

**Criteria for assessing
the design process of a
technological design**

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In March 2010 the 3TU.School for Technological Design, Stan Ackermans Institute, published criteria for assessing a technological design. For each of 9 aspects of quality, several indicators were given, to be measured with a 5-point scale. In this publication criteria are given for the assessing of the design process of a technological design.

In the designer programs of the Institute the final project is the concluding part, leading to a technological design. Its goal is to evaluate trainee's skills and knowledge to carry out a relatively large design project within an industrial environment. The final project is related to an industrial problem and is constrained by time planning, project management, industrial context, and project deliverables. Projects have substantial scientific level and are devoted to problems of true value for the companies where the projects are carried out.

The final project is divided into project phases; division and naming of phases are dependent on the specific designer program. As an example we mention: analysis or diagnosis phase, design phase, implementation or realization phase, reporting phase. Each phase can be concluded with a deliverable, e.g., the deliverable of the diagnosis phase is a problem description with clear goals and project and time planning, the deliverable of the design phase is an extensive description of the technological design in the context of the requirements.

Every project is carried out within a company and this company takes care of a working space with the usual up-to-date facilities such as computer and laboratory equipment and facilities, chair and desk. A team is responsible for supervision of the final project. It consists of supervisors of the university and from the company. Also other experts can be part of the team.

The trainee participates actively in the team meetings. The minutes of these meetings are part of the logbook of the project. At the end of the final project, the project results, the technological design, and the project process are evaluated by an evaluation committee. Generally, members of the project team are also members of the evaluation committee.

To evaluate the performance 12 aspect, with several indicators are distinguished to evaluate the execution of the design project. The aspects and indicators are specified in the following. An assessment form is added. A five point grading scale is proposed: from Excellent to Fail.

Grade	Meaning
Excellent	Successfully addresses all relevant aspects Shortcomings are minor
Good	Well done Certain improvements are possible
Fair	Significant weaknesses that need correction
Poor	Inherent serious weaknesses
Fail	Cannot be judged due to missing/incomplete information

We list the detailed aspects and indicators, to be applied as/when appropriate (Notice: not all these indicators are relevant all the time. They can be implicit, irrelevant or tacit).

For every aspect several indicators are given with an ordinal range of descriptions.

The scale value (Excellent ... Fail) applies for which most of these descriptions hold true.

Aspect 1: Carrying out project planning

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Phasing</i>	Project planning contains milestones, phasing, activities and necessary updates	Project planning contains milestones, phasing and activities	Project planning contains milestones	Project planning contains no milestones	No project planning
<i>Planning as a communication tool</i>	Project planning concerns own activities and activities of others involved; uses planning as a tool to communicate	Project planning concerns own activities and activities of others involved	Project planning concerns own activities only and assumes results of others	Project planning concerns own activities only	No project planning
<i>Initiative</i>	Takes the lead in project planning	Plays a pro-active role in project planning	Keeps project planning on his/her own initiative	Keeps project planning when triggered by supervisor	No project planning

Aspect 2: Carrying out time planning

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Reference to milestones</i>	Time planning contains references to milestones, phasing and activities and necessary updates	Time planning contains references to milestones, phasing and activities	Time planning contains references to milestones	Time planning contains no references to milestones	No time planning
<i>Planning as a communication tool</i>	Time planning concerns own activities and activities of others involved; uses planning as a tool to communicate	Time planning concerns own activities and activities of others involved	Time planning concerns own activities only and assumes results of others	Time planning concerns own activities only	No time planning
<i>Initiative</i>	Takes the lead in time planning	Plays a pro-active role in time planning	Keeps time planning on his/her own initiative	Keeps time planning when triggered by supervisor	No time planning

Aspect 3: Meeting Project goals

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Completeness & planning</i>	Meets all milestones set in the project planning and exceeds these	Meets all milestones set in the project planning	Meets almost all milestones set in the project planning	Meets some milestones set in the project planning	Meets only few of the milestones
<i>Focus</i>	Able to meet the project goal according to planned strategy	Able to meet the project goal	Focus on the project goal	Little focus on the project goal	No focus on the project goal

Aspect 4: Formulating a clear problem description

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Initiative</i>	Formulates a final problem description on own initiative; needs no help of supervisors for further elaboration	Formulates a final problem description on own initiative; needs little help of supervisors for further elaboration	Formulates a draft problem description on own initiative; relies on help of supervisors for further elaboration	Formulates a problem description only with help of the project supervisors	No problem formulation
<i>Diagnosis</i>	Problem formulation based on distinguished diagnosis	Problem formulation based on reasonable, but not verified assumptions	Problem formulation based on educated guesses	Problem formulation not based on any arguments	No problem formulation
<i>Link to planning</i>	Problem formulation has clear link to project and time planning, including contingency	Problem formulation has clear link to project and time planning	Problem formulation is not inconsistent to project and time planning	Problem formulation without link to project and time planning	No problem formulation
<i>Commitment</i>	Problem formulation agreed by all stakeholders of the project	Problem formulation discussed with all stakeholders of the project	Problem formulation communicated to all stakeholders of the project	Problem formulation not communicated to all stakeholders of the project	No problem formulation

Aspect 5: Putting the project in context

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Understanding of impact</i>	Demonstrates understanding of the impact of reaching the project goal on the organisation at large	Demonstrates understanding of the impact of reaching the project goal on the project environment	Has tried to understand the impact of reaching the project goal on the project environment	Realises that reaching the project goal may have impact on the project environment	Does not understand the impact of reaching the project goal on the project environment
<i>Analysis</i>	Analyses various interests and political implications	Knows how to analyse various interests and political implications	Able to mention (without actual analysis) various interests or political implications	Realizes that there are interests or political implications	Doesn't realize that there are interests or political implications
<i>Consistency</i>	Consistently acts in accordance to his/her analysis of the context	Consistently acts in accordance to assumed context	Occasionally acts in accordance to assumed context	Does not act in accordance to assumed context	Has no awareness of context

Aspect 6: Seeking and incorporating expert knowledge

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Initiative</i>	Actively searches for expertise inside and outside the own university and project organization	Actively searches for expertise inside and outside the own university and project organization	Actively searches for expertise inside the university and project organization	Waits for expertise to be offered (no active seeking for expertise)	Does not realize when external expertise is needed
<i>Integration</i>	Incorporates and shares knowledge obtained in the process of the project	Incorporates and shares knowledge obtained in the process of the project	Incorporates knowledge obtained	Incorporates knowledge obtained	Does not incorporate knowledge obtained
<i>Reflection</i>	Uses expertise to define one's own opinion and decisions	Is able to reflect on expertise knowledge offered	Is somewhat able to reflect on expertise knowledge offered	Is unable to reflect on expertise knowledge offered	Is unable to reflect on expertise knowledge offered

Aspect 7: Communicating with stakeholders

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Initiative</i>	Initiates communication with the stake holders	Initiates communication with the stake holders	Initiates communication with the stake holders	Initiates communication with the stake holders	Does not initiate any communication with the stake holders
<i>Dedication</i>	Routinely tailors communication means and frequency to the needs and preferences of the stake holders	Routinely tailors communication means and frequency to the needs and preferences of the stake holders	Occasionally tailors communication means or frequency to the needs and preferences of the stake holders	Does not tailor communication to the needs of the stake holders	Does not tailor communication to the needs of the stake holders
<i>Stakeholder awareness</i>	Includes other parties in the communication if needed	Includes other parties in the communication if needed	Includes other parties in the communication if needed	Does not include other parties	Does not include other parties
<i>Purpose</i>	Distinguishes between informing, consulting and decision making	Makes little distinction between various types of communication	Makes no distinction between various types of communication	Confuses various types of communication	Does not communicate effectively
<i>Persuasion</i>	Shows adequate persuasion in communication	Shows persuasion in communication	Shows little persuasion in communication	Has a passive role in the communication	Does not initiate any kind of communication with the stake holders

Aspect 8: Setting up meetings

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Initiative</i>	Independently takes initiatives in setting up regular meetings	Independently takes initiatives in setting up meetings	Takes initiatives on request of supervisors to set up meetings	Takes initiatives on request of supervisors to set up meetings	Does not take any initiative to set up meetings
<i>Preparation</i>	Prepares the agenda, the room and people attending; invites the supervisors and stakeholders	Prepares the agenda, the room and people attending; invites the supervisors and stakeholders	Prepares the agenda, the room and people attending; invites the supervisors and stakeholders	Is not reliable in preparing agenda, room and attendees; invites the supervisors but not necessarily any other stakeholders	Is not reliable in preparing agenda, room and attendees; makes no invitations
<i>Considerate</i>	Makes sure that each attendee of the meeting knows how to contribute best	Pays some individual attention to attendees	Does not distinguish roles of various attendees	Is inconsiderate with respect to attendees	Is inconsiderate with respect to attendees
<i>Documentation</i>	Prepares and provides adequate meeting documents	Prepares and provides adequate meeting documents	Prepares and provides meeting documents	Not reliable in providing meeting documents	Fails to prepare and provide meeting documents
<i>Feedback</i>	Routinely writes clear meeting minutes and asks for feedback	Routinely writes clear meeting minutes	Routinely writes meeting minutes	Occasionally writes meeting minutes	Does not write minutes

Aspect 9: Working in a team

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Initiative</i>	Independently involves the right people in the project	Independently involves the right people in the project	Independently involves the right people in the project	Involves, if triggered by supervisors, the right people in the project	Does not demonstrate ability to work in a team nor make a team
<i>Responsibility management</i>	Actively stimulates peers in keeping their responsibilities	Makes sure all understand their responsibility	Recognises responsibilities in peers	Understands what responsibilities are	Incapable to deal with the notion of 'responsibility' in a team
<i>Atmosphere</i>	Makes other feel comfortable working with her/him, and actively creates a good atmosphere	Makes other feel comfortable working with her/him	Makes other feel comfortable working with her/him	Seems to be incapable to increase or improve a feeling of comfort for his/her peers	Lacks basic social skills
<i>Conflict management</i>	Knows how to manage and mitigate conflicts	Knows how prevent a potential conflict from escalating	Capable of detecting (potential) conflicts	Incapable of detecting (potential) conflicts	Unnecessarily causes conflicts

Aspect 10: Delivering presentations

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Dedication</i>	Tailors the presentation to the audience	Tailors the presentation to the audience	Tailors the presentation to the audience	Presentation is not tailored to the audience	Delivers a presentation without showing any interest to inform
<i>Structure</i>	Designs the structure of a presentation such that the level of detail is just right at any time	Distinguishes between main aspects and technical details	Understands the difference between main aspects and technical details	Doesn't seem to appreciate the difference between main aspects and technical details	Incapable of giving a coherent presentation
<i>Presentation skills</i>	Is capable of actively drawing the attention of any audience	Keeps the audience interested and paying attention	Is capable of getting a message across if the audience is willing to listen	Gives a presentation that is little understandable even for a willing audience	Incapable of giving a coherent presentation
<i>Self confidence</i>	Answers questions with confidence; shares and defends own opinion if necessary	Answers questions with confidence	Gives (partial) answers to questions	Is rarely capable to answer questions	Is rarely capable to answer questions

Aspect 11: Showing creative thinking

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Lateral attitude</i>	Tries different approaches and actively tries out alternatives;	Tries different approaches and searches for alternatives	Considers different approaches and shows interest in alternatives	Applies the customary methods	Has difficulties in applying the customary methods
<i>Associativeness</i>	Constructively applies associative thinking; makes use of links between related aspects	Easily associates; sees links between related aspects	Attempts to find links to related aspects	Focuses on the 'standard' aspects	Has difficulties in focusing on the 'standard' aspects
<i>Genericity</i>	Applies a more generic approach than necessary	Seeks a generic approach	Realizes that the problem at hand might be solved in a more generic way	Considers the standard approach	Has difficulties in finding or applying the standard approach
<i>Boldness</i>	Dares to abandon the orthodox method and creates a better one	Considers abandoning the orthodox method and creating a better one	Realizes that there may be alternatives to the orthodox method	Understands what the orthodox method entails	Is not aware of 'the' orthodox method

Aspect 12: Showing a critical attitude

Indicator	Excellent	Good	Fair	Poor	Fail
<i>Alertness</i>	Tends to find and call attention to errors and flaws	Tends to seek errors and flaws	Sees errors and flaws when pointed at, and reacts adequately	Sees errors and flaws when pointed at	Takes everything for granted
<i>Reflection</i>	Consistently demonstrates reflective thinking throughout the design process	Demonstrates reflective thinking in the major part of the design process	Occasionally demonstrates reflective thinking in parts of the design process	Lacks reflective thinking on the design process	Takes everything for granted
<i>Independency</i>	Independently examines trustworthiness of arguments; seeks for evidence	Independently examines trustworthiness of arguments; seeks for evidence	Seeks for evidence when asked	Is reluctant to seek for evidence	Does not want to / know to seek evidence
<i>Opinionated</i>	Succeeds to maintain a personal opinion, even when it differs from general consensus, using justified arguments	Actively tries to defend a personal opinion against general consensus	Realises when/where his/her personal opinion deviates from general consensus	Is able to formulate his/her personal opinion	Has no well-formulated own opinion

Project name	
Designer	
Company	
Company supervisor	
University supervisor	

Aspect	Indicator	Value	Judgement
Carrying out project planning	Phasing		
	Planning as a communication tool		
	Initiative		
Carrying out time planning	Reference to milestones		
	Planning as a communication tool		
	Initiative		
Meeting project goals	Completeness & planning		
	Focus		
Formulating a clear problem description	Initiative		
	Diagnosis		
	Link to planning		
	Commitment		
Putting the project in context	Understanding of impact		
	Analysis		
	Consistency		
Seeking and incorporating expert knowledge	Initiative		
	Integration		
	Reflection		
Communicating with stakeholders	Initiative		
	Dedication		
	Stakeholder awareness		
	Purpose		
Setting up meetings	Initiative		
	Preparation		
	Considerate		
	Documentation		
	Feedback		
Working in a team	Initiative		
	Responsibility management		
	Atmosphere		
Delivering presentations	Dedication		
	Structure		
	Presentation skills		
	Self confidence		
Showing creative thinking	Lateral attitude		
	Associativeness		
	Genericity		
	Boldness		
Showing a critical attitude	Alertness		
	Reflection		
	Independency		
	Opinionated		