Europäisches **A**nrechnungs**sy**stem für Teilqualifikationen in **Metal**l-berufen

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3.3 Ableitung von units of l.o.

Lernergebniseinheit Nr. 4 in Englisch: 1204_EN_LE4_ Warten_technischer_Systeme_Metall

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Unit of Learning Outcomes for basic qualification in metal industry

No. 4

Maintenance of Technical Systems

April 2012

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Dieses Projekt wird gefördert aus Mitteln des Hessischen Ministeriums für Wirtschaft, Verkehr und Landesentwicklung

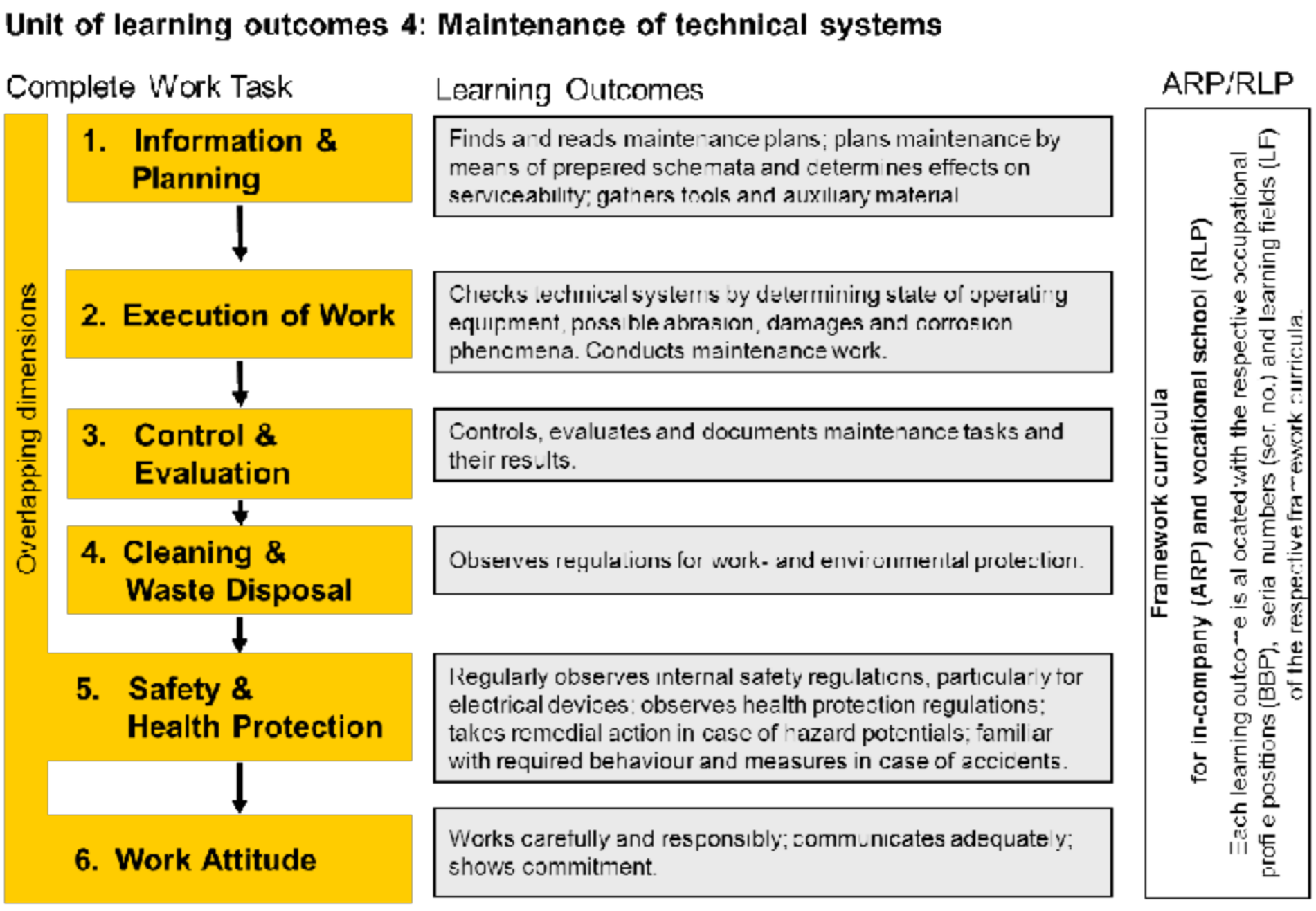
Unit of Learning Outcomes 4

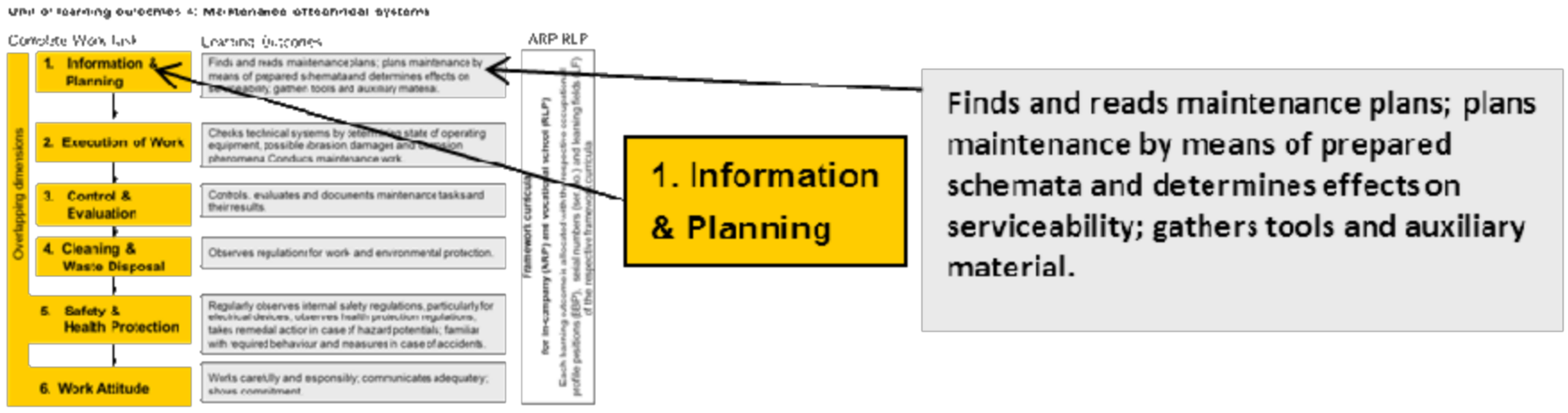
for Prevocational Training in Metal Working with Test Criteria

Title	Maintenance of technical systems
Brief description of the unit of learning outcomes	The trainees are able to plan and completely conduct maintenance work at machine tools. Based on maintenance instructions and lubrication charts they gather the maintenance measures and plan the process by means of a work schedule. They conduct maintenance work and check the state of operating equipment, possible abrasion, damages and corrosion phenomena of the machine tool. They control the result and record the conducted maintenance work and possible faults in a maintenance list. They observe the basic aspects of work-, health and environmental protection.
Example for entire work task	Example: maintenance of machine tool based on the manual or the maintenance plan
Respective qualified jobs and ECVET points to be scored (in relation to entire training). (Calculation based on 60 points per year.)	Industrial metal-working occupations (3,5 years) (plant mechanic, industrial mechanic, construction mechanic, tool mechanic, milling machine operator) 10,12 ECVET points Metal worker (3,5 years) 7,70 ECVET points Machinery and plant operator (2 years) 8,60 ECVET points
Dual Vocational Training System	The dual vocational training system combines part-time vocational school with practical work experience. The training in companies and in vocational schools is based on framework curricula so that uniform national qualification standards are guaranteed. The dual vocational training system sees itself as a holistic system in which the vocational education has to place the skills, knowledge and competences (vocational action ability), which are essential for the exercise of a qualified vocational operation in a changing working environment (See: Vocational Training Act Section 1, Paras. 3).
Framework curriculum (in company)	Legal basis for the training in companies according to respective job
Framework curriculum (vocational school)	Legal basis for the education in vocational schools according to respective job
Prevocational training	Training preparation is an integral part of the vocational training (see: Vocational Training Act). Training modules used in schemes to prepare individuals for vocational education and training contain parts of the vocational training offered for recognized occupations. The “unit of learning outcome” at hand is one of four units which are illustrating the first year of apprenticeship of the occupations above.

Outline of Unit of Learning Outcome 4

The following figure shows the sequences of a complete work task including information and planning, execution of the task, control and evaluation as well as cleaning up the workplace and waste disposal. One dimension that concerns all work sequences is the observation of safety instructions and health protection regulations. Another overlapping dimension is the work attitude as prerequisite for a successful execution of a work assignment. To each working sequences learning outcomes are allocated as well as occupational profile positions/ serial numbers and learning fields of the respective framework curricula.

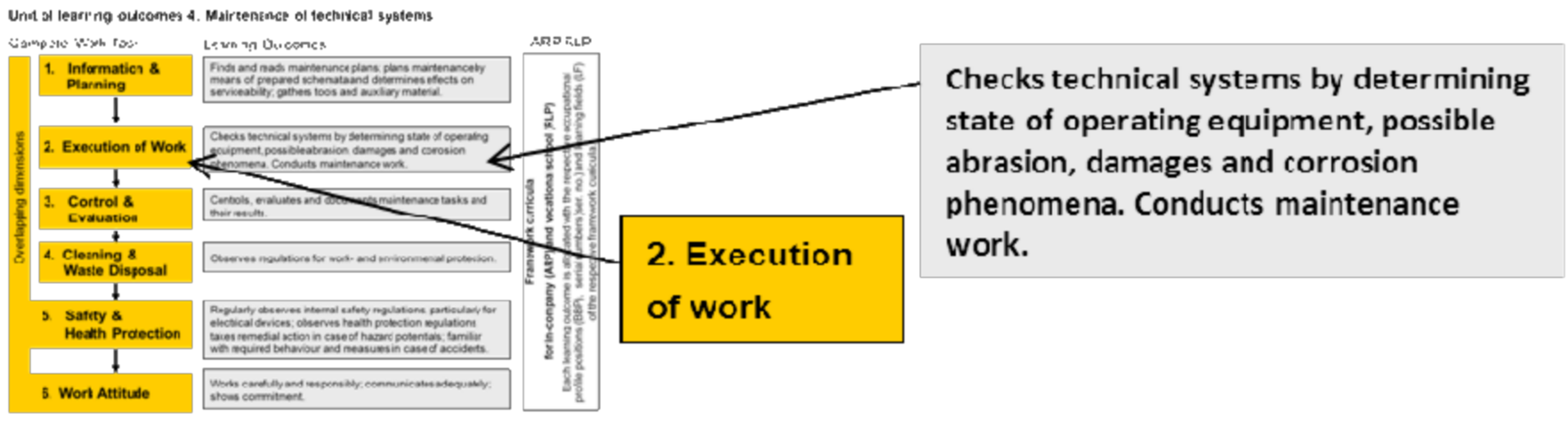




Learning outcome: Finds and reads maintenance plans; plans maintenance by means of prepared schemata and determines effects on serviceability; gathers tools and auxiliary material.

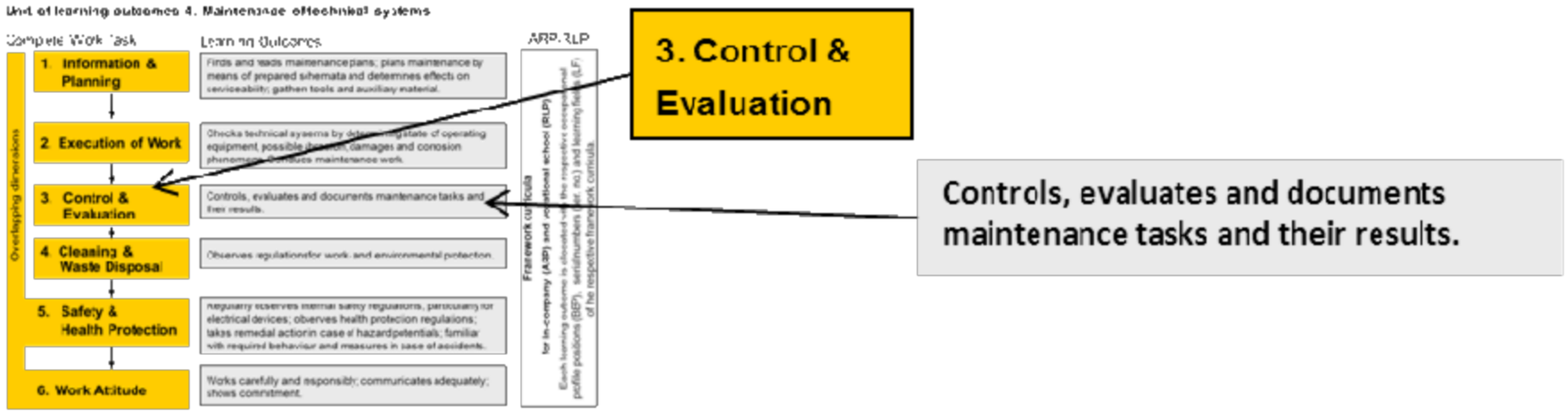
	EQF-Dimensions
Knowledge	Names maintenance jobs. Names symbols with regard to maintenance tasks and lubricants. Names various maintenance intervals for machine tools together with the respective jobs to be done.
Skills	Gathers relevant information about maintenance from maintenance instructions and lubrication charts. Care: handles maintenance instructions and lubrication charts carefully and properly. Communication: in case of uncertainty asks appropriate (clarification questions) and adequate (choice of language) questions. Listens attentively. [1]
Competences	Plans the work sequences based on the maintenance instructions and lubrication charts and puts the sequences in a reasonable order. Care: Observes the completeness of work sequences during the planning process.
Framework curricula	Industrial metal-working occupations: BBP 5a,c, 6b,l; LF 4; Metal worker: ser. no. 5a,f, 6a,b; LF 4; Machine and plant operator: ser. no. 5b, 6a, 7a,b, 12a; LF 4 of industrial metal-working occupations.
Test criteria	Names major maintenance tasks. Names symbols with regard to the maintenance tasks and lubricants. Names various maintenance intervals for machine tools and respective jobs to be done. Prepares a work schedule based on the information of the maintenance instructions and lubrication charts.

[1] The execution of a complete work task implies work attitudes that are generally called “social and personal competences”. The companies consider them as prerequisite for an apprenticeship. The “unit of learning outcomes” lists them under “work attitude” (sequence no. 6). Furthermore, they are mentioned in the respective sequences of the work task in order to show at what point they are especially relevant. The draft of the German Qualification Frame (G-NQF/GQF) mentions, apart from knowledge and skills, also social competence and self-competence.



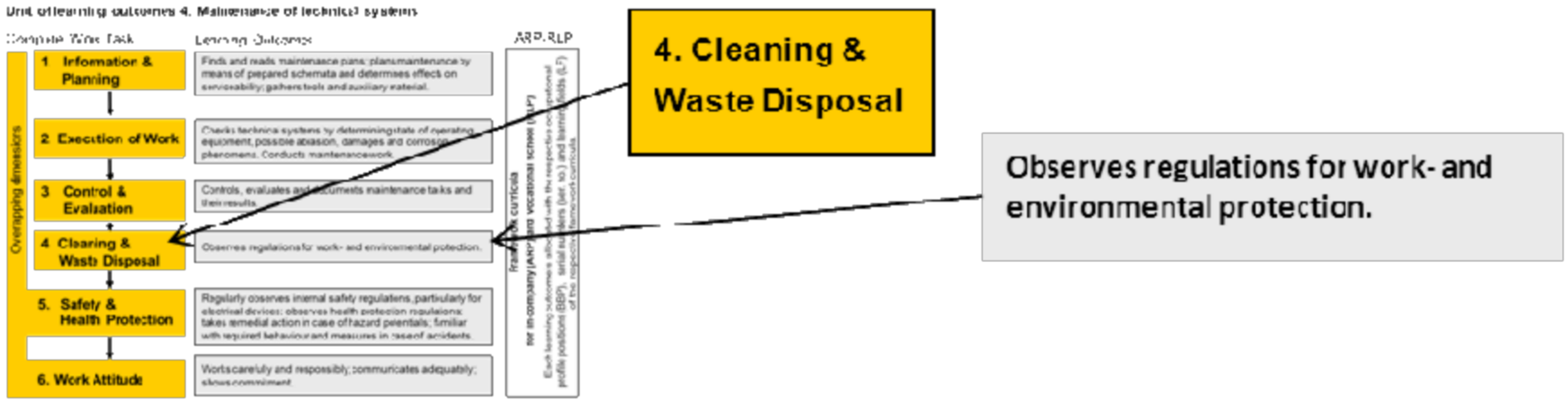
Learning outcome: Checks technical systems by determining state of operating equipment, possible abrasion, damages and corrosion phenomena. Conducts maintenance work.

	EQF-Dimensions
Knowledge	Names various lubrication- and maintenance parts of machine tools.
Skills	Conducts maintenance.
Competences	Checks reliably the state of operating equipment, possible abrasion, damages and corrosion phenomena on the machine tool. Communication: in case of uncertainty asks appropriate (clarification questions) and adequate (choice of language) questions. Listens attentively. Makes arrangements with colleagues to coordinate the maintenance (vs. use) of machines. Care: resource-oriented work.
Framework curricula	Industrial metal-working occupations: BBP 6c,j, 7b, 9a,b,c; LF 4; Metal worker: ser. no. 8c, 12a,b,c,d,e; LF 4; Machine and plant operator: ser. no. 6e, 13a; LF 4 of metal-working occupations
Test criteria	Names properly various lubrication- and maintenance parts on machine tools. Names various kinds of additives used for maintenance of machines. Selects required tools based on maintenance instructions and lubrication charts. Cuts machine off the power supply and safeguards it against being accidentally switched on again.



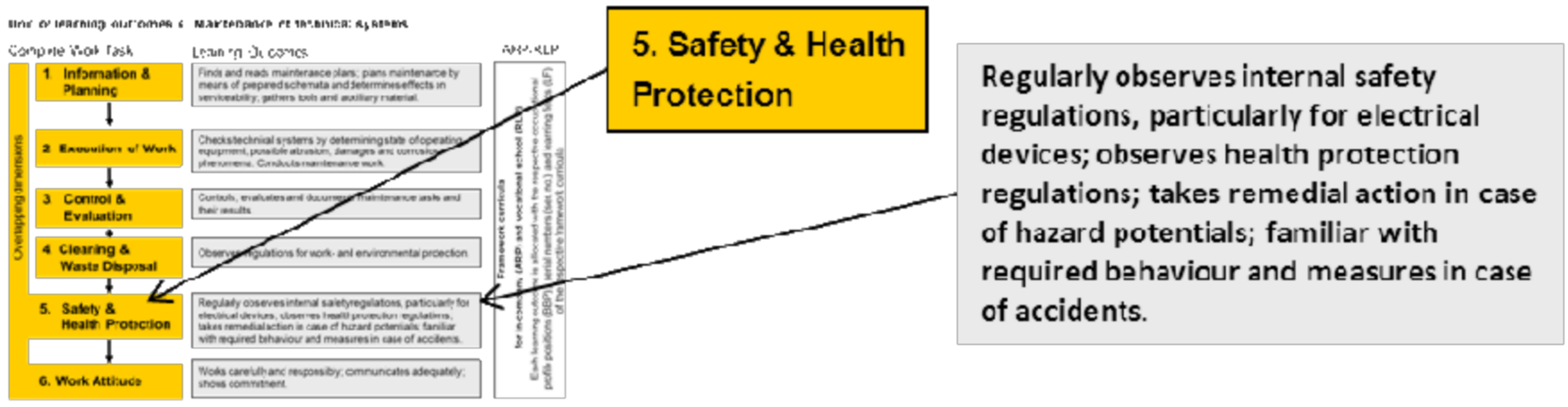
Learning outcome: Controls, evaluates and documents maintenance tasks and their results.

	EQF-Dimensions
Knowledge	Names major maintenance steps so that the serviceability of the machine can be demonstrated (functional check)
Skills	Conducts functional check.
Competences	Evaluates maintenance tasks regularly during and at the end of the work process. Records maintenance tasks and arising faults in a maintenance list (according to the requirements of the manufacturing company of the machine / device). Sense of responsibility: reduction of abrasion by conscientious control and evaluation.
Framework curricula	Industrial metal-working occupations: BBP 6g,k; LF 4; Metal worker: ser. no. 5g, 6d; LF 4; Machine and plant operator: ser. no. 6d,g; LF 4 of industrial metal-working occupations
Test criteria	Names preliminary work for functional check: removing barriers and warning notices, restoring power supply, informing colleagues about maintenance being finished. Conducts work sequences for preliminary work and functional check. Prepares a documentation.



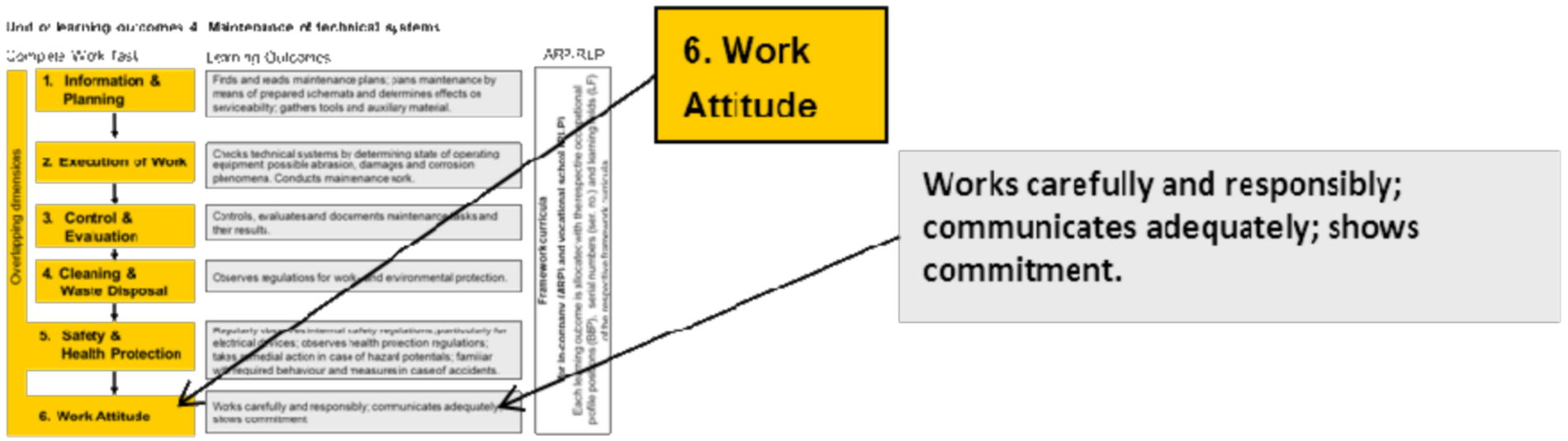
Learning outcome: Observes regulations for work- and environmental protection.

	EQF-Dimensions
Knowledge	Names possibilities and regulations for a safe and environmentally correct disposal on site, the storage system of the workshop, the workshop regulations, and the basics of health-, work and environmental protection.
Skills	Disposes of remains of materials and additives, particularly of lubricants (coolants). Stows away tools, materials, products according to the storage system of the workshop. Cleans up the workplace according to the basics of health-, work- and environmental protection as well as to workshop regulations.
Competences	Checks and evaluates the orderliness of the workplace and the workshop and corrects inadmissibilities independently or upon consultation
Framework curricula	Industrial metal-working occupations: BBP 4a,b,c,d; LF 4; Metal worker: Ser. no. 4a,b,c,d; LF 4; Machine and plant operator: ser. no. 4a,b,d, 12b; LF 4 of industrial metal-working occupations
Test criteria	Cleans up the workplace by using appropriate tools and means. Cleans tools and stows them away properly. Names internal facilities for disposal of waste and hazardous materials. Finally evaluates cleaning up and corrects, if necessary.



Learning outcome: Regularly observes internal safety regulations, particularly for electric devices; observes health protection regulations; takes remedial action in case of hazard potentials; familiar with required behaviour and measures in case of accidents.

EQF-Dimensions	
Knowledge	Names safety regulations required for work assignment. Names protective measures required for work assignment.
Skills	Applies safety regulations required for work assignment. Applies protective measures required for work assignment. Observes behaviour required to protect own health and the health of others. Identifies hazard potentials during maintenance work based on known hazardous situations and takes remedial actions accordingly. Keeps workplace in order.
Competences	/
Framework curricula	Industrial metal-working occupations: BBP 3a,b,c,d,e; LF 4; Metal worker: ser. no. 3a,b,c,d; LF 4; Machine and plant operator: ser. no. 3a,b,c,d, 12a; LF 4 of industrial metal-working occupations
Test criteria	Names safety measures: applying barriers and warning notices; cutting off power supply; informing colleagues about maintenance being conducted; removing chips not with compressed air (injury risk), current above 50 mA and voltage above 50 V are life-endangering, naming hand guard (gloves) and skin protection (barrier cream), describing first measures in case of electrical accidents. Keeps workplace in order.



Learning outcome: Works carefully and responsibly; communicates adequately; shows commitment.

Features of work attitude and personality	
Sense of responsibility	Works carefully during maintenance. Evaluates what safety measures have to be applied for selecting and using tools and machines. Shows responsibility for entrusted materials, tools and machines.
Carefulness	Minds completeness of work sequences during planning process. Handles drawings, tools, machines and materials carefully and accordingly selects adequate tools, machines and materials. Works carefully, accurately and environmentally consciously.
Appropriate, target-oriented communication	In cases of uncertainty asks appropriate and proper questions, and listens attentively. Makes arrangement with colleagues to coordinate use of materials and machines.
Commitment	Works steadily on work assignment.
Framework curricula	Industrial metal-working occupations: BBP 3a, 5i; Metal worker: ser. no. 3a, 5b; Machine and plant operator: ser. no. 3a,
Test criteria	Selects and applies required safety measures while working with tools and machines. Selects appropriate tools, machines and materials and careful handling. Asks understandably in case of uncertainty. Makes arrangement with team colleagues about use of tools, machines and materials. Conducts maintenance work steadily. Conducts complete maintenance.