1 EXECUTIVE SUMMARY

After four years of activity, EuCARD has most of its objectives fulfilled, with some new objectives added and a few others on excellent tracks while requiring additional time. The management has been active in reinforcing the collaborative links between partners and projects, contributing to the preparation of FP7-EuCARD2, initiating FP7-HiLumi-LHC Design Study, to favour sustained collaborations beyond EuCARD. An out-of-contract network has been successfully launched on laser plasma acceleration, to combine forces between accelerator, laser and plasma communities. Communication and dissemination activities have led to two highlights: Accelerating News, an accelerator R&D newsletter initiated by EuCARD and now common to all FP7 accelerator projects (over 1000 subscribers) and a series of monographs on accelerator sciences that is progressively finding its public. The scientific networks have more than fulfilled their initial objectives: roadmaps are defined for neutrino facilities, submitted to the European HEP Strategy Session. The accelerator networks have so successfully become the international forum on accelerator sciences that their share and scope in EuCARD2 have been significantly expanded. With over 40 topical workshops organized on diverse scientific and technological topics, from innovative crab cavities to roadmaps towards novel frontier accelerators, their impact is largely acknowledged in the community. The two open facilities (MICE@STFC, HiRadMat@SPS) delivered more access units than foreseen, with significant results. The JRAs have the lion's share in EuCARD. They have had naturally tight links with networks and TA facilities, resulting in a coherent and coordinated approach. The development of an innovative Nb_3Sn magnet with a YBCO insert, has made significant progress, confirmed by its international advisory committee, even though an extension of the study by 1.5 years turns out to be necessary: the mechanical structure of the magnet is completed and tested at cold, and a test coil with Cu conductor was manufactured. The Nb_3Sn cable shows excellent performance. The YBCO HTS insert solenoids were built and the dipole components are procured with completion of the insert by end 2013. The HTS electrical link demonstrator is fully operational. It will allow remote powering of magnets, avoiding risks of single event upset and easing maintenance. The new collimation collaboration organized for EuCARD fully fulfilled its plans, including an optional crystal collimation experience. Novel more robust materials were characterized for collimator jaws. The smart collimator and cryo-catcher were designed, built and successfully tested. The EuCARD contribution to linear colliders is deeply integrated in the CLIC/ILC studies. Significant progress was obtained in ultra-precise assembly and integration of RF modules, thermal stabilization, ultra-precise phase control to 20 fs and beam control. The active mechanical stabilization of magnets to a fraction of nanometer is especially impressive, as well as highly sophisticated simulations of RF break-downs, showing new microscopic mechanisms and giving directions for mitigation. The collaboration concurred to the record accelerating gradient obtained, exceeding 100 MV/m. The study of an innovative compact crab cavity gave momentum to this R&D line and went well beyond plans, with the fabrication of a bulk Nb sc unit. The progress in thin film deposition is slower, given the complexity of this highly promising technology. Better sputtering seems at hand. Progress is noted in chemical processing and cleaning strategies for sc cavities and their couplers. Two reference monographs were published. A new original RF control was built for FLASH and already showed improvement to operations. Finally, the assessment of novel accelerator technologies out of the main stream (crab waist crossing,

non-scaling FFAG and diagnostics for divergent beams from laser-plasma acceleration) all met the planned goals. In summary, EuCARD contributed to significant scientific progress beyond the state-of-the-art and to a marked expansion of the collaborative dimension.