

The Interreg IVB North Sea Region Programme

*Investing in the future by working together
for a sustainable and competitive region*



European Regions for Innovative Productivity

ERIP Deliverable

Report Work Package 4:

The Final ERIP Methodology

Document legend

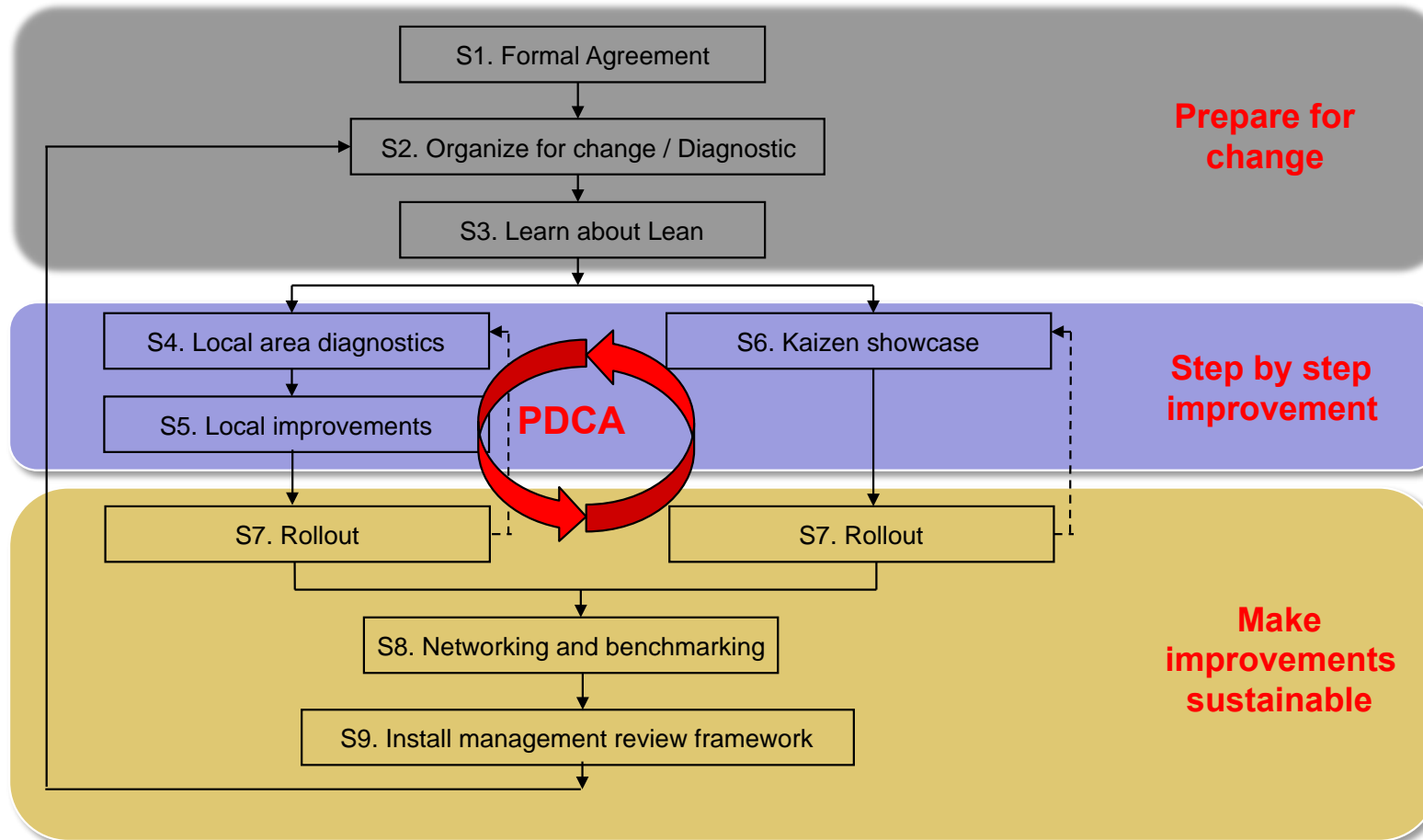
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ERIP Methodology for Lean in SMEs



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Total lead time for testing methodology: 1 year (+/- 3 months) from agreement.

The development of an ERIP methodology (S1 to S9/ M1 to M4), is based on the NEPA methodology and is a deliverable of work package 4. Testing of this methodology in SMEs within the 6 IPCs is a deliverable of work package 5. Progress of implementing the ERIP methodology in tester SMEs across the 6 IPCs was recorded by delivery partners, in the internal project management software tool designed by Swerea IVF AB (the IMT tool.)

Steps Sx: action to SME's Mx: ERIP monitoring	Duration Effort	Content	Who acts Who attends	Documents used / deliverable
PREPARING THE SME				
S1. Agreement	0.5 day per SME	Formal agreement signed Change agent/s within the SME identified ERIP requirements explained	IPC delivery partner, SME management	IVF Boilerplate document <i>Signed agreement</i>
S1a. Establish management support	0.5 day per SME	Establish the management support structure	IPC delivery partner, SME management	Additional explicit step, ensure management are fully committed
S2. Organize for change (Diagnostic)	2 days per SME	Determine focus activity area of SME Identify core team members Understand company expectations and willingness to change Identify management needs + tools to cure Could be in multiple sessions	IPC delivery partner, NEPA ¹ , SME management	Checklists (MNA , TNA, PNA) Groningen manual <i>Assessment reports with needs + tools to introduce</i>
S3. Learn about Lean	2 x 1 day 3 x evening sessions	Introduction to Lean WORKSHOP Management team + selected operators/supervisors + Visit to Exemplar	IPC delivery partner, Exemplar, SME core team	NEPA tool book or equivalent Buckingham game or equivalent
M1. Zero base measurement	1 day	Overall KPI indicators measured Human Resource Management (HRM) motivation/stress measured Current state Value Stream Mapping (VSM)	Academic staff, IPC delivery partner, SME team	KPI checklist ERIP Questionnaire Ugent eVSM or VISIO or Powerpoint
Note: S2 and S3 can run concurrently. Take care to perform M1 before any improvement cycle is started.				
Steps	Duration	Content	Who acts	Documents used / deliverable

¹ The NEPA methodology (i.e. checklists for MNA, TNA and PNA for example) was transferred into each region by the NEPA engineer, who delivered the first showcase in each region and taught the methodology to the IPC delivery partner. Once the IPC delivery partner had learnt the NEPA methodology, they were able to carry out the methodology independently of the NEPA engineer. Therefore, the NEPA engineer's input in S2 was only needed once, at the very start of ERIP.

Sx: action to SME's Mx: ERIP monitoring	Effort		Who attends/reviews	
STEP BY STEP IMPROVEMENTS (PDCA)				
Note: these steps S5-S6 can be executed multiple times for each improvement cycle in different areas, different problem domains, etc.				
	1 month	Start with local workshops (3S, standard work, visual management, skill) , then possibly value stream-wide workshops (flow, process, ...)		
S4. Local Area diagnostics (PLAN)	1 – 3 days (spread out over a lead time of 1-3 weeks)	Select area for current improvement cycle All operators/supervisors of selected area provide problem list Develop action plan for this improvement cycle Cluster & follow up (to do, started, finished, not tackled) First introduction on Value Added (VA) /Non Value Added (NVA), 7 wastes concepts, locally applied Prepare area for improvement (build stock?) Organize measurement of local indicators Set up operator team to do measurements Analyze data (Q, C, D, E)	Operators, IPC delivery partner, SME management	Value Cycle Map (when data is available), Process Map (otherwise) <i>A3 reports on each problem/issue</i>
S5. Local improvements phase, prepare area (DO)	0.5 day per each week (spread out over a lead time of 2-4 weeks)	Focusing on the local problems of initiate structured problem solving Clear out small/easy/local problems Introduce Visual Mgt (colors,...), 5S, standard work	Operators, IPC delivery partner, SME management	Post-it on wall (optional) Team board with visual sheets
S6. Kaizen workshop (PLAN – DO)	3/1 days	Kaizen event or workshop to introduce topic/area Introduce specific controls and tools Explain data/causes to operators	IPC delivery, partner, SME team (1 representative of other SME's)	NEPA tool book or equivalent <i>Team board with visuals</i> Results registered by SME at least every 2 weeks
M2. End of cycle measurement (optional)	0.5 day	KPI indicators measured Can take measurements at the end of a PDCA cycle	Academic staff, IPC delivery partner and SME team	KPI checklist ERIP

Steps Sx: action to SME's Mx: ERIP monitoring	Duration Effort	Content	Who acts Who attends	Documents used / deliverable
ADDITIONAL ACTIONS				
M3. Half-way measurement	1 day (after 6 months)	KPI indicators measured HRM motivation/stress measured Updated VSM	Academic staff, IPC delivery partner and SME team	KPI checklist ERIP Questionnaires UGent
S7. Pilot use (CHECK – ACT)	Lead time = 2- 6 months	Rollout by Operator team Checkup visits by ERIP team (IPC delivery partner and academic partner)	SME team, IPC delivery partner	<i>Team board with visuals</i> Results registered by SME at least every 2 weeks
S8. Local Exemplar visit, networking, present results	1 day	To reinforce topic and show good practice. These are supporting activities	IPC delivery partner, academic partner, Exemplar, SME teams	
S9. Install management review framework	0.5 day x 3	Every month; based on internal KPI follow-up by company	IPC delivery partner and SME management team	<i>Result report A3</i>
M4. Final measurement	1 day (after 1 year)	KPI indicators measured HRM motivation/stress measured Updated VSM	Academic staff, IPC delivery partner and SME team	KPI checklist ERIP Questionnaires UGent

ERIP Guidelines for the change method

1. To ensure that any results can be obtained regarding the effectiveness of the proposed method, the method is mandatory, i.e. all steps must be followed. As far as content is concerned, unless it is explicitly stated in the method, most content is adaptable to the situation. Obviously, content is drawn from the “black book”, the BOK on Lean, and any other material that is (preferably) contained in the uploaded documents on KX.
2. Monitoring: all actions that are part of the change method should be registered in the ERIP-IMT monitoring tool. Again, without these registrations no valid conclusions or research can be made regarding the method. The registrations should be done as shortly as possible after they took place, and at the latest within the week following them.
3. Results of each Mx measurement round are reported using the standardized lists used to make the measurements. However, project partners should be aware that indicators take time to change and that they may be influenced by extraneous factors, i.e. partners should not be too optimistic about great improvements in the indicators during the project lifetime.
4. In-depth reports should be made by the IPC delivery partners (and academic partners where IPCs split functionality differently between partners) regarding the actions, problems in SME's etc. A3 reporting style is preferable.
5. It would be advisable that all other documentation regarding the SME activities (VSM, process maps, checklists, etc.) is posted centrally. The local IPC must certainly keep these documents on file for proof of activities and for use in follow-on research.

Objectives of the method

As Lean is a management method for continuous improvement, the main effect to pursue within the SMEs is the adoption of this new management method (which involves employee empowerment, people development etc., see training scheme). Given the short timeframe (1 year, 3 to 4 improvement cycles) for such a mental turnaround, the IPC members will have to find a good mix of “showing and telling” and “discovery and trial/error by the SME people”. Thus, which areas are to be improved, and by which tools, is largely dependent on the local situation (and thus not included in the method description). The only requirement is that the tools are effective for their intended use, and the pilot areas important for the SME's bottom line and strategic direction. The PNA tool should be prescribed for this reason.

The change method must cover the basic steps of the generic Transformation Method (Transmeth, Van Aken et al.), while minimizing the burden on the SME resources. Following table illustrates the point:

Transmeth step	ERIP change method step
1. Set up a structure for change <ol style="list-style-type: none"> a. Communication mechanisms b. Team-based structures c. Education/training 	S3, S8
2. Understanding the need for change <ol style="list-style-type: none"> a. Burning platform b. Change triggers 	S1
3. Analyzing current situation <ol style="list-style-type: none"> a. Defining target system b. Assessing organization 	S2
4. Setting direction for change <ol style="list-style-type: none"> a. Vision b. Key Performance Areas c. Principles/Values 	S2
5. Defining improvement initiatives <ol style="list-style-type: none"> a. Improvement initiatives and strategies 	S4
6. Deploying and implementing initiatives <ol style="list-style-type: none"> a. Improvement teams b. Initiate action plans 	S5
7. Reviewing progress and performance <ol style="list-style-type: none"> a. Performance reviews b. Lessons learned c. Recognition 	S7, S8, S9, M1, M2, M3, M4

Next each step is succinctly described, listing the essential content points and possible alternatives.

The measurement steps (and the research issues) will be treated afterwards

S1. Formal Agreement

1. *Formal agreement signed*: this is not part of the method, only its formal starting point. It is however mandatory in order to maximize the chance that the SME will stay committed for the whole project period.
2. *Change agent SME identified*: based on the principle that SMEs have short lines of communication and mostly a limited management structure (one owner, or general manager and a limited number of middle management positions), the person or persons that will drive the actions in the SME (not execute them!) and keep the light burning should be identified. This will mostly be one or more persons from the list above. If the owner of general manager is not part of it, he/she should at least clearly demonstrate his commitment (failure to do so constitute a clear risk element for early termination by the SME).
3. *ERIP requirements explained*.

S2. Organize for change / Diagnostic

1. *Determine focus activity area of SME*: besides a generic description of the SME activity area, it is important to document the area(s) (value streams) that will be the focal point for the ERIP improvement activities. Documentation includes
 - a. *NEPA needs analysis checklist (MNA / TNA/ PNA mandatory)*
 - b. *Value Stream Map (current state)*

This documentation will have to be drawn up by the IPC members, as it is unlikely that the SME will already have this available or the expertise to make them.

Interview two groups of SME people separately: management team and shopfloor team, and then take the findings to the discussion with management. This way intangible issues are captured, as well as a check versus the checklist indications.

2. *Identify team members*: both the IPC delivery partner (+ academic partner in some instances) to be assigned to the SME, as the SME internal team members (operators and management), are identified. The IPC delivery partner (+ academic partner in some instances) member is responsible for the reporting to the ERIP project partners and should be identified in the KX reporting tool. This team should include representatives (or all of) from operators, supervisor and management. This team should actually carry out the improvement activities (for their area). Supervisor is crucial to obtaining drive and sustainability, and additional training might be needed (in both Lean and People skills).
3. *Understand company expectations*: this is akin to the future state of a VSM. It should set a realistic but ambitious goal, to make sure that enough drive is present within the SME to improve. These expectations should ideally be translated into KPI values to be reached after 6 months and after 1 year (see measurements). Here the concept of VALUE should be introduced and elaborated, to make sure the objectives are of any use to the SME for its future competitiveness. The MNA checklist is a good guideline for this. Should be in the form of a discussion with management.
4. *Needs + tools to cure (PNA)*: follows from the NEPA checklist and should indicate which tools are more likely to be used, and hence need to be introduced through training or showcasing (exemplar visit or SME pilot area). The tools that will be used should be reported in the ERIP tool for research purposes (without details), and therefore should come from a limited list of Lean tools (NEPA black book).

S3. Learning about Lean

1. *Lean introduction*: the team (S2.2) will have to be trained in the Lean Continuous improvement method, as well as in the basic Lean principles. Ideally (in the Lean spirit) there should be a standard content of the training, but minimally the following elements should be present:
 - a. *Explanation of the basic Lean principles*:
 - i. *Quality first and built in*
 - ii. *Gemba orientation*
 - iii. *Waste elimination*
 - iv. *People development*
 - v. *Visual standards (= standard work + visual management)*

vi. *Process and results (= process orientation + KPI)*

vii. *Pull Flow thinking (= flow + pull)*

b. *Some sort of hands-on game or simulation to experience the effect of the Lean principles*

2. *Visit to exemplar.* The choice of visits is not limited to the national exemplar, can be organized transnationally if organized in advance.

S4. Local area diagnostics (PLAN)

1. *Measure local indicators:* these are the indicators that are linked to the improvement tools and activities for this cycle and are (possibly) different from the general KPI's to be measured in the M steps.
2. Value Stream Map (when data is available), Process Map (otherwise), VA/NVA steps identified
3. *Set up operator team:* the operators of the area under scrutiny should be briefed and prepared for the action. This should include a limited training or presentation.

S5. Local Improvements (DO)

Same activities as in Kaizen (S6), but spread out in time, over a 3 (to 6) month period.

1. *Event to introduce topic:* given the short timeframe to "make them see",
2. *Day 1-2:* Team introductions / NEPA presentation (7 wastes, VA, NVA, W + visual management) / Focus on gemba tour (Measures, process map)
3. *Measures that describe the problems (or process mapping) +get data yourself (video)*
4. *Day 3-4:* Corrective actions appropriate to the problem detected + always 5S (counters wastes) + problem solving (counters problems)
5. *Take first measures by operators, decide on actions by operators:* following the Kaizen event, the first results must be recorded, and from these learning points the operators should develop (together with Lean Team and IPC delivery partner (+ academic partner in some instances)) an action plan for further implementation of the findings across the whole area under scrutiny.
6. *Document results, capture standard work*

S6. KAIZEN Workshop

Agenda of the workshop should be constructed in 30 minute segments!

1. *Kaizen event to introduce topic :* given the short timeframe to "make them see", a Kaizen event (intensive improvement activity lasting 2 to 3 days) is the most effective form to start the improvement cycle. There should be a succinct Standard Work manual for Kaizen events.
2. *Day 1-2:* Team introductions / NEPA presentation (7 wastes, VA, NVA, visual management) / Focus on gemba tour (measures, process map)
3. *Measures that describe the problems (or process mapping) +get data yourself (video)*
4. *Day 3-4:* Corrective actions appropriate to the problem detected + always 5S (counters wastes) + problem solving (counters problems)
5. *Take first measures by operators, decide on actions by operators:* following the Kaizen event, the first results must be recorded, and from these learning points the operators should develop (together with Lean Team and IPC delivery partner (+ academic partner in some instances)) an action plan for further implementation of the findings across the whole area under scrutiny.
6. *Document results, capture standard work*

S7. Pilot use (CHECK – ACT)

Set up a rollout plan.

This is the implementation of the results from S4/S5 (possibly after multiple cycles), rolling them out into the normal way of working in the area. Regular visits by IPC delivery partner (+ academic partner in some instances) are advisable to check on progress and lend support. There is an opportunity here to involve other SME's from the local group, or even from other countries in ERIP, and also to involve IPC delivery partner (+ academic partner in some instances) from other countries. This step enhances synergies from the international collaboration.

S8. Local Exemplar visit, Networking

This is an optional step but highly effective and valuable. The purpose is to have operators relate to operators from exemplars regarding the same tool they are using themselves, and also to serve as a kind of reward/recognition to the operators. Networking does the same for management.

A form of formal reporting should be set up for the SME management and Lean team, and should ideally include both the SME's own results, but also results from other SME's in the ERIP group that are comparable (needs to be defined what this means): this benchmarking serves as reinforcement to keep the momentum going. If an SME is doing extremely well, it will motivate them. If an SME is lagging, then seeing that other SME's achieve better results will reinvigorate them by showing the goals are attainable. An online PDCA tool can serve this purpose, as tested by the Flanders' IPC.

S9. Install management review framework

This is an important, and thus mandatory, step. A seamless set of interlocking reporting cycles should be set up, that link the improvement teams through all line management levels into the board of directors. For SMEs this involves at most 3 levels of reporting meetings, sometimes only 2.

Measurements

The Measurements are important for the ERIP Interreg reporting as well as for the research to the validity and effectiveness of the method. Each measurement cycle is basically the same, and for each SME there should be 3 time-bound measurements (M1, M3, M4) and per cycle one end measurement (M2).

M1. Zero base measurement

The list of KPI's to be measured was set by the ERIP project proposal. ERIP participants agreed on the final list of KPIs to be measured listed below. They needed to be the same across all SME's and regions to enable international comparisons.

The KPI's are measured across the whole company.

The list is currently:

$$\begin{aligned} & 1. \text{ Not Right First Time (NRFT)} \\ & = \frac{\text{Quantity of defective parts}}{\text{Total quantity of parts produced}} \end{aligned}$$

Note: Quantity defective does not mean just scrap parts, it includes all rework.

$$\begin{aligned} & 2. \text{ Stock turns} \\ & = \frac{\text{sales turnover of product}}{\text{Value of raw material + WIP plus finished goods}} \end{aligned}$$

$$\begin{aligned} & 3. \text{ Value Added per person} \\ & = \frac{\text{Output value} - \text{input value}}{\text{Number of employees}} \end{aligned}$$

(minimal 3 to 4 / 1 !)

$$\begin{aligned} & 4. \text{ Cumulative Lead time 1} \\ & = \text{Time from raw material to end of production} \end{aligned}$$

5. Delivery Schedule Achievement (DSA)

$$= \frac{\text{number of actual deliveries in full on time} - (\text{incorrect time} + \text{incorrect quantity})}{\text{Number of planned deliveries}}$$

6. Downtime of equipment

$$= 1 - \text{availability}$$

M2. End of cycle measurement

Depending on the type of improvement activities that took place, a subset of the measurements could be taken.

M3. Half-way measurement

Same KPI's as M1.

M4. Final measurement

Same KPI's as M1.