

REPAIR

Using Badges to Increase Railway Sustainability



REPAIR supports the Sustainable Development Goals

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INTELLECTUAL OUTPUT 5

REPAIR WHITE PAPER

*Leveraging Communities of Practice and Open Badges
to Support the Adoption of SDGs*

31 August 2023



The REPAIR Project was funded by the European Union's ERASMUS+ Program.

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TABLE OF CONTENTS

- Summary 3**
- Introduction..... 4**
 - Scope 5
 - Methodology 5
- Section 1: Overview of Communities of Practice (CoPs)..... 7**
 - Definition and Significance 7
 - CoPs and Reification 7
 - Combining Reification and Recognition..... 8
 - Characteristics of Effective CoPs..... 8
 - Examples in Related Contexts..... 10
 - Benefits and Challenges..... 11
 - CoPs and SDGs 12
- Section 2: Open Badges as Recognition Tools..... 14**
 - What are Open Badges? 14
 - Reification and Open Badges: 14
 - Recognition and Open Badges: 14
 - Advantages and Limitations..... 14
 - Open Badges & SDGs 15
- Section 3: the Rail Sustainability index (RSi)..... 17**
 - Exploiting the RSi to elicit emerging practices and competences 19
 - Utilising Open Badges to advance the RSi 20
- Section 4: Synergising CoPs and Open Badges for SDGs..... 21**
 - Supporting CoP dynamics 21
 - Mapping emerging practices 22
- Section 4: Recommendations..... 24**
 - The SDGs Adoption Maturity Matrix..... 24
 - High-level, broad recommendations for adopting CoPs and Open Badges..... 26
 - Option 1: Creation of Ad-Hoc CoPs Related to SDGs Across all Railway Practices 26
 - Option 2: Creation of Working Groups within Existing Communities of Practice 27
 - Combining option 1 and 2 28
 - Policy Recommendations for Enhancing Sustainability in the Railway Sector..... 28
 - Recommendations based on the REPAIR analysis 29
 - Recommendations overview 31
- Sources and references 32**

SUMMARY

The REPAIR White Paper delves into the synergistic potential of Communities of Practice (CoPs) and Open Badges as tools for recognising the efforts of the railway sector professionals to achieve the United Nations' Sustainable Development Goals (SDGs). The paper adopts a mixed-methods approach for its analysis, gathering data from approximately 740 professionals across different domains and countries.

Objectives

The paper aims to provide the findings relevant to SDGs of the existing literature on CoPs and Open Badges. It then synthesises this information to make actionable recommendations for effectively using CoPs and Open Badges to promote SDG adoption.

Key Findings

- Pedagogical Approaches: to leverage digital technologies to dynamically integrate SDGs in professional settings.
- Communities of Practice: to share learning and reflection, facilitating the dissemination of emerging practices and contributing to SDG-aligned strategies.
- Open Badges: A flexible, interoperable means to recognise and validate informal learning within CoPs, thus encouraging further engagement and innovation.
- SDGs and CoPs: real-world examples to argue for the creation of CoPs focused on SDGs in professional practices.

Strategic Recommendations

- Moving from Awareness to Action: Emphasises that awareness is insufficient and needs to transition into a strong desire for actionable change, supported by a framework like the SDG Adoption Maturity Matrix.
- Harness Existing and Emerging CoPs: Advocates for the extension of existing CoPs to cover SDGs and for the development of new CoPs centred around specific SDGs.

Tactical Recommendations

- Implement Open Badges in Organisational Culture: The paper suggests that an inclusive organisational culture is fundamental to the successful deployment of Open Badges.
- Railway Sector Recommendations: Suggests that CoPs related to SDGs can significantly benefit sectors like railways, provided they choose the right approach tailored to their needs.

Policy Guidelines

- Suggests establishing policies that facilitate data-sharing and collaboration between different stakeholders.
- Recommends the development of tools and platforms that facilitate reflective learning and sharing of insights within CoPs.

In summary, the REPAIR White Paper presents a comprehensive overview of how Communities of Practice and Open Badges can be effectively combined to promote the Sustainable Development Goals, providing both strategic and tactical recommendations for various sectors.

INTRODUCTION

This White Paper is one of the outcomes of REPAIR, a 3 year Erasmus+ project, dedicated to the exploration of the power of Communities of Practices (CoPs) and Open Badges to recognise the emerging practices supporting the adoption of the United Nations 'Sustainable Development Goals (SDGs).

The objective of this White Paper is to provide a valuable resource for railway companies, policymakers, and other stakeholders who are committed to supporting SDGs.

This document provides:

- An overview of CoPs and Open Badges and how they can be used to support the adoption of SDGs.
- Develop recommendations for how CoPs and Open Badges can be used to support the adoption of SDGs.
- Discuss the implications of these recommendations for practice and research

About REPAIR

Competence mapping is generally associated with "competence frameworks", which are models that broadly describe performance expected by the people operating within a sector or a company. The REPAIR approach reverses the traditional top-down approach to building competence frameworks.

REPAIR is about mobilising the collective intelligence of the workforce to create real time occupational maps that will help students, citizens, employees, employers and public authorities make informed decisions regarding learning and career paths.

While the traditional building and exploitation of competence framework was based on an analytical model, the REPAIR approach is based on an 'analogical' model centred on the recognition of individuals and their practices.

About the UIC

The International Union of Railways (UIC) is a global railway organisation that represents the interests of 193 railway companies in 100 countries. The UIC is committed to supporting the Sustainable Development Goals (SDGs) and has developed a number of initiatives to help railways contribute to their achievement.

Some of the UIC's key activities in relation to the SDGs include:

Developing and promoting sustainable railway practices: The UIC has developed a number of guidelines and standards for sustainable railway operations, including standards for energy efficiency, emission reduction, and waste management. The UIC also provides technical assistance to railway companies to help them implement these standards.

The UIC's work on the SDGs is aligned with its mission to promote the development and operation of safe, efficient, and sustainable railways. The UIC believes that railways can play a significant role in achieving the SDGs and is committed to working with its members and other stakeholders to make this happen.

Scope

The White Paper aims to provide practical recommendations, strategic and tactical, for implementing Open Badges and CoPs, especially in the railway sector, based on an in-depth understanding of Communities of Practice (CoPs) and Open Badges as tools for recognition and learning. It specifically links these concepts to the United Nations' Sustainable Development Goals (SDGs), seeking ways to synergise both to support the achievement of these goals.

The scope boundaries are:

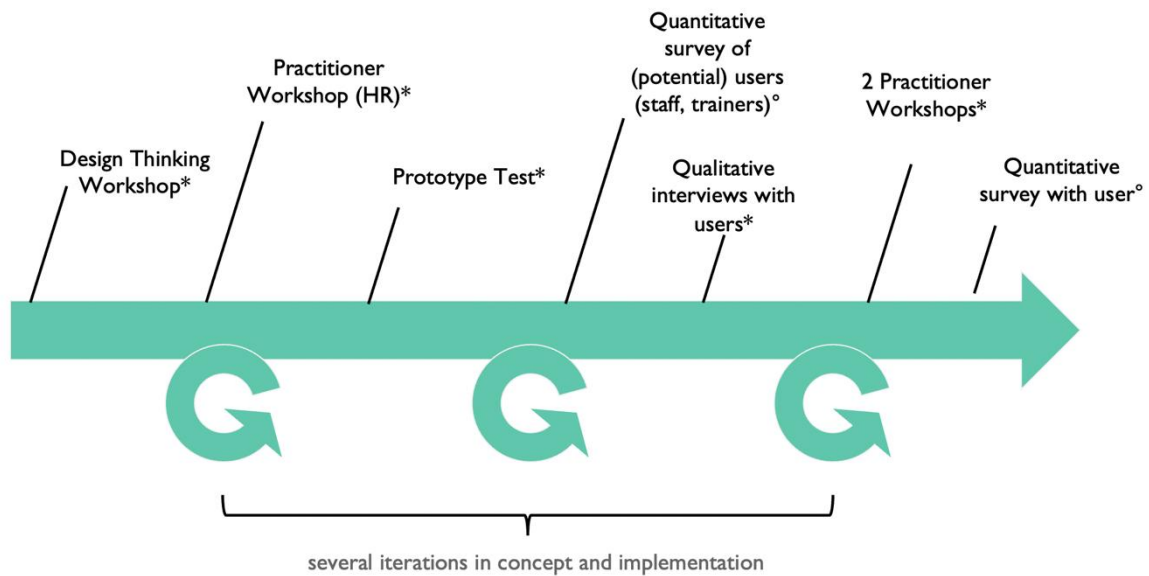
- **Sector-Specific:** While it provides broad recommendations for CoPs and Open Badges, it narrows its application scope to the railway sector towards the end, which might limit its general applicability.
- **Domain-Specific:** It is focused on the United Nations' Sustainable Development Goals (SDGs).
- **Geographic Scope:** The data collection involves professionals from only two countries, potentially limiting the global applicability of its findings.
- **Exploratory Nature:** The paper largely focuses on feasibility and conceptual alignments. It provides limited empirical evidence to support the effectiveness of implementing its recommendations.

Methodology

This document is based on two documents produced by REPAIR:

- **REPAIR Analysis:** an evidence-based paper describing the potential, limitations, strengths, and weaknesses of SDG-related digital badges. The central questions of this paper were: How can digital badges be used to promote the SDGs in the rail sector? What is their potential impact? And what are the prerequisites for their implementation?
- **REPAIR Framework:** a prospective document, based on the exploration of current practices and technologies that could assist in understanding emergent transformations, identifying early signals, rethinking education for unknown futures, rethinking the role of individuals in the workplace, and leveraging digital technologies for human resource development.

REPAIR Analysis methodological approach to data collection is inspired by design thinking. In this approach, development and data collection are an iterative process. We opted for a mixed method design of qualitative and quantitative approaches, including workshops, qualitative interviews, and quantitative surveys. This process was linked to the intention that data collection should start small within the consortium and gradually expand the scale of people involved. In total, data was collected from approximately 740 people in different professions, different communities of practice and two different countries (Spain and Slovenia).



Design of Data Collection

To address the questions the REPAIR framework the context of the U.N. Goals (SDGs). By introducing the context from an *unknown* remains *unknown* is the way future. It is an *unknown* on act.



raised by an unknown future, reframed those questions in Sustainable Development the SDGs, we were changing future to a *desirable* one. What we can achieve that desirable which we have the power to

Taking into account that new context the list of initial questions were reformulated as:

Understand emergent transformations -> Understand how to achieve the SDGs

- What are the key drivers for the practices to support the SDGs ?
- How can data analytics and predictive modelling be used to identify emerging job roles and required skills to support the SDGs?

Identify early signals -> Share emerging practices conducive to achieving the SDGs

- What real-time indicators or markers can be leveraged to identify SDG-aware practices?
- How can Communities of Practice (CoPs) contribute to include SDGs in their practices?

Rethink education for unknown futures -> Rethink education to achieve the SDGs

- What pedagogical approaches can best equip learners with the adaptive skills required for supporting the adoption of SDGs?
- How can educational systems become the playground for practices conducive to the SDGs?

Rethink the role of individuals in the workplace -> Recognise employees as key stakeholders to achieve SDGs

- How can employees contribute to the adoption of SDGs within their organisations?
- How can organisations encourage a culture of transformative learning among their employees?

Leverage digital technologies for HR -> Leverage digital technologies for the planet

- How can digital platforms help individuals and organisations plan for and develop their careers to develop occupational competences supporting the achievement of SDGs?
- How can machine learning algorithms and AI be employed to dynamically integrate SDGs in professional practices?

SECTION 1: OVERVIEW OF COMMUNITIES OF PRACTICE (COPS)

Definition and Significance

In his book, “Communities of Practice: Learning, Meaning, and Identity”, Etienne Wenger argues that learning is a social process that takes place through participation in communities of practice. He identifies three key dimensions of learning in communities of practice:

- **Learning as participation:** When we participate in a CoP, we learn by doing. We learn by interacting with other members of the community, by sharing our knowledge and experiences, and by listening to the knowledge and experiences of others.
- **Learning as meaning-making:** When we participate in a CoP, we learn by making meaning of our experiences. We learn by negotiating the meaning of concepts and practices, by developing shared understandings, and by creating new knowledge.
- **Learning as identity formation:** When we participate in a CoP, we learn by developing our identities. We learn by taking on new roles and responsibilities, by developing new skills and knowledge, and by becoming part of a community that shares our values and interests.

CoPs and Reification

Wenger argues that these three dimensions of learning are interdependent. Learning as participation is necessary for learning as meaning-making, and learning as meaning-making is necessary for learning as identity formation. CoPs provide a space for people to learn from each other, develop new skills, and solve problems together.

Reification, the process of giving concrete form to abstract ideas, knowledge, and practices within the community, is one of the most important aspects of CoPs: knowledge sharing, communications, and transformation are fundamentally driven by this concept.

CoPs and Reification

- **Codification:** the process of transforming practices into tangible forms such as documents, tools, or other resources.
- **Symbolism:** creating rituals, traditions, or jargon as shorthands for sharing complex ideas and experiences.
- **Artefacts:** the tools, templates, or other artefacts embodying collective practices.
- **Boundary Objects:** artefacts that enable communication across domains.

Combining Reification and Recognition

In a Community of Practice (CoP), reification and recognition can work together to codify knowledge and validate contributions. In contrast to reification, recognition acknowledges and validates the contributions and expertise of community members. Through the integration of reification and recognition in a CoP, concrete forms of knowledge (reification) are produced and maintained through systems that acknowledge and incentivise individual contributions (recognition). Through this symbiosis, shared practices can be enhanced, knowledge can be transferred, and communities can become more engaged and collaborative.

Here are some examples of how they can interact and complement one another:

Recognition through reification:

- **Recognition through artefacts:** A reified practice or the competence (knowledge, skills, attitudes and values) it involves, can serve as a tangible proof of expertise of the community members who have contributed to its creation.
- **Recognition through publication:** When community members contribute to the development of tools, practices, or documents, their contributions become visible and can be recognised within and beyond the CoP.
- **Recognition through credentials:** certificates can be used to recognise the expertise or contributions of community members and shared within and outside the community.

Recognition as incentive for reification (from informal to non-formal recognition):

- **Social Validation:** informal recognition in the community of a particular practice, idea, method, or tool may serve as an indicator that it is valuable enough to be formalised (reified).
- **Contribution:** Recognition can serve as an incentive for community members to actively participate in discussions, problem-solving, and creating reified instruments like practice guides, competence frameworks, thereby enriching the community's knowledge base.
- **Accountability:** Recognition systems can ensure that only high-quality, peer-reviewed contributions get reified to enhance the value and reliability of the reified artefacts.
- **Influence:** Recognition can lead to a member's practices or contributions being reified as a standard within the CoP.

Characteristics of Effective CoPs

Effective CoPs are “reflective.” Reflection is the process of thinking about one's experiences and learning from them. It is a critical skill for individual and community learning and development. CoPs can provide a safe and supportive space for members to reflect on their practice. They can also provide opportunities for members to learn from each other's experiences and to share ideas for improvement. By promoting reflective practice and reflection in action, CoPs can help members to become more effective practitioners and learners.

The ideas of "reflective practice" and "reflection-in-action," popularised by Donald Schön and Chris Argyris, align well with the functioning of Communities of Practice (CoPs). These concepts explore the way professionals think in action and learn from their experiences, which is a cornerstone of any effective CoP.

Reflective practice is the process of reflecting on one's own practice in order to improve it. It involves thinking about what happened, why it happened, and what could be done differently next time.

Reflection in action is the process of reflecting on one's own practice while it is happening. It involves thinking about what is happening in the moment and how to respond in the best way possible.

Reflective practice and reflection-in-action are integral to the functioning of a CoP. They contribute to both individual and collective learning, feeding into the broader dynamics of social capital, reification, and recognition that underlie the community's operation.

Here's how they intersect:

Reflective Practice:

- **Learning Through Doing:** In CoPs, members often learn by doing, which naturally integrates reflective practice. Post-task reflections allow members to understand what went well, what didn't, and how things can be improved.
- **Shared Reflection:** Reflective practice is usually a collective endeavour in a CoP. Group discussions, debriefing sessions, or formal reviews can be forums where members share their reflections, get and provide feedback, thereby enriching collective knowledge.
- **Adaptive Learning:** Reflective practice enables CoP members to adapt to new situations by applying the wisdom gained from past experiences. This is particularly important in fast-changing fields where the community needs to evolve continually.

Reflection-in-Action:

- **Real-time Adjustments:** In CoPs, reflection doesn't always happen after the fact. Members often have to adapt their actions in real-time, similar to Schön's concept of "reflection-in-action."
- **Collective Cognition:** The community serves as a 'collective brain' where reflections-in-action can be immediately discussed, dissected, and applied. The immediate feedback loop is shorter, allowing for rapid iterative learning.
- **Implicit Knowledge:** Schön also talks about "knowing-in-action," the tacit knowledge that professionals have but may not be able to articulate. CoPs provide an environment where such implicit knowledge can surface through collective reflection-in-action.

Examples in Related Contexts

SDGs-in-the-Classroom Community of Practice at York¹

The SDGs-in-the Classroom Community of Practice (COP) at York is created with a vision to track, weave, amplify and inspire the infusion of the SDGs into the curriculum. It is for York faculty and instructors who are involved or interested in infusing the SDGs into the curriculum across the campus.



Drawing Change COP Graphic - “SDGs-in-the-Classroom” Community of Practice at York

Using a co-creation approach, the COP fosters the ability of group members to achieve shared objectives to incorporate SDGs into curricula and build upon each other's expertise and experience. The COP will help identify curricular champions and develop resources to enable faculty to ‘see the SDGs’ in their respective courses and classroom activities.

Currently, there are more than 60 members of the COP including faculty members, instructors, administrative professionals, and students from York University.

ILO Communities of Practice in the Asia-Pacific²

The ILO sponsors a number of Communities of Practice (CoP) in Asia Pacific to help ILO constituents, donors, partners and others interested in the themes share problems or issues, and access knowledge, expertise and solutions. The CoPs offer cost efficient ways of working, minimise barriers created by geography and time, and provide a collaborative workspace for those with a specialist interest to deliver information, learn and exchange views. The CoPs include: Green Jobs, Industrial Relations, Migration, Youth Employment, Skills and Employability, and Forced Labour



¹ <https://www.yorku.ca/unsdgs/toolkit/the-sdgs-in-the-classroom-community-of-practice-york-university/>

² https://www.ilo.org/asia/library/WCMS_125850/lang--en/

Benefits and Challenges

Benefits:

- **Knowledge sharing:** CoPs can provide a forum for members to share knowledge and expertise. This can help members to learn new things, to solve problems, and to improve their practice.
- **Collaboration:** CoPs can provide a forum for members to collaborate on projects. This can help members to achieve common goals, to pool resources, and to share ideas.
- **Networking:** CoPs can provide a forum for members to network with other professionals in their field. This can help members to find mentors, to get advice, and to build relationships.
- **Professional development:** CoPs can provide a forum for members to learn about new developments in their field. This can help members to stay up-to-date on the latest trends and to improve their professional skills.
- **Motivation:** CoPs can provide a sense of community and belonging. This can help members to feel motivated and supported in their work.

Challenges:

- **Time commitment:** CoPs can be time-consuming to participate in. Members need to be willing to invest time in attending meetings, participating in discussions, and contributing to projects.
- **Engagement:** Maintaining active participation and engagement can be challenging, especially in larger communities. Risks of reduced effectiveness and the potential dissolution of the community over time.
- **Resources:** Establishing and managing a CoP can require resources, including time, money, and expertise. Limited resources can hinder the community's ability to achieve its objectives and sustain its activities.
- **Leadership:** CoPs need to have strong leadership to ensure that they are successful. The leader needs to be able to facilitate discussions, build consensus, and motivate members.
- **Communication:** CoPs need to have effective communication channels to ensure that members are able to stay informed and to participate in discussions.
- **Diversity:** CoPs need to be diverse in order to be successful. This means having members from different backgrounds, with different perspectives, and with different skills.

Overall, CoPs can be a valuable resource for professionals who want to learn, collaborate, and network. However, it is important to be aware of the challenges that CoPs can face in order to be successful.

CoPs and SDGs

Communities of practice (CoPs) can be a powerful tool for achieving the United Nations' Sustainable Development Goals (SDGs). CoPs can help to:

- **Share knowledge and best practices:** CoPs can bring together people from different organisations and backgrounds who share an interest in a particular SDG. This can help to share knowledge and best practices, and to build a common understanding of the challenges and opportunities associated with each goal.
- **Collaborate on solutions:** CoPs can provide a space for people to collaborate on solutions to the challenges associated with the SDGs. This can help to pool resources and expertise, and to develop innovative solutions that can be scaled up and replicated.
- **Advocacy:** CoPs can advocate for the SDGs at the local, national, and international levels. This can help to raise awareness of the goals, and to build support for policies and actions that will help to achieve them.

There are a number of existing CoPs that are already integrating some of the SDGs. For example, the Sustainable Brands Community³ brings together businesses and organisations that are committed to sustainability. The community's work aligns with several SDGs, including SDG 12 (responsible consumption and production), SDG 13 (climate action), and SDG 17 (partnerships for the goals).

There are also a number of emerging CoPs that are dedicated to one or more SDGs. For example, the SDG 6 IWRM Community⁴ brings together people who are working to achieve SDG 6 (clean water and sanitation). The community's work focuses on sharing knowledge, best practices, and resources related to water and sanitation.

CoPs can be a powerful tool for achieving the SDGs. By bringing people together from different organisations and backgrounds, CoPs can help to share knowledge and best practices, collaborate on solutions, and advocate for the goals.

Communities of Practice (CoPs) can play a significant role in advancing the United Nations Sustainable Development Goals (SDGs). Both existing CoPs and newly emerging ones can contribute to this global agenda in different but complementary ways.

Examples of CoPs Integrating SDGs

- **Broadening Scope:** Existing CoPs can broaden their objectives to integrate relevant SDGs. For instance, a CoP focused on agricultural best practices could integrate SDG 2 (Zero Hunger) into its activities.
- **Knowledge Sharing:** The expertise within these communities can be harnessed to disseminate knowledge that aligns with the SDGs. For example, a CoP around renewable energy can contribute to SDG 7 (Affordable and Clean Energy).
- **Policy Influence:** Established CoPs often have connections with policy-making bodies and can leverage this influence to push for SDG-aligned policies.
- **Capacity Building:** Through workshops, training, and mentorship, existing CoPs can build the capacities of their members to contribute more effectively to the SDGs.

³ <https://sustainablebrands.com/participate/corporatemember/community>

⁴ <https://iwrmaactionhub.org/group/sdg6iwrms/about>

- **Global Partnerships:** Existing CoPs with a broad network can collaborate with international organisations, NGOs, and governments to jointly work on SDG-related projects.

Emerging CoPs focused on SDGs

Targeted Objectives: These CoPs can be created with a specific focus on one or more SDGs, ensuring a concentrated effort on particular objectives.

Cross-Sector Collaboration: Given the interdisciplinary nature of the SDGs, these CoPs often involve members from diverse sectors—ranging from academia to industry to government.

Innovation: New CoPs are more agile and can be more experimental in their approaches, allowing for innovative solutions to complex SDG-related challenges.

Grassroots Initiatives: Emerging CoPs may be more connected to grassroots realities and could be more effective in implementing localised solutions that align with SDGs.

Funding and Resources: New CoPs can seek funding specifically aimed at SDG-related projects, allowing for more directed and impactful work.

By actively aligning with the UN's SDGs, both existing and emerging CoPs can make meaningful contributions to these global goals, benefitting from the shared knowledge and collaborative potential that these communities offer.

SECTION 2: OPEN BADGES AS RECOGNITION TOOLS

What are Open Badges?

Open Badges offer an innovative way to intertwine the processes of reification and recognition within Communities of Practice. They serve as both concrete representations of knowledge and skills, and as mechanisms for recognising individual contributions, thereby enriching the communal fabric of learning and practice. Instruments initially designed to make visible informal learning can also be used to make visible contributions, artefacts and credentials in a standardised and interoperable format.

Reification and Open Badges:

- **Artefacts as badges:** when a community develops an artefact, such as the documentation of a practice, an Open Badge can be created to make it visible as a reified representation of the collective knowledge and expertise involved in its creation.
- **Standardising contributions.** It is possible to use Open Badges as a standardised indicator of various types of contributions, past, present or future: participation, commitments, achievements, publications, etc.
- **Codifying practice:** Open Badges can encapsulate the description of specific practices and/or the underlying competences (i.e. the activation, in context, of knowledge, skills, attitudes and values) or other attributes relevant to that practice

Recognition and Open Badges:

- **Contribution recognition:** An Open Badge can be awarded to a community member as a form of recognition for their contributions to an artefact, project, or the body of knowledge within the CoP.
- **Peer recognition:** Some CoPs have peer-review mechanisms where community members can nominate or endorse each other for badges, fostering a culture of recognition and validation.
- **External recognition:** Because Open Badges are often designed to be interoperable and can be displayed across various platforms, they enable members to take their credentials and recognitions beyond the boundaries of the CoP, thereby expanding their professional opportunities.

Advantages and Limitations

Advantages of Open Badges in CoPs:

- **Interoperability:** by using standardised specifications, Open Badges can be easily shared across different platforms and communities, making them more useful and more valuable.
- **Granularity:** An Open Badge can capture a wide range of contributions and achievements, from sharing knowledge, to managing a successful project, allowing for a more nuanced approach to recognition.
- **Transparency:** a transparent peer-review system is an incentive for the badge reviewers to act honestly and with discernment which adds to the credibility of both the badge, the reviewers who issued it and the holder who claimed it.
- **Trust:** making visible the trust relationships within the community and the place of a badge within that trust network contributes to making the badge trustworthy.

- **Empowerment:** The democratic nature of Open Badges can empower all community members to engage more proactively, knowing that their contributions will be recognised and valued.

Open Badges & SDGs

Achieving SDGs requires a systemic approach: for the professionals, the main challenge is not to acquire a new set of competences, but to be empowered to imagine, explore and implement innovative practices through which they will acquire, develop and hone their competences.

For that is important to understand the relationship between *competence* and *practice*:

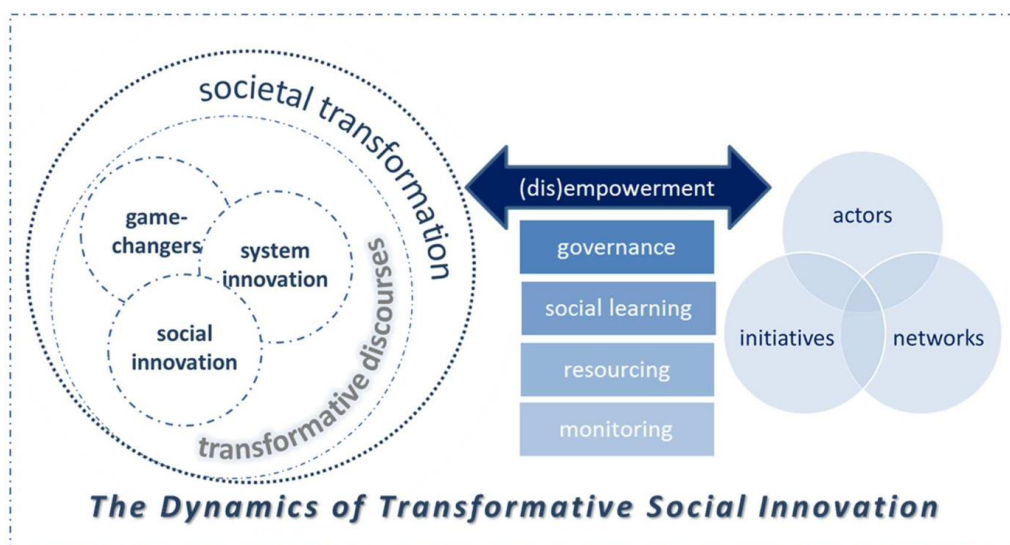
- A competence does not exist independently from a practice (even the so-called transversal competences!)
- It is through practice that competences are acquired and developed
- It is through the analysis of practices (reflective practice) that competences are elicited.

It is very unlikely that an addition of “competences” acquired independently from a specific (integrative) practice will create a performant practitioner:

“Acquiring various competencies does not necessarily make a manager competent.” Contrary to the assumption of most leadership competency frameworks, there is neither a linear, nor even causal, relationship between competencies and job performance.”

--Henry Mintzberg, author of “Managers Not MBAs”

For transforming practices, there is not a catalogue of predefined “innovative practices” nor “new competences” from which to choose in order to achieve the SDGs. Transforming practices is about creating the conditions to empower professionals to develop new practices that might (should?) have a ripple effect on other practices. The dynamics of transformative professional innovation are similar to the dynamics of transformative social innovation.

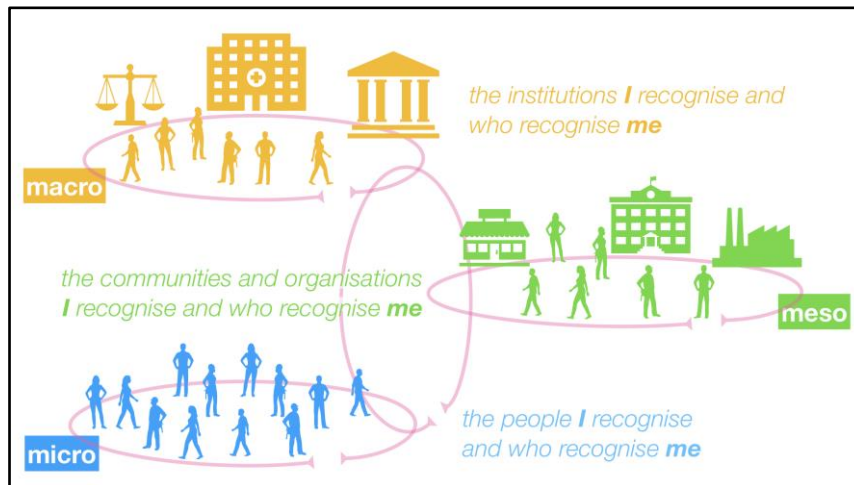


Cognitive map for TRANSIT research questions
(Source:<http://www.transitsocialinnovation.eu/>)

The graphic above elicits the issue of (dis)empowerment. The response of REPAIR to that issue is to state that:

- Everybody has the power to *recognise* and be *recognised* (c.f. above)
- Open Badges are the instrument that everybody can use to do so

Open Badges make recognition visible and by making recognition visible, new dynamics can emerge that wouldn't have otherwise: Helmut has developed new practice, made it visible with an Open Badge, other professionals endorse or adopt it, a community of practice emerges, this community is recognised by one or more institutions and actors who then become visible as part of the extended community of practice.



A recognition ecosystem

The systemic approach is about building an ecosystem, a **recognition ecosystem** of actors with a range of commitments to achieving the United Nations 'Sustainable Development Goals.

SECTION 3: THE RAIL SUSTAINABILITY INDEX (RSI)

The Rail Sustainability Index (RSI) is a rating system developed by the UIC Sustainable Development Group to assess the sustainability performance of railway companies addressing 7 Sustainable Development Goals (SDGs):

- SDG 5 : Gender Equality
- SDG 7: Affordable and Clean Energy
- SDG 8: Decent Work and Economic Growth
- SDG 9: Industry, Innovation and Infrastructure
- SDG 11: Sustainable Cities and Communities
- SDG 12: Responsible Consumption and Production
- SDG 13: Climate Action

These SDGs were selected because they are relevant to the railway sector and because they are important for achieving a sustainable future.



Here is a brief overview of each SDG:

- SDG 5: Achieve gender equality and empower all women and girls. This SDG aims to achieve gender equality and to empower all women and girls. This includes ending all forms of discrimination against women and girls, ensuring women's full and effective participation and equal opportunities for leadership at all levels of decision-making, and eliminating all forms of violence against women and girls.
- SDG 7: Affordable and Clean Energy. This SDG aims to ensure access to affordable, reliable, sustainable and modern energy for all. Railways can contribute to this SDG by using energy-efficient technologies and by switching to renewable energy sources.
- SDG 8: Decent Work and Economic Growth. This SDG aims to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. Railways can contribute to this SDG by creating jobs and by providing opportunities for people to develop their skills and knowledge.
- SDG 9: Industry, Innovation and Infrastructure. This SDG aims to build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation. Railways can contribute to this SDG by developing new technologies and by investing in infrastructure.
- SDG 11: Sustainable Cities and Communities. This SDG aims to make cities and human settlements inclusive, safe, resilient and sustainable. Railways can contribute to this SDG by providing a sustainable and efficient mode of transport for people and goods.
- SDG 12: Responsible Consumption and Production. This SDG aims to ensure sustainable consumption and production patterns. Railways can contribute to this SDG by reducing their environmental impact and by promoting the use of recycled materials.

- SDG 13: Climate Action. This SDG aims to take urgent action to combat climate change and its impacts. Railways can contribute to this SDG by reducing their greenhouse gas emissions and by investing in low-carbon technologies.

The RSI is based on seven key performance indicators (KPIs) that are aligned with the Sustainable Development Goals (SDGs):

- Energy efficiency: The RSI assesses the energy efficiency of railway operations, including the use of renewable energy and the development of energy-efficient technologies.
- Emissions reduction: The RSI assesses the railway company's emissions of greenhouse gases and other pollutants.
- Waste management: The RSI assesses the railway company's waste management practices, including the recycling and reuse of materials.
- Water management: The RSI assesses the railway company's water management practices, including the conservation of water resources and the treatment of wastewater.
- Social impact: The RSI assesses the railway company's social impact, including its contribution to job creation and its commitment to diversity and inclusion.
- Economic performance: The RSI assesses the railway company's economic performance, including its financial stability and its contribution to economic growth.
- Governance: The RSI assesses the railway company's governance practices, including its commitment to transparency and accountability.

The RSI is a valuable tool for railway companies to assess their sustainability performance and to identify areas for improvement. The RSI can also be used to benchmark railway companies against each other and to track their progress over time:

- It can help railway companies to assess their sustainability performance and to identify areas for improvement.
- It can be used to benchmark railway companies against each other and to track their progress over time.
- It can help railway companies to communicate their sustainability efforts to stakeholders.
- It can help railway companies to attract investment and to secure contracts.

Exploiting the RSI to elicit emerging practices and competences

The Rail Sustainability Index (RSI) offers a comprehensive framework for not only assessing current sustainable practices but also for eliciting emerging practices and competences within railway companies. The use of RSI in conjunction with Communities of Practice (CoPs) and Open Badges could be particularly transformative.

Identification of Emerging Practices: by comparing the RSI scores of different railway companies, it is possible to identify those companies that are performing best in terms of sustainability. These companies can then be studied to identify the practices and competences that they are using to achieve success.

- **Benchmarking:** By using RSI, railway companies can assess where they stand in relation to SDGs and compare their performance with others. This sets the stage for the emergence of best practices.
- **Gap Analysis:** RSI can point out areas where a company is not meeting its sustainability goals, prompting the creation of targeted CoPs focused on those specific areas.
- **Innovation Catalyst:** RSI could inspire CoPs to focus on particular SDGs and drive innovation. CoPs could become labs for testing new practices or technologies, supported by RSI indicators.
- **Competence Mapping:** By aligning CoPs with RSI goals, railway companies could map required competences for each SDG. This makes it easier to identify skills that need development or recognition.

Tracking trends. By tracking the RSI scores of railway companies over time, it is possible to identify emerging practices and competences. For example, if a number of railway companies are suddenly improving their scores in a particular area, such as energy efficiency, this could be a sign that a new technology or practice is becoming more widely adopted.

Conducting research. The RSI can also be used to inform research on sustainability practices and competences in the railway sector. For example, researchers could use the RSI to identify the factors that are most strongly correlated with high RSI scores. This information could then be used to develop new practices and competences that can help railway companies to improve their sustainability performance.

Adaptive Learning and Reflection. Use the RSI to adapt and pivot CoP objectives and learning resources in real-time, much like a 'reflective practice' model. This ensures that the CoP is always aligned with the most pressing sustainability needs.

Policy Integration. As CoPs develop new practices and earn badges, these could feed into policy recommendations that are aligned with RSI and SDGs. This can guide larger organisational strategies for sustainability.

Impact Assessment. Over time, the RSI can help measure the impact of CoPs and the efficacy of Open Badges in promoting sustainability. This not only serves for internal review but also for reporting sustainability achievements to external stakeholders.

Here are some specific examples of how the RSI could be used to elicit emerging practices and competences:

- With the RSI, a railway company can identify where it is lagging behind its peers. With this information, a plan could be developed to enhance the company's sustainability performance. For example, if a company's RSI score for energy efficiency is low, it could invest in new energy-efficient technologies.
- A railway company could use the RSI to benchmark its performance against other companies in the same country or region. This information could then be used to identify areas where the company can improve its relative performance. For example, if a company's RSI score for emissions reduction is lower than the average for its peers, it could develop new initiatives to reduce its greenhouse gas emissions.
- A railway industry association could use the RSI to track the progress of its members over time. This information could then be used to identify emerging practices and competences in the sector. For example, if the average RSI score for energy efficiency is increasing over time, this could be a sign that new energy-efficient technologies are being adopted more widely by railway companies.
- A research institution could use the RSI to conduct research on sustainability practices and competences in the railway sector. For example, researchers could use the RSI to identify the factors that are most strongly correlated with high RSI scores. This information could then be used to develop new practices and competences that can help railway companies to improve their sustainability performance.

By integrating RSI, CoPs, and Open Badges, railway companies can aim for a more structured, engaging, and effective approach to sustainability, mapped clearly to globally recognised objectives.

Utilising Open Badges to advance the RSi

Open Badges can be developed to recognise competencies in specific sustainability areas identified by RSI, and can facilitate knowledge transfer among peers, external validation of skills and competences, and motivation to participate in sustainability efforts.

- **Skill Recognition:** Open Badges can be developed to recognise competencies in specific sustainability areas identified by RSI. For example, a badge for 'Energy Efficiency Innovator' could be awarded to individuals who contribute significantly to energy-saving practices.
- **Peer Learning:** Badges can facilitate knowledge transfer among peers. Someone who earned a badge for excellent waste management practices could be seen as a mentor for others looking to improve in that area.
- **External Validation:** Open Badges can be shared across organisations and sectors, allowing for external validation of skills and competences. This can be particularly useful in multi-stakeholder collaborations aimed at achieving SDGs.
- **Motivation & Engagement:** The gamification aspect of badges can be a motivational tool, encouraging more railway employees to participate in sustainability efforts.

SECTION 4: SYNERGISING COPS AND OPEN BADGES FOR SDGS

Supporting CoP dynamics

Open Badges can play a pivotal role in enhancing the dynamics of a Community of Practice (CoP). These digital credentials provide a standardised way to recognise skills, contributions, and achievements. Here is how they could impact various internal facets of a CoP:

Recognition and Social Capital:

- **Visible Contributions:** Open Badges can make members' contributions more visible, thus providing a tangible form of recognition. This contributes to members' social capital, enabling them to garner trust, influence, and status within the community.
- **Incentivising Participation:** Badges serve as micro-credentials that can motivate members to be more active. This participation, recognised and reified through badges, further enhances a member's standing and social capital within the CoP.
- **Diversifying Contribution Types:** Different badges for different types of contributions (e.g., problem-solving, mentoring, content creation) can help diversify the ways in which members can gain recognition, thereby encouraging a wider range of activities and involvements.

Learning and Skill Development:

- **Skill Tracking:** Badges can represent various skills or competences gained through community involvement. This provides members with a clear path for self-improvement and skill acquisition within the context of the CoP.
- **Peer-to-Peer Learning:** Badges can be used to identify experts or experienced members in specific areas, facilitating more targeted peer-to-peer learning opportunities.
- **Reflective Learning:** Earning a badge can serve as a moment for reflective practice, encouraging members to assess what they have learned, how they have contributed, and what they can do next.
- **Tracking progress and achievement:** When community members earn Open Badges, it can help them to track their progress and achievement. This can be motivating and can help members to stay focused on their goals.
- **Personalised learning paths:** When community members earn Open Badges, it can help them to create personalised learning paths. This can help members to focus on their interests and to learn at their own pace.

Collaboration and Task Coordination:

- **Role Identification:** Badges can help in quickly identifying who has what skills or expertise, thus aiding in more efficient team formation for projects and collaborations within the CoP.
- **Task Completion:** Badges could be awarded for completing certain milestones in a project, making the progression and contributions more transparent to all members involved.

Community Governance and Culture:

- **Meritocracy and Democracy:** Open Badges can provide a more meritocratic way of recognising contributions, thereby influencing governance models and possibly even community culture.
- **Community Values:** The types of behaviours and contributions that are badged can signal what the community values most, thus subtly shaping the cultural norms within the CoP.

Risks:

- **Diminishing intrinsic motivation:** using badges as “extrinsic” motivation is likely to reduce the “intrinsic” motivation to participate. There is a risk of members becoming overly focused on badge accumulation rather than genuine learning or contribution.
- **Administrative Overhead:** The process of issuing, tracking, and managing badges can be complex and may require additional resources, which could affect the CoP's operational efficiency.

In summary, Open Badges offer a multifaceted approach to bolstering the internal dynamics of a CoP, impacting recognition, learning, collaboration, and governance. When implemented thoughtfully, they can provide a rich tapestry of opportunities for both individual and collective growth.

Mapping emerging practices

Open Badges offer a dynamic way to identify and validate emerging practices and competences within a learning environment or Community of Practice (CoP). They serve as digital credentials that capture specific skills, contributions, or achievements, and can be particularly effective in tracking and catalysing the development of new competences and practices. Here's how:

- **Create a shared language** around emerging practices and competences. This can help to facilitate communication and collaboration within the CoP.
- **Create a mutual understanding of the value of emerging practices** and competences. This can help to motivate community members to participate in these practices and to develop the necessary skills and knowledge.
- **Create a culture of innovation and entrepreneurship.** This can help community members to identify new opportunities and to develop innovative solutions to problems.

Identifying Emerging Practices:

- **Crowdsourced Insights:** Open Badges can be issued not just by administrators but also by community members, allowing for a more nuanced, ground-up identification of new and valuable practices.
- **Granular Recognition:** Unlike traditional certifications that may cover broad skills or competences, Open Badges can be used to recognise very specific practices, even those that are newly emerging within a CoP.
- **Adaptability:** The digital nature of Open Badges allows them to be easily updated or modified. As new practices emerge, new badges can be quickly created to recognise and incentivise these developments.

Mapping Emerging competences:

- **Skill Landscaping:** The variety of badges issued within a CoP can provide a "map" of the skills and competences that are considered valuable, including those that are emerging.
- **competence Pathways:** Badges can be designed to represent progressive levels of mastery in an emerging competence. This creates a roadmap for those interested in developing that particular skill.
- **Interdisciplinary competences:** Often, emerging competences are at the intersection of existing disciplines. Open Badges can capture these nuanced, interdisciplinary skills that traditional frameworks might overlook.

Data and Analytics:

- **Tracking Trends:** The data associated with badge issuance and acquisition can offer insights into trends. Are certain badges being earned more frequently? This could indicate a growing importance for the competence or practice they represent.
- **Gap Analysis:** By looking at which badges are rarely earned or issued, organisations can identify areas where there may be a skills gap, prompting targeted intervention or training.

Fostering Community Engagement:

Community Conversations: The introduction of new badges for emerging practices can prompt dialogue among members about the value and relevance of these new areas, thereby keeping the community engaged and forward-looking.

Peer Validation: The peer-to-peer nature of some badge systems can serve as an additional validation of emerging practices and competences, enhancing their credibility and acceptance within the CoP.

Open Badges thus offer a flexible, adaptable tool for mapping emerging practices and competences, providing both the granularity and dynamism needed to keep pace with rapid changes in knowledge and practice. They can serve as both a lens to identify emerging trends and a catalyst to encourage their development. By identifying emerging practices, eliciting and defining the underpinning competences, Open Badges can help CoPs to stay up-to-date on the latest trends and to ensure that their members are developing the necessary competences.

SECTION 4: RECOMMENDATIONS

The SDGs Adoption Maturity Matrix

While people and organisations are becoming increasingly aware that the way the world operates is unsustainable, awareness does not necessarily translate into action. How can awareness be transformed into action? It is to address that question that REVEAL designed the *SDGs Adoption Maturity Matrix* (SAMM).

SAMM defines four levels of “maturity” for a person or organisation:

- Aware (being) — I / my organisation understand(s) the value of SDGs
- Experimenting — I / my organisation experiments with practices supporting SDGs
- Integrating — SDGs are an integral part of my practice / organisation
- Transforming — SDGs have transformed my practice / organisation

When it comes to SDG adoption, it is not so much the maturity level of an individual or organisation that matters, but how to move to the next level, which is primarily the shift from awareness to exploration, the desire to take action. As a person, a community, an organisation, what can be done, how to contribute?

The Matrix can be used in multiple ways:

- Positioning: individuals, organisations and communities can claim a level of awareness and provide evidence supporting that claim;
- Benchmarking: develop indicators to position organisations and share practices;
- Planning: defining pathways to move from one level to the next (see below);...

	Awareness Raising	Experimenting	Integrating	Transforming
Definition	Understand the value of SDGs	Experimenting with practices supporting SDGs	SDGs practices are an integral part of the community of practice / organisation	SDGs practices have transformed the way the communities and organisations operate
Positioning question	What is the degree of SDGs awareness?	Are there SDGs initiatives? Are they encouraged and supported?	Is there a policy for systematic integration of <i>SDGs practices</i>	Is there an impact on the organisation and the community (e.g. cross-discipline collaboration, etc.)?
Action (examples leading to)	Seminars, webinars, workshops	Workshops, engaging in SDGs practices, thought experiments, challenges	Create a dashboard to measure the level of “SDG activity”	Benchmark across institutions, organisations and communities
Tools (supporting)	Leaflets, learning resources, polls	Documentation of SDGs practices, observations, suggestions, experimentations, etc.	Statistics, annual reports, policies, etc.	Benchmarking, ad hoc software
People (supporting)	Experts, SDG advocates, managers, ...	Experts, SDG advocates, ...	Managers, executives	Leaders
Indicators (success)	Number of people “SDGs aware”	Number of projects and people involved, impact	Progress indicators at organisation, community and society levels	Network effect
Badges (how it is made visible)	Participation Support “I support SDGs” “SDGs Ambassador”	Documenting projects and practices “SDGs Mentor” “SDG Practice xxx”	Documenting organisational practices “Here we value SDGs”	“SDGs Champion”

	Awareness Raising	Experimenting	Integrating	Transforming
Impact (of visibility)	A growing community of SDGs aware individuals, organisations and communities	Documented, shared and recognised practices	Resilience, sustainability	Transformation

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SDGs Adoption Maturity Matrix (SAMM)

The Matrix can be customised to address a specific group, for example by creating a matrix for individuals as shown below.

	Awareness Raising	Experimenting	Integrating	Transforming
Definition	Understand the value of SDGs	Experimenting with practices supporting SDGs	SDGs practices are an integral part of practices	SDGs practices have transformed work
Positioning questions	Are SDGs relevant to my work? Do I know people who are involved in SDGs?	How do I imagine that I could contribute to SDGs? With whom?	How could I make SDGs an integral part of my work and my community/organisation?	What are the transformations necessary to be fully in line with SDGs?
Action (examples leading to)	Meeting people, conversations, attending lectures, reading, etc.	Reflecting on approaches to SDGs, inviting others in the conversation and in experimenting	Working with colleagues and/or clients in a way that is conducive to achieving SDGs	SDGs advocacy, activism, ...
Tools (supporting)	Internet, books, special interest groups	Documentation of SDGs practices, observations, suggestions, experimentations, etc.	Statistics, annual reports, policies, etc.	Benchmarking, ad hoc software
People (supporting)	Experts, SDG advocates, colleagues, managers, ...	Experts, SDG advocates, colleagues, managers, ...	Colleagues, managers, executives	All!
Indicators (success)	Knowledge, social contacts, clear ideas	Formulated ideas, support from colleagues and other stakeholders	Endorsements	SDG-related social network
Badges (how it is made visible)	<i>"I support SDGs"</i>	<i>"SDG Practice xxx" (author of)</i>	Endorsements received and offered	<i>"SDGs Champion"</i>
Impact (of visibility)	A growing community of SDGs aware individuals, organisations and communities	Documented, shared and recognised practices	Resilience, sustainability	Transformation

Personal version of SAMM

The UIC's Rail Sustainability index (RSi) is an example of a benchmark for railway actors which is both raising awareness and an invitation to improve their practices to improve their scores.

One dimension for the definition of badges related to specific SDG techniques could be:

(K) - Knowledge: badge that acknowledges having attended a course on the technique.

(T) - Teaching: badge recognising the ability to teach the technique to others.

(I) - Implementation: badge recognising the use of the technique in the field.

(D) - Developer: badge recognising that it has developed a new technique.

(P) - Pedagogy: badge recognising having passed on the technique to others.

Another dimension could be related to the level of commitment of individuals in relation to SDGs in general or a specific one:

(A) - Ambassador / Advocate: badge recognising the role in promoting SDGs

(O) - Observer: badge recognising the role in observing and documenting SDGs actions and progress

(C) - Champion: badge recognising excellence in advancing SDGs practices

High-level, broad recommendations for adopting CoPs and Open Badges

implementing Communities of Practice (CoPs) focused on Sustainable Development Goals (SDGs) within the railway sector could be approached through two distinct strategies: creating ad-hoc CoPs across all railway practices or forming working groups dedicated to SDGs within existing communities of practice. Here, I will discuss the potential pros and cons of each option.

Option 1: Creation of Ad-Hoc CoPs Related to SDGs Across all Railway Practices

Option 1 entails the establishment of specialised Communities of Practice (CoPs) that are individually focused on specific Sustainable Development Goals (SDGs) across the railway sector. One of the main advantages of this approach is that it allows for targeted and nuanced discussions around each SDG, helping to identify unique intersections between different railway practices and these global goals. This is augmented by the inclusive nature of membership, as professionals from various subfields within the railway sector can join a single, specialised CoP. This not only brings a broader set of perspectives into the discussion but also encourages interdisciplinary collaboration, potentially leading to inventive and groundbreaking solutions.

Furthermore, setting up CoPs across all aspects of railway operations allows for a comprehensive, holistic view of the sector. This can be particularly beneficial for fostering innovation, as it provides a space for complex discussions that take into account the sector's multiple, interconnected elements. Moreover, with a unified focus on SDGs, there's a better chance of aligning different subfields and practices within the railway sector, streamlining efforts to achieve common objectives.

However, this approach is not without its drawbacks. Managing multiple CoPs can present a logistical challenge that may slow down decision-making processes and limit progress. It's also a resource-intensive option, requiring both a considerable time commitment from members and financial investment, especially during the initial setup. Another concern is that while a broad approach can offer a comprehensive understanding of the issues, it might lack the depth required for addressing specific challenges within individual sectors of the railway industry. This could hinder the development of specialized solutions tailored to unique issues, making the approach less effective in the long run.

Advantages:

- Targeted Discussion on SDGs:
- Inclusive Membership:
- Comprehensive Viewpoint:
- Multi-disciplinary Synergy:
- Cohesive SDG Alignment:

Drawbacks:

- Coordination Complexity:
- Time and Resource Intensive:
- Potential for Surface-Level Engagement:

Option 2: Creation of Working Groups within Existing Communities of Practice

Option 2 proposes the formation of specialised working groups within existing Communities of Practice (CoPs) that are dedicated to individual Sustainable Development Goals (SDGs). One major benefit of this approach is that it allows for more concentrated conversations around SDGs within each specialised area of railway practice. This can be advantageous for members because it is time-efficient; participants would only need to engage with a single working group. Furthermore, such specialised working groups have the potential to enact meaningful change within their respective fields as they can plan, develop, and implement initiatives aimed at achieving SDGs.

This strategy is particularly appealing because it capitalises on existing networks and relationships within CoPs. By leveraging already established communities, there may be quicker implementation and better alignment with pre-existing goals. The use of current frameworks also facilitates greater member engagement, as participants are likely already committed to the objectives of the broader community. This setting could enhance collaboration and enable more effective sharing of knowledge and resources.

However, there are limitations to this approach. It risks creating silos, where each working group concentrates solely on its specific practice and corresponding SDG, which could result in a lack of overarching coordination. This compartmentalization might prevent the emergence of holistic, integrated solutions that take into account the interconnected nature of SDGs. Monitoring and evaluation could also become cumbersome, making it challenging to keep track of overall progress and to fine-tune strategies as needed. Additionally, by focusing each working group on a particular discipline or practice, cross-disciplinary collaboration could be limited, restricting the scope for innovative, multi-faceted solutions.

Advantages:

- Specialised Focus

- Utilises Existing Networks
- Facilitates Engagement

Drawbacks:

- Potential Silo Effect:
- Complex Monitoring and Evaluation:
- Limited Cross-Disciplinary Interaction:

Combining option 1 and 2

Ultimately, the best option for the railway sector will depend on the specific needs and goals of the organisations involved. If the goal is to have a focused discussion of SDGs, then option 1 may be the better choice. If the goal is to drive change within the railway sector, then option 2 may be the better choice.

Given the strengths and weaknesses of both Options 1 and 2, a hybrid approach could be worth exploring. This could involve setting up ad-hoc CoPs for strategic planning and coordination at a high level while concurrently forming specialised working groups within existing CoPs for targeted actions. This blend could potentially capture the benefits of both options, providing a comprehensive and effective strategy for aligning railway practices with SDGs.

Policy Recommendations for Enhancing Sustainability in the Railway Sector

The UIC has established a clear vision and framework for sustainability in the railway sector in consultation with all stakeholders, including railway companies, governments, and civil society organisations. The framework has identified 7 SDGs (5-Gender Equality, 7-Affordable and Clean Energy, 8-Decent Work and Economic Growth, 9-Industry, Innovation and Infrastructure, 11-Sustainable Cities and Communities, 12-Responsible Consumption and Production, 13-Climate Action) that the railway sector is committed to achieving.

To implement that framework the UIC is engaged in combining “top-down” and “bottom-up” approaches:

Top-down: the Rail Sustainability index (RSi) provides

- A guide for advancing the steps that need to be taken to achieve these goals.
- A benchmark to track the sustainability performance of railway companies. Benchmarking can be used to compare the sustainability performance of different railway companies. This can help to identify best practices and to drive continuous improvement.

Bottom-up: CoP and Open Badges:

- **Create and support communities of practice (CoPs) on sustainability in the railway sector.** CoPs can provide a forum for railway professionals to share knowledge and expertise, to collaborate on projects, and to learn about new developments in sustainability. CoPs can also be used to identify and address challenges to sustainability in the railway sector.
- **Develop and implement Open Badges for sustainability in the railway sector.** Open Badges are digital credentials that can be used to recognise and reward individuals for their contributions to sustainability. Open Badges can be used to motivate railway

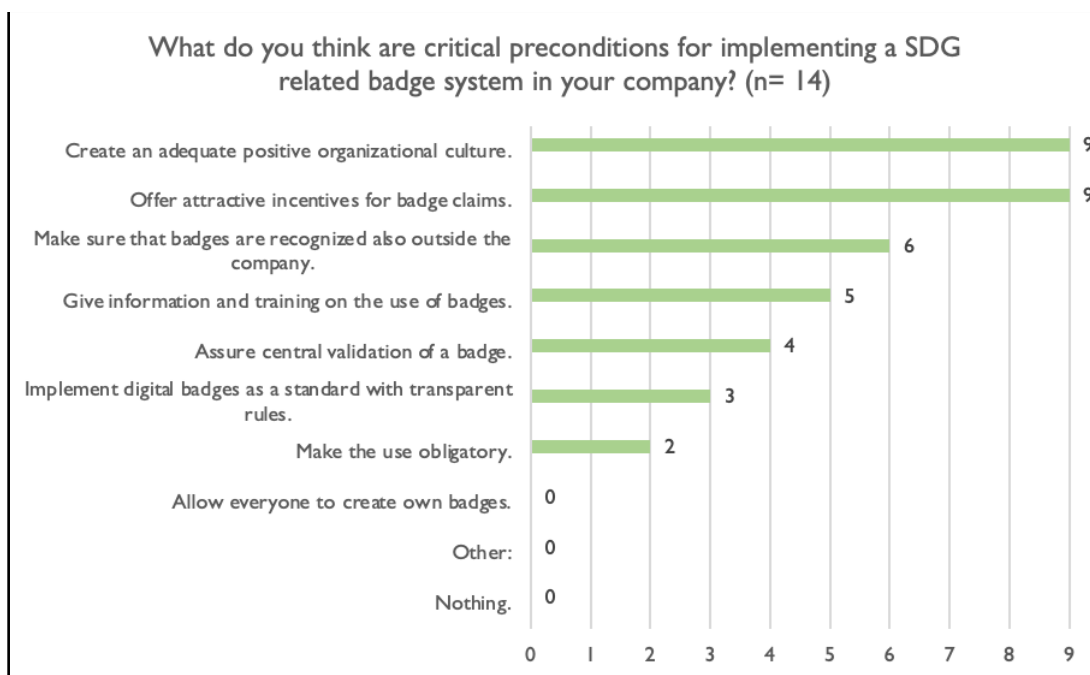
professionals to engage in sustainability activities, and they can also be used to track progress towards achieving sustainability goals.

In addition it could:

- Provide financial and technical support to railway companies to help them achieve their sustainability goals. Governments and other organisations can provide financial and technical support to railway companies to help them achieve their sustainability goals. This support can help to reduce the costs of sustainability initiatives and to improve the chances of success.
- Create a culture of sustainability within the railway sector. This can be done by promoting sustainability awareness and education, and by rewarding and recognising individuals and organisations for their sustainability efforts.
- Measure and report on progress towards sustainability goals. This will help to track progress and to identify areas where further action is needed.
- Regularly review and update the policy framework as needed. This will ensure that the policy framework is always up-to-date and that it is responsive to the changing needs of the railway sector.

Recommendations based on the REPAIR analysis

Neither the SDGs nor the Open Badges are self-explanatory and self-sustaining. Both ideas and concepts need to be communicated, implemented, promoted, and supported by the organisation. The good thing is that these concepts complement each other perfectly and work synergistically.



Preconditions for implementing a SDG-related badge system.

The quantitative user survey provides good clues about what pre-conditions within the organisation are seen to be required (see figure above). The most important aspects are the creation of an adequate positive organisational culture and the corresponding attractive benefits and incentives for using digital badges. The fact that badges should also be an accepted currency of showing your competencies outside the company is one of the most critically seen

aspects. The importance of universal validity is also shown in the approval of central validation instances for badges and the non-existent importance of being able to create your own badge.

As shown multiple times in the REPAIR Analysis, various assumptions and requirements need to be fulfilled. Briefly summing up these findings, we identify the following measures as necessary for implementation of a SDG-related Digital Badge system to succeed:

- **Set-up an organisation-wide policy related to SDGs, recognition of individuals and bottom-up approaches.** We consider committing as an organisation to aiming for the SDGs, to foster the recognition of individuals and their competencies, experiences and practices and eventually, also, committing to enabling bottom-up initiatives and engagements as essential. Otherwise, any other activities like setting up a Digital Badge System are bound to not live up to their full potential. Such a strategy also implies the necessity of adequate change/transformation processes on every level of the organisation.
- **Follow through the organisation-wide policy considering SDGs, a culture of recognition and bottom-up approaches.** A strategy is only as credible as the actions that are taken to follow it through. So, concrete measures are needed to be carried out. The implementation of a Digital Badge System being only one of a variety of measures aiming for SDGs, recognition and bottom-up involvement. A culture of recognition should also, but not only aim at SDG-related activities. This helps to promote ideas for SDG-related activities and strengthens the organisation as an SDG-oriented company. However, it is important to say, that a culture of recognition should aim at all the values that the organisation is striving for, e.g., encouraging others to contribute to the solution of a problem (bottom-up approaches).
- **Develop training on the SDGs.** Awareness needs to be raised about what the SDGs are and what opportunities there are for each employee to support the SDGs. Such a workshop format was developed in the Repair Project and was positively evaluated.
- **Provide training on Digital Badges.** As our research showed, awareness and knowledge about Digital Badges and their potential is scarce. Therefore, with the implementation of a Digital Badge System, also training how to use them needs to be carried out.
- **Develop a diverse Digital Badge system.** To be able to reach diverse target groups, it is recommended to have multiple badge varieties on offer, offering “quick wins” as well as badges that need more involvement – reaching from simply claiming an interest to prove accomplishments.
- **Develop an incentive system.** The attractiveness of SDG-related digital badges should be increased through incentives, with the company providing benefits for particularly outstanding activities. An incentive system motivates individuals and can contribute to the crucial initial momentum of getting a new system running. Also, an incentive system reflects the actual value that certain practices have for the organisation. It adds to the credibility of the organisation’s strategy.

International programmes such as the Railway Sustainable Index (RSi) can support the use of digital badges, as the process can award badges to outstanding practitioners. On the other hand, it supports the badge system by increasing the visibility of SDG-related practices.

Recommendations overview

The strategy can be framed around four core pillars:

- Fostering inclusive Communities of Practice (CoPs) that support Sustainable Development Goals (SDGs),
- Setting benchmarks,
- Integrating various approaches, and
- Building capacity and education.

Firstly, there is a call to cultivate CoPs across the railway sector, including diverse areas such as infrastructure, administration, and engineering. Providing platforms and resources can enable these communities to grow and work together effectively. Within this, an Open Badges Recognition System could be introduced to highlight individual and community contributions toward sustainability. This system would not only make these sustainable practices more visible but could also be tied to career advancement and other incentives. Sharing innovations and knowledge within these CoPs, as well as celebrating their achievements, can boost morale and drive further contributions.

Secondly, adopting and expanding the use of a Rail System Sustainability Index (RSi) is recommended for benchmarking purposes. This index would act as an invitation for community members to share effective practices and would be designed to adapt to insights and feedback from the community level. Coupled with this is a push for more data-driven decision-making, emphasising the importance of using data analytics in policy development and encouraging platforms that facilitate data sharing among different stakeholders.

Thirdly, an integrated approach encourages collaborative planning between governing bodies and CoPs. Feedback mechanisms should be developed to allow insights from the community level to have a real impact on policy decisions and benchmarking criteria.

Lastly, there is a focus on capacity building and education. The goal here is to implement programs that sharpen the skills and knowledge base of CoP members, particularly in the areas of sustainability and innovation. Partnerships could be developed with educational institutions to create curriculum and training modules that are directly aligned with the sector's needs. To sustain this educational push, promoting reflective practices and learning within these communities can be beneficial. Tools and platforms could be developed to facilitate this kind of reflective learning and sharing of insights.

By addressing these four pillars, the strategy aims to create a more sustainable, innovative, and interconnected railway sector.

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