

PROJECT PERIODIC REPORT

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Coordinator:

Prof. Steve Renals

University of Edinburgh

Email: S.Renals@ed.ac.uk

URL: <http://homepages.inf.ed.ac.uk/srenals/>

Tel/fax: +44 131 650 4589 / +44 131 650 6626

Project website: <http://rockit-project.eu>

1 Publishable Summary

1.1 Project Context and Objectives

The European language and interaction research communities have a strong track record in language, multimodal, and speech processing technologies. However, innovation is still lagging behind, and it is thus important to identify the key innovation drivers and most promising elements across science, technology, products, and services on which to focus in the future. Technology roadmapping is a process to lay out a path from science and technology development through integrated demonstration to products and services that address business opportunities and societal needs. Often performed by individual businesses, it can also be used to put together all of the different viewpoints and information sources available in a large stakeholder community as a way of helping them work together and achieve more.

ROCKIT is driven by a broad vision for conversational interaction technologies. We see a future, in 2024, where human-human, human-machine, and human-environment communication is not hampered by differences in language capability, accessibility, or knowledge of the technology, and where security and privacy are built in. These future conversational interaction technologies will enable interaction, collaboration, creativity, and information access within a vast, dynamic, heterogeneous, and partly ephemeral information space.

In consultation with researchers and companies of every size, the ROCKIT support action has constructed a technology roadmap for Conversational Interaction Technologies. Conversational Interaction Technologies are those that, broadly construed, enable people to achieve some end through natural back-and-forth communication with, or mediated by, devices. Within the next ten years, we expect it to cover a range from properly interactive speech search on a smartphone to use of richer modalities (face, hands, tone of voice) with very many different devices both embodied (like robots) and embedded in our surroundings. Hardware developments are happening so quickly that the most critical platforms, applications, and devices to target are impossible to predict. Moreover, as small companies know well, business environments can change unexpectedly, too. This makes ROCKIT's contribution important, because it will allow the community to steer through change and understand how they can get what they most want in the context of everything else that is happening. For this reason, the roadmap we have developed is not just a series of steps that go from current science and technology outcomes to future profitable products and services, but conveys the relationships among societal drivers of change, products and services, use cases for them, and research results.

ROCKIT has fostered a connection among Europe's strong R&D base, commercial and industrial activity, and policy makers – at the EU and national levels – through:

1. An open roadmapping process, involving the full range of stakeholders;
2. The establishment of a broad-based community bridging the gap between research and innovation, with a very strong emphasis towards SMEs;
3. The development of a number of target scenarios as a focus for the vision;
4. Planning for an infrastructure to achieve the outcomes, including the development of an open platform of data supported by tools for conversational interactive technologies.

We guided roadmap development using a small number of *target scenarios*. Each scenario includes its societal and technological drivers, R&D aspects, market and business drivers, and potential testbeds. We identified a number of common themes coming out of ROCKIT's consultations

with stakeholders, in particular accessibility, multilinguality, the importance of design, privacy by design, systems for all of human-human, human-machine, and human-environment interactions, robustness, security, potentially ephemeral interactions, and using the technology to enable fun.

The scenarios, all of which operate in multilingual and multisensor contexts, are:

1. **Adaptable interfaces for all**
2. **Smart personal assistants**
3. **Active access to complex unstructured information**
4. **Communicative robots**
5. **Shared collaboration and creativity**

A key aim of ROCKIT was to organise a European research and innovation ecosystem in the area of conversational interaction technologies (CIT). By identifying the key players to be involved in the roadmapping exercise from within the CIT ecosystem we have created a core group of key CIT stakeholders, the Conversational Interaction Technologies Innovation Alliance (CITIA), which will be further developed after the end of the support action. Based on the needs expressed by its stakeholders, CITIA will be focusing on the creation and sharing of multilingual open data for conversational interaction technologies, as well as some simple open tools for working with the data. The stakeholders have agreed that this is the single most important focus the Alliance could have for opening new markets for European CIT SMEs.

1.2 Progress

ROCKIT has constructed a technology roadmap for Conversational Interaction Technologies – technologies that enable people to have back-and-forth communication with, or mediated by, computers, devices, or the environment around them. This roadmap will ensure that Europe capitalizes on its science and technology strengths in this area by combining the intelligence of stakeholders from the research community and industry into the best path forward to products and services that match business opportunities and society’s needs.

In the second year of this two-year support action, ROCKIT has completed its series of consultation workshops and other forms of input gathering that together, with overlap, span the range of information and ideas needed from stakeholders; reviewed the verticals that form the best targets for integration in a European context; and designed and garnered support for shared open infrastructure that will support SMEs in the area and increase the flow from research to innovation. The ROCKIT Roadmap continues to be structured around five scenarios, each of which describes some global change that the community agrees will emerge over the next ten years, but the scenarios have been updated to reflect additional stakeholder input, particularly for the area of Industry 4.0, or smart manufacturing. Two additional science and technology areas were identified as missing in the first year and have been added – user modelling and knowledge representation. The ROCKIT Roadmap is supported by a complex web of relationships that link science and technology advances, products and services, use cases, and drivers to the scenarios, with SWOT analyses and likely timings expressed for innovations. In order to aid stakeholders in navigating through the roadmap, we have added to our scenario whitepapers brief textual documents that describe complete roadmap areas. These cover the overall vision; research; and innovation; as well as specific documents for four key verticals and all ten science and technology areas.

Our community building and dissemination activities in the second year of ROCKIT have focussed on strengthening a stakeholder community through the organisation of workshops related to the

vision, research, and innovation themes, identifying and engaging the community through bilateral communications, and engaging with other actions such as META and LT-Innovate. We launched CITIA, our innovation alliance, early in the year at the first roadmap conference, and have used subsequent events, including LT-Innovate and the second roadmap conference, to further develop its mission and approach. This has led to foci on key target verticals and open infrastructure, both of which are important SME concerns. For infrastructure, CITIA has a very concrete, low cost proposal for open multilingual speech data, that we call the CITIA Multilingual Baselayer. Although we already have strong community support for our proposal, we have authored brief fliers and a very short animated video, “Data Talks: Let’s Share It”, to promote it further following the project end.

1.3 Results

ROCKIT achieved its four main objectives:

1. The construction of a strategic roadmap for conversation interaction technologies which can form the basis of a research and innovation agenda in the area (<http://www.sharpcloud.com/ROCKIT>);
2. The formation of a stakeholder community including SMEs and corporations, universities and research institutes, European institutions, investors, and specialized media – CITIA, the Conversational Interaction Technologies Innovation Alliance, (<http://citia.eu>);
3. The development of a set of target scenarios as focus the strategic vision (www.lt-innovate.org/sites/default/files/citia_files/rockit-scenarios-whitepaper-v2.1.pdf);
4. A plan for an infrastructure to facilitate these outcomes based on a shared layer of open access multilingual data, core open source software components, and a broader open software architecture (<http://www.lt-innovate.org/citia/citia-baselayer-multilingual-speech>).

1.4 Web Presence

A ROCKIT website has been set up to describe the project objectives, to present the partners, and to publish the project public deliverables. For this purpose the website is accessible through: www.rockit-project.eu. The purpose of the website is to focus on ROCKIT-specific matters, rather than the broader scope of CITIA, and is not our primary route for wide public dissemination. However, we also publish the news automatically curated from Scoop.it on this website.

The web presence supporting CITIA is available at <http://www.citia.eu>.
