Annex 4: Monitoring Status of Call 1 Experiments at the End of the Reporting Period

Assesment	3DSSC	CoHRoS	DEBURR	DEXBUDDY
Tech. KPIs				
Imp. KPIs				
Deliverables				
Milestones				
Dissemination				

Assesment	EXOTRAINER	2F	GAROTICS	LA-ROSES
Tech. KPIs				
Imp. KPIs				
Deliverables				
Milestones				
Dissemination				

Assesment	LINARM++	MODUL	MOTORE++	PICKIT
Tech. KPIs				
Imp. KPIs				
Deliverables				
Milestones				
Dissemination				

Assesment	SAPARO	TIREBOT	MARS	
Tech. KPIs				
Imp. KPIs				
Deliverables				
Milestones				
Dissemination				

Monitoring Status of the Experiments and Discussion of Difficult Point

3DSCC – Preliminary evaluation

Note that the final review for 3DSSC is to be held on the 10th of February 2017, a few days before the E++ review meeting. Monitoring results discussed here thus remain preliminary, and are based on monitoring performed up to this point. A number of concerns can be raised regarding technical KPIs. In particular, cheese loss is not carefully quantified, and the manner in which sides and bottom of the blocks are addressed is unclear. Prototype is clearly functional however and the implementation seems sound (Yellow overall tKPIs). Impact metrics are typically either not carefully quantified, or ignored (Yellow iKPIs). Milestones and deliverables overall fine, although some deliverable lack details. Dissemination is according to plan but with notable delays on some items (hence Yellow). Overall, there remains technical concerns that should be elucidated on the occasion of the final review, but technology appears sound overall, and the Experimenters have received concrete signs of commercial interest from at least one major third party.

CoHRoS

The experiment suffered from major issues, in particular with respect to the industrial partner. The key person in charge of the work in the project left CLOOS, and the personnel resource was not there anymore at CLOOS. The academic partner pushed hard (with assistance from the E++ team) to pursue project activities with the industrial partner. They managed to perform some interesting work, but not all that was expected was done. The work was supposed to be tested on a complex, robotic arm mounted on a 2 axis Cartesian robot. Instead, it was tested on a simpler setup (fewer DoFs). In addition, a large scale series of test was expected, instead, only implementation and quantitative tests were done. While still of value (demonstrated efficacy of the technology in industrial setting), it fell short of the target. Technical merit was Yellow in the end (good technical work under the circumstances, but short of the mark). External reviewer pointed out scientific progress over the project was incremental. Impact was less than expected as well, due to lack of engagement of CLOOS in making use of the technology. In addition, the academic partner argues the iKPIs were unrealistic and too ambitious for a short term project. The current monitoring team agrees with the Experimenter, the original monitoring team did not. Impact ended up in the Yellow as well. Deliverables overall OK although light on details. Dissemination suffered from lack of CLOOS involvement (Yellow).

DEBUR

DEBUR had a very solid final onsite review, the reviewers commented that the Experimenters overall achieved the technical targets they set at project onset, and that they had the metrics to measure and justify these achievements (tKPIs OK). The impact deviated from original targets, but achieved performance was acceptable (Yellow iKPIs). Deliverables were of good quality but often delayed (Yellow as well). Dissemination results were mixed, with some objectives achieved, others not so much (Yellow). The experimenters intend to further develop the technology in collaboration with machine integrators, technology transfer to a number of different sectors is being actively pursued (automotive, aeronautics, wind turbine manufacturers).

DEXBUDDY

DEXBUDDY suffered from a number of issues. Experimenters outright failed in a number of respects, including a number of deliverables not being submitted, and expected dissemination actions not happening. The technical developments performed (in particular on aspects related to vision) were, according to the final reviewers' evaluation, carefully engineered to work in the demonstrated, specific

scenario, but lacked any systematic quality and had little robustness or generalization capacities. The video of the prototype working seems to be the result of capturing on tape the one time it does work according to plan, rather than providing one example of an achievement that is repeatable and robust. Part of the HW used in the demonstration setup was trashed due to concerns over depreciation. While understandable, it makes it difficult, going forward to verify technical achievements. Overall, the partners appeared to lack commitment and proved at times difficult if not somewhat hostile towards the monitoring team. Shortcomings resulted in Reds in most measured performance indicators. Experimenters still seem to have gotten something out of the work done in the project, with a collaboration shaping up with Siemens on a topic that appears to be based on what they did here.

EXOTRAINER – Preliminary evaluation

The project performed very well in a lot of respects. It rated very high with the reviewers, and one external expert (from the medical field) was particularly high on the results achieved. The project was extended to accommodate clinical trials, undertaken in early 2017, which are crucial to the impact, in particular as they pave the way towards CE marking. The final review is to be scheduled in the second half of February. Some shortcomings were detected on aspects related to the impact. In particular, the comfort of use of the exoskeleton by the patient does not meet the marks initially set (Yellow impact). In addition, delays to accommodate clinical trials have led to delays on deliverables (Yellow too), but there does not appear to be any significant concerns on deliverables' quality. The Experimenters are particularly high on their own commercial perspective. Separate discussions of the monitoring with technology transfer specialists on the project's perspectives were somewhat inconclusive but encouraging. Questions of the market size was raised, but value of the equipment being high, a limited market could still be OK.

GAROTICS

The overall outcome of the project is positive, but a number of question marks remain, including the absence of a sufficiently detailed exploitation plan. The industrial partner, STRAUSS, is expected to carry the product and is well established in the field. But, as already mentioned, the exploitation plan is hazy and in some sense fails to convey a strong industrial commitment. Technical performance of the device seems to meet the necessary objectives. The reviewers characterized testing performed as reasonable, but still expected significantly larger testing efforts would be required, as a number of aspects of the overall system were not assessed (system autonomy, robustness, etc.).

LA-ROSES

The project suffered from a number of problems. It does not seem, a posteriori, that there is a good match between the project and E++'s Experiments Instrument's objectives. The technology started at too low of a TRL, and did not have much of a chance to reach a high enough TRL by end of the experiment to fit in the "From Lab to Market" spirit. In the end, the prototype developed is of TRL3, and requires additional extensive work before being able to consider clinical trials (in contrast to other medical field Experiments explicitly pursuing that aspect either directly in the Experiment's scope, or shortly after completion). There is no question that the topic is interesting, that there is a demand for the system being worked on, and that there is exciting, impactful research to be done in the area. But E++ was probably not the place for this research (too low of a TRL). Technical results achieved fall short of targets set at Experiment onset, system demonstration showed a lack of robustness of the prototype (Yellow tKPI), and impact falls woefully short (Red). Of particular concern to the external reviewer, not only is there no realistic exploitation plan to bring the technology to market at the end of the project, Experimenters did not really expect that there would be one even at the project's onset (whereas E++

is chiefly interested in bringing new robotic products to market). The promised dissemination efforts were largely untraceable, although there was a publication (in an online video journal). Deliverables were uneven, medical aspects were well covered, technical aspects were not in many respects. Sincerity of (some of) the Experimenters came into question following the final review.

LINARM++

The project worked great on most accounts, with only minor problems on some dissemination items. The reviewers also questioned the exploitation plan, which was deemed "unclear," and clinical trials could not proceed within the duration of the project. Further, the Experimenters have clarified that parts of the prototype needed adjustments/improvements before moving on to trials. Still, Experimenters expect these clinical trials to occur within the coming months.

MODUL

The project was a success story and probably a highlight of the E++ Experiments Instrument. The project targeted development of two different products, a Series Elastic Actuator (SEA), and a quadruped robot making use of this SEA. Work performed during the Experiment clearly built upon previous efforts by the participants. But Experimenters claim that the ECHORD support allowed to develop the SEA to a sufficiently high TRL to consider commercialization in the short term. ETH has a spin-off focused on development and commercialization of the two products. They have secured additional funding (from a Swiss national grant) to bridge the remaining gap between the current TRL 7 SEA prototypes, and series production. They have received requests from interested customers and expected to have sold early SEAs before the end of 2016. They also expected to sell a number of quadrupeds starting in 2017, although that honestly sounds like a very ambitious proposition. Specific market for quadrupeds is probably limited, but it is believed that they do have generated significant interest in the developed actuators. Monitoring has a Yellow in impact because originally targeted sales numbers during the project did not happen.

MOTORE++

MOTORE++ was also a strongly performing Experiment. The Yellows on milestones and deliverables are due to (justified) delays. The device underwent clinical trials during the run-time of the Experiment, they obtained CE marking, and they have sold (no less than) 5 devices before Experiment end. HumanWare will be directly leading commercialization of the product.

PICKIT

The experiments rated high in all categories. Short-term commercialization is not yet considered, the partner interested in bringing it to market, Scape, had other short-terms commitments, but they will explore possibilities at some point in the spring. In the meantime, technology from the project is being further developed in a European project, in which the academic partner is participating.

SAPARO

The project had all strong marks in measured performances. The product developed, although still at TRL 6, is being sold to research institutes (1 sale recorded, to TUM). The industrial partner is committed to bringing the product to market in the coming year. Technology developed is of high relevance to Factories of the Future and Industry 4.0, it provides an original tool to help make secure human-robot collaboration, which remains a concern. The product on its own is likely not sufficient, but can constitute a significant part of the solution for safe interactions.

TIREBOT

Reviewers were satisfied with TIREBOT achievements. Outcomes seem a bit hazy. They have contacts with two interested, possible end-users; a car manufacturer interested in a robot similar to the prototype produced, and another company interested in human-robot interaction principles developed in the project. The project rated well in measured metrics, but commercial outlook seems uncertain.

MARS

The industrial partner in the project is committed to the research done, and to bringing a product to market, although that will be on the longer term. MARS did a brilliant job of communicating their vision, which is strong, and they are addressing a hot topic: precision agriculture. By the metrics used to monitor progress, the project did very well. The end TRL however is fairly low at 5. The scope of the project (swarms, cloud computing, robots autonomy, swarm logistics, new mechanical device for seed planting) was ambitious for an Experiment's duration, which explains the low final TRL. Progress made was impressive, but final state of the technology makes it clear they have a lot of work left. The robots in their demonstration at the review actually collided with each other due to a problem in path planning. Nevertheless, the vision is good, progress was good, and the industrial partner (which has identified precision agriculture as a key strategic topic) will fund the next phase of the project.