



SWForum.eu

European forum of the software research community

Improving exploitation of Project outcomes using Market and Technology Readiness Levels

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European forum of the software research community - SWForum.eu project has received funding from the European Union's Horizon 2020 - Research and Innovation program - under grant agreement no. 957044.

Overview

15:00 – Introduction to SWForum.eu & aims of this webinar

15:10 – What is MTRL and an MTRL analysis?

15:25 – How to complete an MTRL assessment?

15:45 – Visualisation of MTRL Results

15:55 – Q&A



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Introduction to SWForum.eu and aims of this webinar



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Overview

- MTRL within SWForum.eu
- Background to the development of MTRL
- What is MTRL?
- Why use MTRL?

SWForum.eu ...

- ...will create a **self-sustainable online forum** that facilitates and encourages both researchers and practitioners as well as projects in **software, digital infrastructure and cybersecurity** to create intersections of expertise and a **multidisciplinary** approach to research and innovation. This forum seeks to set in place the **European research roadmap** and offer **cross-fertilisation of competencies** to all other research and innovation areas.
- ...works to **enhance the visibility and increase the competitiveness of research and innovation** in the field of **software technologies, digital infrastructure and cybersecurity**, especially European funded **Research and Innovation Action (RIA)** projects. Moreover, the project aims to introduce best practices and **technology transfer opportunities** to cross-synergise European excellence.
- ...runs from 1 October 2020 through 31 March 2023.

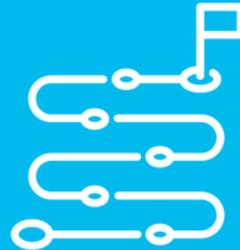
Objectives



Create a Self-Sustainable Forum



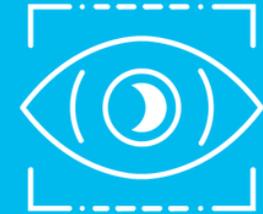
Cross-Fertilisation



European Research Roadmaps



Enhance Visibility of EU Projects



Strengthen European Competitiveness

Coordination and Su

Develop an effective way to **map R&I project topics** of software engineering, digital infrastructures, cybersecurity in Europe, **inducing collaborations** and realising synergies by proactively facilitating them through practical steps.

Project radar
Hub of future project sites
workshops

1. Mapping,
cross-fertilization
& synergising

Governance structure
Fellowship programme
Business model
Roadmaps

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Continuously engage all relevant **stakeholders** by executing **communication and marketing activities** and by systematically acting upon pragmatic motivational mechanisms.

Communication strategy
Web & Social media presence
Discussion fora
MTRL training

3. Engaging

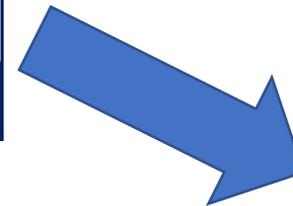
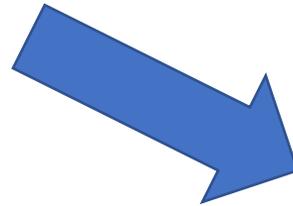
2. Road-
mapping
& governance

Provide **recommendations on policy-related issues** and the **governance structure** for the **sustainability** of the SWForum.eu community

Market and Technology Readiness Levels in SWForum.eu

- Objective 4: Provide guidance for increasing the competitiveness of European initiatives through the definition of a methodological approach to the improvement of their MTRL, Mentoring, Technology Transfer & Best Practices guiding towards Policy Innovation.
- Key Result
 - **MTRL methodology customized** for the complex problem domain of software engineering, digital infrastructures and cybersecurity.
 - Supporting means for projects to perform a self-assessment.
 - Webinars will be offered to guide software engineering projects through their MTRL self-assessment journey
 - Quantification criteria (KPI 4.1a): Public availability of the methodology.
 - Quantification criteria (KPI 4.1b): At least one third of all active projects running at the same time as SWForum.eu will apply the MTRL methodology and run regular MTRL self-assessments.

Development of MTRL



What is MTRL?

The “**Market & Technology Readiness Level**” is a methodology used to evaluate how close to the market project outputs/products are.

A numerical combination of;

TRL

Technological Readiness Level

Measuring the maturity of a technology being developed by a project.

MRL

Market Readiness Level

Measuring the commercial readiness of a technology for market.

Why is MTRL useful for your project or product?

1. It assesses the current state of your project
2. It helps you to identify the project weaknesses and next steps
3. It facilitates interconnection between funded projects

Who should use MTRL?

- Project Leaders
 - Understand viability of project outputs for exploitation and sustainability,
- Product Managers
 - Demonstrate current status of products for market launch and demonstration of understanding of barriers to exploitation/sustainability,
- Project Funders
 - Do you really understand ROI on investments into projects, what reduces possible exploitation on funded activities outputs?

Questions?



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What is MTRL and an MTRL analysis?



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Overview

- Why?
- TRL – Background
- Summarising TRL
- MRL - Background
- Summarising MRL
- Sum is greater than its parts, MTRL

Aims

- By adopting the MTRL framework R&I projects can benefit;
 - Quickly assess the maturity of a group of projects in a cluster/portfolio,
 - Provide targeted support to project leaders with exploitable outputs,
 - Communicate clearly the current and desired future state of a project,
 - Rapidly improve the quality of sustainability and exploitation planning,
 - Reduce the risk of project failure by intervening before crisis points,
 - Understand roadblocks and dependencies between TRL and MRL.
- Provide decision makers with
 - a holistic view of a project's maturity in a simple way - with a trackable single score.
 - a faster way to assess, measure and support technology projects.

Requirements

- Key measure of success for R&I initiatives,
 - Impact, Exploitation, Sustainability, Reuse....
- Why do these occur?
 - Fitness for purpose
 - Readiness for exploitation
 - Technical maturity

Technical Evaluation

- Technical Readiness Level
 - Measurement of technical maturity
 - NASA, 1980s
 - Defined range
 - Fundamental research → Operationally proven system
 - Widely used inc. by EC H2020 program

TRL Definitions

TRL 9

•Actual system “flight proven” through successful mission operations

TRL 8

•Actual system completed and “flight qualified” through test and demonstration (ground or space)

TRL 7

•System prototype demonstration in a space environment

TRL 6

•System/subsystem model or prototype demonstration in a relevant environment (ground or space)

TRL 5

•Component and/or breadboard validation in relevant environment

TRL 4

•Component and/or breadboard validation in laboratory environment

TRL 3

•Analytical and experimental critical function and/or characteristic proof-of-concept

TRL 2

•Technology concept and/or application formulated

TRL 1

•Basic principles observed and reported

Simplification

MEASURE YOUR TECHNOLOGY READINESS LEVELS - TRL

How technology ready is your service/product?



Technology Readiness Levels as adapted by the CloudWATCH2 project

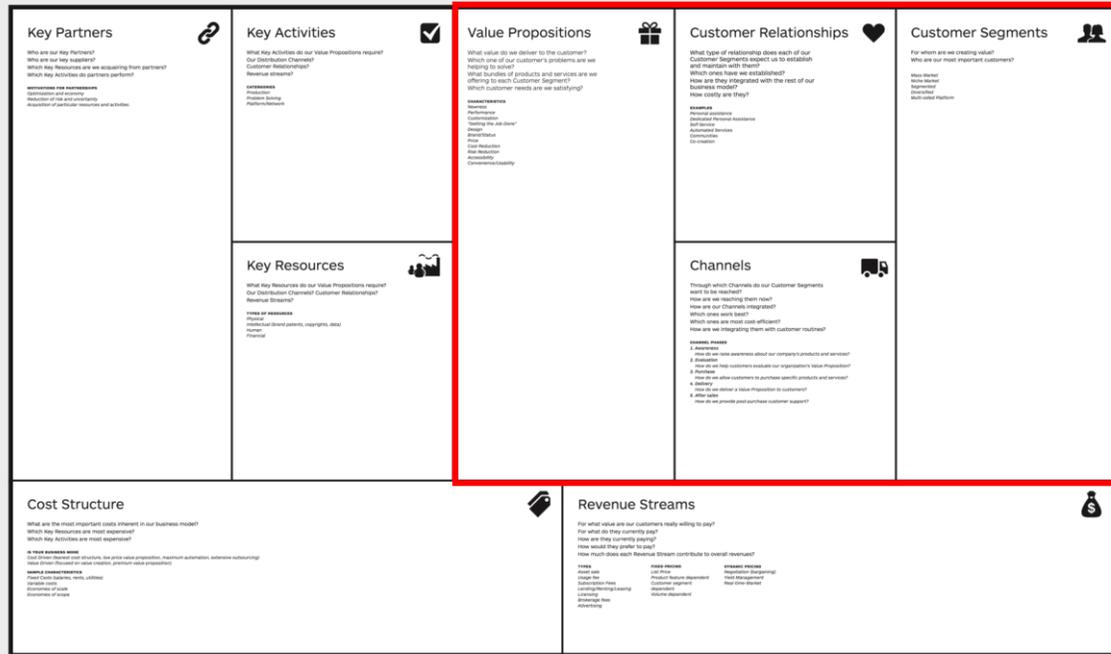
Find out more about CloudWATCH2 TRL: http://bit.ly/TRL_MRL

Market Evaluation

- Technically best product can still fail...
- Bringing a product to market can be a complex and difficult task without an appreciation of supporting activities required;
 - Business strategy
 - Business modelling
 - Marketing
 - Sales
 - Support
 - ...

Business planning and modelling

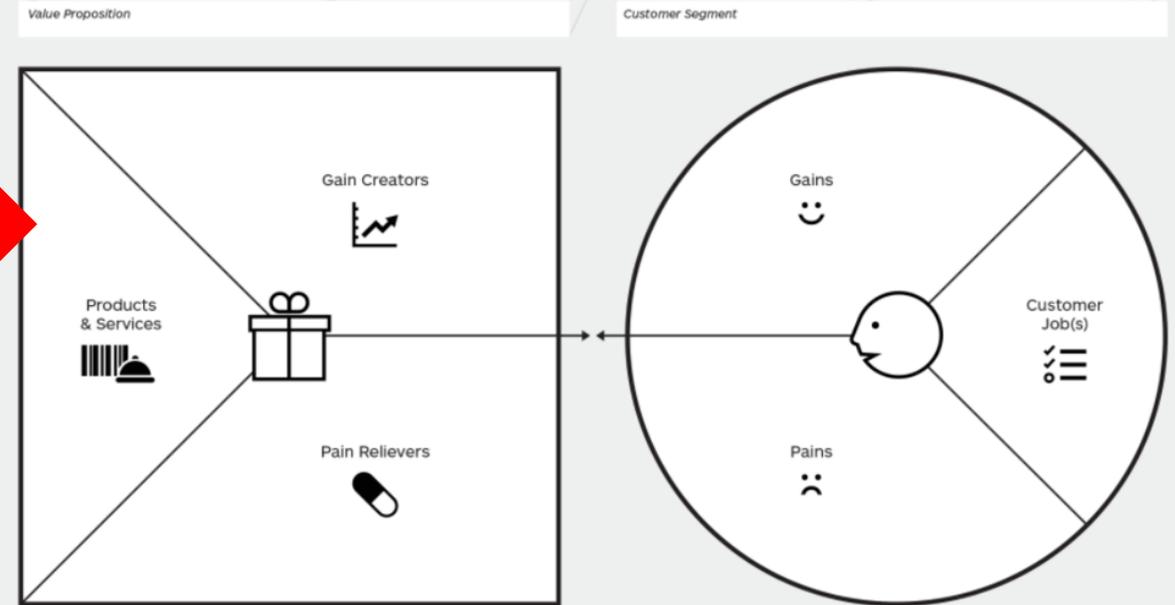
The Business Model Canvas



DESIGNED BY: Business Model Foundry AG
 The makers of Business Model Generation and Strategyzer
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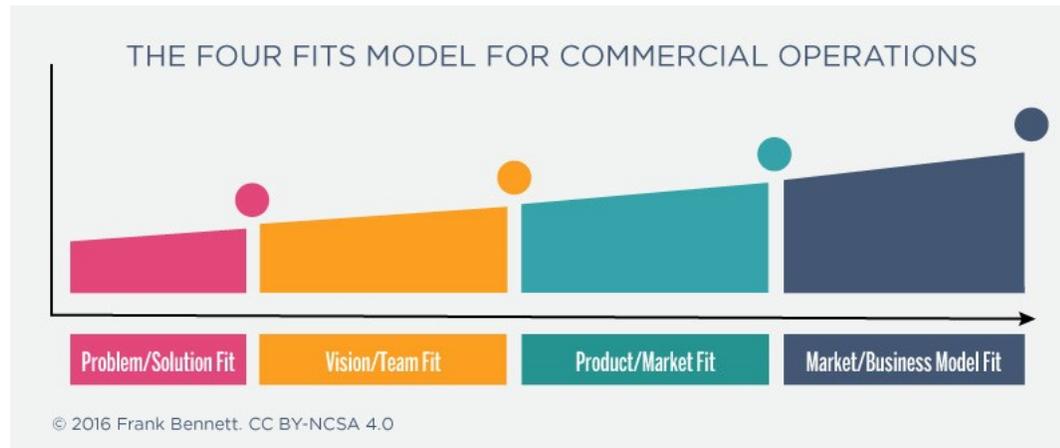
The Value Proposition Canvas



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 The makers of Business Model Generation and Strategyzer



Business planning and modelling



Problem/Solution fit

“Does the problem exist? Can we solve it? Are we ‘improving’ or ‘creating new’?”

Vision/Team Fit

“Do we have the right team to solve the problem?”

Product/Market Fit

“Have we identified our target customer segment(s)?”

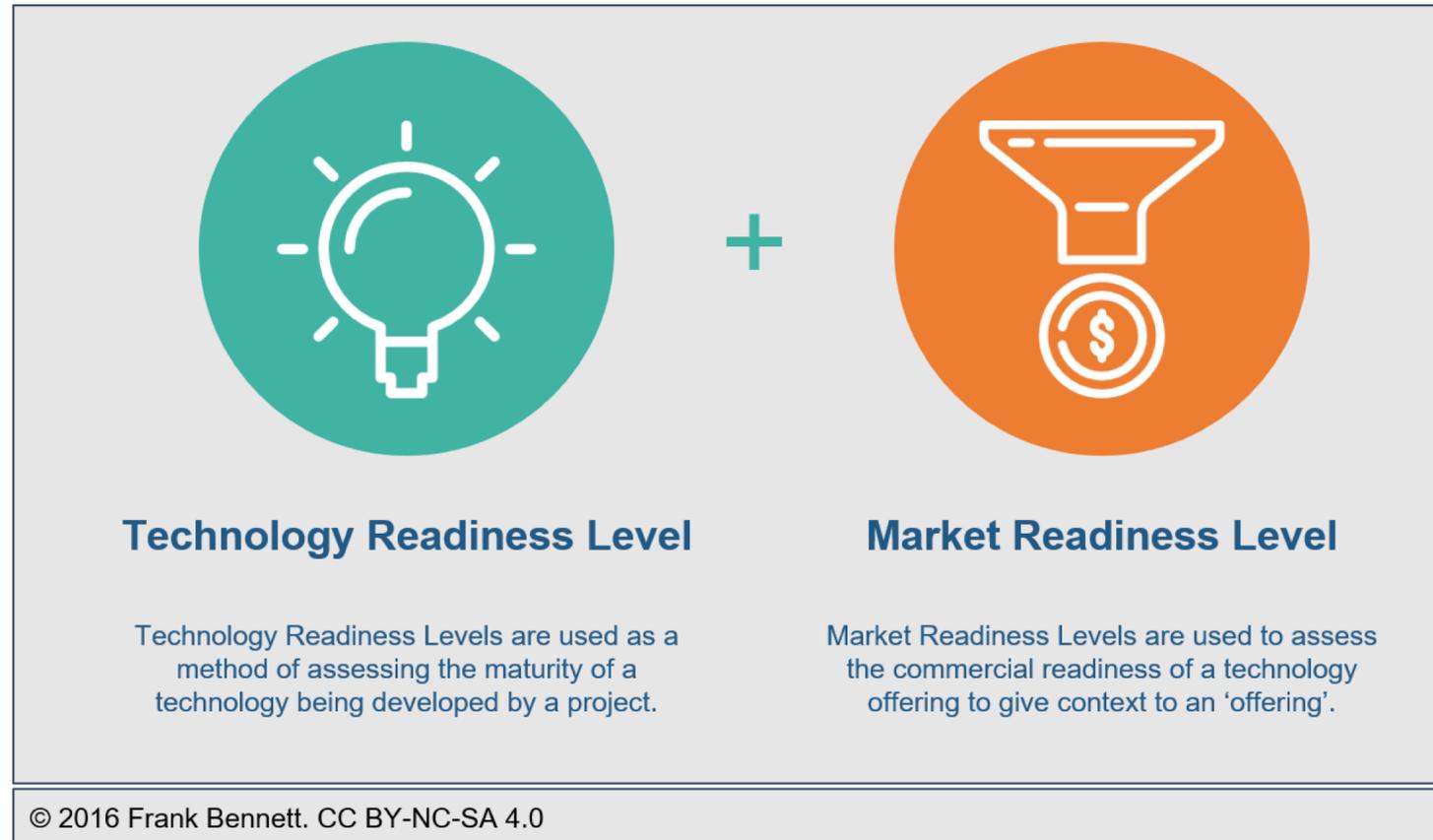
Market/Business Model Fit

“Do we understand the model for exploitation and sustainability?”

Marketing Readiness Levels



Combining TRL and MRL, the MTRL



Questions?



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How to complete an MTRL self-assessment



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- Self Assessment
- Questionnaire
- Periodic Re-assessment?

Self-Assessment

- Assessment methodology developed during development from CloudWatch2, via Cyberwatching and now into SWForum.eu
- CloudWatch2 -> Assessments completed via CW2 team in collaboration with project,
 - highly manual process requiring significant skill
- Cyberwatching -> Project self assessment
 - There is no team of expert reviewers, as part of the project, to perform this task.
 - The number of projects to be evaluated is very high (more than 100 just to start and it will grow as the projects catalogue grows).
 - The main goal of the assessment is not the deep understanding of the project but the identification of synergies and convergences.
- SWForum.eu
 - Similar problem to Cyberwatching i.e. project will use Self-assessment

Automated generation of MTRL via Questionnaire

- Easier to reach and evaluate a larger number of projects.
- Provides a standardized, repeatable process for evaluating the project under analysis.
- Quickly provides a snapshot of the status of a project at a given time.
- Collects
 - General project information
 - Project details
 - Contacts and Authorizations
 - 9 substantive questions
 - 2 TRL (Project Maturity and Product Development)
 - 7 MRL (Product Definition/Design, Competitive Landscape, Team, Documentation, IP management, Go-To-Market and Supply Chain)
- Automated calculation of TRL, MRL & MTRL

1. PROJECT MATURITY

1. *Project work is beyond basic research and technology concept has been defined. Principles postulated and observed but no experimental proof available.*
2. *Applied research has begun and practical applications have been formulated.*
3. *Preliminary testing of technology components has begun in a laboratory environment. Proof of concept.*
4. *Initial testing of integrated product has been completed in a laboratory environment. Early prototype.*
5. *Integrated product demonstrates performance in the intended environment. Large scale prototype.*

2. PRODUCT DEVELOPMENT

1. *Initial product/market fit has been defined.*
2. *Pilot scale product has been tested in the intended environment close to the expected performance. Prototype System.*
3. *Demonstration of a full scale product prototype has been completed in operation environment at pre-commercial scale.*
4. *The manufacturing issues has been solved and you have a first commercial product/service.*
5. *Product/service is available for all consumers.*

3. PRODUCT DEFINITION/DESIGN

1. *One or more initial product hypotheses have been defined.*
2. *Mapping product attributes against customer needs has highlighted a clear value proposition.*
3. *The product has been scaled from laboratory to pilot scale and issues that may affect achieving full scale have been identified.*
4. *Comprehensive customer value proposition model has been developed, including a detailed understanding of product design specifications, required certifications, and trade-offs.*
5. *Product final design optimization has been completed, required certifications have been obtained and product has incorporated detailed customer and product requirements.*

4. COMPETITIVE LANDSCAPE

1. *Market research has been performed and basic knowledge of potential applications and competitive landscape have been identified.*
2. *Primary market research to prove the product commercial feasibility has been completed and basic understanding of competitive products has been demonstrated.*
3. *Comprehensive market research to prove the product commercial feasibility has been completed and intermediate understanding of competitive products has been demonstrated.*
4. *Competitive analysis to illustrate unique features and advantages of the product compared to competitive products has been completed.*
5. *Full and complete understanding of the competitive landscape, target applications, competitive products and market has been achieved.*

5. TEAM

1. *No team or organization (single individual, no legal entity).*
2. *Solely technical or non-technical founders running the organization with no outside assistance.*
3. *Solely technical or non-technical founders running the organization with assistance from outside (advisors, mentors, incubator, accelerator, etc.).*
4. *Balanced team with technical and business experience running the organization.*
5. *Balanced team with all capabilities onboard (technical, sales, marketing, customer service, operations, etc.) running the organization.*

6. DOCUMENTATION

1. *Solely technical descriptions have been elaborated, i.e., software documentation, architecture diagrams, etc.*
2. *User-oriented documentation has been created, such as user manual, installation guides, reference manual, etc.*
3. *Live demonstration resources have been developed (recorded videos, website with link to demo, etc.).*
4. *Position papers, press releases, posters, etc. have been elaborated for the dissemination of the project.*
5. *Marketing documentation has been created, such as a Business Model Canvas, etc.*

7. INTELLECTUAL PROPERTY MANAGEMENT

1. *No IPR have been defined.*
2. *Initial means of protection have been considered.*
3. *A proper and clear definition of shares has been elaborated.*
4. *An assignation of exploitation rights has been developed.*
5. *A contractual obligation regarding IPR has been established.*

8. GO-TO-MARKET

1. *Initial business model and value proposition have been defined.*
2. *Customers have been interviewed to understand their needs and business model and value proposition have been redefined based on customer feedback.*
3. *Market and customer needs and how those translate to product requirements have been defined, and initial relationships have been developed with key stakeholders across the value chain.*
4. *Partnerships have been formed with key stakeholders across the value chain (suppliers, partners, service providers, customers).*
5. *Supply agreements with suppliers and partners are in place and initial purchase orders from customers have been received.*

9. MANUFACTURING/SUPPLY CHAIN

- 1. Potential suppliers, partners and customers have been identified and mapped in an initial value chain analysis.*
- 2. Relationships have been established with potential suppliers, partners, service providers and customers and they have provided input on product and manufacturability requirements.*
- 3. Manufacturing process qualifications have been defined and are in progress.*
- 4. Products have been pilot manufactured and sold to initial customers.*
- 5. Full scale manufacturing and widespread deployment of product to customers has been achieved.*

Analysis - TRL

1. PROJECT MATURITY	2. PRODUCT DEVELOPMENT	TRL
-	5	9
-	4	8
-	3	7
-	2	6
5	1	5
4	1	4
3	1	3
2	1	2
1	1	1

$$TRLscore = \begin{cases} q_2 + 4, & (q_2 \geq 2) \\ q_1, & otherwise \end{cases}$$

Analysis - MRL

QUESTION	WEIGHT
3. PRODUCT DEFINITION/DESIGN	4
4. COMPETITIVE LANDSCAPE	3
5. TEAM	7
6. DOCUMENTATION	2
7. INTELLECTUAL PROPERTY MANAGEMENT	1
8. GO-TO-MARKET	5
9. MANUFACTURING/SUPPLY CHAIN	6

$$MRLscore = \frac{9 \times \Sigma(q_i \times w_i)}{5 \times \Sigma w_i}$$

MTRL

- Outcome as product of MRL & TRL to recognise equal contribution

PRODUCT / CUSTOM THRESHOLDS									
MRL	TRL								
	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

red 48 59%
yellow 20 25%
green 13 16%

Questions?



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Visualisation of MTRL Results



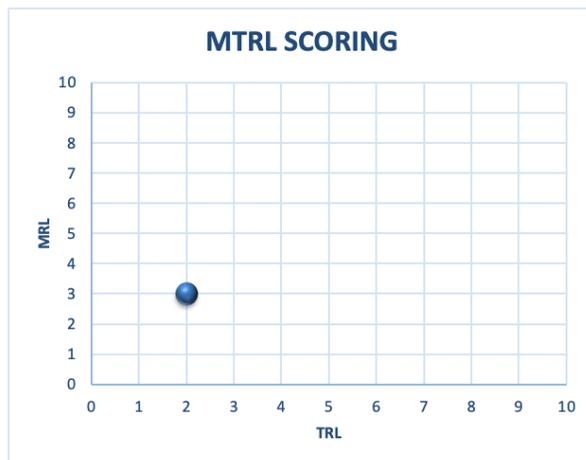
Aim

- Provide a simple method by which the product/project can view and understand MTRL assessment with preliminary suggestions about next steps.

Output from self-assessment spreadsheet

Calculated TRL, MRL and MTRL Values

SCORING	
TRL	2
MRL	3
MTRL	6

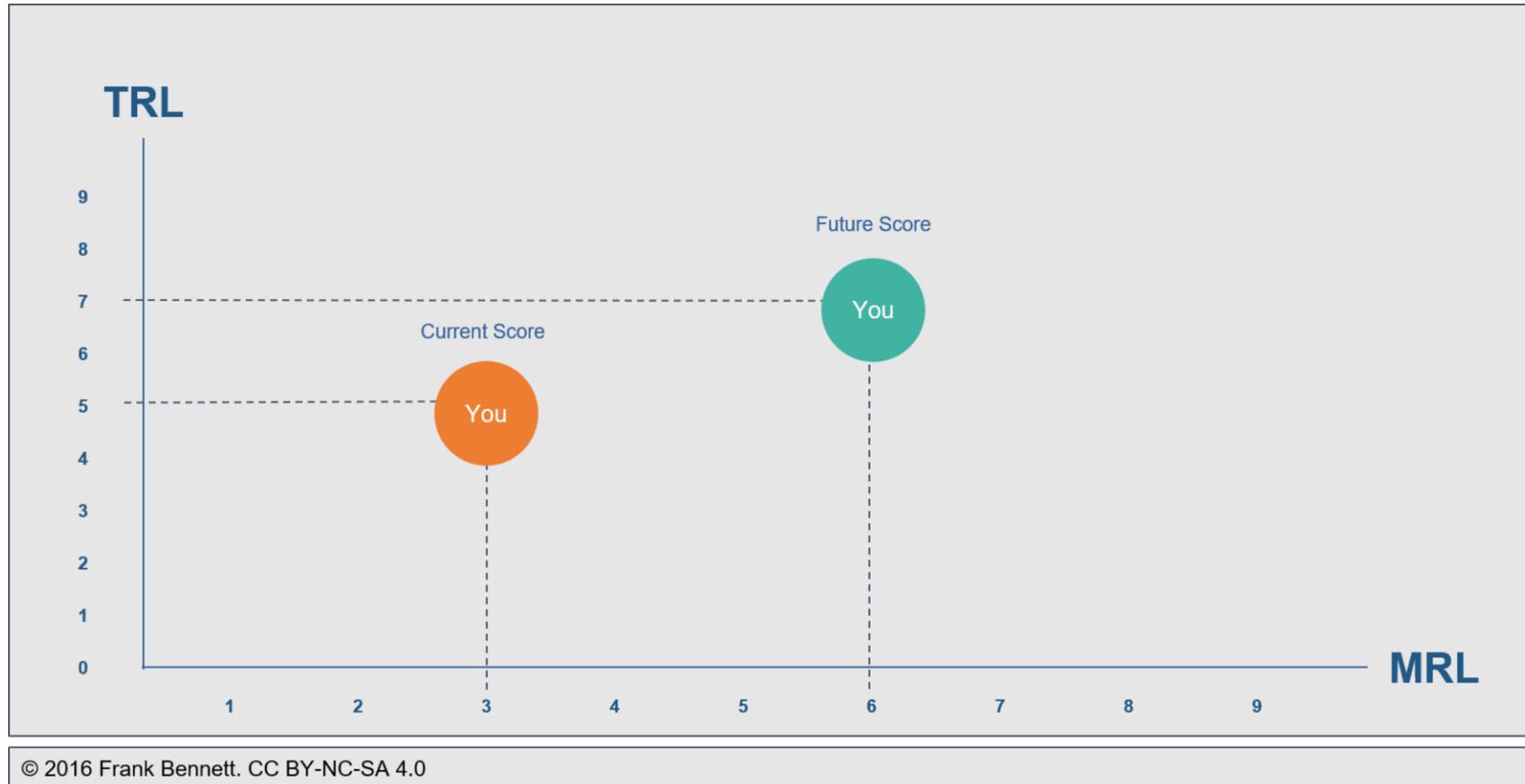


Graphical representation

RECOMMENDATIONS
It seems that you already formulated the technology. It's time to advance to an applied research.
Your project results are not marketable yet. You still have a long way to go. You could start by improving your manufacturing/supply chain.

Recommendations depending upon score

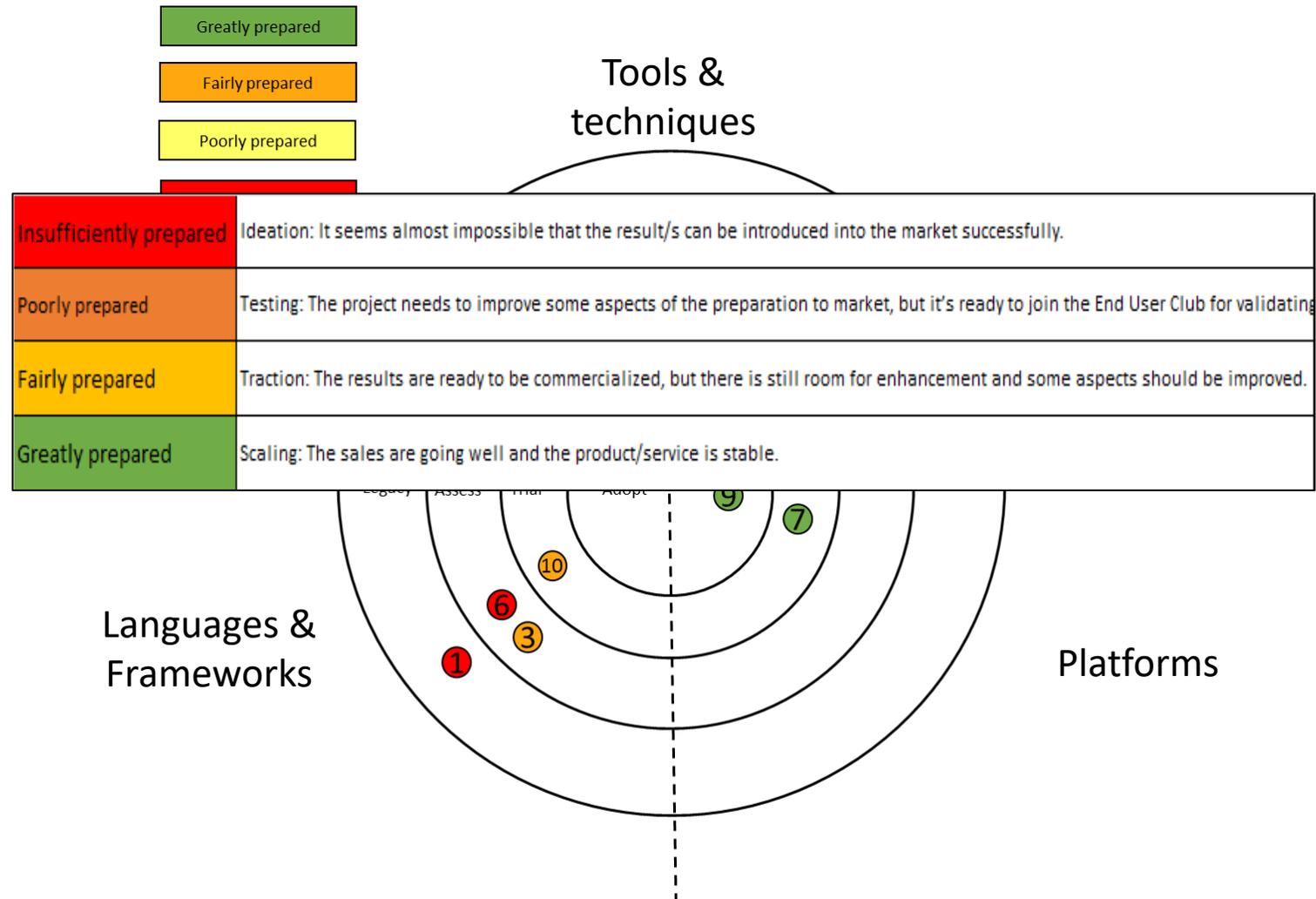
MTRL Progression and use of Re-assessment



Simplified scales for MRL and TRL

TRL / Technology Radar	Scores	MRL / Preparation level
Idea / Assess	0 - 3	Ideation / Insufficiently prepared
Prototype / Trial	4 - 5	Testing / Poorly prepared
Validation / Adopt	6 - 7	Traction / Fairly prepared
Production / Legacy	8 - 9	Scaling / Greatly prepared

Linking visualisation technologies



What's next for you and MTRL?

- Contact SWForum.eu to request self-evaluation questionnaire
- Complete self-evaluation questionnaire
- Return to SWForum.eu and meet with SWForum.eu team
 - Discuss results and available support for your project and product.
 - Engagement with SWForum.eu forum community.

Q & A

MTRL Webinar Series

- Introduction to MTRL (Today)
- Understanding criteria for optimal self-assessment (Aug 2021)
- Understanding your MTRL Feedback (Dec 2021)
- Using MTRL self assessments to understand project trajectory (Mar 2022)



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Thank You!



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