TS Workshop 2004

Integration of Prototype Transport and Handling Equipment at CERN
-
Criteria to satisfy operational needs and safety aspects

Oliver Böttcher / Caterina Bertone

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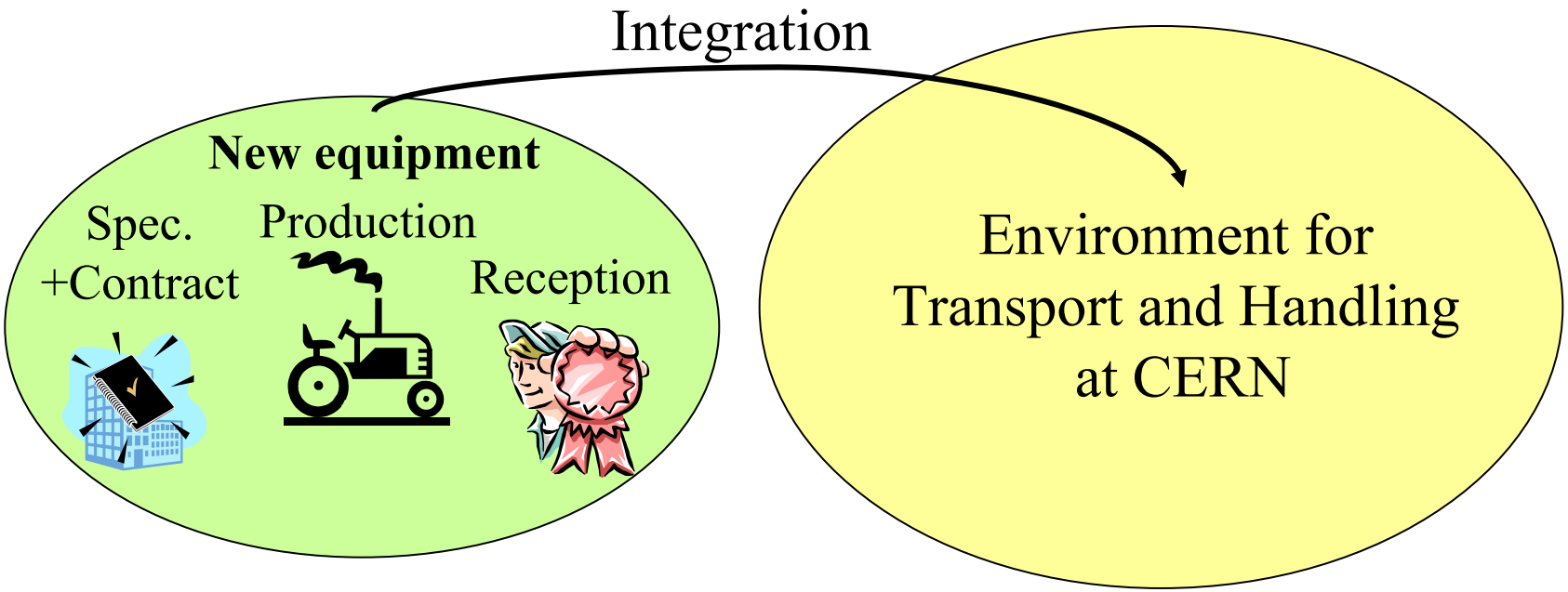
Why this presentation

- For LHC installation we use multiple new transport and handling equipment - some are prototypes for very complex operations.
  The question is: how to assure high operability and safety?

Handling SM18 site	Transports SM18 site	Transport to SMI2	Handling SMI2 / PMI2	Transport in tunnel	Positioning in tunnel
1 Mobile Crane	2 Rocla Vehicles	1 Nicola Trailer	1 Brunnh. Crane	5 MAFI Vehicles	3 ZES Table Sets
Standard	Prototype	Special	Special	Prototype	Prototype
complex	complex	simple	simple	complex	complex
DBS	ICS	DBS	DBS	DBS	DBS
					

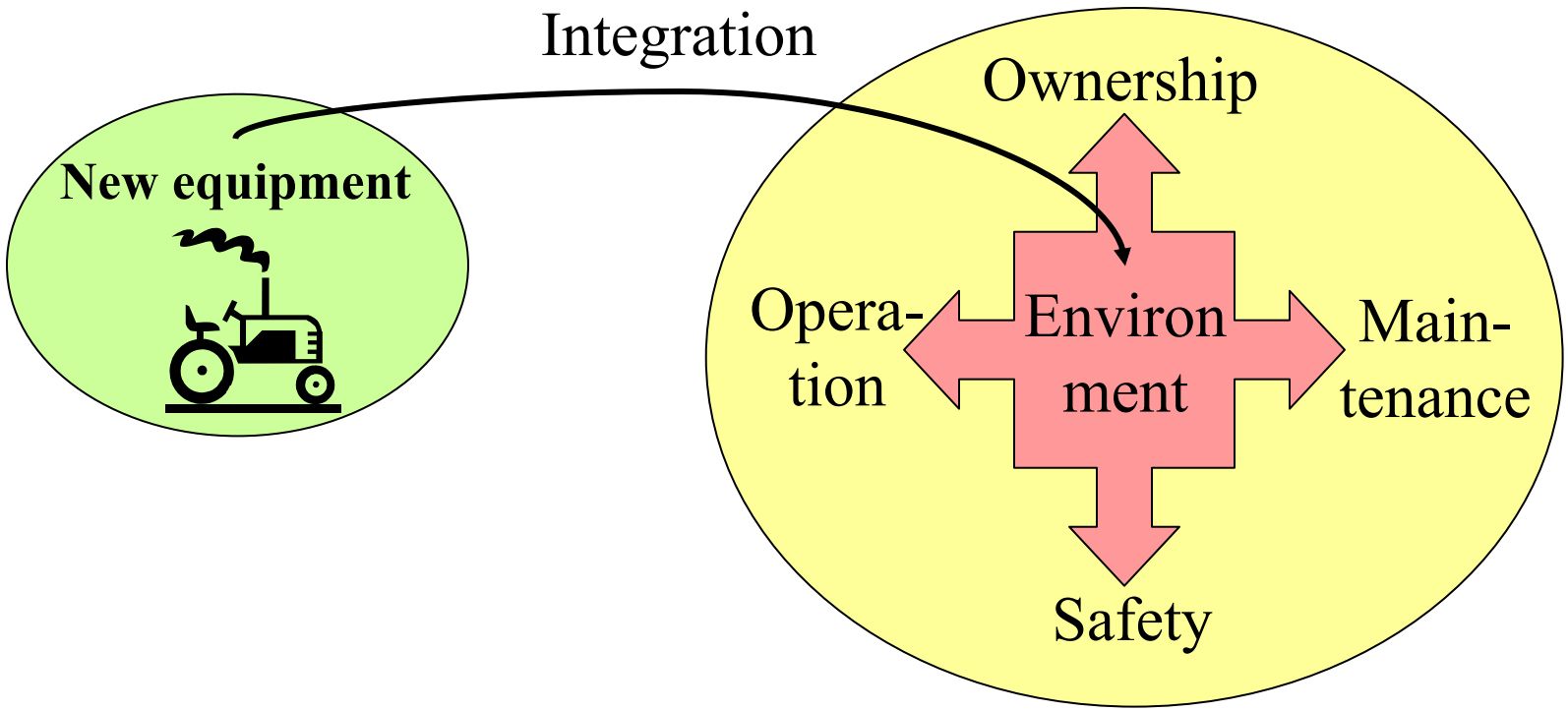
Introduction

- **Integration practically starts after reception with the handover of new equipment to the users**



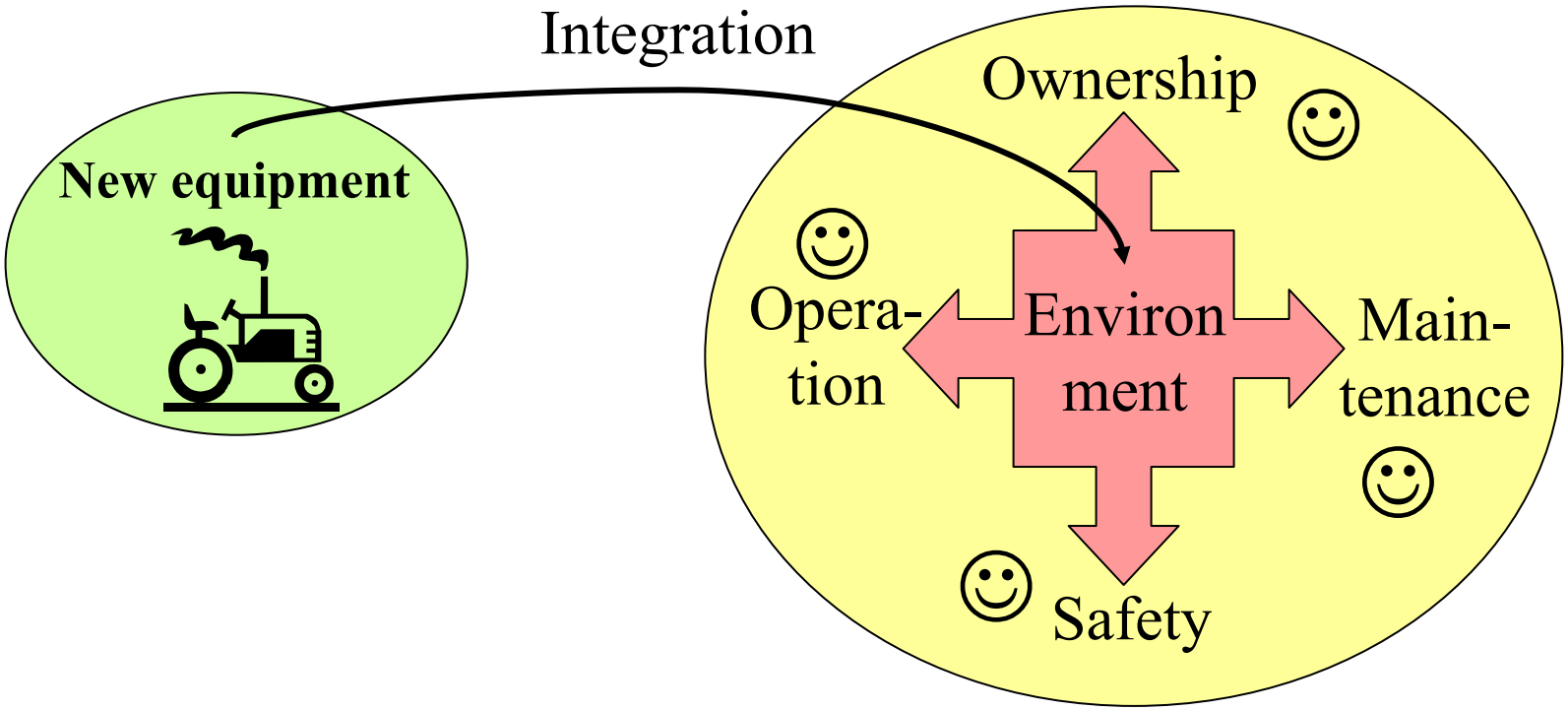
Introduction

- **Integration means that new equipment is implemented into the established working environment at CERN**



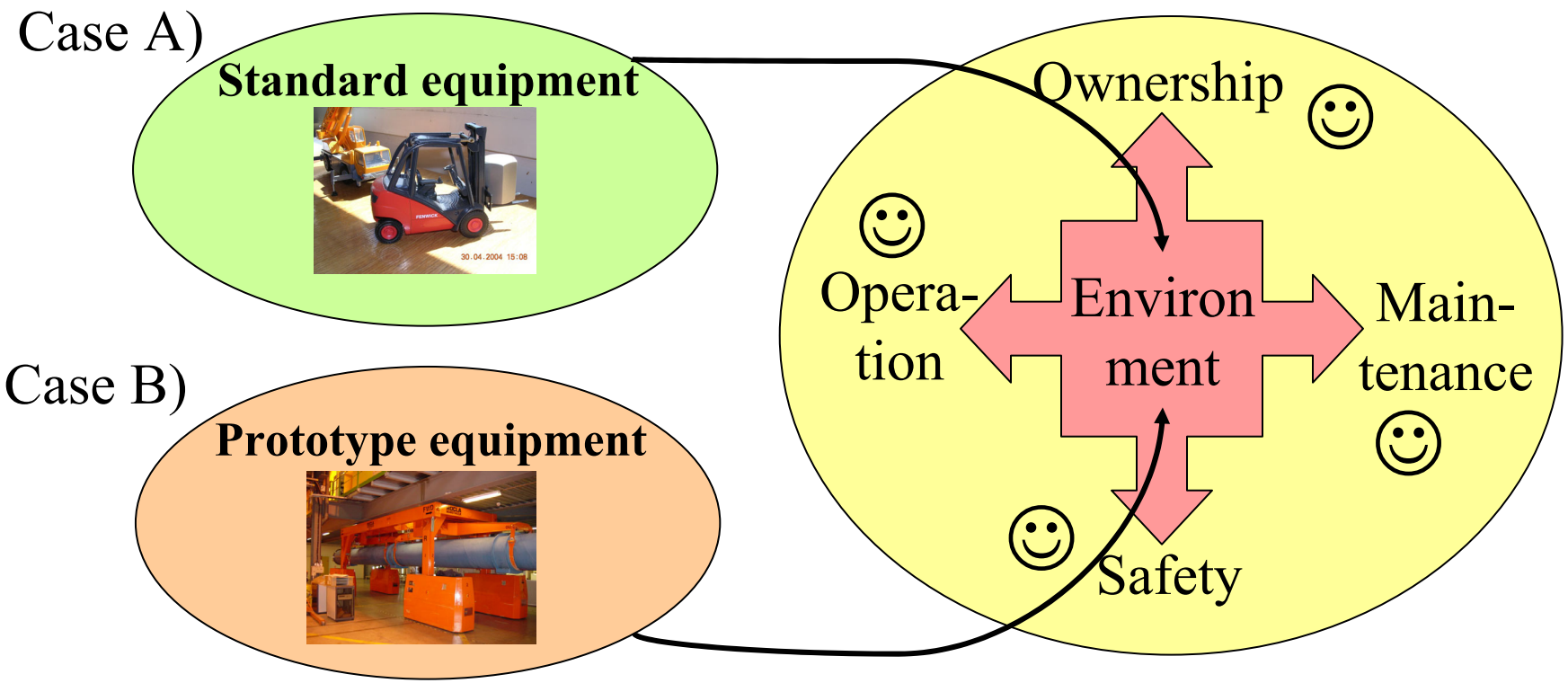
Message

- **A good integration process assures a satisfactory level for operability and safety using the equipment!**



Integration Process

- In the following we discuss what has to be done in order to successfully integrate standard and prototype transport and handling equipment



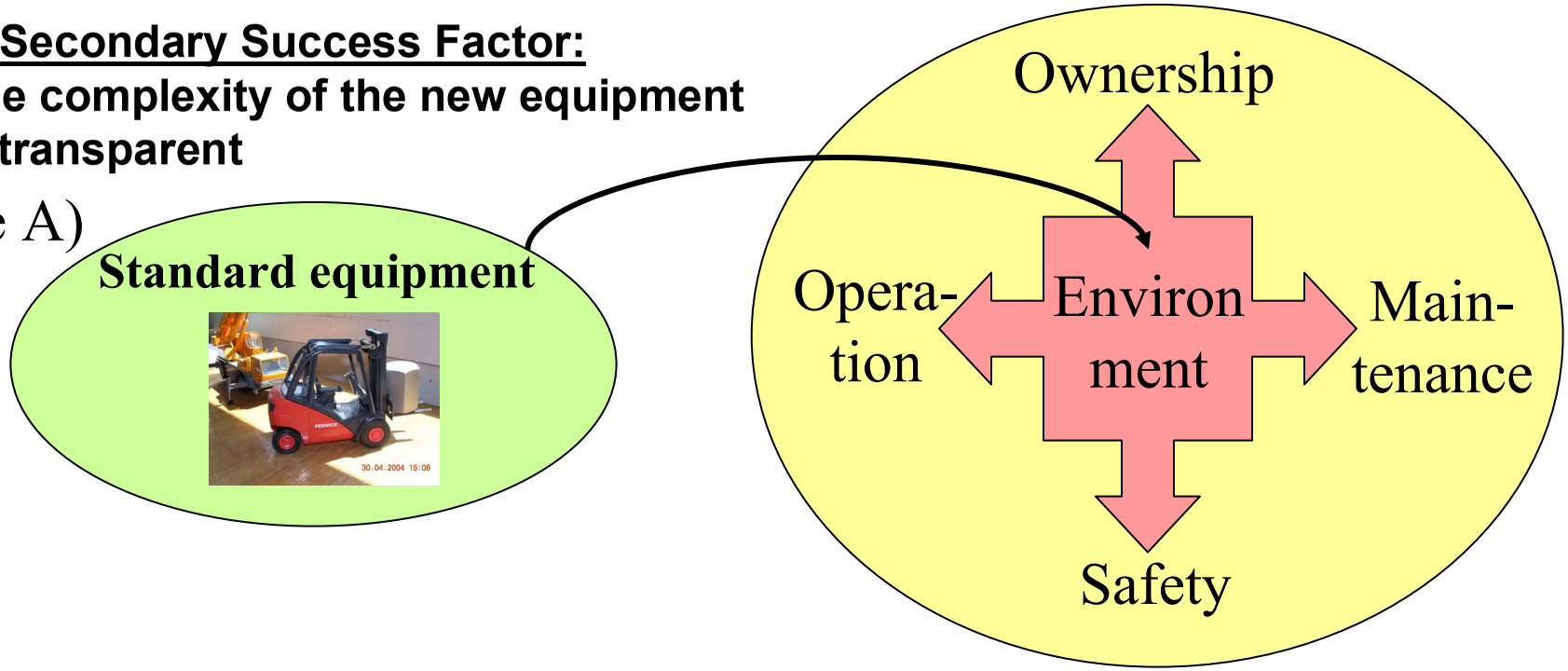
Success Factors

- We can define 2 success factors for the integration process

1) Primary Success Factor:
The environment has routine and is well prepared integrating new equipment

2) Secondary Success Factor:
The complexity of the new equipment is transparent

Case A)

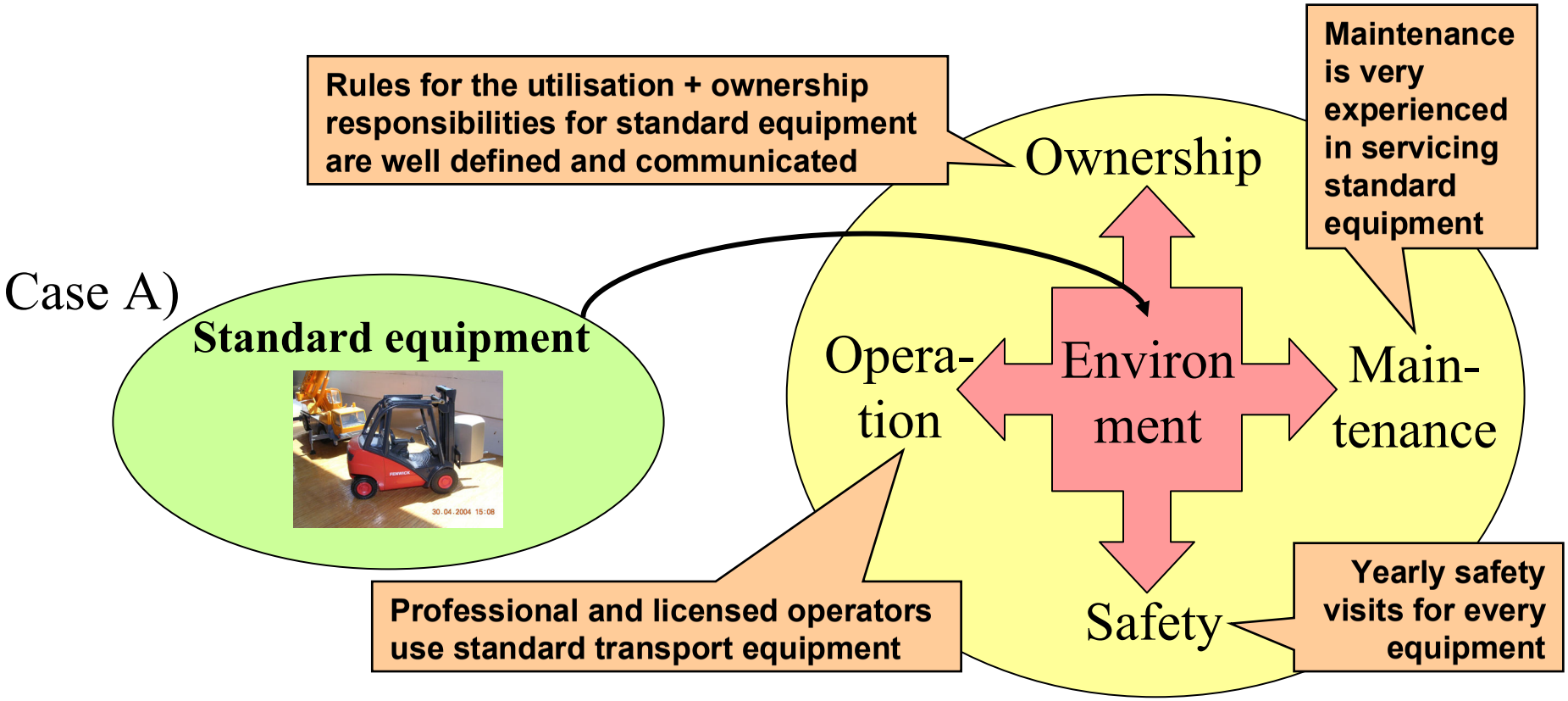


Standard Equipment Integration

- **Exemples of standard equipment:**

Standard Equipment Integration

- **1) Primary Success Factor: The environment has routine and is well prepared integrating new equipment**



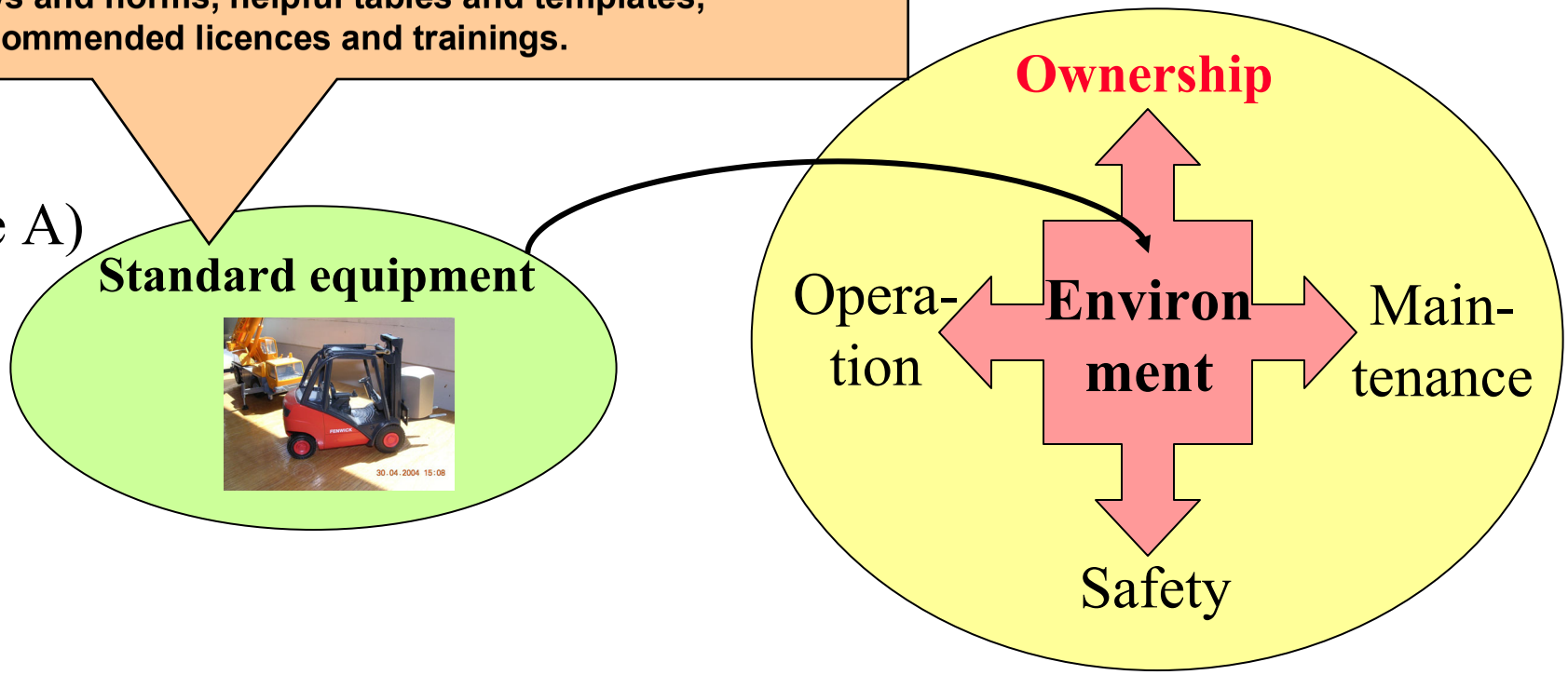
- **Conclusion: The CERN is generally well prepared for the integration standard equipment**

Standard Equipment Integration

- **2) Secondary Success Factor: The complexity of the new equipment is transparent**

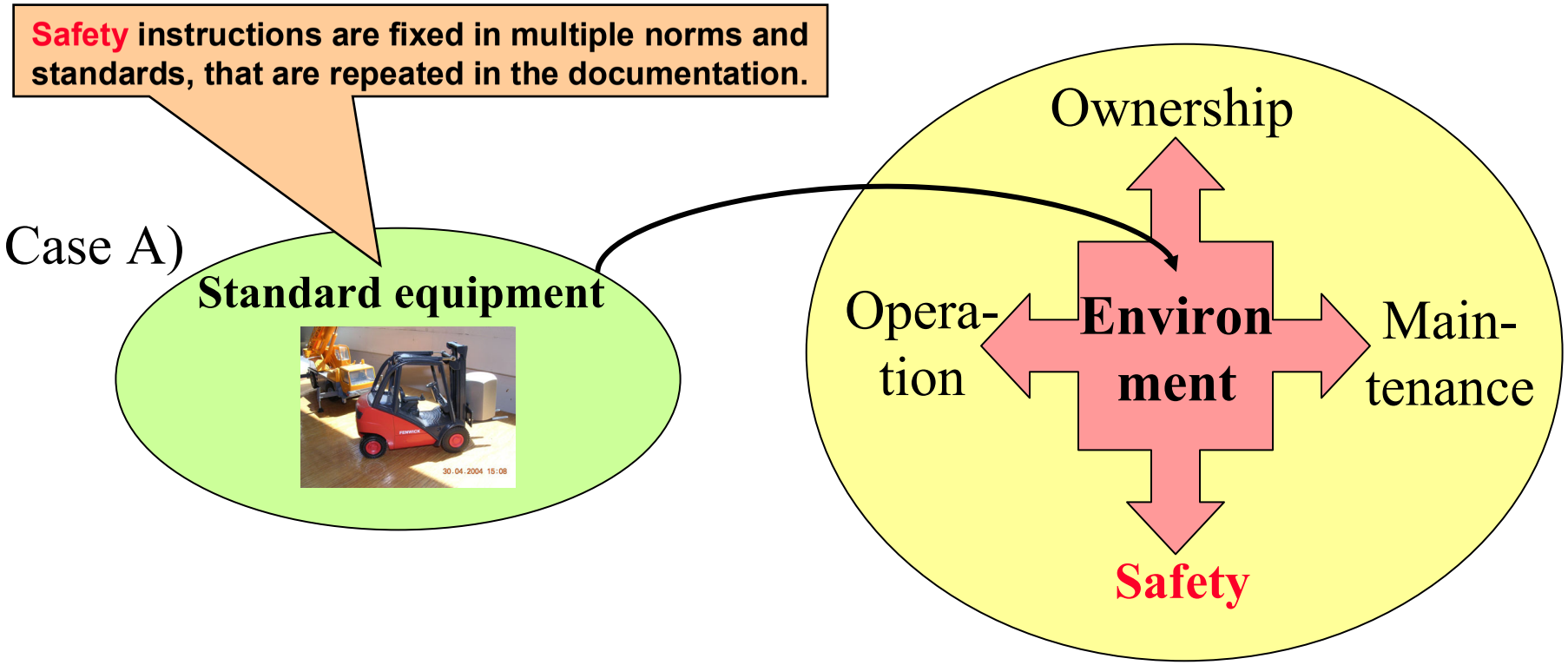
The documentation precises well utilisation and related risks. Rules + responsibilities are given in order to support the users ownership. Information cover related laws and norms, helpful tables and templates, recommended licences and trainings.

Case A)



Standard Equipment Integration

- **2) Secondary Success Factor: The complexity of the new equipment is transparent**



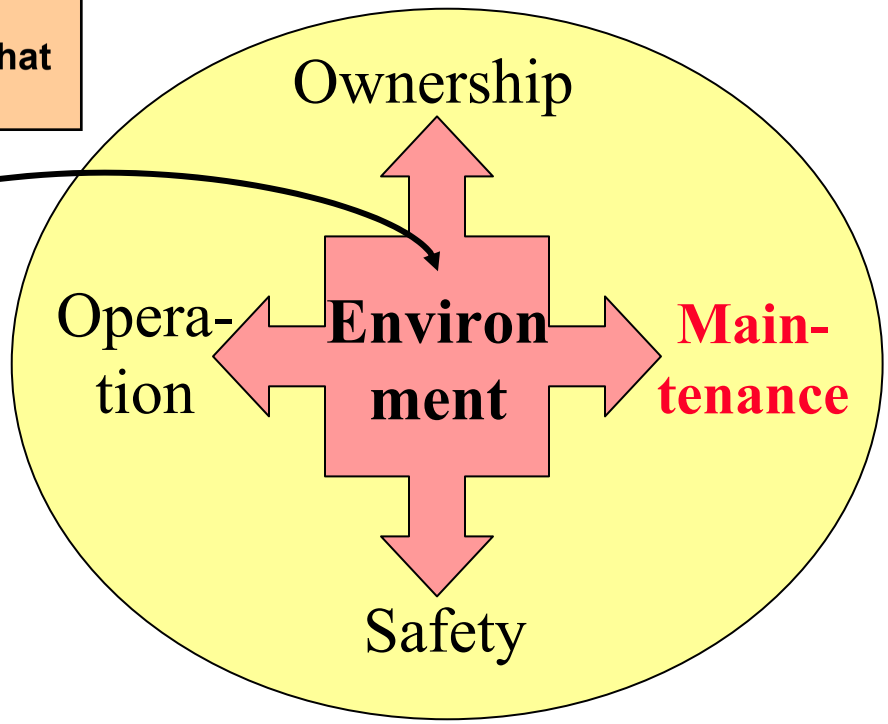
Standard Equipment Integration

- **2) Secondary Success Factor: The complexity of the new equipment is transparent**

Instructions and procedures for maintenance are standardised and well approved by lots of experience. Construction is almost advanced so that service is easy and rare.

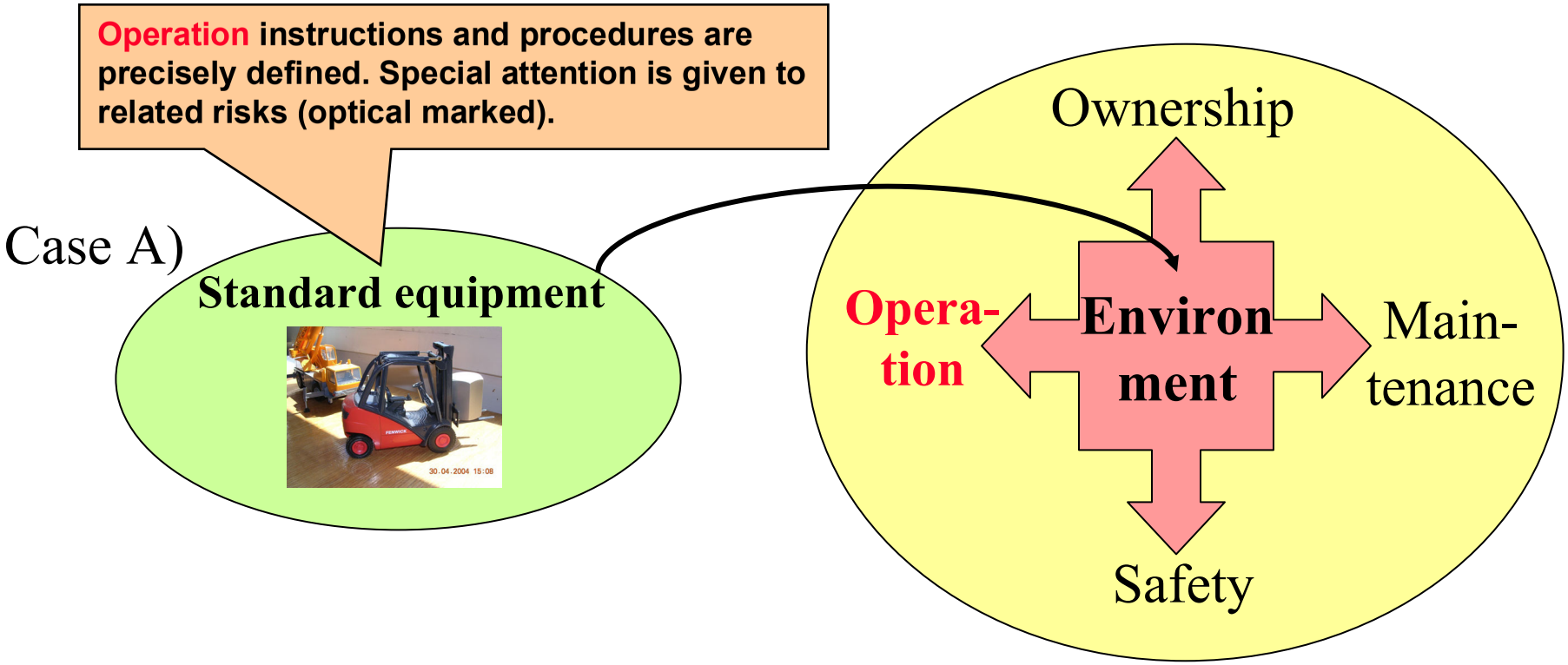
Case A)

Standard equipment



Standard Equipment Integration

- **2) Secondary Success Factor: The complexity of the new equipment is transparent**

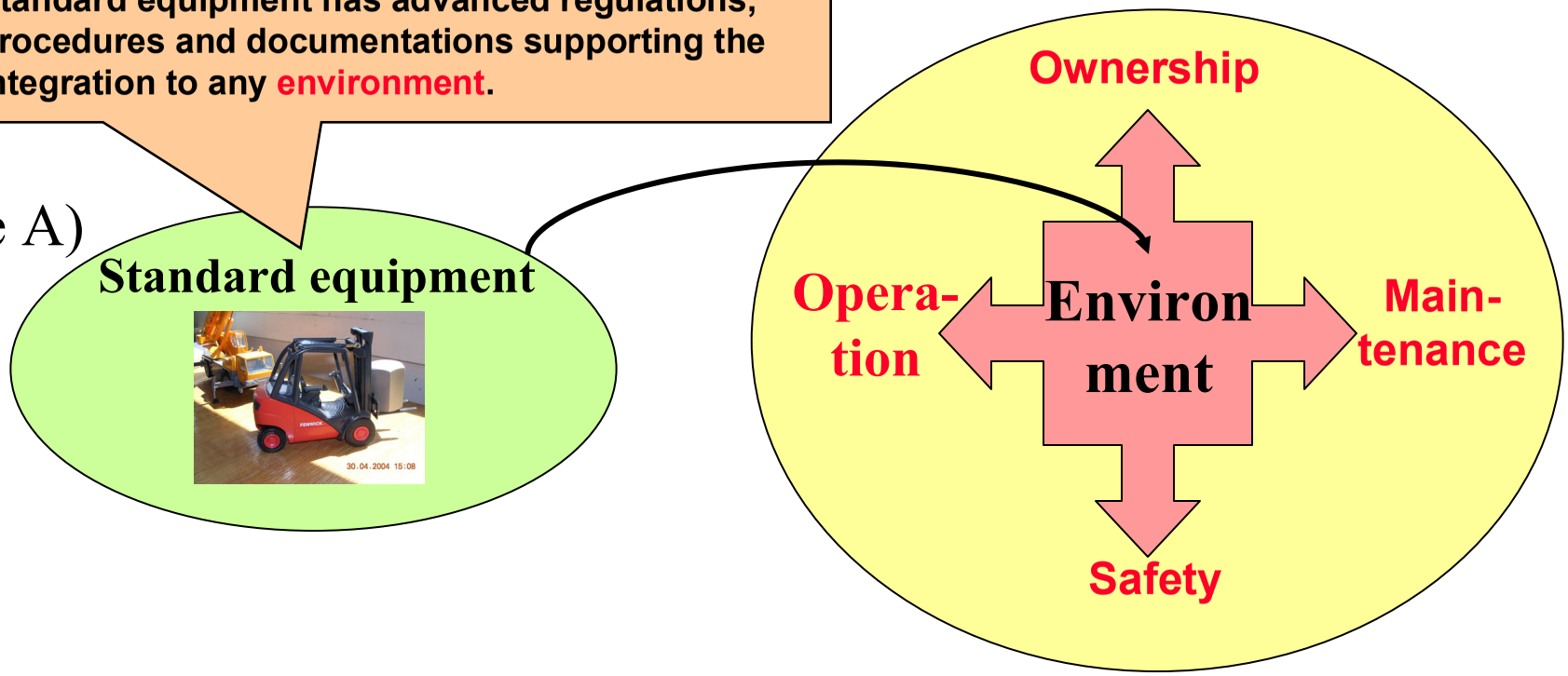


Standard Equipment Integration

- **2) Secondary Success Factor: The complexity of the new equipment is transparent**

Standard equipment has advanced regulations, procedures and documentations supporting the integration to any environment.

Case A)



- **Conclusion: The complexity of standard equipment is very transparent for everybody dealing with it.**

Standard Equipment Integration

- **In summary: The infrastructure at CERN knows how to deal properly with new standard transport and handling equipment …**

and if not …

- **… well informing documentation is available**
- **… training is standardised and available at any time**
- **… after sales services of the constructors are well organised.**

- **Conclusion1: The criteria for successful integration of standard transport and handling equipment at CERN are generally fulfilled!**

Prototype Equipment Integration

- Examples of prototype equipment: MAFI Tunnel Transporters

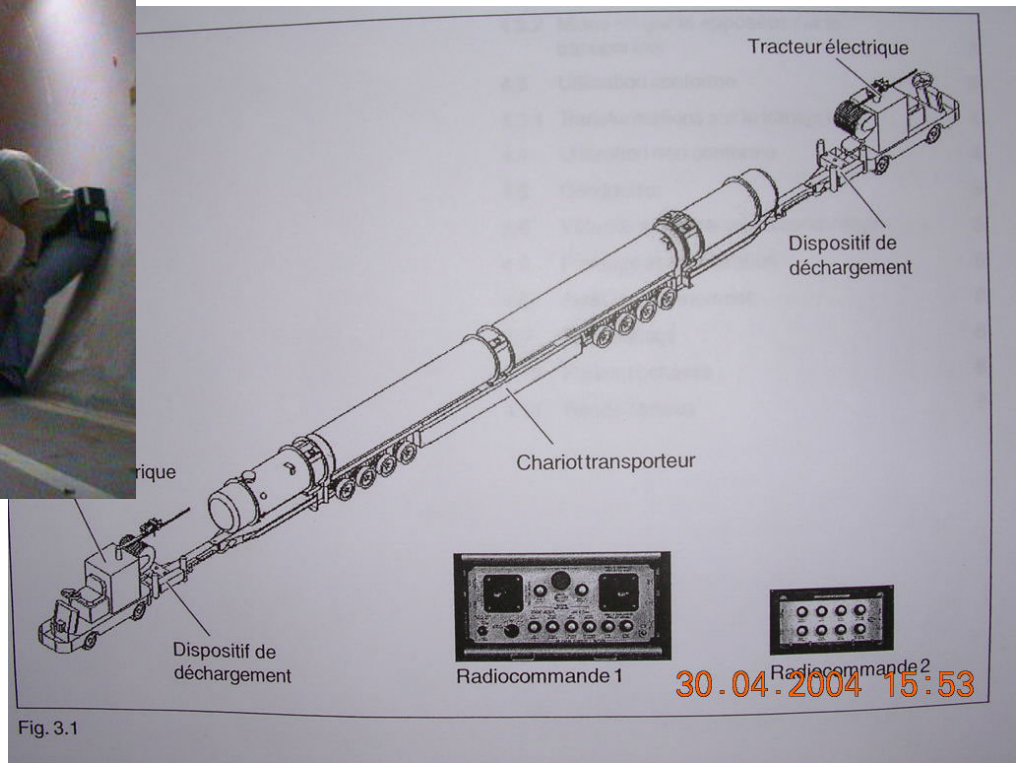


Fig. 3.1

Prototype Equipment Integration

- Examples of prototype equipment: MAFI – Kouba Transporters

Prototype Equipment Integration

- Examples of prototype equipment: Rocla Transporters

Prototype Equipment Integration

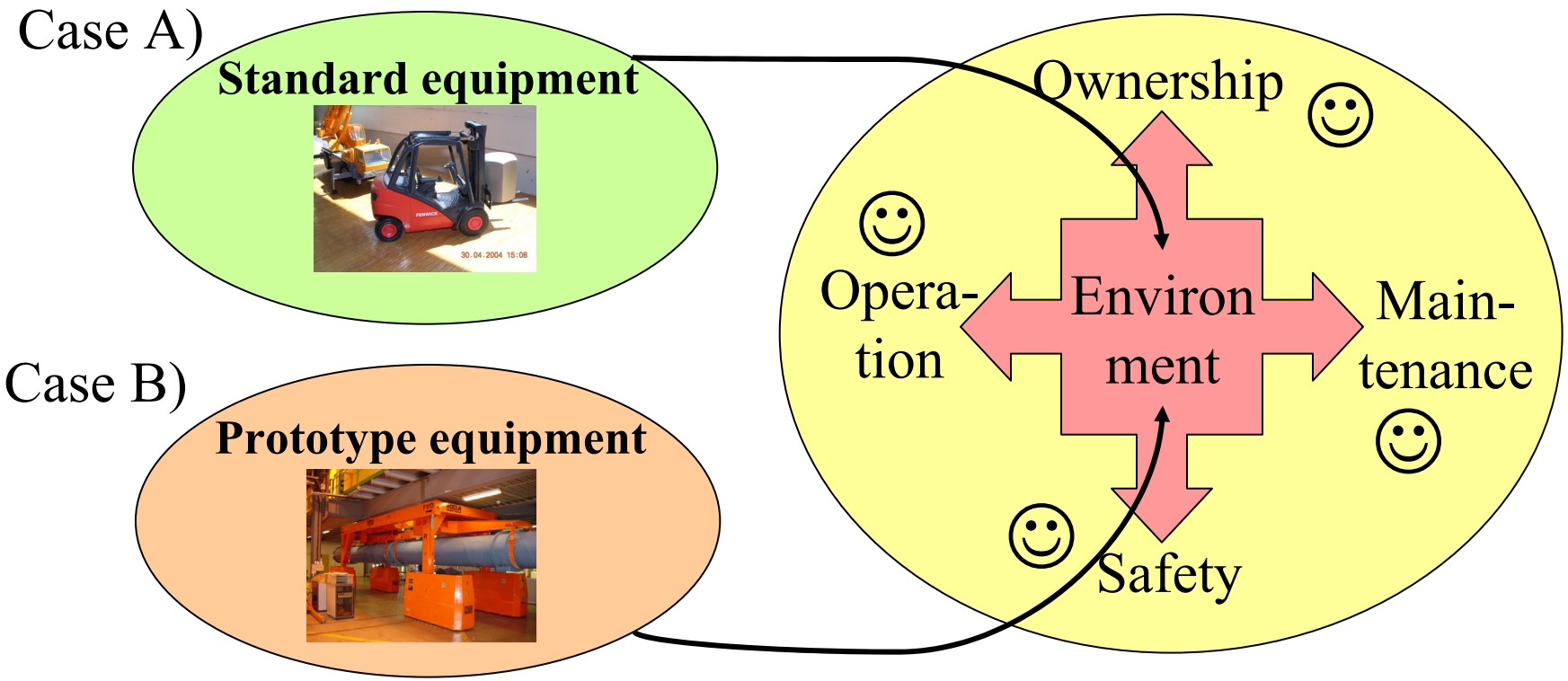
- Examples of prototype equipment: Transfer Tables

Prototype Equipment Integration

- Examples of prototype equipment: 15 – 20 years

Prototype Equipment Integration

- In the following the success factors between standard and prototype equipment integration will be compared
- The goal is to define systematic measures to increase operability and safety for the use of prototype equipment at CERN



Prototype Equipment Integration

- **1) Primary Success Factor: The environment has routine and is well prepared integrating new equipment**

Standard Equipment	Prototype equipment	How to close the gap
Rules for the utilisation + ownership responsibilities for standard equipment are well defined and communicated.	Not standardised! Ownership differs form project to project	For every individual case: Definition of owner Definition of responsibilities and rules for utilisation
Yearly safety visits for every equipment.	Same as standard equipment	
Maintenance is very experienced in servicing standard equipment.	Maintenance is contractually available. The result depends on the technical complexity.	Possibilities to become familiar with the system (trainings and information follow-ups)
Professional and licensed operators use standard transport equipment.	Operators are contractually available. Complex functionality may cause problems.	Possibilities to become familiar with the system (trainings) Constant information about risks and equipment status

- **Conclusion: The integration of prototype equipment mainly needs a defined owner and systematic recurrent training and instructions!**

Prototype Equipment Integration

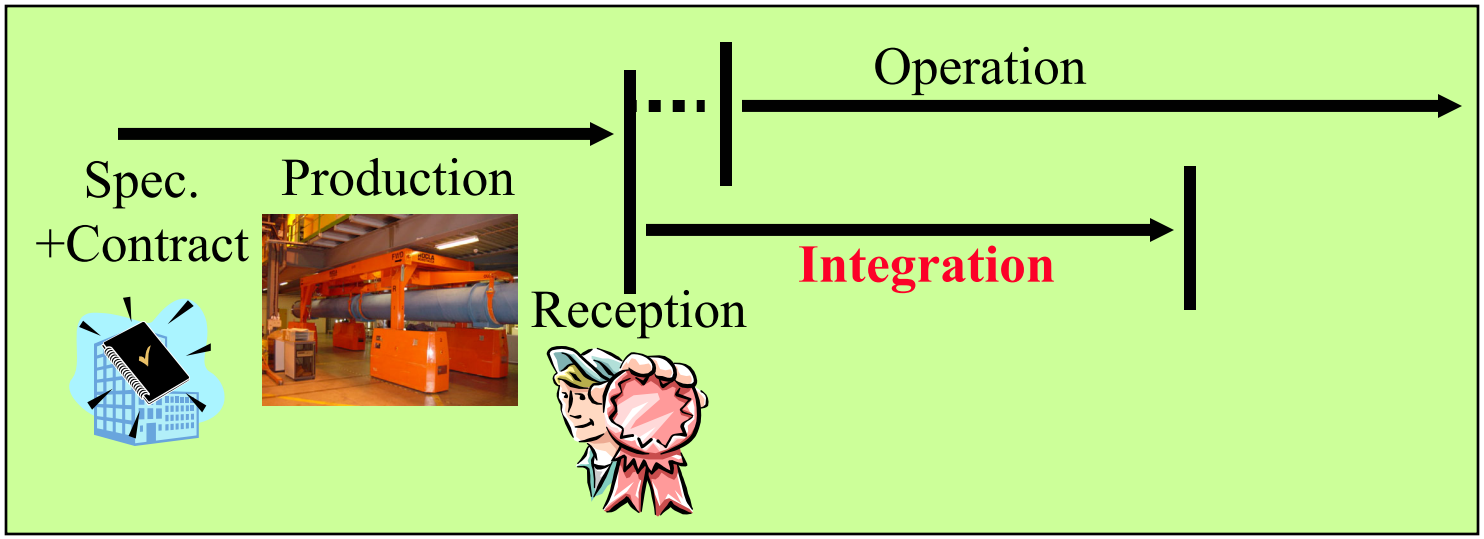
- **2) Secondary Success Factor: The complexity of the new equipment is transparent**

Standard Equipment	Prototype equipment	How to close the gap
Precise rules + responsibilities are given in order to support the users ownership (laws, norms, risks, maintenance, etc.)	Documentation has to be individually developed and adapted to the CERN environment.	Experience during run-in phase has to be implemented into owners documents
Safety instructions fixed by norms (info in documentation).	Not standardised! Multiple norms and regulations do apply	Needs special attention – evtl. revisions necessary
Instructions and procedures for maintenance are standardised.	Maintenance instructions are only provisional and on theoretical basis	Experience during run-in phase has to be implemented into maintenance documents
For operation instructions and procedures are precisely defined. Special attention is given to related risks.	Procedures for standard operation are available. Low level of experience!!!	Experience during run-in phase has to be implemented into operators documents

- **Conclusion: The complexity of prototype equipment is discovered during the run-in phase. The documentation has to be updated constantly.**

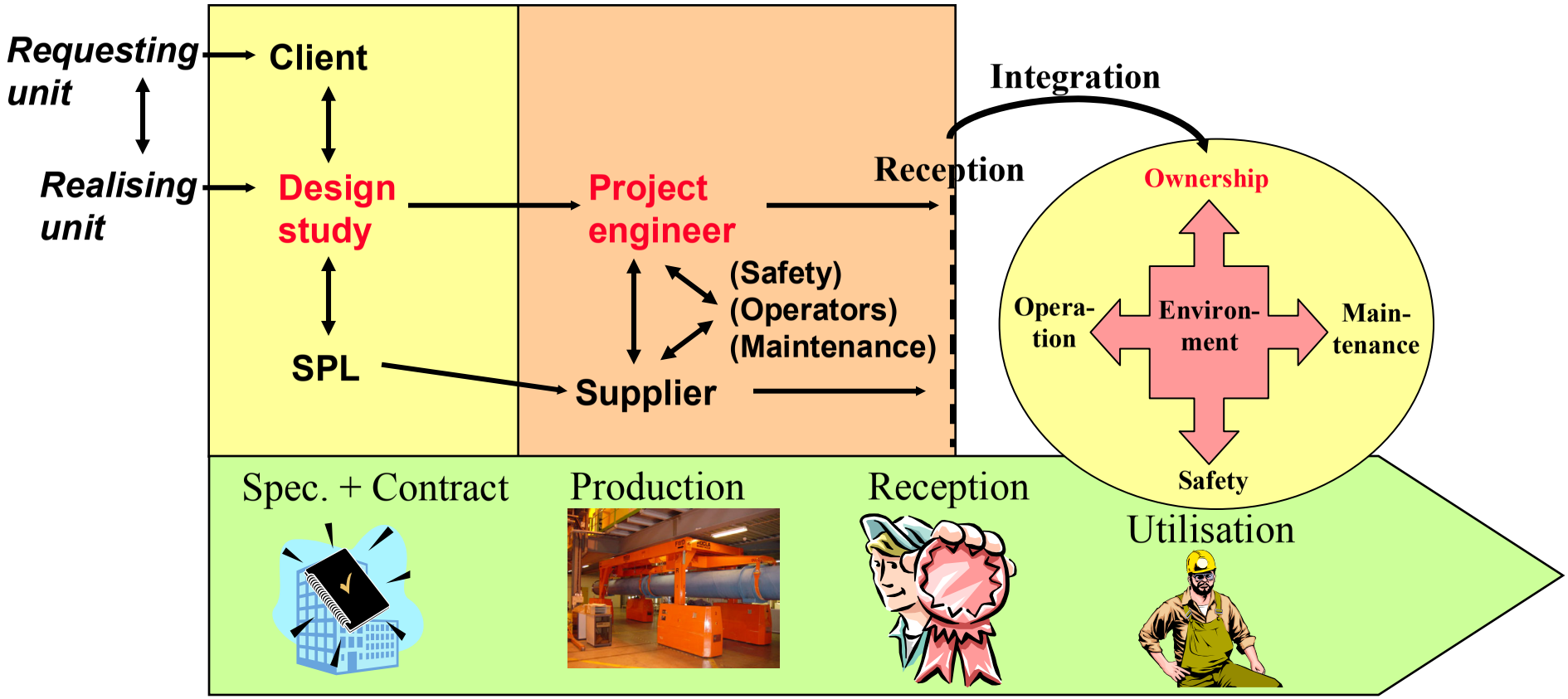
Conclusion

- **Conclusion 2: The integration of prototype equipment should be treated as a project by it's own starting with the equipment hand-over to the user and ending when full operability is achieved.**
  - **The organisation has to be prepared (responsibilities, training, introduction, procedures etc.)**
  - **The documentation has to be updated constantly (version and information management)**



Proposal

- **Actually, projects are mostly handed over with their advancement (client and later users are very passive).**
  Problem: Know-how has to be transferred multiple times!!!



Proposal

- Requesting unit mandates the later owner. This person is leading the project and stays in charge of the equipment for it‘s whole lifecycle