhilyaev, Van Gunsteren chapter 2.

ODL response building block: see course table.

3 REFERENCE MATERIAL

The following books and scientific articles will be used for this course.

General:

- Blanchard, B.S. and Fabrycky, W.J., "Systems Engineering and Analysis" Print: 5th edition July 2013.
- Addendum to the reader: Best fit for common purpose, see Brightspace.

Extra:

- Ackoff, R.A., "Ackoff's Best". Wiley, 1999.
- Barzilai, J. "Preference Function Modelling: The Mathematical Foundations of Decision Theory" in: Trends in Multiple Criteria Decision Analysis, Springer, 2010.
- Binnekamp, R., "Preference-based Design". IOS Press, 2010.
- Dyme, C.L, and Little, P., "Engineering Design: A Project-Based Introduction", 2nd Edition ISBN-13: 978-0471256878, 2003.
- Fisher, R. and Ury, W.L., "Getting to Yes". Penguin, 1991.
- Roozenburg, N.F.M. and Eekels, J., "Product Design: Fundamentals and Methods, ISBN-13: 978-0471954651, 1995.
- Van Gunsteren, L.A., "Quality in Design and Execution of Engineering Practice" ISBN978-1-61499-251-6 (print) | 978-1-61499-252-3 (online), 2013.
- Zhilyaev, D., Binnekamp, R., Wolfert, R., "Best fit for common purpose: A multi-stakeholder design optimization methodology for construction management". Paper currently under review.

DRAFT DETAILS not for STUDENTS

Human Resources - concept

- Main assumption 6 tracks with each maximum 15 groups (of max 4 studs). So, in total 360 students max. can be hosted
- SE constructors main task: general supervision, 5 concept and dialogue sessions, overall responsible for ODL response commendation. Responsible for the Masterclasses. Instruction session to track specific DEs and SAs (ODL way of thinking and linear programming modeling). Integrative role for practical sessions. Support overall questions from DEs Sessionrs and SAs.
- 6 SAs under supervision of SE staff, main task facilitating practicals and commending ODL responses and approval SOIs.
- 6 track specific senior reflective practitioners: i.e., track coordinator (DE) main task is: 1) introduction of the domain with inciting SOIs of the domain, 2) reflective practitioning on SOIs, allocation 4-5 weeks of 4 hours per Session (half a day per week for max. 5 weeks: intro motivation/ reflection/ MCs) 3) input the ODL commendation
- The SE constructors will commend the ODL (with the assistance of the SAs). The DEs are being asked for input on at least two of the Commendation aspects: *Connect* (learning process) *Construct* (model setup/ concept transformation, improvement proposals and verification). SvN responsible for commendation coordination/ conspection-individual contribution
- DEs are should be available for 7 practicals and together with their SAs responsible for input to the commendation. DEs available for 7x4+2=40 uur.
- 2 non-SED constructors responsible for the ethics, sustainability.

Additional Organizational remarks

- Instruction session design optimization bij RB to 6 DEs and also all SAs.
- SAs regie 3MD and supportive to DEs
- DEs 4-5 weeks responsible for practical work sessions
- SE constructors together with all SAs responsible for commendation of ODL responses
- SA will be allocated to support DE with practical work sessions
- SvN coordinates all practical work sessions
- RB coordinates link design optimization model and track contents
- DEs and SvN approve SOIs
- ..

Detail remarks KLAD

Voor concept 3
Voor de ODL R&D onderdeel vragen we studenten een beperkte invulling van het kwadrantenmodel op te leveren. Dat betekent dat voor de development kant de volgende onderdelen gemaakt dienen te worden:

- Development gap
- Development statement
- User needs
- Product requirements
- Intended product description

(specifieke V&V laten we achterwege, zie 4030 of 4481)

Geheugensteuntje R'damse baan
Main problem : Verkeerssituatie en congestie den haag

Q1 RQ Actuele verkeersanalyse
Q2 RQ Analyse stakeholder draagvlak
Q3 DS Locaal hergebruik asfalt (product is te maken machine)
Q4 DS Visualisatie tool vergroten draagvlak sneller snappen oplossing (digitaal visualization of design process tool)

Voor concept 7. De gedachte is dat elk groepje kritisch naar het real life SOI kijkt. Is er mogelijk manipulatie geweest. Is er een stakeholder geweest die macht heeft doorgedrukt. Ook theory-in-use versus espoused theory Argyris and Schon. Macht kan tot uitdrukking komen wanneer single stakeholder optimum heel dicht licht bij real-life SOI. Transparantie vs. Ruimte voor manipulatie. Heeft de tijd misschien de fitness for purpose ingehaald?
Socio-Eco purpose onderscheid in lagen
Ethiek impliciet in socio-eco purpose pyramide verweven (economical- ecological -sociological)
Opbouwend: bijvoorbeeld derde hoekpunt economy-logical:
Hier is het een statisch systeem en niet een organisme': dus in EAM Socio-organic : social threefolding→ organisatie
Hier Socio-eco zou kunnen : groepering van ty's over wat het oplevert voor mens-aarde-maatschappij : human-resources-societal dus socio-econom-ecolog (omgeving maatschappij-financieel-resources)

1 target :goal laagste budget = minimaliseren kosten (minst ethisch)
2 target: plafond stellen = alles is goed binnen de gestelde kaders
3 purpose: integraal / moraal = tenminste iedereen die meewerkt verdient er iets aan (meest ethisch)
Zo ook te doen voor socio en gaia logical.

Voorbeelden van elk illustreren. Socio (basiswet en sociologische hoofdwet). Ecology (bio-dynamisch vertrekpunt).

Studenten werken in groepen van 5, 4 vertegenwoordigen een stakeholder, de 5e neemt de rol van systeem modelleur op zich en wordt gevoed door de andere met randvoorwaarden en doelen.