IT Competences and Learning Outcomes

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The IT competences are described for all Dutch IT studies in
https://www.hbo-i.nl/publicaties-domeinbeschrijving/ (available both in Dutch and English, see
the 2018 version). If relevant for you, also check the addendum Data Science.
The IT competences are divided into more general proficiency and professional skills. For
graduation they are translated into the Learning Outcomes Professional duties (proficiency),
Situation orientation, Future-oriented organisation, investigative problem solving, personal
leadership and targeted interaction. Below you'll find the description and clarification for each.

Professional duties

You are able to adapt your working activities, style and communication based upon what the
actual situation requires, given the assignment, the company and the team around you.
You:

- Work autonomously to solve interactive problems and have a positive effect on team
  performance.

- Structured in an unpredictable context with vague problems, in situations where
  approach and solution area are open.

- Can combine several concepts and delve deeper into an innovation in a local situation.

Clarification:

- Professional duties is about the professional activities and the resulting professional products that are the core of your graduation portfolio. In activities and products the lifecycle of Analysis, Design, Realise, Advice and Manage&Control can be recognised although not all projects need to address all of these phases.

- As a reference for the activities and products that are expected and their level you can look at (a) the HBO-I domain description for the proficiency indicator at level 3 (Bachelor level), (b) the level and products that you created during the semesters 6 and 7 and that are related to the IT subdomain of your graduation project and (c) the professional standards, expectations and level that is in line with the practice within the IT subdomain of your graduation project.

- A large part of your portfolio will consist of professional (end)products. Which products will be in your portfolio depends on the IT sub-domain and matching graduation project. They provide the context for the professional products that can be expected as a result of your activities. Therefor professional products should always be recognizable as common (professional) practice for the IT subdomain of your graduation project. E.g. a software architecture in full stack software development is a common product for the IT subdomain of full stack development and therefore should be in your portfolio as professional product when your graduation project lays inside the full stack development IT sub domain.

- All IT subdomains are related to one or a mix of the five architectural layers of the HBO-I domain description (User Interaction, Organisational Processes, Software, Hardware Interfacing, Infrastructure). This means that your activities and resulting professional products may be related to the proficiency description of one of these layers or on a mix of layers at level 3. Mixing layers is quite common in domains like cybersecurity, web development, AI engineering, game development, mobile development etc. You show professional duties when using the right mix of layers that fit to the needs of your graduation project.

Situation-Orientation

You apply your previously acquired knowledge and skills in a new and authentic context to deliver relevant and valuable results for the project and company.
Clarification:

- There should be a clear match between the knowledge and skills you offer the project and the project's needs. Also the needed knowledge and skills should be at level 3 (HBO-I framework).

- You apply your previously acquired knowledge and skills in the project's context which means that you adapt to the processes and way of working of the company and to what is expected or standard for the IT sub-domain

- Your activities and products are relevant for the project's stakeholders and users and creates value.

- You put effort in showing, proving and monitoring the added value of your project for example by (a) the upward Technology Readiness Level (TRL) transition you realise, (b) validation oriented methodology and (c) explicit value creation related objectives you have defined using the Design Challenge (Newman 1995, 2003)

- You work in a methodological and structured manner within a context where approach and solution area are open, with multiple stakeholders and multiple IT areas combined. Your project, activities and products show contextual innovation and exploration.

Future-oriented Organisation

You explore the organisational context of your project, make business, sustainable and ethical considerations and manage all aspects of the execution of the project.
Clarification:

- You put your situation orientation of Learning Outcome 2 in the perspective of the future (both inside and extending the project) and use this perspective to:

  - Create a project plan and monitor your project execution including the practice based research activities, project approach/strategy, planning, financial aspects, risks and the quality of the solution.

  - identify long term business legitimisation and business values that are relevant for the stakeholders.

  - Consider business and domain trends, sustainable development and ethical aspects in your judgement process using standards or methods/tools (e.g. the Technology Impact Cycle Tool TICT).

Investigative Problem Solving

You take a critical look at your project from different perspectives, identify problems, find an effective approach and arrive at appropriate solutions.
Clarification:

- Throughout all phases of the project you identify and solve relevant problems and challenges:

    - Initially (problem analysis) by

        - identifying the problem/opportunity of the stakeholders (client),

        - defining the scope and focus of the project and

        - formulating the related practice based research questions (using the Design Challenge),

    - During the project by identifying newly encountered problems/challenges (e.g. spikes) and formulating more in-depth or detailed research questions.

- Effective approach means that you use a variety of research strategies, methods and activities based on the DOT framework[1] in a structured way in order to find justified answers to your research questions.

- Appropriate solutions means you use the results from your research to create valuable solutions and validate these using test methods, usability tests and by assessing the conformity with stakeholders, experts, peers or using a benchmark.

Personal Leadership

You are entrepreneurial around your projects and personal development, you pay attention to your own learning ability and keep in mind what kind of IT professional and/or what type of positions you aspire to.
Clarification:

- Entrepreneurial means that you take the lead in your own project, both planning as well as content wise.

- Paying attention to your own learning ability means that you can reflect on your own actions, ask and receive feedback on your actions and look for further opportunities and possibilities that flow from that feedback and that you are aware of your development as an IT professional.

- You know which role you envision in the IT-landscape and what role you play in a team.

Targeted Interaction

You determine which partners play a role in your project, collaborate constructively with them and communicate appropriately to achieve the desired impact.

Clarification:

- Communicating appropriately means that you make sure that your communication has the right impact and execution.

- Partners are the different stakeholders in the project to which you pay attention to and whose interests in the project are clear to you.