DOCUMENT TITLE:

GOOD PRACTICE REPORT FROM HUNGARY

Project: Improving RD and business policy conditions for transnational cooperation in the manufacturing industry

Acronym: Smart Factory Hub

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PU	Public	
PP	Restricted to other Programme participants	
RE	Restricted to a group specified by the consortium	
CO	Confidential, only for members of the consortium	X

TARGET GROUP ASSESSMENT

Has this deliverable addressed any of the target group indicated in the application form?

Yes / No

If yes, please describe the involvement of each individual target group in the table below.

Target group	**Number reached by the deliverable**	**Description of target group involvement**
SME	*4*	Good practices collected from the following SMEs: • Galambos Trans Ltd • Julius Globe • Vesz-Mont 2000 Ltd. • Borsodi Műhely LTd.
Regional public authority		
National public authority		
Higher education and research		
Business support organisation	*1*	• am-LAB

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1 INTRODUCTION

Regional Good Practice Report for Hungary contains five good practices collected using the Good Practice Template developed in D4.2.1.

The data in this report was collected during September – December 2017 as part of the project entitled "*Improving RD and Business Policy for Transnational Cooperation in the Manufacturing Industry – Smart Factory Hub (SFH)"*.

These five examples are the basis of the regional report, the Handbook tool report and the Good Practice Handbook, which together with the Mapping tool will allow project partners to present and promote specific smart manufacturing solutions. Based on the collected data, the Handbook tool report will be prepared by the UTC-N, WP4 leader.

The handbook will be available in electronic format on the web portal, while, for disseminating the work package, also 250 handbooks will be printed, which will be available to the participants at the closing dissemination event.

The data collected during this period will also be used for ex-ante evaluation.

PBN collected the following good practices cases:

Table 1: The list of good practices from Hungary

No.	Name of the Good Practice	Classification[1]
1	Galambos Trans Ltd.	HRM digitalisation, Industry 4.0
2	Julius Globe	i4.0 applications are utilized at production level
3	am-LAB	3D printing, 3D scanning, digital shape and shape design, 3D scanning and design at industrial level, CAD design, industry 4.0
4	Vesz-Mont 2000 Ltd.	Special purpose machinery, advanced manufacturing, laser technology
5	Borsodi Műhely LTd.	high quality, custom component

[1]According GOOD PRACTICE GUIDELINES

		manufacturing,intership training,Industry 4.0

2 GP1: Galambos Trans Ltd.

Galambos Trans Ltd.
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Keywords: HRM digitalisation, Industry 4.0
Good practice applied in: (NACE code): H52 - Warehousing and support activities for transportation
H52.1 - Warehousing and storage

Galambos Trans Ltd focuses on unique storage solutions. The integrated logistics systems are built into the multinational manufacturing customer's ERP system – Macine2Machine communication. Special innovative creative solutions and value-added processes provide to partners with the services to meet their needs.

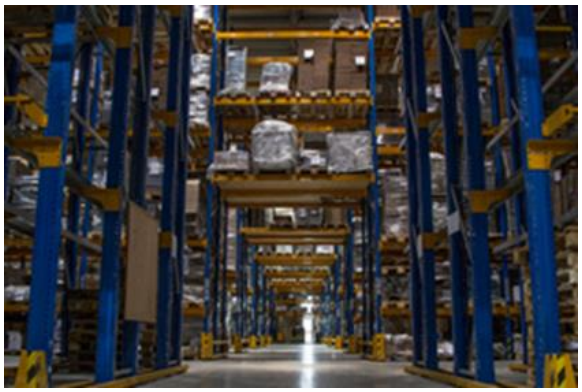
2.1 GOOD PRACTICE DESCRIPTION

The Galambos Trans Ltd developed integrated logistics systems which allows the machine to machine communication. This is in line with the industry 4.0 goals and promote innovative solutions in the storage systems.
Storage system digitalisation and adaptation for requirements of Industry 4.0 – HRM or cost efficiency
The solution combines the multinational customer's ERP systems with the logistic system, so it can minimize the failure risk and also spare time compared to the manual storage systems.
Competitors are on the market, using unique storage systems are a trend now, especially among large companies.

1. Figure: Galambos Logistics

2. Figure:Galambos Logistics

3**. Figure:Storage system**



4**. Figure: Storage system**

2.2 OBJECTIVE AND TARGET AUDIENCE

The solution where good practice has been tested and validated is Hungary, West Hungary.
Main audience are the multinational companies and middle-sized companies, as the solution combines the Enterprise resource planning systems with the storage system. Special innovative creative solutions and value-added processes provide to partners with the services to meet their needs. Target group for this good practice are SMEs, Large companies and public institutions.

2.3 METHODOLOGICAL APPROACH

The implementation of the solution requires technical background and special knowledge, too. Human resource, technical devices are necessary for implementation.

2.4 VALIDATION PROCESS

The validation was done by internal staff members. The testing phase ensures that differences were minimized.

2.5 RESULTS / IMPACT

The solution has the advantages like:

- saving time through M2M communication
- reduced storage errors
- increased transparency
- environmentally friendly

2.6 SUCCESS FACTORS AND CONSTRAINTS

In case of the company is not using ERP system, it is not possible to harmonize and integrate the unique storage solution system.
Larger companies are aware of this solution. Based on the references the brand is in a good position at potential customers.

2.7 LESSON LEARNED & SUSTAINABILITY

In order to implement the good practice, technical background and qualified human resources are needed. The innovation skills of the management are one of the major question.
The solution is software based and all relevant data are stored in databases which guarantees the sustainability.

2.8 REPLICABILITY AND UP SCALING

Especially among Hungarian SMEs, the digitalization of processes and the installation of ERP systems is even more available. Based on this trend, more and more SMEs will be able to implement this good practice, if they are handling significant stock.
Integration of storage system will be possible with other existing internal systems.

2.9 FINAL REMARKS

The good practice is useful for companies who are dealing with warehousing. It can help them to use an innovative and effective solution which is in line with Industry 4.0 principles.

Disclaimer / Acknowledgements

No legal constrains.

List of attachments:

The company's presentation:

Attachment 1: https://www.youtube.com/watch?v=_ivd6Npgqys

Information about the services:

Attachment2:http://galambostrans.hu/en/services/#logisztika
Attachment3:http://galamboslogistic.hu/en/services/#logisztika

3 GP2: Julius Globe

Julius-Globe Ltd.
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Fax.: 00-36-96-355-161
E-mail: erika.racz@jglobe.hu

Keywords: i4.0 applications are utilized at production level
Good practice applied in: (NACE code): C- manufacturing
C27.9.0 - manufacture of other electrical equipment
C28.9.0 - manufacture of other special - purpose machinery

Julius-Globe Ltd. is supplying energy sector, oil rigs and automotive industries. During workshop level production procedure i4.0 applications are utilized – machinery equipped with RFID and built-in routers for distance optimization.

3.1 GOOD PRACTICE DESCRIPTION

Julius-Globe Ltd. is one of the leading SMEs in Wes-Hungarian region who are using novel technologies on the field of advanced manufacturing.

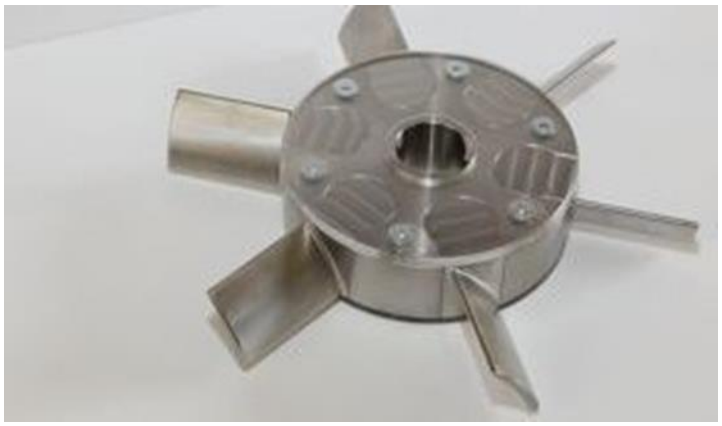
1. Research and development:

   - Research and development according to customer orders and needs
   - 7 development engineers
   - Used programs: CATIA V5-6 R2016-CAD, CREO 2, ESPRIT

2. Realised research and development
   - Development of Engine Block (oil of body water) contamination testing equipment
   - Digital display, surface roughness measuring device-specific improvement
   - Support the development of production technology, glass roof blind
   - Raw material feed roller surface material non-stick and wear-resistant experiment
   - Research and introduction of raw material-dependent optimal coating experiments
   - Integration of advanced technologies and measurement equipment manufacturing technology changes into customers' production

- Manufacturing production of medical device testing - knee replacement - Medical University of Szeged
- Development of new heat treatment units
- Development and construction of propeller
- The aim was to develop new production technologies - development of only from one material screw blade propellers, the longer the blade size and the larger the number of blades.
- Ideal blade design, development of edge geometries
- Mounted propeller design manufacturing
- Manufacturing of a greater number of propeller blades
- Straight and twisted blade propellers airflow engineering study

One of the most innovative SME in the region in the advanced manufacturing. Competitors are on lower level in R&D and also the machine park is well equipped.



5. Figure: R&D at Julius Globe

6. Figure: European Business Awards

3.2 OBJECTIVE AND TARGET AUDIENCE

The solution where good practice has been tested and validated is Hungary, West-Hungary.

Actors in automotive industry, advanced manufacturing are the main target audience of the company, mainly large companies.

3.3 METHODOLOGICAL APPROACH

Using of the machine park connected to advanced manufacturing, cost reduction is possible
As customer, using the industry 4.0 based solutions makes possible to gain a wider knowledge about advanced manufacturing technologies.

3.4 VALIDATION PROCESS

Validation of implemented solution is done by existing team in the company.

3.5 RESULTS / IMPACT

The solution has positive impacts to the beneficiaries:

- cost effective manufacturing
- design and production of unique fixtures
- less human resource need

3.6 SUCCESS FACTORS AND CONSTRAINTS

Mass production needs a different technology than unique production. Innovation skill of management is need for implementation of advanced manufacturing.
Good references showing a standard quality. Wide range of available machines help the satisfying of the customer demand. Openness for R&D guarantees a permanent innovation level.

3.7 LESSON LEARNED & SUSTAINABILITY

Implementing innovative solutions open new doors in customer relationship. New segment of market can be targeted, so it is a long-term investment. Also, the same situation with employing highly qualified workforce.

Based on the market trends in manufacturing, advanced manufacturing and innovative solutions are sustainable in long term.

3.8 REPLICABILITY AND UP SCALING

1. Possible know-how transfer
    a. an SME can be also able to use this service or buy devices and hire qualified employees
2. Cost effective solution for manufacturing

New technologies are appearing permanently, so study them and if possible, implement them can assure the extension of the good practice.

3.9 FINAL REMARKS

The good practice is useful for production oriented SMEs in order to allow them to use advanced manufacturing solutions

Disclaimer / Acknowledgements

No limitations

List of attachments:

Attachments1: http://www.jglobe.hu/Open_doors_open_minds.html

Attachments2:http://www.jglobe.hu/Competitiveness_in_Focus__Institutions_for_the_Development_of_SME.html

Attachments3:
http://www.jglobe.hu/JuliusGlobe_Ltd_named_as_one_of_Europes_best_in_first_ever_One.html

Attachments4: https://www.youtube.com/watch?v=Kn6GkJyseBQ

4 GP3: am-LAB

am-LAB
Contact Person: Joós Attila
coordinator
joos@am-lab.hu

Keywords: 3D printing, 3D scanning, digital shape and shape design, 3D scanning and design at industrial level, CAD design, industry 4.0
Good practice applied in: (NACE code): C18.1.2 - Other printing

Objectives of am-LAB are:
– *translate international learnings of PBN into tangible support tool for local SMEs*
– *assist application of i4.0 in the field of additive manufacturing*
– *Educate local business and scholar community about additive manufacturing*

4.1 GOOD PRACTICE DESCRIPTION

Basically AM-Lab is meant to be working in the additive manufacturing sector, 3D printing is the main direction.
The main point is to develop new technical solutions with the use of this modern technology in an environmentally friendly way and to organize training sessions to university students and to other interested possible end-users like local citizens, representatives of companies and so.
As in the case of a lot of European regions, the population of Vas County is decreasing and getting older and older. The small towns grow older as the younger generation moving to bigger cities to get more qualitative education and better positions to work in. This tendency forces the organization of new services and brings up questions about the availability of adequate workforce. The labour force must be available not only in space and time, but also in the appropriate competence, which is not possible in a lot of cases in the county.
With establishing AM-Lab, the aims to ensure that the project provides the employees with marketable, new knowledge and experience based on the labour market. By doing so, participants can fill in jobs locally, oriented, more profitably with professionally challenging jobs, providing a better quality of life and provide them with professional development opportunities. For the sake of sustainability, credibility and entrepreneurship, the AM-Lab Centre also provides services to local businesses, as a test centre and as an educational venue.
Am-Lab is the first digital innovation HUB in the region so no existing competitor is identified.
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7. Figure: Prusa I3 MK2

8. Figure: Ultimaker 3 Extended

10. Figure: Extreme Builder 1000

9. Figure: FormLabs Form 2

4.2 OBJECTIVE AND TARGET AUDIENCE

The solution where good practice has been tested and validated is Hungary, Vas county. AM-Lab could help a lot with taking the first step towards a quite modern technology like additive manufacturing to get to know it better and help (mainly) the local population to learn this valuable knowledge and use it.

4.3 METHODOLOGICAL APPROACH

It is cost efficient because with the help of this technology the workers are able to produce the same number of products or even more in shorter working hours and with less human resources needed.
The centre has received the ISO qualification.
The solution is in line with the existing risk management
The devices are available in the Center so there is an opportunity to rent them. And the Centre also provides training to help in the use of the devices and gain more knowledge about advanced manufacturing.

Resources are necessary for implementation: cost calculation for the manufacturing, technical devices, human resources.

4.4 VALIDATION PROCESS

Internal staff members validated the process, ISO controller checked the operation.

4.5 RESULTS / IMPACT

Advantages:
- reducing production time
- provides better quality
- cost efficient
- unique design and production

4.6 SUCCESS FACTORS AND CONSTRAINTS

Highly qualified employees are needed
The newest technologies require special knowledge
Available for local stakeholders, too
Unique design and production
Wide range of machines with special properties

More qualified employees with good innovative skills would be appreciated in order to develop more and more projects and ideas.

4.7 LESSON LEARNED & SUSTAINABILITY

Since PBN is eager to produce tangible results and new, useful solutions to provide for its own region and possibly to an even wider consumer circle, they decided to start to participate in the area of the digital innovation related to Industry 4.0 programme with establishing a kind of subsidiary called AM-Lab. The main lessons learned is that it is possible to turn into real business model the knowledge what we gained from international projects.
Am-lab is sustainable from technological and financial aspect, too. Initiatives like this are also included in the S3 strategy of the country.

4.8 REPLICABILITY AND UP SCALING

AM-Lab is not meant to be involved in bulk manufacturing. The main point is to develop new technical solutions with the use of this modern technology in an environmentally friendly way and also to organize training sessions to university students and to other interested possible end-users like local citizens, representatives of companies and so.
Through the trained persons more and more SMEs will have a valuable knowledge about the advanced manufacturing.

4.9 FINAL REMARKS

From prototyping to low- mid Series production. Different 3D printers with different sizes and technologies with multi-material support.

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No limitation.

List of attachments:

NA

5 GP4: Vesz-Mont 2000 Ltd.

Vesz-Mont 2000 Ltd.
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sales@veszmont.hu

Keywords: Special purpose machinery, advanced manufacturing, laser technology
*Good practice applied in: (NACE code):*C33.2 - Installation of industrial machinery and equipment

With respect to Industry4.0 applications the main focuses of Vesz-Mont 2000 Ltd are:

- Integrated sensor technology into robotics
- Laser-engraving applications into mobile devices

5.1 GOOD PRACTICE DESCRIPTION

In 2010 they realized that they need to provide wider service portfolio to our customers. They targeted technologies they were not proficient at the time. Focus was on laser technologies. they were looking for companies with this competency and they were able to keep moving on this path. Nowadays Vesz-Mont 2000 Ltd - one of the largest S.P.M. builder in Hungary.
The relationship to SFH approach is novel technology special purpose machinery.

1. Integrated sensor technology
2. Digitalization
3. Cost effective solutions
4. Energy consumption

As Vesz-Mont 2000 Ltd is one of the largest S.P.M. builder in Hungary, competitors are more in complementary role.

11. Figure: From close

12. Figure: Quantum Lasertech

5.2 OBJECTIVE AND TARGET AUDIENCE

The solution where good practice has been tested and validated is Hungary, West Hungary
The target group of good practice are all companies that have production in their establishments.

5.3 METHODOLOGICAL APPROACH

The applied technology is cost efficient compared to the old technologies.
Buying or using the available technology of Vesz-Mont Ltd is the way to implement the good practice.

5.4 VALIDATION PROCESS

Validation of implemented solution is done by existing team in the company.

5.5 RESULTS / IMPACT

Using of Advanced manufacturing technologies can develop the production of the beneficiaries.

5.6 SUCCESS FACTORS AND CONSTRAINTS

- Integrated sensor technology
- Digitalization
- Cost effective solutions
- Energy consumption

5.7 LESSON LEARNED & SUSTAINABILITY

It is possible to improve every production process and advanced manufacturing can support this activity.

5.8 REPLICABILITY AND UP SCALING

The solution can be transferred to all sectors of the manufacturing industry.

All the positive effects of the implementation can be transferred or repeated, but the infrastructure would be different in every case.

5.9 FINAL REMARKS

They developed a readable code connecting workers, machines and parts involved in the production, enabling them recognizing each other. The IIoT (Industrial Internet of Things) device will provide instant information about the production.

Manufacturing processes can be optimized more than before – also with respect to energy -, intervening in early stage helping capacity usage close to 100%.

Disclaimer / Acknowledgements

No legal constrains.

List of attachments:

Attachment1: https://www.youtube.com/watch?v=c0PqjNYEUQA

6 GP5: Borsodi Műhely LTd.

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Fax: +36 96 529 072
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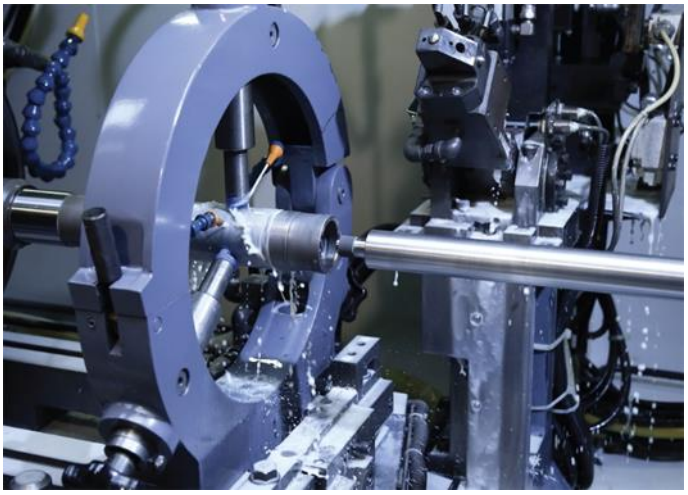
www.borsodimuhely.hu

Keywords : high quality, custom component manufacturing, intership training, Industry 4.0
Good practice applied in: (NACE code) : C25.1 - Manufacture of structural metal products C25.1.1 - Manufacture of metal structures and parts of structures.

Borsodi Műhely Ltd. focuses on integrating robotics and sensor technology into mounting of the single-purpose assembly lines – both design and production included.

6.1 GOOD PRACTICE DESCRIPTION

The main aim of the Borsodi Műhely Ltd. is to satisfy the procurers needs.
Borsodi Műhely Ltd. has professional experiences in the production of unique and precision accessories and gauges. Thanks for the continuous technological developments, the company has the most modern technologies and machines, and this guarantees a high level of quality.
The high quality and internship training for requirement of Industry 4.0
For the perfect quality, Borsodi Műhely Ltd is ascertaining the quality of the raw materials in its own measuring laboratory.
In a unique way the company provide training for students to ensure labour development in all areas. The company has a good relationship with the University of Győr. The company supports the dual training in the university.
During the Practicing-training the company provides 3 months for the students. Within this 3 months the students spend 4-5 days in the company. The company has trainees in the field of engineering, finance and human resource too. Typically, students coming to the company during their last semester, and the company offers them an employment contract if they get their thesis.



13. Figure: Manufacture of precision parts spare parts

14. Figure: Machine, machine repair renovations and maintenance

6.2 OBJECTIVE AND TARGET AUDIENCE

The solution where good practice has been tested and validated is Hungary, West Hungary. The main target audiences: students, companies whose can apply the qualified workforce later.

6.3 METHODOLOGICAL APPROACH

Basically, it is not cost efficient, but the training price can be payback in a long run.
The solution is in line with the existing quality assurance.
Because of the training, companies get a lot of information about the advanced manufacturing. Thanks for this knowledge later they can teach other SMEs for advanced manufacturing. This process can be causes market development.
Human resources, technical devices, professionals, modern and novel teaching material, practical time, company field visit are the minimum expectations of the model.

6.4 VALIDATION PROCESS

Validation was made by internal staff members.

6.5 RESULTS / IMPACT

Absolutely positive impact is that if we have more qualified workforce on the market, more SMEs are able to employ experts who can help with the installation of advanced manufacturing technologies. It is also a niche on the labour market, so newly trained employees will have a good chance to get suitable position.

6.6 SUCCESS FACTORS AND CONSTRAINTS

Education is a long-term investment. Technical devices, company relations and good trainers are needed as investment.

- increase the reputation of the company
- more valuable in advanced manufacturing with this example

More cooperation with large companies, possible field visits, international study visits would increase the value of the trainings.

6.7 LESSON LEARNED & SUSTAINABILITY

Borsodi Műhely Ltd. has professional experiences in the production of unique and precision accessories and gauges. We still decided to use their good practice as education- model. This can give the biggest added value in long term and also contribute to the regional development of SMEs in the field of advanced manufacturing.

6.8 REPLICABILITY AND UP SCALING

SMEs are able to work together with Borsodi Műhely Ltd, as partner in the production, and also take advantages from the educational activities.
Checking the available market needs, more educated experts would be needed in the field of advanced manufacturing. Wider network and cooperation would be welcomed

6.9 FINAL REMARKS

Borsodi Műhely Ltd. has two aspects as good practice. In short term, thanks for the continuous technological developments, the company has the most modern technologies and machines. In long term, the company is active in the educational activities, like organising dual trainings and strongly cooperates with the local university, which can help in the field of lack of well-trained human resources in the advanced manufacturing.

Disclaimer / Acknowledgements

No.

List of attachments:

Information about the services:

Attachments1: http://www.borsodimuhely.hu/
Attachments2: https://www.youtube.com/watch?v=ofWkJRx_E5A
Attachments3: https://www.youtube.com/watch?v=_JU_1_ZxCK4&feature=youtu.be
Attachments4: http://www.borsodimuhely.hu/en/entrepreneur-of-year-2017-award_3682-n.html

7 LESSON LEARNED

This section contains the learned lessons related to the good practice collection activity from the perspective of the partner and who provided the data for each good practice.

Lessons learned from the perspective of the companies who provided the good practice information

The responders were questioned about the learned lessons from their point of view and asked to provide information about the most important aspects. These are summarized as follow:

- Galambos Trans: Customizing is an important requirement for user acceptance. Skilled workforce is needed.
- Julius Globe: skilled worforce are needed for further development and high quality production
- Am-lab: as start-up investment costs and quality assurance are the most important steps to be realible on the field of advanced manufacturing
- Borsodi Műhely: skilled workforce is the basis of the implementation of advanced manufacturing
- Vesz-Mont: Lack of skilled workforce is teh biggest programm. Innovative solutions need a big one-time investment

Lesson learned from the perspective of PBN

- Hard to find competent SMEs
- Some of them very open-minded but the long questionnaires are frightening
- Some data are secret or only CEO can give them
- Industry 4.0 is more a dream than reality
  - expect the showed good examples