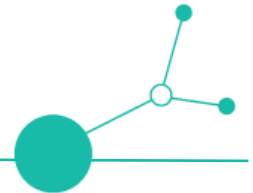
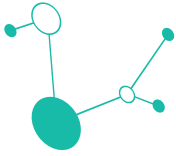


Re/Upskilling Programs PP4

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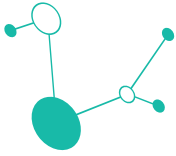


General introduction

Re/UpSkilling programs are a part of Digital Skills Transformation Toolkit DiSTT (Toolkit) is defined by project proposal as a comprehensive solution to address the skills gap and support the digital fabrication skills transformation process. The toolkit includes re/upskilling programs, assessment tools, and an implementation guide to ensure sustainable adoption and impact. By enabling Fab Labs and Makerspaces to offer structured, high-quality training, DiSTT fosters innovation, bridges the gap between education and industry, and prepares individuals for the challenges of an evolving technological world.

PP4 contributes to DiSTT by developing suitable workshop formats and programs for the target group of SMEs. These companies are mainly associated to the automotive industry. This creates a monostructure of the economical force of the region. As the general changes in the labour market also apply, there are additional challenges emerging of that. Companies that are heavily dependent on one client, specialised in delivering the same products in slowly evolving processes.

Besides a skill gap in new technologies - which is due to the industry needs smaller then in other regions - a new way of work culture is needed in the SMEs to be more innovative. Both aspects in mind PP4 adapts DiSTT's modular, practice-first approach for SMEs in our region. The program combines concise, applied workshop modules with project-based builds, delivered through two tracks: an individual project path starting from an existing idea, and a standardized path for SMEs reached via warm/cold outreach. Each workshop includes an optional GenAI note, no separate AI vs. non-AI variants are maintained.



PP4 UPskilling program:

Title of the program:

Hackathon Aftermath: from Challenge to Idea to Product

As planned, brigk (PP4) was able to start its planned follow-up program to a Hackathon. This Hackathon was aimed at SMEs, the partner's target group. In the event the companies brought in ideas, problems and needs to the participants, most likely students of the neighbouring technical university. Within 48 hours 12 project groups formed. The three winning teams were selected to join the follow-up program to continue on the developed solutions and bring them to life. Another team was selected and added because of the promising approaches in terms of scalability and prospects for success.

The implementation is carried out in close coordination with the SMEs and the project teams and accompanies them over a period of at least three months or longer. The aim is to achieve a sustainable and viable solution by imparting extensive knowledge in the field of solution development and rapid prototyping.

Each workshop program is compiled out of prepared contents and fits the needs of each project group. As the focus lies on soft skills to get the groups into a working team as soon as possible, the learning of new technologies are implemented as a vehicle to deliver these skills.

PP4 pedagogical approaches to the Re/Up program

The program is based on three complementary pedagogical principles:

- **Self-Assessment & Reflective Practice** - Students complete a self-evaluation survey at the end.
- **Project-Based Learning** (in creation-focused workshops) - Final presentations show the result of the process.
- **Minimal Formal Assessment** - Emphasizes learner ownership and reflection rather than traditional evaluation.

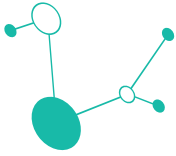
For every workshop there will be a self-evaluation part in the held survey at the end. For workshops that are targeted to create something there will be final presentations. A school-like and individual evaluation of the participant is not planned, as the results reflect the engagement and learnings of the people.

PP4 program main stakeholders

- **Regional agencies for economic development** - Organizers of the hackathon
- **Expert network** - build up and established network of experts in various fields (coaching, prototyping, ideation, team building, AI, digital fabrication)

PP4 main purpose of the program

The main purpose the program offers is to create a real value to the ideas and solutions coming out of a hackathon. This format tends to bring up great projects. The following implementation into the real world suffers in most cases from low capacity, missing knowledge and others. Providing a frame to push it



further will increase chances to create real value and give new approaches and techniques to companies. In the long run the (participating) SMEs will be more open to innovative concepts and bring them on themselves creating a more flexible and resilient approach.

The resulting goals and scope are:

- Build skills in digital fabrication and prototyping (CAD, 3D printing, laser cutting, electronics/Arduino, Generative AI, etc.).
- Strengthen an innovation mindset (iteration, short sprints, documented results).
- Enable workplace transfer (templates, starter files, checklists).
- Track measurable outcomes: competence gain, prototype maturity, time-to-MVP, workshop utilization.

PP4 clear learning outcomes

As stated above the skill gap in technological terms is not that of a problem for the target group. More likely it lacks in innovation skills and needs new approaches in product development. A hackathon is a whole new experience for a lot of the companies that are used to more traditional and conservative methods. Being open to such a format is a very good starting point to learn and implement new and fundamentally different ways of working. The key to have a long-term impact is to let the participants experience the advantages of this within the workshops and create opportunities to go further in their “real-life” work life.

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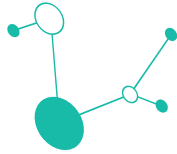
PP4 target competencies

To reach the stated learning outcomes the focus for PP4’s workshops lies on these competencies to reach:

Technical Competencies

- **Digital fabrication skills** - using 3D printers and laser cutters to produce real, functioning parts.
- **CAD/CAM design** - designing for digital fabrication using tools like Tinkercad, Fusion 360, or Inkscape.
- **Basic electronics and coding** - using Arduino and components (LEDs, motors, sensors) to create interactive prototypes.
- **Time and project management** - planning, organizing, and executing tasks within a limited timeframe.
- **AI:** Understanding and using LLMs, proper prompting, efficient and goal orientated use, proper use of GenAI for coding and 3D-modelling

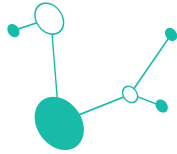
Soft Skills



- **Team skills** knowledge of team dynamics, approaches of team development, team problem solving, shared responsibility
- **Ideation** problem identification, identification and focus on main aspects
- **Problem-solving:** Addressing design and fabrication challenges creatively and practically
- **Prototyping** agile working, pragmatical approaches, focus on main aspects, knowledge of prototyping states and their purpose (i.e. mvp, mock up)

General Skill List (According to the Blueprint)

3D Printing / Additive Manufacturing	Operating 3D printers 3D modeling and slicing software (e.g., Cura, PrusaSlicer) Maintenance and troubleshooting of 3D printers
Laser cutting (CNC cutting)	Operating laser cutters Vector graphic design for laser cutting Material selection and settings adjustment
CNC Machining	Operating CNC machines (e.g., routers, mills) CAM software (e.g., Fusion 360, Mastercam, RhinoCAM, SprutCAM) Toolpath generation and machine setup
2D & 3D design (and computer simulation)	2D and 3D CAD software (e.g., AutoCAD, SolidWorks, Tinkercad) Parametric design, Algorithmic design Technical drawing and blueprint creation
Electronic prototyping platforms & IoT	Programming microcontrollers (e.g., Arduino, Raspberry Pi) Sensor integration and interfacing IoT (Internet of Things) development PCB design Basic electronics (Ohm's Law, components identification) Soldering and PCB fabrication Circuit design and simulation software (e.g., KiCad, Eagle)
Digitally assisted crafting	Woodworking (e.g., sawing, drilling, joining) Metalworking (e.g., welding, machining) Plastics fabrication (e.g., cutting, forming)
Makers soft skills	Effective communication of ideas and concepts Prototype iteration and improvement Documentation and presentation skills Teamwork and collaboration Design thinking
AI	Machine Learning Algorithms Prompt engineering



PP4 developed Program Curriculum

The project teams that originated from the hackathon differed in the composition of people. The company challenges and the developed solutions also had a wide range.

To cope with this and get a feeling for what each group will need for the program and be able to build suitable workshop series a separate kick off event was held for each group. The intense four hour workshops were aimed on

- Team Building
 - Getting to know all team partners
 - Knowledge of all existing competencies in the group
- Project Commitment Building
 - Sharing expectations on the outcome of the project
 - Vision building
 - „Contracting“
- Build the program
 - Knowledge about DiSTT and its goals
 - Possible learning/subject areas
 - Setting group priorities

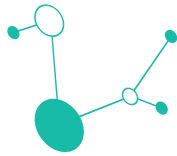
The following methods used to reach these goals were:

Team Building

- Speed Dating:
 - A quick one minute 1 on 1 interview format with predefined questions on personal and professional background
 - Participants introduce their partner to the group
 - Goals:
 - low-threshold communication in 1 on 1
 - creating first personal contacts
 - identifying competencies of each group member
- Rube-Goldberg-Machine
 - Building a chain reaction from a predefined start to a finish
 - Time pressure: 1 hour to build
 - Group splitted into smaller group of 2 - 4 people
 - Each small group builds a part of the whole chain reaction
 - Goals:
 - Experiencing the other team member under simulated pressure
 - Identify the individual characters
 - Hands-on agile working experience

Project Commitment Building

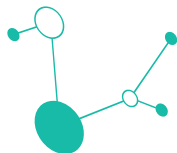
- Sharing expectations
 - Presentation of Radical Candor
 - Team work in two groups on predefined questions
 - Presentation of the outcomes
 - Goal:
 - Communicating the expectations of all participants
- Contracting
 - Putting the results into a joint contract



- Signing the contract
 - Goal:
 - Create a visible sign for the commitment for each other
- Vision Building
 - Future News: this is the headline of a newspaper regarding your project in six months
 - Additional short text describing what happened
 - Group work
 - Presentation to each other
 - Building a shared vision
 - Goal:
 - Sharing expectations and wishes to create commitment and responsibility for the project and the team members
- Build the program
 - Framing DiSTT
 - Sharing of the possible subject areas out of the blueprint
 - Voting for the next steps
 - Goal:
 - Knowledge of the needs for a best suitable workshop program

Based on the outcomes of the kick off workshops the programs were build individually for each project and the exact contents were adjusted as needed. Especially in the means of the planned product the following workshops were compiled out of the following:

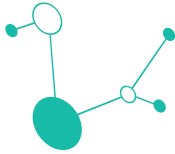
Workshop title	3D CAD Design
Target audience	SME teams, technicians, engineers, apprentices
Prerequisites	Basic PC literacy; no prior CAD required
Purpose & Learning Outcomes	Parametric modeling (sketches, constraints), parts and simple assemblies; drawing creation; STL/DXF export for manufacturing; confident navigation and file management.
Program Format	Hands-on workshop with guided exercises and mini-projects; brief inputs + practice blocks
Duration / Delivery	4-6 hours, in person at brigk Makerspace (computer lab or BYOD)
Skill Gaps	Digital design fundamentals, design-for-manufacture, file/format fluency
Learning Activities	Short lectures, step-by-step builds, peer review, quick design challenges
Assessment	Pre-/post self-assessment (competency grid), artifact review (CAD files), trainer feedback
Roles & Support	Facilitator: brigk Makerspace trainer; Evaluator: internal team lead or trainer



Feedback	End-of-session survey + DAKI (Drop/Add/Keep/Improve)
Showcase or Closure	Lightning demo of designed parts; export and handover of files/templates
Documents, support materials	Slides, starter files, checklists; sample parts and templates
Language	German, English; GenAI—optional note included in course handout

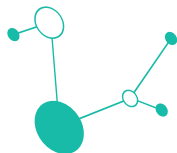
Workshop title	3D Printing (Additive Manufacturing)
Target audience	SME teams, prototyping roles, maintenance and R&D
Prerequisites	None; CAD basics helpful
Purpose & Learning Outcomes	Slicing parameters, materials, bed adhesion, supports, troubleshooting; selecting profiles for function vs. speed; basic post-processing.
Program Format	Hands-on workshop with live print; guided setup and troubleshooting
Duration / Delivery	4-6 hours, in person; FDM printers on site
Skill Gaps	Printer setup and tuning, material selection, failure diagnosis
Learning Activities	Mini-lecture, slicer labs, failure gallery, group troubleshooting
Assessment	Pre-/post self-assessment; printed artifact quality vs. brief; trainer observation
Roles & Support	Facilitator: brigk Makerspace trainer; Evaluator: trainer
Feedback	Quick survey + group DAKI
Showcase or Closure	Show-and-tell of parts; slicer profile handover
Documents, support materials	Slides, slicer profiles, troubleshooting guide
Language	German, English; GenAI—optional note included in course handout

Workshop title	Laser Cutting & Vector Design
Target audience	SME staff in prototyping, product, signage, and enclosures
Prerequisites	None; basic vector skills advantageous



Purpose & Learning Outcomes	Vector prep, materials (MDF, plywood, acrylic), engraving vs. cutting, safety; panelization and assembly basics.
Program Format	Practice-led workshop with a small panel project
Duration / Delivery	4-6 hours, in person; CO ₂ laser at brigk
Skill Gaps	Vector-to-machine workflow, material behavior, safe operation
Learning Activities	Demo, guided vector lab, material tests, assembly
Assessment	Pre-/post self-assessment; cut quality vs. design spec; trainer checklist
Roles & Support	Facilitator: brigk Makerspace trainer; Evaluator: trainer
Feedback	End-of-session survey
Showcase or Closure	Final panel/faceplate demo and assembly
Documents, support materials	Slides, DXF/SVG templates, safety sheet
Language	German, English; GenAI—optional note included in course handout

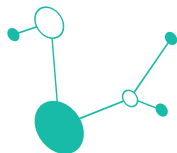
Workshop title	Arduino, Electronics & IoT
Target audience	SME technicians, developers, maintenance, R&D
Prerequisites	None; basic programming understanding helpful
Purpose & Learning Outcomes	Sensor/actuator basics, I/O, serial monitor, prototyping on breadboard; write and flash simple sketches safely and reliably.
Program Format	Hands-on workshop with mini-prototype build
Duration / Delivery	6 hours, in person; Arduino kits provided
Skill Gaps	Electronics fundamentals, practical debugging, documentation
Learning Activities	Short inputs, wiring labs, code exercises, peer review
Assessment	Pre-/post self-assessment; working demo; code and wiring review
Roles & Support	Facilitator: brigk Makerspace trainer; Evaluator: trainer
Feedback	Survey + DAKI; verbal coaching



Showcase or Closure	Live demo of prototype (e.g., LED array + button logic)
Documents, support materials	Slides, starter sketches, wiring diagrams
Language	German, English; GenAI—optional note included in course handout

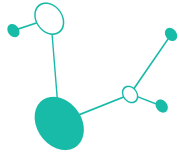
Workshop title	CAM/CNC (Wood & Metal)
Target audience	SME makers, technicians, product and process teams
Prerequisites	CAD basics recommended; safety briefing mandatory
Purpose & Learning Outcomes	CAM fundamentals, toolpaths, stock/fixtures, post-processing; generate G-code and run demo safely.
Program Format	Compact practical workshop with demo runs (wood/soft material)
Duration / Delivery	4-6 hours, in person; CNC router/mill on site
Skill Gaps	Toolpath strategy, fixturing, machine-side validation
Learning Activities	CAM lab, setup sheets, dry runs, machine demo
Assessment	Pre-/post self-assessment; CAM file review; demo-part inspection
Roles & Support	Facilitator: brigk Makerspace trainer; Evaluator: trainer
Feedback	Survey + DAKI
Showcase or Closure	Demo part review and lessons learned
Documents, support materials	Slides, setup sheet templates, safety checklist
Language	German, English; GenAI—optional note included in course handout

Workshop title	Intro to AI & Prompting (Methods)
Target audience	Cross-functional SME teams and leadership
Prerequisites	None
Purpose & Learning Outcomes	Understand generative AI fundamentals and safe use; structure prompts; evaluate outputs; apply AI to documentation, ideation, and simple code support.



Program Format	Interactive seminar/workshop with short exercises
Duration / Delivery	2-3 hours, in person
Skill Gaps	Prompt literacy, result evaluation, safe/ethical use
Learning Activities	Mini-lectures, guided prompts, pair work, critique
Assessment	Pre-/post self-assessment; quality of produced playbooks
Roles & Support	Facilitator: brigk Makerspace trainer; Evaluator: trainer
Feedback	Survey; team retro
Showcase or Closure	Team prompt playbooks and brief share-out
Documents, support materials	Slides, prompt templates, guidelines
Language	German, English

Workshop title	(Optional) Simulation/CAE
Target audience	Engineers and advanced makers in SMEs
Prerequisites	CAD basics; basic mechanics knowledge helpful
Purpose & Learning Outcomes	Meshing, boundary conditions, solver runs; interpret results for decisions; focus on 'good enough' engineering trade-offs.
Program Format	Compact practical workshop with demo studies
Duration / Delivery	3-4 hours, in person
Skill Gaps	Simulation workflow, result interpretation, reporting
Learning Activities	Guided studies, parameter sweeps, result critique
Assessment	Pre-/post self-assessment; short report template completed
Roles & Support	Facilitator: brigk Makerspace trainer; Evaluator: trainer
Feedback	Survey; trainer debrief
Showcase or Closure	Short report-out with decision recommendations
Documents, support materials	Slides, study files, report template



Language	German, English; GenAI—optional note included in course handout
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PP4 - developed Instructional Design tools

The instructional design developed by PP4 blends concise theoretical input with strong practical engagement. Each workshop integrates short presentations, live demonstrations, and guided tutorials that lead directly into hands-on experimentation. Participants work with digital fabrication and coding tools such as CAD software, 3D printers, laser cutters, exploring both design principles and technical workflows. This applies partly on the soft skills, whereas there the main focus lies on the experience rather than theory.

To make learning both effective and approachable, PP4 designed a modular system of materials that can be easily adjusted to different levels of prior experience and individual learning styles. The resource package accompanying each workshop consists of:

- **Instructor presentations** highlighting key concepts and process steps through clear visuals
- **Printed handouts and task sheets** to guide participants through in-session activities
- **Example files and starter templates** (e.g. CAD models, Calliope sketches) ready for immediate use

Rather than relying on extensive documentation or academic lectures, the sessions follow a practice-oriented, workshop-style format. Learners progress through short, focused input phases followed by direct application, experimentation, and discussion. This structure encourages active participation, peer learning, and immediate feedback—fostering curiosity, independence, and confidence in working with new technologies.

The overall approach emphasizes clarity, functionality, and adaptability, ensuring that all materials remain purposeful, easy to use, and directly applicable within diverse learning environments.

PP4 developed Assessment tools

For the workshops around the projects emerging from the hackathon, the kick off workshops were used as an assessment as described above.

The following workshops were framed by pre- and post-assessment to track the development of the level of knowledge of the participant if applicable.

Different methods were tested and the final tool is still to be set. The most promising approach is to use online tools like Mentimeter, as it's engaging, interactive, flexible and anonymous. This combination tends to create the most engagement at all and the most reliable answers.

In the cases of the kick offs a DAKI (Drop, Add, Keep, Remove) was performed with the participants, as there were no measurable points. This is performed in similar cases.