Function		Phase in security cycle				Field					ENCIRCLE TECHNOLOGY NEEDS	Tool Requirements
ID	Description	Prev	Prep	Resp	Rec	C	B	RN	Med	Priority	Desc	
Risk Reduction	Too little research/ identification of improvised CBRNE devices and production facilities.	X				X	X	X	X	L		
Protection	Lack of ordinary working suit for daily-use, including embedded detectors.			X	X	X	X	X		H		
	Lack of standardised or universal and multifunctional (with integrated sensor systems) PPE, that is not heavy and bulky. Lack of respiratory protection, with an extended range of protection from toxic agents.			X	X	X	X	X	X	H	Find the optimum balance between comfort, systems integration and protection of PPE (standardised, light – for longer use -, usable also at high outside temperatures, and including communication, localisation devices and sensors): a) Respiratory protection system with an improved sound quality for communication; b) Gloves that allow to use touch screen devices and buttons; c) Protective suits against general toxic threats (with no changing of air filters).	Respiratory protections to first responders that can protect towards a range of toxic agents. Standard and multifunctional, light, non-bulky and easily manoeuvrable PPE. Additional features should include: end of filter life, rail mounting, disclosure coatings, novel closings.
Detection	Lack of the ability for fast scanning of large numbers of containers for threatening CBRNe material.	X		X	X	X	X	X		H	Lack of the ability for fast scanning of large numbers of containers for threatening CBRNe material.	
	Insufficient equipment for estimation of contamination, and insufficient training in the use of the equipment. Lack of instant scanning, single or multipurpose detectors, which are fast, sensitive, robust, reliable, affordable, handheld and which do not disturb business continuity when applied in the prevention or preparedness phase. Needs to detect a large spectrum of detectable agents, and detect degree of hazard and residual, post decon, contamination. Must produce less false positive results.	X		X	X	X	X	X	X	H	Insufficient equipment for estimation of contamination. Lack of instant scanning, single or multipurpose detectors, which are fast, sensitive, robust, reliable, affordable, handheld and which do not disturb business continuity when applied in the prevention or preparedness phase. Needs to detect a large spectrum of detectable agents, and detect degree of hazard and residual, post decon, contamination. Must produce less false positive results.	
	A general lack of accurate and instantaneous detection equipment and technologies for search and detection (also a gap between commercially available instruments and those which are really used).			X	X	X	X	X		L	Quick detection of the presence of contaminating agent (without need of immediate identification).	Further development and improvement of RN detection systems. Important issues are: reduction of weight, natural background rejection, improvement of sensitivity, capability of interconnectivity between sensors, integrated neutron detection. Also procurement of up to date detection systems.
	Lack of detectors for wash water and water used in food production processes.		X	X		X	X			H	Lack of detectors for wash water and water used in food production processes.	
	Lack of stand-off detectors for CE threats cheap enough to allow a spatially comprehensive deployment.			X		X	X	X		H	Lack of stand-off detectors for CE threats cheap enough to allow a spatially comprehensive deployment.	
	Lack of detectors for relevant B agents and toxins in various matrices, especially in food production.		X	X			X			H	Contaminating agent sensor with simplified and direct reading having an improved false alarm rate.	Possibility of detection of pathogens which are relevant for food contamination in an automated, real-time and fast way. Possibility of detection of natural occurring, intentionally and accidentally released pathogens.

Medical countermeasures	Lack of effective specific long term medical treatment.		X	X	X	X	X		X	H	Better coordination and identifying of responsibility party for long tern treatment	Remote and easier tele nursing systems
	Lack of new and improved antidotes, vaccines, and medical equipment available in adequate numbers (new medications should have long shelf lives, not require special storage, and be easy to administer).			X		X	X		X	M	Improving the logistigs, communication systems; track and trace	logistics,and traceability of stocks, improved supply chain management systems to adminster vaccines easier
	Lack of fast and reliable on-site information on nature and severity of exposure. Many of the existing systems do not support simulation and/or training modes.			X		X	X	X	X	M	Information exchange between all stakeholders in the field, crisis managers, authorities, ; situational awareness, decision making Advanced devices for the field detection and identification of pathogens presenting a threat on civilian populations	fast efficient threat detection and diagnostics, including simulation and training possibility. Fast iaudio/visual information exchange between field responders and hospitals
Information management, commandcontrol, communications	Few systems/methods to coordinate results and integrate them to make a total picture of the events. Very important points are those of resilience and dependability, essential in many systems: focus has to be on the verification and proof of programming languages and assessment of critical software to fault tolerance, robust architectures.			X		X	X	X	X	H	Managing a large quantity of information coming back from the users (can crash the system).	A system architecture which can manage and coordinate a large amount of information. The system must be resilient and robust.
	No tools today to process and manage all information from social media.	X	X	X	X	X	X	X	X	H	Improve information collection of social media, analysis, dissemination	Real time information from various social media channels for improved early warning and situational awareness and better response coordination
	Lack of dispersion calculation tools which are used for the calculation of the spread of radioactive material in real time and therefore can be used for real time assessment. These modelling tolls should not only take various information into account like weather conditions but also should be easy to use.		X	X		X		X		M	Dispersion of radioactive cloud or contamination must be considered in real-time (via analysis and modelling tools of dispersion of contamination). Based on the prediction of what will happen in next few hours response activities are coordinated and decisions are made with regard to what has to be done immediately. Modelling systems for prediction are needed involving factors related to wind, agent type, dispersion type, topography, orography, etc.	Development and further improvement of modelling systems for real time dispersion calculations taking into account wind, agent type, dispersion type, topography, orography, etc. Also improvement of real-time information gathering and provisions (e.g. weather condition) for getting a better information basis for the calculations.
	Mid to long term recovery: need for long term strategies for recovery, decontamination, reoccupation and eventually reconversion including monitoring, logistics, Human and social sciences, ethics…				X	X	?	X	X	L	Long term monitoring, decontamination, environmental protection, population handling	Sensors, monitoring, databases, human and social sciences
	Lack in precision for traceability of units along food chains (particularly complex chains).		X			X	X			H	Traceability system for food products which covers the whole chain from producer to customer in order to make a proper recall and back track each single batch.	Increase the precision and scope of traceability systems all over the chain.
	Lack of suitable equipment for use with untrained persons. Many of the existing systems do not support simulation and/or training modes, making them difficult to operate for personnel who are not normally involved in CBRNe activities.			X	X	X	X	X	X	L	Lack of suitable equipment for use with untrained persons. Many of the existing systems do not support simulation and/or training modes, making them difficult to operate for personnel who are not normally involved in CBRNe activities.	

Decontamination	Decontamination, which balance efficacy, environment and electronic sensitivity. This topics includes: shortage on knowledge on how different surfaces should be decontaminated; insufficient equipment and techniques for decontamination of electronics, rough or porous surfaces (like concrete surfaces or wallpaper); Responsible decontamination (wastes) etc.			X	X	X	X	X		H	Decontamination, which balance efficacy, environment and electronic sensitivity. This topics includes: shortage on knowledge on how different surfaces should be decontaminated; insufficient equipment and techniques for decontamination of electronics, rough or porous surfaces (like concrete surfaces or wallpaper);	
	Lack of automated decontamination equipment such as unmanned vehicles allowing recovery teams to work outside of harm's way.			X		X	X	X		L	Lack of automated decontamination equipment such as unmanned vehicles allowing recovery teams to work outside of harm's way.	
Ground Systems	Severe lack of radiation resistant equipment (for working in highly contaminated areas), e.g. helicopters, UGVs (unmanned ground vehicles), UAVs (unmanned aerial vehicles) and RN detection systems			X	X			X		L	Radiation resistant equipment: vehicles for working in contaminated areas (remote controlled, autonomous or manned).	Development of equipment (Unmanned Ground Vehicles (UGVs), helicopters, Unmanned Aerial Vehicles (UAV s)) which can operate under elevated radiation levels. Testing of existing equipment concerning radiation hardening prior to procurement and deployment for field use.
	Lack of specific function parts of robots for handling RN sources in terms of disposal (e.g. after finding a smuggled R-source). More relvant for C			X				X		H	Lack of specific function parts of robots for handling RN sources in terms of disposal (e.g. after finding a smuggled R-source). More relvant for C	