FAQs – TRLs in NMP Proposals

Q1: How to provide proof in proposals that the requested TRL in the call text is reached?

In general, the European Commission (EC) is not looking for a single TRL; however the level of readiness should be adequate to what is requested in the text of the topic. There have been proposals submitted to NMBP topics that are far from the TRL targeted in the topic. The proposers should be ambitious, but also explain clearly what work is proposed to reach the TRL targeted by the topic in question.

Q2: TRLs are new in H2020/ WP 2014-2015; will the concept stay the same in the future?

The TRL scale and the underlying policies will stay the same in the Work Programme (WP) 2016/2017.

Q3: In RIA TRL is up to 6? In IA TRL is greater than 6?

Although there is not an absolute connection, in the next WP the link between the type of action and the TRL will be clearer. In general IAs will target pilot lines and demonstrators in industrial settings, i.e. TRL 7.

Q4: How to deal with call topics that do not mention TRL?

All NMBP topics, apart from CSA and ERA-Nets, do mention the targeted TRLs. In other parts of H2020, TRLs are used more selectively. However, the concept of TRL is increasingly being used across the societal challenges of Horizon 2020.

Q5: How should we classify the projects in terms of TRL and should we identify the TRL for each activity?

It is not necessary to identify a TRL for each activity. The same funding rate applies for all the activities in the project (depending only on the type of action specified for the topic) and the proposal should have a convincing set of actions in the work packages in order to demonstrate that the proposal is likely to reach the targeted TRL at the end of the project. It is acceptable for some of the activities in the work packages to be at lower TRLs that the targeted TRL. The bulk of activities may be at a lower level than the targeted, final TRL. The targeted TRL (specified in the topic) is what is supposed to be reached at the end of the project, ideally.

Q6: Which have been the specific problems related to the applicants' interpretation/usage of TRLs observed in the evaluation of proposals in the calls so far?

Often enough, the submitted proposals are unrealistic for the target TRL of the topic for which they are submitted. Another issue is that even when the TRL is realistic from the technological point of view, the outline business plan (or business case) is not sufficiently thorough and convincing. The EC has developed a template that is being used to guide funded projects with

regard to the business plans that have to be developed once the project is funded. To help proposers, the concepts addressed in a business case (e.g. targeted markets, estimated size in Europe and globally, user or customer needs) will be outlined in the new WP

Q7: What TRL is required to apply for the Phase 1 of the SME Instrument (NMP-25-2015)?

Phase 1 is about the exploratory phase. Proposers have to present a technology that is credible (and not specifically centred on a particular TRL). Phase 2 targets TRL 6.What applies to the SME instrument of NMBP applies to the SME instrument as a whole.

Q8: From which level may I consider I have a product?

The TRLs addressed in KETs refer to the maturity of the technology not necessarily the manufacturing readiness, or the market readiness of a product. Horizon 2020, and more specially NMBP, tries to target the gap from lab to industry but does not go all the way to funding the development of products since this is not the role of public funding. However, industry is expected to make further investments and integrate the technologies to bring them to the market.

Q9: How the scale is applied for 'individual innovations/inventions' vs against the whole project - bearing in mind most projects have several inventions (often at different TRLs)?

It is accepted that a project, in general, spans a range of TRLs; not too large a range, but a range nevertheless. It is accepted that some of the elements that are needed to make progress will have to be pursued in the project, at a lower TRL hence the 'centre of weight' will be below the targeted (final) TRL.

Q10: In a multidisciplinary proposal different technologies may be at different starting TRLs. How much latitude is there to have certain parts which are outside the TRL range quoted in the call text?

There is some latitude because the indicated TRL is indicative. The TRL range given in topics is based on roadmaps and the current state-of-the-art. Applicants must come up with credible proposals and convince the evaluators why they intend to start at a lower TRL. They have to describe how they will use available resources to reach the targeted TRL in the course of their 3- or 4-year project.

Q11: TRL5 and TRL6 are important in H2020 proposals, but sometimes it is hard to define and differentiate. It would be good to have as many examples as possible to try to make one's own opinion from the very short definition given by the EC. In particular what means "validated" and what means "demonstrated" - what are the proofs required?

The EC will provide examples of TRL 5 and 6. In practice, it is possible to see in the WP that these levels are used together with very few exceptions.

Q12: There is also a problem of wording. Many people rather talk about "proof of concept" (is that TRL 4-5) and prototypes may be developed in a lab, so what is the prototype of TRL7 in the EC definition and is it necessarily developed in industrial environment?

TRLS 7 is meant to be in an operational environment. TRL 7 means a demonstrator in an industrial environment. This is the end point of the project, and the level to which the project takes the technology. The EU funding is intended to fund the development to reach the TRL7. Thus, TRL 7 is seen as the point where industrial commitment starts, especially in the case of the contractual Public.

Q13: Miniaturisation / upscaling: at which TRL does it take place? Same question for the production of pre series e.g. on pilot lines? And can the product certification be considered as being at TRL8?

In the case of nanotechnology, upscaling takes place at much earlier stage. When miniaturisation is used it means at least TRL 5 or 6 or 7. **Product certification: in the context of NMBP, the TRL are related with technology that feeds into the product.**

Q14: How can we distinguish between two TRLs when the project is at the interface of both?

Please refer to the previous answer regarding the range of TRLs.

Q15: For TRL 5 and 6 what does it mean "industrially relevant environment"?

It means it does not have to be in a factory. It can be done in a research centre but it has to take into account the issues that industry will have to address in an industrial environment so, in terms of upscaling and reliability.

Q16: A commercial product is on TRL 9 or outside?

Please refer to the previous answer on manufacturing readiness and market readiness.

Q17: Can you provide information about the relation between Manufacturing Readiness Level (MRL) and TRL;

In NMBP, when a KET reaches a high TRL it does not necessarily mean it is a product. In any case the funding ends at TRL 7. It does not mean that the corresponding KET is ready for the market; it means that the technology should be ready to be integrated with other technologies in a product or solution, which may then reach the market. MRL is not directly addressed in NMBP, even though by going to the higher TRLs for KETs, certainly the ability to manufacturing the corresponding material or nanomaterial in the context that is needed for industrial application (or in the case of production to demonstrate the production technology in a relevant environment) is considered. The concept of TRL, MRL and closeness to the market are different, but complementary.

Q18: Is TRL application specific? Therefore, a multi-purpose technology can be at different TRL level depending on the type of application?

The application is not specific, not in the context of KETs because what we are looking for is the maturity of the KET itself and whether it can be produced. In general the EC refers to different applications when are talking about a TRL of a particular KET. Depending of the application, there are other issues that go beyond the the TRL of that particular KET.

Q19: How to determine the corresponding TRL to healthcare?

In the case of healthcare, there is the obvious question of clinical trials and NMBP does not go that far (though a high TRL is a prerequisite).

Q20: How the reviewers are instructed about TRLs?

Reviewers are briefed exactly the same way as proposers.

Q21: How different KETs are being evaluated to be assigned a specific TRL?

The approach is based on roadmaps; the EC tries to be at the same time realistic and ambitious. In general the EC is trying to bridge the critical gap between TRL 3 and TRL 7 using different topics at different TRL ranges, and those topics are informed by the various roadmaps that come from technology platforms, cPPP boards and other sources like the advisory board.

Q22: How different models of TRLs are being confronted and integrated if any? (EARTO, NASA, DOD)

A wording has been developed that can be used across Horizon 2020 (the list of TRLs is in General Annex G of the current Work Programme). The wording for TRL 5 and 6 in particular has been fine-tuned to reflect the concerns of the Programme Committee in the context of the first WP.

Q23: TRL4 indicates technology validation in lab, TRL5 technology validation in relevant environment; does the scale matter (e.g. pilot) or is placing the lab scale equipment in the industrial environment? and some connection to upstream or downstream elements of the value chain, Sufficient ?

Yes, the scale matters but the concepts are also different. It is not sufficient just to put lab scale equipment in the industrial environment because there may be problems as, for example, the skills that are needed or how it will be operated in practice; issues that are addressed at TRL 5 but not at TRL 4.

Q24: Most TRL for RIA proposals start by default at 4. Why is that? When the word "new" (catalysts, processes, etc.) appears in the call, I would expect lower TRL and for implementation actions I would expect higher TRL. What aspects are considered to determine the start TRL?

In general, we refer to new (or even the first) applications of new technologies, which rely on further development

Q25: Did proposals tend to indicate what TRL range each Work Package was contributing to - or was it left to the evaluators to infer the TRL from the text of the proposal? Did evaluators look out for statements about what TRL proposers were working at/to?

It varied among proposals and often enough evaluators concluded that the proposals were not realistic in terms of TRL.

Q26: Were there many proposals that positioned themselves outside the TRL range specified in the WP? It would be useful to know how this worked for all proposals (i.e. did proposers think the topic addressed the wrong TRL range?) and if the successful ones stayed more rigidly within the topic TRL banding.

No, there were not many proposals that deliberately positioned themselves outside the TRL range specified in the WP, but some of them were unrealistic with regard to the final TRL they were claiming, or the initial TRL of the technology proposed was still too low. Where possible, proposals can go beyond the TRL that is targeted in the topic as long as the proposal is credible and as long as it is not propose to use funding for activities that should be privately funded. In general, the EC does not rule out the possibility that some development will be done at TRL 8 within a project, where appropriate. The EC does not ask for TRL8 and the funding stops at TRL 7. The EC expects that the private commitment kicks in after TRL7.

Q27: It would be good to define the scale of the demonstrators that is expected depending on the TRL and sector both for IA and RIA so proposers standardise their approach. Are there guidelines?

The topics present the rough scale of the EU funding, giving an indicative funding range. However, proposals should beware that this is not prescriptive and as such, the ranges are only indicative.

Q28: There are specific definitions of TRLs applied to the health sector, therapeutics?

The details will be asked to the colleagues from nanotechnology and materials applied to the health sector. But roughly, NMBP stops where clinical trials begin.

Q28: Do all the proposals have to include a business plan? How can applicants have access to the business plan template, prepared by the EC?

Business plans are an important part of the proposal but not all proposals have equally good outline business plans. The templates have been developed for the first projects on pilot lines, particularly nanotechnology pilot lines, in order to help the partners to develop their plan and target a proper market. It included questions such as the type and size of the market, how they will go about targeting that market, what steps are needed, what further funding is needed, etc.. In the WP 2016-17, the intention is to outline all these aspects in the introductory section and refer to it from the relevant topics. In the new WP, the term 'business cases and exploitation strategies' will be used in preference to 'outline business plans' as the earlier term had caused some confusion, and will be used somewhat more selectively (see next question and answer).

Q28: What is the lowest TRL that needs a business plan?

In the first WP, outline business plan were mentioned for almost all topics, with the exception of the nanosafety topics and the CSAs. It is clear that depending on TRL, a different approach to business plans is appropriate. Certainly for all the Innovation Actions (IA) and also for Research and Innovation Actions (RIA) targeting TRL 5 or 6, an outline business plan is needed. In any case, to demonstrate impact the proposers need to already have an idea of the next possible steps after the project

FAQs – TRLs in NMP Proposals

Annex 1 - Difference between TRL 5 and 6

TRLs depend on the application field and this is why we do not have an extensive "universal" definition beyond the short definitions which we have.

The main differences between TRL 5 and 6 could be summarised as follows, but please not that this is not an official definition as such:

- **TRL 5:** Basic technological components are integrated with reasonably realistic supporting elements so they can be tested in a controlled relevant environment
- **TRL 6:** Representative model or prototype system, which is well beyond that of TRL 5. Represents a major step up in a technology's demonstrated readiness and provides data on risk and cost of upscaling of the technology.

Annex 2 -Examples:

SONO – reached TRL 7, pilot plant operated at end user premises; antibacterial textiles produced in sufficient quantity to facilitate first patient trials in hospital environment

PLASMANICE – reached TRL 6 (failed to reach 7)- paper coating line operating at industrially relevant speeds at a RTO, several coating and treatment technologies demonstrated to industrial end users

GECCO - It is development of nanorods for Light Emitting Devices. The demonstrators were tested in an "industrial" environment. Research started with lab work ad +- experimental proof of concept level. The project is in its finalisation phase and we are waiting for final reports to confirm the overall results. Production in larger scale of the new LEDs : there is a proof of a technological concept, that it "can" work.

Annex 3: TRLs in Healthcare:

Level	Definition	Explanation
1	Basic Principles Observed and Reported in the Context of a Military Capability Shortfall	Potential scientific application to defined problems is articulated.

2	Technology Concept and/or Application Formulated	Hypothesis(es) generated. Research plans and/or protocols developed, peer reviewed, and approved.
3	Analytical and Experimental Critical Function and/or Characteristic Proof of Concept	Basic research, data collection, and analysis. First hypotheses tested, alternative concepts explored. Initial characterization of candidates in preclinical studies.
4	Component and/or Breadboard Validation in Laboratory/Field Environment	Non GxP laboratory research to refine hypothesis and identify relevant parametric data required for technological assessment in a rigorous (worst case) experimental design
5	Component and/or Breadboard Validation in a Relevant (Operating) Environment	Intense period of nonclinical and pre-clinical GxP research studies involving parametric data collection and analysis in well-defined systems.
6	System/Sub-System Model or Prototype Demonstration in a Realistic (Operating) Environment or Context	Phase I Clinical Trials
7	System Prototype Demonstration in an Operational Environment or Context (e.g., Exercise)	Phase II Clinical Trials
8	Actual System Completed and Qualified through Test and Demonstration	Phase III Clinical Trials
9	Actual System Operationally Proven through Successful Mission Operations	Post Marketing Studies

Technology Readiness Levels as applicable to Healthcare

Reference: http://ec.europa.eu/research/industrial_technologies/pdf/biomaterials-roadmap-for-horizon-2020_en.pdf