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D5.1 Integration and Networking plan

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Executive summary

This document, standing for D5.1: Integration and Networking plan (INP), defines the strategy, objectives, and implementation framework for strengthening VASSAL's engagement with its broader ecosystem of stakeholders. The deliverable sets out how integration and networking activities will reinforce VASSAL's scientific, industrial, and societal impact, ensuring that research excellence translates into sustainable collaborations and long-term positioning within the European and international R&I landscape. The INP outlines the vision and rationale for structured networking, complemented by strategic objectives that stimulate collaboration across the Quadruple Helix and leverage the advanced networks of partners. The document also introduces the pillars of INP Implementation, describing best practices, targeted activities, and recommendations for stakeholder engagement, outreach, and ecosystem integration to build trust.

Overall, the Integration and Networking Plan is both a strategic reference document and a practical implementation guide for the VASSAL consortium. It complements related deliverables, particularly the Dissemination, Exploitation and Communication (DEC) Plan, and will be regularly updated to reflect evolving priorities, opportunities, and stakeholder needs.

List of Abbreviations

Abbreviation	Description
BUoT	Brno University of Technology
TUW	Technical University of Vienna
CEA	The French Alternative Energies and Atomic Energy Commission
HISRO	Honeywell International
EC	European Commission
R&I	Research and Innovation
EU	European Union
AI	Artificial Intelligence
LLM	Large Language Model
INP	Integration and Networking Plan

Contents

1 INTRODUCTION

1.1 THE VASSAL PROJECT

The objective of the VASSAL project is to elevate the research profile, visibility and reputation of Brno University of Technology (BUoT) by fostering excellence in research and innovation (R&I) as well as by leveraging the institutional R&I governance and administration competencies while ensuring the integration and sustainability of the project. This will be achieved through intensive collaboration and knowledge sharing with internationally renowned consortium partners Vienna University of Technology (TUW), CEA, and Honeywell International (HISRO). The VASSAL project will use a series of twinning actions focused on several key areas to elevate the excellence of capacities and research profile of all consortium partners, mainly BUoT. VASSAL aims to raise participating institutions' reputations and deepen their collaboration, while establishing new partnerships with stakeholders and opening funding opportunities.

The VASSAL project is dedicated to seeking significant advancements in its scientific domain of software safety and security and delivering cutting-edge technologies by integrating model-based design (MBD) preconditions with formal methods (FMs) for automated analysis and verification. This combined approach ensures software reliability from development through to operations. By assessing the economic implications of deploying these advanced verification tools, VASSAL aims to provide insights into the benefits and challenges for end-users, particularly in critical applications such as automotive and aerospace systems.

VASSAL is coordinated by the Brno University of Technology (BUoT), with the participation of three European partners.

1.2 PURPOSE OF DELIVERABLE

This deliverable defines the strategic framework, objectives, and implementation pathways for the Integration and Networking Plan (INP) under WP5. It serves as a practical guide for the consortium, ensuring a coherent and targeted approach to ecosystem engagement, stakeholder collaboration, and long-term integration of BUT and VASSAL into the European and international R&I landscape.

The document provides a reference for all partners on how to leverage collective networks, position project outcomes, and coordinate strategic communication and outreach activities, ensuring that integration efforts are aligned with the project's objectives.

The main objectives of this document concerning integration and networking are to:

1) Outline the vision, strategic objectives, and expected outcomes of the INP;

2) Detail the methodology for ecosystem mapping, stakeholder engagement, and credibility-building;

3) Present the phased approach and priority actions to be implemented throughout the project;

4) Ensure alignment with the project's Dissemination, Exploitation, and Communication (DEC) Plan and maximise synergies across work packages.

1.3 INTENDED AUDIENCE

VASSAL partners are the main audience for this deliverable, as it outlines the processes, priorities, and collaborative approaches for effective integration and networking within the project's ecosystem. It serves as a reference for all project team members involved in stakeholder engagement, strategic communication, and outreach activities, ensuring a shared understanding of objectives and methodologies. Each project beneficiary and member is expected to familiarise themselves with the provisions of this document and apply its guidance in their respective activities to ensure a consistent and impactful approach to ecosystem integration and networking.

2 ECOSYSTEM MAPPING AND STAKEHOLDER LANDSCAPE

A complex mapping of the research and innovation (R&I) ecosystem of the VASSAL scientific domain, as well as the relevant stakeholders to BUoT and the VASSAL consortium, is covered in this section. The activities aim to identify key actors, analyse collaboration dynamics, and provide the basis for targeted engagement within a broader European and international context.

The mapping provides insight into existing collaboration infrastructures and identifies leverage points for ecosystem-wide engagement. It also supports the identification of underrepresented stakeholders and potential high-impact connections.

2.1 SUMMARY OF INITIAL ECOSYSTEM MAPPING

The mapping exercise, coordinated by BUoT's Project Support Team (PST) in collaboration with the Integration Task Force, applied a structured approach to identify and classify relevant stakeholders across multiple domains. Given that the application of formal methods and model-based design (MBD) spans a wide spectrum of sectors, each with its own drivers and priorities, the process sought to capture the broadest possible range of potential targets (see Table 1). Desk research, internal consultations, and inputs from VASSAL's advanced partners informed this activity. The objective was to consolidate a landscape of strategic relevance for strengthening BUoT's R&I positioning, while aligning with EU policy priorities such as the European Research Area (ERA), Horizon Europe's strategic orientations, and the Digital Europe Programme.

VASSAL scientific domain – Formal methods, model-based design (MBD), and automated analysis and synthesis – constitute a foundational set of approaches for developing reliable, high-performance, and certifiable software and systems. In the context of increasing complexity in software-driven systems, MDB and formal methods approaches reinforce robustness of safety-critical, security-critical, and mission-critical domains while offering predictability, traceability, and ensuring compliance with regulatory frameworks (e.g., ISO 26262 for automotive, DO-178C for aerospace, IEC 61508 for industrial control) that are increasingly demanded by regulators, industry stakeholders, and society at large.

The upcoming era of i) autonomous driving systems requires continuous software updates while maintaining ISO 26262 compliance; ii) industrial robotics in smart factories must adapt to changing production needs without compromising safety; iii) energy grid control systems must integrate renewable sources with minimal downtime, requiring robust verification.

Across these sectors, three converging trends create an urgent need for formal methods and MBD:

- **Escalating Complexity** – The number of software components in critical systems has grown exponentially, increasing the risk of emergent errors.
- **Stringent Regulatory Frameworks** – Compliance now often requires mathematically proven assurance of safety and security.
- **Acceleration of Innovation Cycles** – Formal synthesis and automated verification can reduce time-to-market while improving quality.

The rapid proliferation of Artificial Intelligence (AI), particularly machine learning (ML) and large language model (LLM)-based systems, introduces **new dimensions of verification complexity**. Unlike traditionally engineered software, AI-driven components often exhibit **non-deterministic behaviour** and operate as opaque "black boxes," making it difficult to guarantee safety, security, and compliance.

Emerging Challenge: Safe AI

While automated decision-making using complex deep reinforcement learning (DRL) model-free agents has shown results beyond human abilities to solve complex tasks, including games, autonomous driving, robotics manipulation, finance, or healthcare, its deployment in real-world tasks is still limited by immense development costs, inability to guarantee safety properties, and problematic interpretability and explainability of the trained agents. Furthermore, these systems depend on the precise construction of suitable simulators, which depends on exact knowledge of the problem domain, since performing agents' exploration in real environments is usually financially and also ethically unbearable. However, the precise depiction of the behavior model of real systems is practically impossible, and thus the use of artificial simulators always contains inherent differences compared to real system behavior, depending on specific use-cases. In addition, real tasks contain inherent uncertainty, which hides important aspects of the tasks from the imprecise sensors of the agent and makes the learning process even more complex.

The orthogonal approach, model-based formal decision-making, solves some parts of the DRL challenges, since it can provide verified, robust, and effective controllers using the knowledge of the model. It does not scale to real tasks, and the necessity of at least a partial model of the system behavior limits the usage to small models provided by an expert in the given domain.

The trend in recent research, including AlphaGo, MuZero, and DreamerV3, utilizes the strengths of both systems to compete with previous SotA approaches using a combination of deep neural networks and model-based decision making in a complex closed-loop. Still, there remain multiple challenges, including the translation of the large neural networks to a framework that the model-based algorithm comprehends, including finite state machines or decision trees, the inherent uncertainty in both observed model state and real system behavior, and the necessity to somehow provide a model of the real system to the model-based component.

The VASSAL projects address four orthogonal, yet connected challenges:

- **Extending SotA policy extraction methods** using both formal automata learning and self-interpretable networks.
- **Improving the robustness** of DRL agents by model-based analysis regarding both state and model uncertainty.
- **Scaling SotA model-based approaches** using neuro-symbolic abstraction and DRL with model-based controller symbiosis.
- **Implementation of an effective and robust** training loop by model-based analysis and DRL closed-loop.

Emerging Challenge: Verification of AI Systems and LLM-Generated Software

The emerging capability of LLMs to autonomously generate software code amplifies challenges related to program verification and analysis. While LLMs can accelerate software development, their deployment introduces additional risks, including **invisible defects, insecure code patterns, data leakage, and untraceable provenance** of software components.

The trend of exponentially utilised LLMs in SW engineering mirrors in growing demand for mitigation of threats mentioned above, representing a good opportunity to be leveraged in order to integrate more in the ecosystem. VASSAL domain is positioned to address such risks by:

- **Establishing verifiable correctness guarantees** for AI-generated code.
- **Detecting security vulnerabilities** and compliance violations before deployment.
- **Providing explainable validation** of the AI system decision logic.
- **Embedding trust and traceability** into AI-enabled software supply chains.

2.1.1 CATEGORIES OF STAKEHOLDERS

The stakeholder landscape encompasses a broad spectrum of actors, each playing a unique role in shaping the R&I ecosystem. Each group exhibits distinct drivers, constraints, and expectations. By identifying these needs early, VASSAL can shape our activities and outputs to ensure alignment with the European R&I landscape.

- **Academic and Research Institutions** - Universities, research centres, and higher education alliances with a focus on software engineering, verification, and digital transformation that generate, exchange, and disseminate new scientific knowledge. They provide the intellectual foundation for formal methods and act as multipliers for training, capacity building, and scientific dissemination.
- **Industry and SMEs (Industrial Technology Providers)** - Companies that develop enabling technologies, toolchains, and platforms. They are critical for transferring theoretical advances into software and hardware tools, ensuring scalability and market readiness. Companies ranging from global technology leaders (e.g., SAP, Siemens, Oracle, SYSGO) to regional SMEs with innovation potential in safety-critical systems, AI, and embedded software.
- **End-User Industries** - Sector-specific industrial actors — such as automotive OEMs, aerospace manufacturers, railway operators, healthcare equipment producers, and energy providers — that integrate verified, model-based solutions into complex operational systems. They bring concrete requirements, operational constraints, and validation opportunities.

- **Standardisation Bodies and Certification Authorities** - National and international organisations responsible for defining, maintaining, and enforcing technical, safety, and quality standards. Their involvement ensures that new methods and tools are compatible with existing certification pathways and influence future regulations.
- **Policy Makers and EU Institutions** - Governmental and EU-level entities that set strategic priorities, funding directions, and regulatory frameworks. They rely on evidence-based insights to shape legislation and support Europe's technological sovereignty. Policy-making and regulatory bodies such as the European Commission (DG RTD, DG CNECT), the Joint Research Centre (JRC), the European Institute of Innovation and Technology (EIT), and certification bodies like EITCI.
- **Regional Innovation Actors** – Innovation centres, business incubators, VCs, EDIHs, chambers of commerce, and local/regional clusters active in the Czech Republic and beyond (e.g., Enterprise Europe Network, etc.)
- **Civil Society, NGOs and the Wider Public** - Citizens, non-governmental organisations, and community groups that are the ultimate beneficiaries of trustworthy, safe, and sustainable digital technologies. Their perception, acceptance, and trust are key to the societal uptake of innovation. Organisations promoting digital inclusion, gender equality in STEM, and science outreach, such as Czechitas.
- **R&I Projects and Initiatives -** ongoing and future R&I initiatives, funded by Horizon Europe, Digital Europe, national funding programmes, or public–private partnerships, can directly utilise and build upon the theoretical and methodological outputs generated by our work.
- **Alumni and Former Collaborators** – Former students, staff, and project partners with potential for sustained engagement as mentors, partners, or advocates.

Table 1 – Stakeholders' Relevance

Stakeholder Category	Potential Needs	Engagement Approach	Expected Benefits from VASSAL
Academic & Research Institutions	Access to cutting-edge theoretical advances, training opportunities, and research networking	Open-access outputs, joint workshops, PhD exchanges	Enhanced research capacity; skilled workforce; increased collaboration opportunities
Industrial Technology Providers	Validated methods for integration; faster time-to-market; sector-specific demonstrators	TRL4–5 prototypes, co-design with engineers, technical guidelines	Competitive advantage; reduced development risk; improved compliance
End-User Industries (Automotive, Aerospace, Rail, Energy, Healthcare, etc.)	Certifiable, reliable systems; smooth workflow integration; AI adoption with trustworthiness	Domain-specific case studies, advisory boards	Higher operational safety; improved efficiency; successful digital transformation
R&I Projects and initiatives	Strengthen own technical approaches; Methodological guidance for multidisciplinary research contexts (e.g., AI, robotics, cybersecurity, energy systems); Collaboration opportunities	Cross-project thematic clusters; joint technical sessions at EU events; shared benchmarking campaigns; mutual use of demonstrators and datasets to validate approaches	Reference implementations, benchmarks, and datasets, and avoid duplication of effort; Access to validated theoretical frameworks and algorithms, advance Technology Readiness Levels (TRLs), technical advisory
Innovation Actors	Access to validated methods and demonstrators; connect startups, SMEs, and research teams with mature innovations	Matchmaking events with startups and SMEs; demonstration at innovation hubs; co-creation workshops to adapt solutions for market readiness	Enhanced portfolio of high-impact, validated solutions; increased attractiveness for industry
Standardisation Bodies & Certification	Evidence for new standards; compliance frameworks for	Contributions to ISO/ IEC/ ETSI/ CEN	Modernised standards; faster certification; stronger

Authorities	emerging tech; updated certification processes	groups, benchmarks, compliance toolchains	EU leadership in global regulation
Policy Makers & EU Institutions	Reliable evidence for safe AI and digitalisation; policy alignment; impact assessment data	Participation in policy workshops, policy briefs, demonstration of alignment with EU missions	Informed policy decisions; evidence-based regulation; strengthened technological sovereignty
Civil Society & Wider Public	Assurance of safety and ethics; clear explanations; opportunities for digital skills development	Public-friendly communication, outreach events, educational activities	Increased public trust; greater technology acceptance; improved digital literacy

2.1.2 SECTORS AND INDUSTRIES ADDRESSABLE BY VASSAL

The methodologies and tools emerging from VASSAL are designed to have broader applicability across multiple sectors. The addressable sectors for VASSAL are those where software verification, analysis, and synthesis already play a critical role, or where their adoption is expected to grow due to increasing system complexity. As highlighted in section 2.1 and section 2.2, industries such as automotive, aerospace, rail, energy, and healthcare are undergoing rapid transformation driven by pervasive digitalisation and the integration of AI-enabled systems. These domains, alongside ICT and industrial automation, represent strategic relevance for Europe and are home to globally recognised companies—including Siemens, Airbus, Bosch, Thales, Dassault Systèmes, Infineon Technologies, and SAP—that both develop and integrate high-value systems.

Within this landscape, VASSAL will apply a prioritisation approach, focusing on sectors where its outcomes can be most readily deployed and validated, while taking into account industry-specific requirements and feedback gathered through stakeholder engagement.

Table 2 - Sectoral Relevance and Emerging Opportunities

Sector / Industry	Primary Drivers	Example Use Cases	Example EU Companies
Software-Intensive / Cloud Platforms	Reliability, fault tolerance	Model-based microservice orchestration, SLA verification	SAP, Atos, Sopra Steria, OVHcloud, Nokia
Automotive & Mobility	Safety, autonomous systems, regulatory compliance	Autonomous driving decision verification, ECU software synthesis	Bosch, Continental, Valeo
Aerospace & Defence	Mission-critical reliability, certification	Flight control verification, satellite onboard software, exploration rover verification and monitoring	Airbus, Thales, Leonardo
Industrial Automation & Robotics	Predictive maintenance, safety assurance	PLC code synthesis and verification, robot motion safety verification	Siemens, ABB, KUKA, UR
Rail & Transportation	Safety, interoperability	Railway signalling systems, driver assistance verification	Alstom, Siemens Mobility, Skoda Transportation
Healthcare & Medical Devices	Patient safety, cybersecurity	Implant firmware verification, diagnostic equipment control	Philips, Siemens Healthineers
Semiconductor & Embedded Systems	Performance, correctness	Processor design verification, hardware/software co-design	Infineon, ARM (EU branches)
Energy & Utilities	Critical infrastructure security, efficiency	Power grid control verification, turbine control systems	Schneider Electric, ABB
Smart Cards	Payment security, digital identity security	Integrity and confidentiality verification of the Javacard Virtual Machine embedded in the smart card; correct implementation of critical security protocols	Thales, IDEMIA, Monet+

2.2 KEY TREND AND COLLABORATION GAPS

The ecosystem of SW engineering, in which VASSAL as well as BUoT operates, is undergoing rapid evolution, shaped by technological, regulatory, and socio-economic dynamics. Several interconnected trends are expected to influence the relevance, uptake, and potential impact of the integration of the VASSAL project as well as BUoT and other partners.

2.2.1 TRENDS

The analysis identified several emerging trends within the ecosystem:

1) **A growing emphasis on applied R&I and Technology Transfer**, with industry demanding concrete, demonstrable outcomes.

Across the European research landscape, there is a marked shift from purely exploratory research towards applied, impact-oriented R&I activities. This trend is driven by industry's demand for concrete, demonstrable outcomes that can be integrated into products, services, and operational processes within shorter timeframes. While fundamental research remains essential for long-term innovation, funding agencies and industrial stakeholders increasingly expect clear pathways from laboratory results to technology validation and eventual deployment. For the VASSAL project, this translates into the need to complement theoretical advances with reference implementations, proof-of-concept demonstrators, and staged validation activities. In practical terms, this means targeting intermediate TRL levels (TRL 4–6), where concepts can be evaluated in relevant or operational environments to facilitate smoother technology transfer and bridge the gap between research and application.

2) **Growing Demand for Trustworthy, Sovereign, and Safety-Critical Digital Systems** in EU agendas.

The EU's strategic agendas – including the Digital Decade, AI Act, Cybersecurity Act, and NIS2 Directive – strongly emphasize ensuring technological sovereignty, protecting critical infrastructures, and maintaining control over key digital capabilities. This imperative extends across safety-critical domains such as mobility, aerospace, healthcare, and energy, where software failure can have direct societal and economic consequences.

The adoption of AI and machine learning, including software components generated by LLMs, is amplifying the challenge. AI-enabled systems often operate as non-transparent "black boxes," creating risks around explainability, robustness, security, and compliance. These issues are particularly acute when AI shall be deployed in regulated or mission-critical contexts, where failures can undermine safety, trust, and legal conformity.

3) **A Push Towards Multi-Stakeholder Partnerships**, combining academia, industry, and civil society.

Complex innovation challenges increasingly require collaborative approaches that bring together academia, industry, standardisation bodies, policy makers, and civil society. Multi-stakeholder partnerships allow for the integration of diverse expertise, from foundational theory to domain-specific application knowledge, as well as societal perspectives. For VASSAL, engaging in such partnerships will be essential to ensure that basic research outputs are co-shaped by real-world needs, improving relevance and uptake while strengthening Europe's innovation ecosystems.

4) **Convergence of Digital and Green Transitions**

EU strategic priorities highlight the twin transition – the integration of digital technologies to enable a more sustainable, resource-efficient economy. As industries adopt advanced automation, smart control systems, and AI-based optimisation, the reliability of these digital systems becomes critical for achieving environmental goals such as energy efficiency, reduced waste, and optimised resource use.

2.2.2 PERSISTENT GAPS AND BARRIERS

BUoT and VASSAL partners have participated in various national and international initiatives, which provide a baseline for further engagement. Nonetheless, many existing collaborations of BUoT are project-based and transactional, lacking long-term strategic anchoring. There is a need to shift toward institutionalised, trust-based partnerships that extend beyond the lifecycle of individual projects.

Despite the progress achieved through ongoing collaborations, several structural and operational gaps remain, limiting the full potential of VASSAL's R&I activities and BUoT's integration:

1) **Fragmentation in stakeholder engagement**, with limited coordinated outreach efforts.

Current outreach to stakeholders is often ad hoc and domain-specific, lacking a unified strategy that coordinates engagement across academic, industrial, policy, and civil society actors. This fragmentation results in missed opportunities for cross-sectoral synergies and hinders the creation of long-term, trust-based partnerships.

A structured, multi-channel engagement framework reduces the risk of low visibility and slower uptake of results in relevant sectors. Recurring multi-sector events foster continuity and cross-fertilisation

2) **Underrecognised Role of Regional and Thematic Ecosystems**

The potential of regional innovation infrastructures, thematic associations, and sectoral initiatives to support R&I projects remains underacknowledged at the institutional level. These actors provide valuable testbeds, networking opportunities, and dissemination channels, but are often overshadowed by a focus on direct bilateral cooperation with large industrial players. This dynamic is particularly visible in the case of SMEs: while they represent an important source of grassroots innovation, their limited capacity to absorb R&D costs often prevents them from engaging at the same level as larger companies. As a result, their perspectives and innovative contributions remain underexploited.

Strengthening institutional awareness will foster integration with regional clusters, European Technology Platforms (ETPs), and thematic industry associations through formal liaison roles and institutional participation in their governance or events, targeted support for SME inclusion, leading to enhanced access to diverse innovation networks, facilitating knowledge sharing, and increasing the potential for scaling results across the wider industrial ecosystem the potential for scaling results and knowledge sharing.

3) **Insufficient Integration of Basic Research into Applied Pathways**

While the project excels in generating high-quality theoretical advances, mechanisms to systematically translate these into higher TRL outputs are not yet fully established.

Dedicated resources for prototype development, industrial piloting, or co-creation with applied research teams foster the pathway from concept to application while lowering risks of delays and missed opportunities.

4) **Credibility challenges in securing industry trust, particularly in the commercialisation of research.**

Industrial partners often require clear evidence of reliability, scalability, and regulatory compliance before committing to adopting research outcomes, especially in safety-critical domains. Basic research outputs, while scientifically valuable, may be perceived as too distant from market application to warrant investment.

The credibility gap remains a core challenge of BUoT's perceived ability to act as a leading R&I partner in competitive EU-wide calls and industrial consortia. Strengthening this position requires not only a consistent and compelling external narrative but demonstrated excellence through flagship events and roadshows, as well as strategic endorsements and support from advanced partners and internationally recognised peers.

Early-stage demonstrators, publishing comparative benchmarking results, and third-party validations by recognised industry experts or governmental or international agencies (e.g., ANSSI in France and ENISA in Europe) enhance credibility, build confidence in the developed methods and tools, and shorten the adoption cycle.

5) **Limited Visibility in high-level EU and International Fora**, which constrains strategic influence and networking potential.

The current presence of BUoT and the project consortium in strategic policy dialogues, standardisation bodies, and flagship EU events remains modest. This constrains opportunities to influence research agendas, form high-impact partnerships, and ensure that the VASSAL's outputs are recognised in relevant international policy and industry contexts.

Representation in selected standardisation committees, speaking slots at major technology events, and contribution to policy consultations aligned with project themes foster integration and credibility.

6) **Limited Capacity for Continuous Knowledge Transfer**

Knowledge transfer currently happens episodically, often linked to specific deliverables or events, rather than through continuous, structured channels. This limits the ability to build sustained communities of practice and reduce knowledge loss between research cycles.

Continuous dissemination and training ensure consistent flow of know-how and maintain stakeholder engagement.

2.3 STAKEHOLDER DATABASE

In response, a central stakeholder database has been created and will be continuously updated throughout the project. The database is structured to include:

- Contact and organisational details
- Type and level of engagement (e.g., collaborator, advisor, target for engagement)
- Sector and thematic focus (e.g., software engineering, policy, education)
- Relevance to VASSAL strategic goals
- Previous collaboration history and interaction frequency

The database will be used to support targeted communication, strategic matchmaking, and engagement planning, including newsletters, roadshows, and tailored co-creation events. It will also serve for tracking progress in ecosystem integration and for developing tailored value propositions to key stakeholders.

3 INTEGRATION AND NETWORKING PLAN

The Integration and Networking Plan (INP) is conceived as a strategic framework to position BUoT and the VASSAL consortium as a recognised and trusted partner within the national, European and international R&I ecosystem. It aims to translate the consortium's scientific excellence into real-world impact through targeted engagement, evidence-based credibility building, and sustained cross-sector collaboration.

3.1 INTEGRATION AND NETWORKING OBJECTIVES

The goal is to transform ad-hoc collaborations and fragmented engagements into a coherent portfolio of structured and long-term partnerships, with visible results in the form of new collaborations, strengthened reputation, increased leverage of funding opportunities, and deepened partnerships, maximising the collective impact of the consortium.

The rationale for the INP lies in addressing two parallel needs:

- Reinforcing the visibility and trust in BUoT's and VASSAL's R&I competencies among diverse stakeholder groups, and
- Establishing an operational framework that enables continuous engagement, knowledge transfer, and joint action with ecosystem partners.

Strategic objectives

1) **Build Credibility and Foster Collaborative Impact**

Build and sustain trust in BUoT's and the VASSAL's R&I capacities through a coherent value proposition, demonstrable results, and transparent communication of achievements. By ensuring that research directions remain relevant to broader technological priorities and responsive to evolving European discussions, the consortium will strengthen its visibility and credibility in software engineering and related domains. Rather than pursuing broad societal or policy alignment, the focus is on consolidating recognition within the R&I community and among relevant industrial and institutional partners, particularly in domains where software engineering and formal methods play a critical role. Engagement with industry stakeholders, SMEs, public authorities, and other partners will be approached in a pragmatic and needs-driven manner, ensuring that collaboration pathways are relevant, feasible, and mutually beneficial. Through constructive dialogue, joint activities, and knowledge exchange, the consortium aims to foster effective partnerships that encourage uptake of project outcomes and contribute to long-term ecosystem integration.

2) **Leverage networks of advanced partners**

Capitalise on the established partnerships and international reach of TUW and CEA, in synergy with HISRO network, to gain access to strategic networks, thematic clusters, and policy forums. All partners will support each other via reciprocal introductions, share participation in relevant flagship events, and co-brand joint initiatives.

3) **Foster Talent, Youth Engagement, and Alumni Relations**

Embed the promotion of R&I careers, skills development, and mobility opportunities into all networking and integration activities. BUoT and VASSAL will build on the expertise of advanced partners to implement targeted outreach to students, early-stage researchers, and underrepresented groups, while leveraging alumni networks to

provide role models, mentorship, and high-level introductions. This dual approach ensures the sustainability of human capital pipelines. Mobility programs within the VASSAL project will further enable BUoT's Ph.D. students and graduates to secure prestigious internships and postdoctoral positions at renowned universities and R&D facilities, while alumni engagement reinforces long-term connections and motivates new generations of researchers to actively participate in international collaborations with experts.

4) Promote scientific diplomacy

Position BUoT and VASSAL not only as a scientifically excellent institution respectively R&I initiative but also as active contributors to European and global dialogues on science, technology and innovation policy. Active participation in high-level forums, thematic working groups and bilateral exchanges with strategic actors in the field of R&I will enhance networking opportunities, promote engagements, deepen contacts and networks as well as reinforce the role of BUoT as a recognized scientific institution and also strengthen Europe's role as a global leader in responsible and impactful research.

Integration with the DEC Plan

The INP is in line with the Dissemination, Exploitation, and Communication (DEC) Plan. Stakeholder intelligence gathered through INP activities will directly feed into DEC updates, ensuring that messages, channels, and events are evidence-based and targeted. In return, the DEC Plan amplifies INP outputs through coordinated branding, cross-platform promotion, and systematic documentation of engagement results, creating a self-reinforcing cycle of visibility, credibility, and collaboration.

Objective	Expected Outputs	How to Achieve
Strengthen trust and credibility in R&I competencies	- Value proposition statement for BUT/VASSAL integrated into outreach materials. - ≥5 endorsements (letters of interest, partnership statements) from key ecosystem actors by M36.	- Showcase achievements via conferences, flagship events, demonstrators - Publish scientific, industrial, and societal contributions. - Invite high-profile stakeholders as speakers / panellists at VASSAL events.
Stimulate collaboration with industry and public actors	- ≥1 new industry collaborations formalised (joint R&I projects, internships, contract research, pilot deployments). - ≥1 public sector entities engaged in policy-relevant dialogue.	- Participate in / Organise thematic brokerage events in e.g., safety-critical sectors - Enhance inclusion of industry into BUT curricula. - Promote joint internships with targeted companies from stakeholder mapping.
Leverage networks of advanced partners	- ≥10 new high-value contacts introduced via TUW/CEA networks.	- Pursue joint Horizon Europe / EUREKA submissions leveraging partner contacts.
Foster talent, youth and alumni engagement	- Annual youth-focused events with ≥20 participants (e.g., Žijeme IT with VASSAL branding). - Pipeline for students into international placements or internships.	- Co-organise STEM promotion campaigns with regional actors (e.g., Czechitas). - Involve alumni in mentoring and industry roadshows. - Use demonstrator projects as learning platforms for MSc/PhD students.
Promote scientific diplomacy	- Representation at ≥2 international forums with policy / research leaders. - ≥1 declared cooperation interests with overseas institutions	- Participate in Brussels-based EU institutional events (JRC, DG CONNECT). - Coordinate outreach with advanced partners for targeted introductions.

3.2 PILLARS OF THE INTEGRATION AND NETWORKING PLAN IMPLEMENTATION

The early phase of the INP focuses on establishing a credible and recognisable presence in the R&I ecosystem through strategic communication, flagship event participation, and targeted networking opportunities. The following pillars set out a phased approach, starting with visibility-building and moving towards more sophisticated integration measures.

The implementation will ensure a sustainable and value-driven embedding of BUoT and VASSAL into the wider R&I ecosystem. Each pillar draws on EU best practices, experience from advanced partners (TUW, CEA), and concrete mechanisms proven to build trust, foster collaboration, and deliver measurable outcomes.

Pillar 1 – Strategic Stakeholder Engagement & Collaboration Platforms

A strong ecosystem position depends on being recognised as a credible and capable partner. In the first implementation stage, the emphasis is on showcasing competencies and initiating trust-based relationships through participation in targeted events and sector-specific forums. Experience from EU R&I projects shows that meaningful collaboration stems from repeated, visible contributions to expert communities, reinforced by personal contacts and demonstrated technical leadership. VASSAL bodies, such as Advisory Board, and alumni can be leveraged to drive and enhance stakeholders' engagement.

Current and planned actions:

Flagship technical events:

Building on the successful VASSAL-branded session at the *Alpine Verification Meeting (AVM'24),* which positioned BUoT and its partners as active contributors to the formal verification community. VASSAL will organise a dedicated panel with invited speakers at the 25th *International Conference on Runtime Verification (RV25)*. This high-level forum is designed to showcase excellence and create networking opportunities with leading industrial experts, and stimulate trust-building.

VASSAL targets consistent and continuous activities showcasing its scientific excellence and domain leadership. The consortium actively participates in top-ranked international conferences, sharing results with leading research communities, and organizes seminars and workshops to promote direct networking and collaboration. Publications by the consortium show a clear research path with strong contributions across the full cycle of cyber-physical systems (CPS), covering formal verification, AI, and programming languages. High-impact publications in CORE A*/A conferences demonstrate wide dissemination and scientific quality. The consortium's tools and approaches are also shared with the community, supporting practical use, visibility, and integration across partners. The future objective of the project is to continue publishing in top conferences and journals to promote active participation. The detailed information about networking and participation at events is outlined in Section 4.3.

Follow-on engagement:

Leverage contacts from these events for targeted follow-up, including invitations to participate in future co-design sessions where industrial actors help shape research priorities, ensuring alignment with market and societal needs. The communication via targeted "Value Proposition" tailored to different audiences will reinforce VASSAL's and BUoT's efforts by highlighting direct benefits for industry, policy, and society.

Best practice learning: CEA will provide training, in M15-M17, on account / liaison / relationship management, enabling BUoT to professionalise stakeholder engagement processes.

Expected outcomes:

- Expanded network of sector-relevant contacts, including potential industrial co-design partners.
- Increased brand recognition of BUoT/VASSAL in target research and industrial domains.
- Structured stakeholder management processes in place.

Such activities not only amplify visibility but also lays the groundwork for sectoral brokerage events and collaborative R&I agendas in later phases. This approach helps to mitigate the credibility gap to establish BUT respectively VASSAL as a trustworthy, solutions-oriented partner.

Pillar 2 – Leveraging Advanced Partners' Networks

BUoT benefits from the established reputation and connections of VASSAL's advanced partners, especially CEA and TUW, which provide proven gateways into high-value networks through established reputations and trusted contacts, which have already delivered results:

CEA's network has enabled BUoT to engage with consortia in different research domains, leading to joint initiatives, proposal development, demonstrating that personal contacts, supported by regular communication, can break disciplinary boundaries.

This underlines that relationship-building is often domain-agnostic, provided the engagement is regular, targeted, and trust-based.

Planned activities:

- Partner-facilitated introductions to relevant Horizon Europe partnerships and thematic working groups, as well as to e.g., EU institutions, R&I clusters, and standardisation bodies.
- Co-representation with advanced partners at high-level EU events (e.g., European R&I Days).
- Inclusion of European roadshow preparations in 2026–2027, with advanced partners assisting in e.g., target stakeholder identification, contact introductions, communication strategy design, joint participation in the roadshows themselves.
- Utilise TUW ‘s best practice in EU-funded initiatives such as EIT to evaluate and designed a structured industry-academia-public approach for driving networking and collaboration, promoting technology adoption, and stimulating funding applications.

Expected outcomes:

- Accelerated entry into high-value networks.
- Increased participation in collaborative funding opportunities and cross-domain collaborations.
- Strengthened credibility for European and global outreach activities.

Pillar 3 – Scientific Diplomacy and Policy-Level Engagement

Although a newer area for BUT, active participation in missions and delegations has already led to unexpected connections with non-European institutions, opening opportunities for both collaborative projects and talent mobility.

Planned activities:

- Capture and consolidate lessons from CEA and TUW on strategic positioning in policy forums.
- Dedicate a session during the CEA-organised workshop to scientific diplomacy.
- Develop a pipeline of targeted missions, ensuring each has clear objectives (e.g., specific collaborations, joint funding proposals, talent exchange agreements).

Expected outcomes:

- New bilateral and multilateral cooperation agreements.
- Enhanced institutional profile as an active contributor to EU and international R&I agendas.

Best practice reference: EU-funded initiatives such as EIT Digital demonstrate that structured industry-academia-public sector collaboration significantly accelerates technology adoption and stimulates joint funding applications.

Pillar 4 – Talent Development, Alumni & Skills Mobility

This pillar is designed to align the human capital pipeline with VASSAL’s R&I and other strategic priorities. Despite this pillar being relatively new to the BUoT, the university recently launched a central Alumni Portal (www.vutalumni.cz), which connects graduates with lifelong learning opportunities, networking, consulting, and access to university resources. Registered Alumni have the opportunity to attend professional lectures and meetings with experts from various industries. VASSAL seeks to utilise the existing platform and to build on this foundation with a more tailored, faculty-specific initiative.

In R&I ecosystems, integration extends beyond institutional linkages—it relies on a sustained influx of talent and engagement from those already familiar with the university and its mission. Engaged alumni not only reinforce brand trust but also act as ambassadors, contributors to curriculum development, and catalysts for partnership and innovation.

Planned activities:

- Strengthened and Sustainable Networks - A faculty-focused alumni program leverages BUoT’s central alumni infrastructure while creating deeper, more targeted connections to actors most relevant to VASSAL. This approach not only amplifies outreach but also ensures long-term institutional sustainability by embedding alumni engagement into BUoT’s culture and governance. Best practice sharing/workshop on talent and alumni

engagement to collect partner insights and define a scalable model for faculty-level alumni framework informed by advanced partners' experiences.

- Alumni involvement in mentoring, mobility schemes, and collaborative projects ensures that the next generation of researchers and innovators is well-prepared for integration into Europe's R&I ecosystem. Alumni in leadership roles can support BUoT and VASSAL, promote outcomes, and facilitate collaborations and high-level introductions. By linking alumni engagement to strategic objectives, VASSAL strengthens its ability to contribute to innovation-driven ecosystems and European research priorities.
- Integrate gender equality actions, building on CzechITas collaboration and (F)IT summer school, ensuring outreach reflects diversity goals.

Expected outcomes:

- Defined framework for alumni engagement linked to R&I priorities.
- Initial pool of students involved in international placements or industry-linked projects.

3.3 IMPLEMENTATION TIMELINE

Period	Priority Focus	Key Objectives & Outputs
M13–M15	Foundation Phase	- Integration Task Force (ITF) and developing INP. - Stakeholder mapping & database creation initiated. - Identify and review alumni engagement best practices from advanced partners.
M16–M18	Strategic Positioning	- Finalise the first version of the stakeholder database (v1). - Participation in high-visibility events (e.g., RV25, AISEC). - Fine-tune value proposition and key messages for targeted stakeholder engagement - Early outreach to priority stakeholders via advanced partners.
M19–M24	Targeted Engagement	- Deploy thematic networking activities based on stakeholder analysis. - Work on developing the alumni programme. - Co-organise targeted workshops with advanced partners. - Preparations for EU roadshows (agenda, partners).
M25–M32	Expansion & Outreach	- Implement INP on a full scale. - Conduct a European roadshow (Brussels + sector-specific stops). - Follow-up meetings with key international leads. - Design final demonstrators' events to validate stakeholder interest. - Initiate co-design sessions with industry/public actors. - Strengthen non-EU collaborations initiated through scientific diplomacy missions.
M33–M36	Consolidation & Sustainability	- Assess INP performance against KPIs. - Formalise partnerships (e.g., MOUs, letters of intent). - Update stakeholder database with impact tracking. - Include INP implementation outcomes in post-project sustainability.

4 INITIAL ACTIONS AND PROGRESS (M13–M18)

4.1 INTEGRATION TASK FORCE (ITF)

The Integration Task Force was formally constituted in M13, bringing together representatives from BUT's BST, partner liaison officers, and selected domain experts from VASSAL partners. Its mandate is to steer the development and implementation of the Integration and Networking Plan, ensure alignment with the DEC Plan, and serve as a single coordination body for ecosystem engagement activities. ITF will oversee and regularly review progress to adapt engagement priorities as well as help in setting up a stakeholders database and communication channels to streamline information flow among partners.

4.2 STAKEHOLDER DATABASE SETUP

A stakeholder database was initiated in M14, designed to support targeted engagement and track relationship history. The database is structured to:

- Classify stakeholders by category, geographical reach, thematic relevance, and past collaboration history.
- Record interactions, meeting notes, and follow-up actions to avoid duplication and ensure continuity.
- Enable segmentation for targeted communications such as newsletters, event invitations, first outreach: Using the database, the ITF will support prioritization of stakeholders for initial personalised communication with emphasis on existing networks within the VASSAL consortium.

4.3 PARTICIPATION IN EVENTS

Early visibility actions focused on events with high networking potential:

- **Alpine Verification Meeting (AVM)** — successfully organised a dedicated session highlighting VASSAL's research focus and capabilities, generating follow-up interest from both academic and industrial participants.
- **Frama-C Day** – BUoT representative, Tomáš Dacík, presented the topic Deadlocks and Data Races with Frama-C to an expert audience of academics, industrial experts and SW engineers and developers, generating follow-up interest in BUoT work and proposed mobility to France.
- **Approche Formelle pour l'Assistance au Développement de Logiciels (AFADL - Formal Approaches for Software Development Assistance)** — VASSAL member, Julien Signoles (CEA), presented the VASSAL project at the French conference AFADL 2025 (about 120 participants) hosted during the annual days of the French Research Group for Programming and Software Engineering (Gdr GPL).
- Preparations have been initiated for the **25th International Conference on Runtime Verification (RV25)**, where BUoT will organize a panel featuring invited speakers. The event is expected to serve both as a platform to showcase excellence and as a stepping stone to initiate co-design discussions for future R&I projects.
- Preparations initiated for **TUW's summer school AISEC** organised by VASSAL member, Ezio Bartocci, leader of the Trustworthy Cyber-Physical Systems (TrustCPS) Research Group within the Cyber-Physical Systems (CPS) Research Unit at TUW. VASSAL has become a partner to support the summer school by promoting its project objectives. With about 70 participants and renowned lecturers from EU institutions expected to arrive, the summer school presents a fantastic opportunity for BUOTs participants to network.

The consortium has actively disseminated its research results through presentations at leading international conferences in formal methods, AI and programming languages, including:

- International Conference on Computer-Aided Verification (2025, CORE A*).
- International Joint Conference on Artificial Intelligence (2025, CORE A*)
- European Symposium on Programming (2025, CORE A)
- International Conference on Autonomous Agents and Multiagent Systems (2025, CORE A*, received the Best Student Paper Award).
- International Conference on Tools and Algorithms for the Construction and Analysis of Systems (2025, CORE A).

4.4 VASSAL EVENTS PREPARATION

EU ROADSHOWS

Roadshows (M19–M36) will be a core part of integration and networking activities. The initial planning activities will focus on defining clear objectives, selecting target regions in EU, and identifying key stakeholders, prioritising software engineering companies, system integrators, and safety-critical systems sectors (automotive, railway, energy).

FINAL DEMONSTRATORS

To ensure that roadshows and workshops not only promote VASSAL but also validate its integration into the R&I ecosystem, final demonstrators represent a strategic part of integration efforts. These demonstrators will present tangible outputs of the project, highlighting applicability in targeted domains. Participation and feedback from stakeholders during demonstrator sessions will serve as a practical metric of interest, adoption potential, and credibility within the ecosystem.

5 MONITORING AND EVALUATION

The implementation of INP will be continuously monitored to ensure progress towards strategic objectives and measurable impact. Monitoring is based on clearly defined Key Performance Indicators (KPIs) that reflect the project's ambition to establish a credible, visible, and trusted position within the R&I ecosystem.

KPIs:

- **New contacts mediated: ≥ 15 (till M36)**, measured through participation in events, roadshows, and targeted networking activities; verified via event participation records, stakeholder database entries, or documented follow-up communication (any of these methods can be applied).
- **New partnerships declared by** Letters of Interest (LoIs), Memoranda of Understanding (MoUs) or equivalent commitment statements: **≥ 5 (till M36)**, demonstrating stakeholder intent for future collaboration.
- **Industry collaborations initiated: ≥ 1 (till M36),** formalised through contract or other document, joint proposals, or pilot activities.
- **Final demonstrators: 2 (till M36),** demonstrating scientific outcomes and fostering future collaboration with stakeholders.

Monitoring responsibilities will be distributed as follows:

- Project Coordinator: Oversees INP implementation progress and reports to the Steering Committee (SC) every quarter.
- Steering Committee**:** Provides strategic oversight, validates progress, and advises on corrective actions when KPIs are at risk.
- BUT's PST (Project Support Team): Maintains the stakeholder database, logs engagement activities, and tracks qualitative feedback from events and meetings.

Evaluation cycles and feedback loops will be conducted every six months, combining quantitative KPI tracking with qualitative feedback from partners and stakeholders. The results will feed into adaptive planning, ensuring that the INP remains agile and responsive to evolving ecosystem dynamics.

6 CONCLUSION

The Integration and Networking Plan positions BUOT and VASSAL to strengthen their role as reliable, innovative, and collaborative partners in the European and international R&I landscape. By combining targeted outreach, strategic communication, and partner-enabled access to high-value networks, the plan builds a foundation for long-term scientific diplomacy, industry engagement, and talent mobility.

Next steps will include:

- **M18:** Update of the Dissemination, Exploitation, and Communication (DEC) Plan to reflect INP priorities and first results.
- **M19–M24:** Targeted thematic engagement based on stakeholder analysis, preparatory work for roadshows, and co-design workshops.
- **M25:** Full deployment of the INP with an emphasis on validating the integration through demonstrator events and formalised collaborations.

The strategic value of the INP extends beyond the project duration, reinforcing the coordinator and the sustainability of the project for continued partnerships, enhanced credibility, and increased visibility of BUoT and VASSAL as leading actors in software engineering and verification.

7 ANNEXES

Annex I: Stakeholder Database Structure (template print screen)

No.	Institution	Country	Representative name	Role/Position	Email	Phone	Sector	Areas of Interest	Engagement Importance	Date of contact	Relevance to VASSAL objectives	Notes
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Annex II: Draft Value Proposition Messaging

Type of stakeholder	Claim	Rationale
Academia	"Empowering researchers with advanced methods, collaborative networks, and talent pathways to accelerate impactful scientific discovery."	• Access to advanced methods (formal verification, MBD, AI trustworthiness). • Positions VASSAL as a partner for collaboration and capacity-building.
Industry	"Delivering validated tools and demonstrators that reduce risk, accelerate adoption, and strengthen competitiveness in high-value sectors."	• Address industry pain points: risk, speed, competitiveness. • Reinforcing the applied, demand-driven nature of VASSAL outcomes. • Bring value for end-user industries and technology providers.
Government & Policymakers	"Providing evidence-based insights and trusted frameworks to guide policy, strengthen standards, and safeguard Europe's technological leadership."	• Building credibility and trust in outcomes. • Address regulatory and policy-making needs. • VASSAL contributes to EU sovereignty and resilience.