

Evaluation framework for damage events in the equipment rental industry

Project participants

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Project approach





Ambition level of the project is to achieve tangible results by concrete OEM actions facilitated by clear communication from the rental industry

Brief elements	Content
<p>Project objectives</p>	<ul style="list-style-type: none"> • Developing a framework as mutual communication tool between rental industry and OEMs related to crucial damage events • Inducing OEMs to include the guidance from the rental industry regarding case event rankings into their equipment design process in order to develop more cost efficient and safer equipment • Evidence from OEMs: actual carried out design changes
<p>Scope</p>	<ul style="list-style-type: none"> • Equipment: selection of product categories within heavy and access <ul style="list-style-type: none"> • Heavy: excavators, rollers, dumpers, wheel loaders, skid steers • Access: telehandlers, scissors, trailer mounted, booms, mast • Damage events: Taken from "Catalogue of rental industry issues, needs and requirements" • Time: Tangible results should be provided by the OEMs till Sept. 2015
<p>Deliverable of this workshop today</p>	<ul style="list-style-type: none"> • Agree upon the project brief and methodology • Develop the evaluation framework • Apply the framework on the actual list of damage events and come up with a ranking of damage events • Elaborate complementary questions and hints towards the OEMs per damage event (at least the high-priority ones) to guide OEM design work





The evaluation dimensions

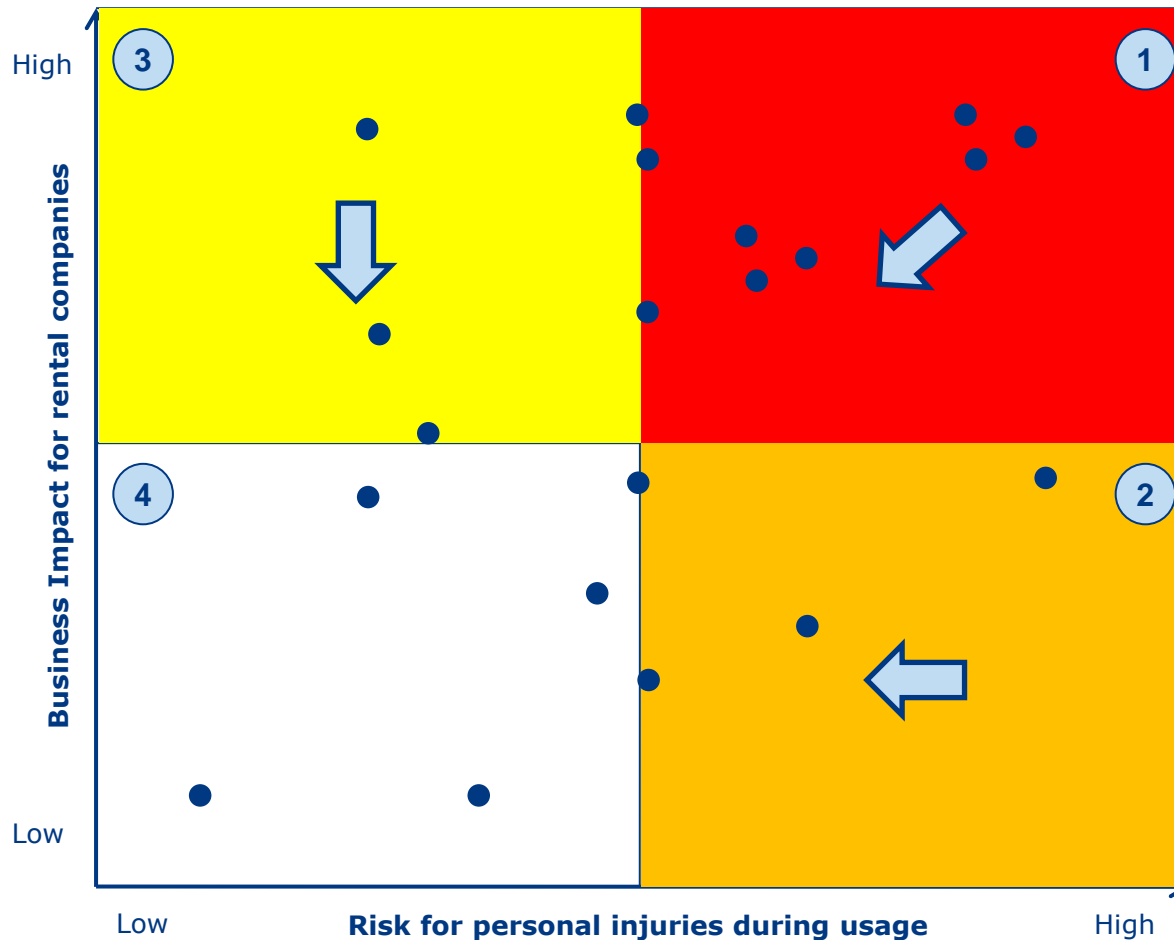
<u>Dimension</u>	<u>Drivers</u>
Business impact for rental company	<ul style="list-style-type: none">• Number of damage events per year• Spare parts costs• Repair service costs• Opportunity costs (e.g. due to idle time and/ or costs for provision of replacement equipment)
Risk for personal injury during usage	<ul style="list-style-type: none">• Potential scope of impact (operator, supporting staff, other people on-site, people off-site)• Type of injury related to a damage event (e.g. squeezing a toe, losing a head)• Potential for preventive measures (e.g. locks, bars, engine shot-downs)• Inbuilt redundancy functionalities (e.g. double-window)• Inbuilt warning systems (e.g. sounds, lights)

Each potential damage event should be evaluated through those two dimensions





The matrix




Comments

- When evaluating the different damage events, proxies or numerous estimates (e.g. costs, volumes) should be used where possible in order to drive the evaluation more fact-based
- Before starting the evaluation it should be considered whether there are synergies between equipment categories related to the evaluation; if yes, those categories could be clustered in the same matrix; if no, separate matrices need to be created in order to keep similar level of value sensitivity
- Depending on the location of the "evaluation dot" in the matrix, different priority and hence attention should be given to the damage event behind it.

Guiding rule for the project must be to move all dots into the lower-left quadrant

 = Priority indicator of 4-field matrix; 1 for highest priority, 4 for lowest

 = Ambition indicator to move all dots into quadrant 4 by action



The starting point

The ERA Technology work is the basis



The aggregation to potential damage events

- Operator broken windows
- Operator damages on bonnets and canopies
- Operated broken tyres and belts
- Operator broken lights and accessories
- Operator broken hydraulic cylinders
- Operator broken baskets (access)
- Operator hydraulic hoses breakage
- Loading and unloading damages on bonnets and canopies
- Loading and unloading damages on hydraulic parts
- Loading and unloading damages on baskets (access)
- Loading and unloading damages on lights and accessories
- Wrongly used fuel
- Running out of fuel
- Flat battery
- Clogged air filters
- Clogged fuel filter
- Misuse of emergency buttons
- Lost keys
- Lack of visible equipment measures on the machine
- Mark and indicators
- Lack of standards in colour and sound safety
- Inappropriate lifting points
- Inappropriate tie down points
- Accessible lifting and tie down points from ground level
- Unclear marking of lifting and tie down points
- Lack of daily maintenance at customer
- Lack of simplified user manuals

The evaluation process during the workshop entails several steps for each potential damage (see next slide)



The workshop routine

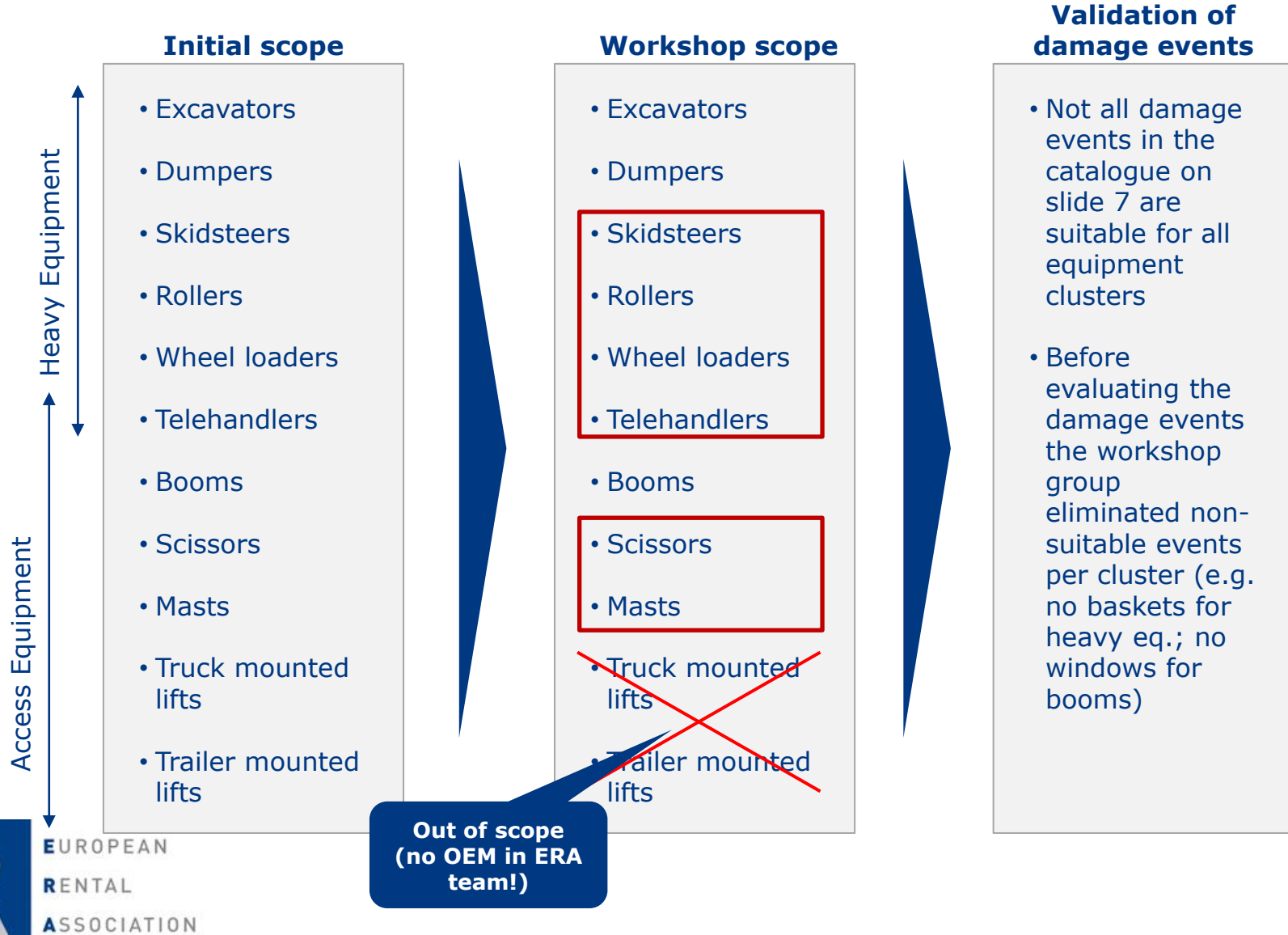
Steps	Explanation
1 Evaluation mechanics	<ul style="list-style-type: none"> • Define potential equipment clusters • List damage events relevant for each equipment cluster (in Excel)
2 Round the table	<ul style="list-style-type: none"> • Evaluate each damage event by giving grades (1 for low, 6 for high) for the two dimensions "Business Impact" and "Risk for injury" • Plot the results into the matrix in Excel
3 Validation of results	<ul style="list-style-type: none"> • Analyze the result and try to identify inconsistencies (e.g. too many dots in one quadrant, obvious outliers, relational outliers) • Resolve inconsistencies; in cases of lacking objective facts or strong expert insights apply the method of pairwise comparison to create a ranking and hence a repositioning of the dots
4 Develop key questions	<ul style="list-style-type: none"> • Rank all damage events based on the evaluation results from the matrix • Start at the top and discuss per damage event potential indepth-questions, which then could guide the OEMs towards a potential solution of the issue

Keep in mind: a result is more worth than the process!



The workshop results

1. Evaluation mechanics





The workshop results – Telehandlers & Wheel Loaders

2. + 3. The Matrix

Damage events sorted according to significance



- Inappropriate lifting points (for machines up to 2,5t)
- Inappropriate tie down points
- Lack of simplified user manuals
- Operator broken hydraulic cylinders
- Operator hydraulic hoses breakage
- Loading and unloading damages on baskets (access)
- Operator damages on bonnets and canopies
- Loading and unloading damages on hydraulic parts
- Lack of standards in colour and sound safety
- Lack of daily maintenance at customer
- Wrongly used fuel
- Lost keys
- Operated broken tyres and belts
- Loading and unloading damages on bonnets and canopies
- Lack of visible equipment measures on the machine
- Running out of fuel
- Misuse of emergency buttons
- Operator broken lights and accessories
- Loading and unloading damages on lights and accessories
- Clogged air filters
- Clogged fuel filter
- Flat battery

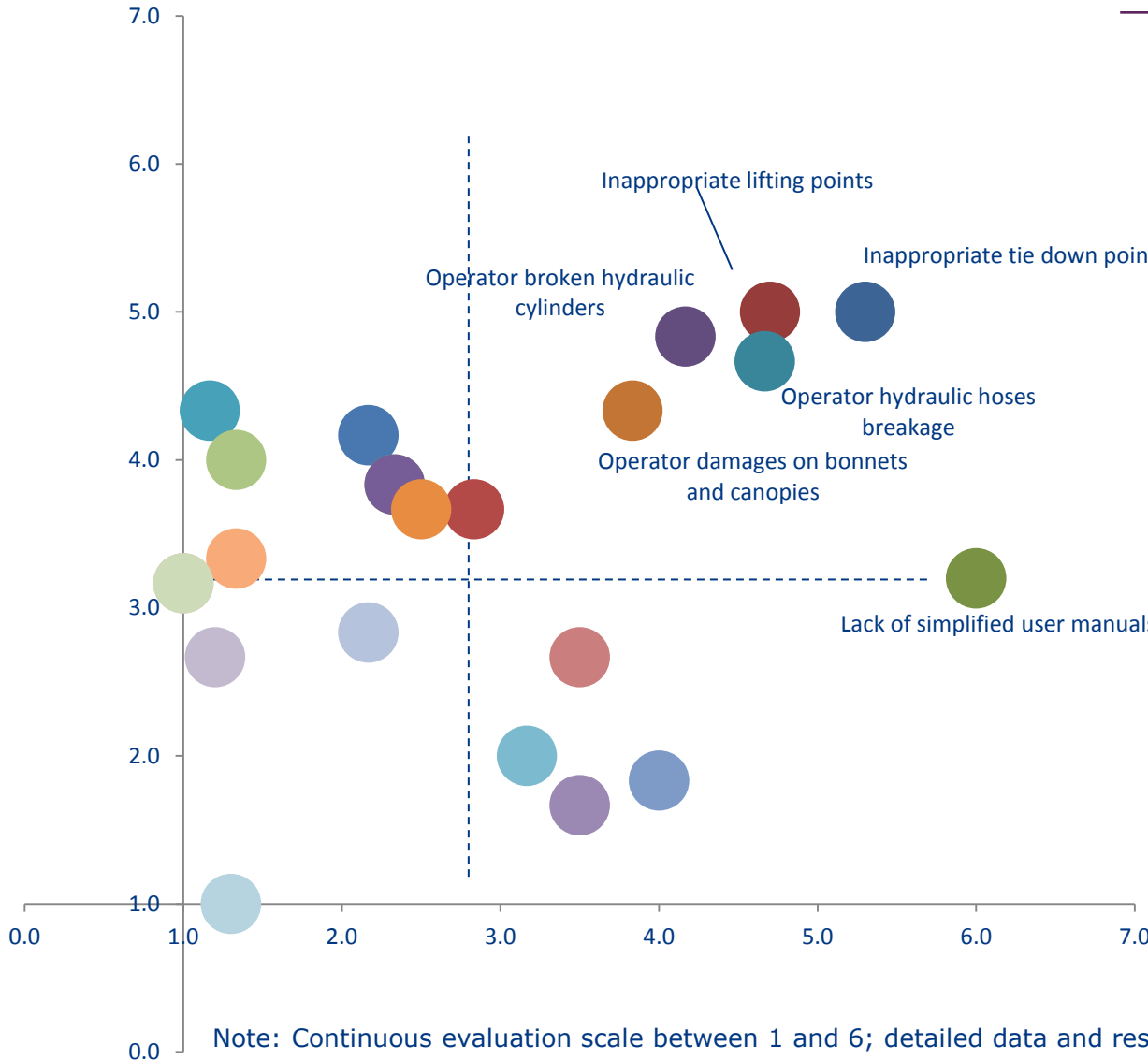
Note: Continuous evaluation scale between 1 and 6; detailed data and results in corresponding Excel



The workshop results – Excavators

2. + 3. The Matrix

Damage events sorted according to significance



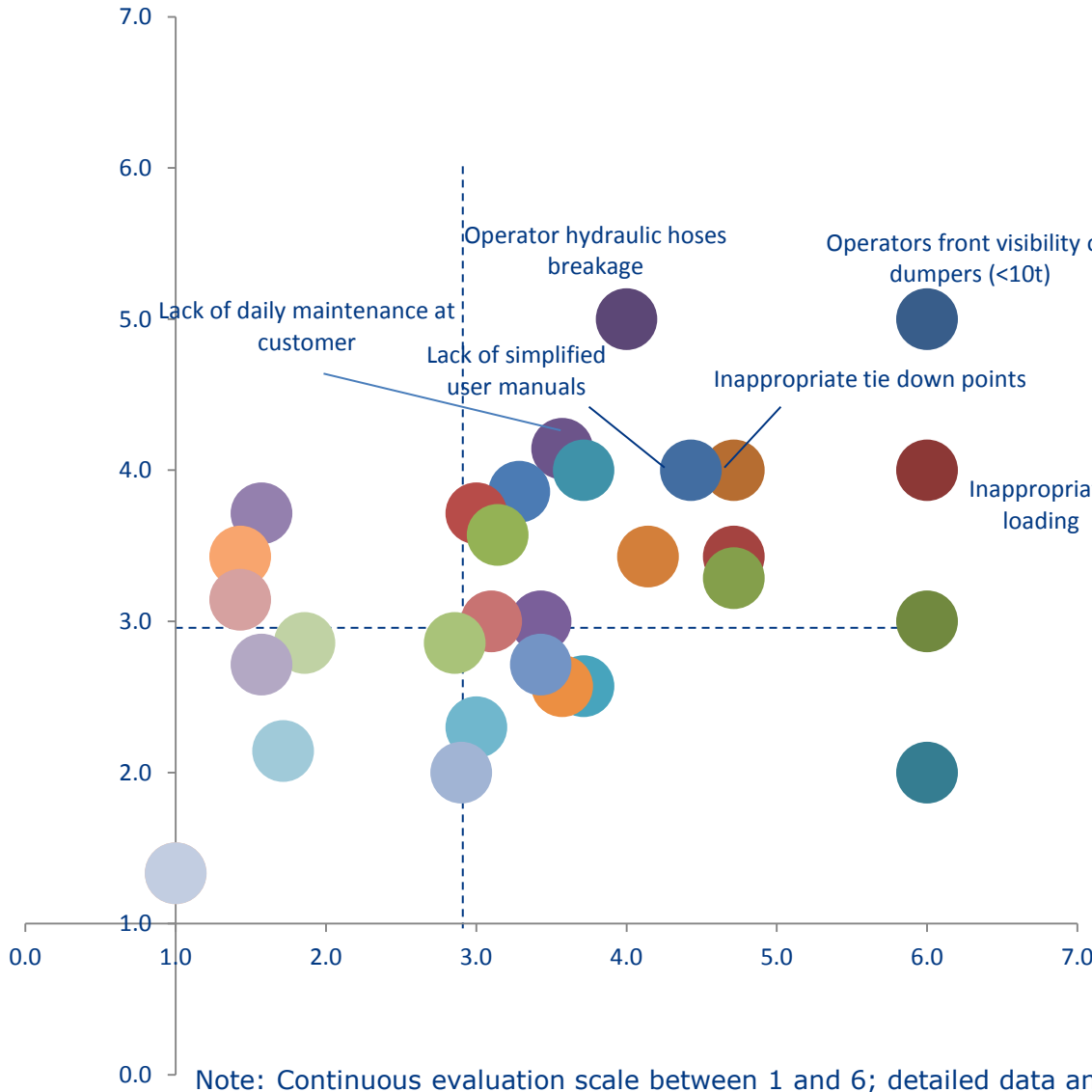
- Inappropriate tie down points
- Inappropriate lifting points
- Lack of simplified user manuals
- Operator broken hydraulic cylinders
- Operator hydraulic hoses breakage
- Operator damages on bonnets and canopies
- Operator broken windows
- Loading and unloading damages on hydraulic parts
- Operated broken tyres and belts
- Lack of daily maintenance at customer
- Wrongly used fuel
- Loading and unloading damages on bonnets and canopies
- Lack of visible equipment measures on the machine
- Mark and indicators
- Lost keys
- Lack of standards in colour and sound safety
- Loading and unloading damages on lights and accessories
- Running out of fuel
- Operator broken lights and accessories
- Clogged air filters
- Clogged fuel filter
- Misuse of emergency buttons
- Flat battery

Note: Continuous evaluation scale between 1 and 6; detailed data and results in corresponding Excel



The workshop results – Dumpers

2. + 3. The Matrix



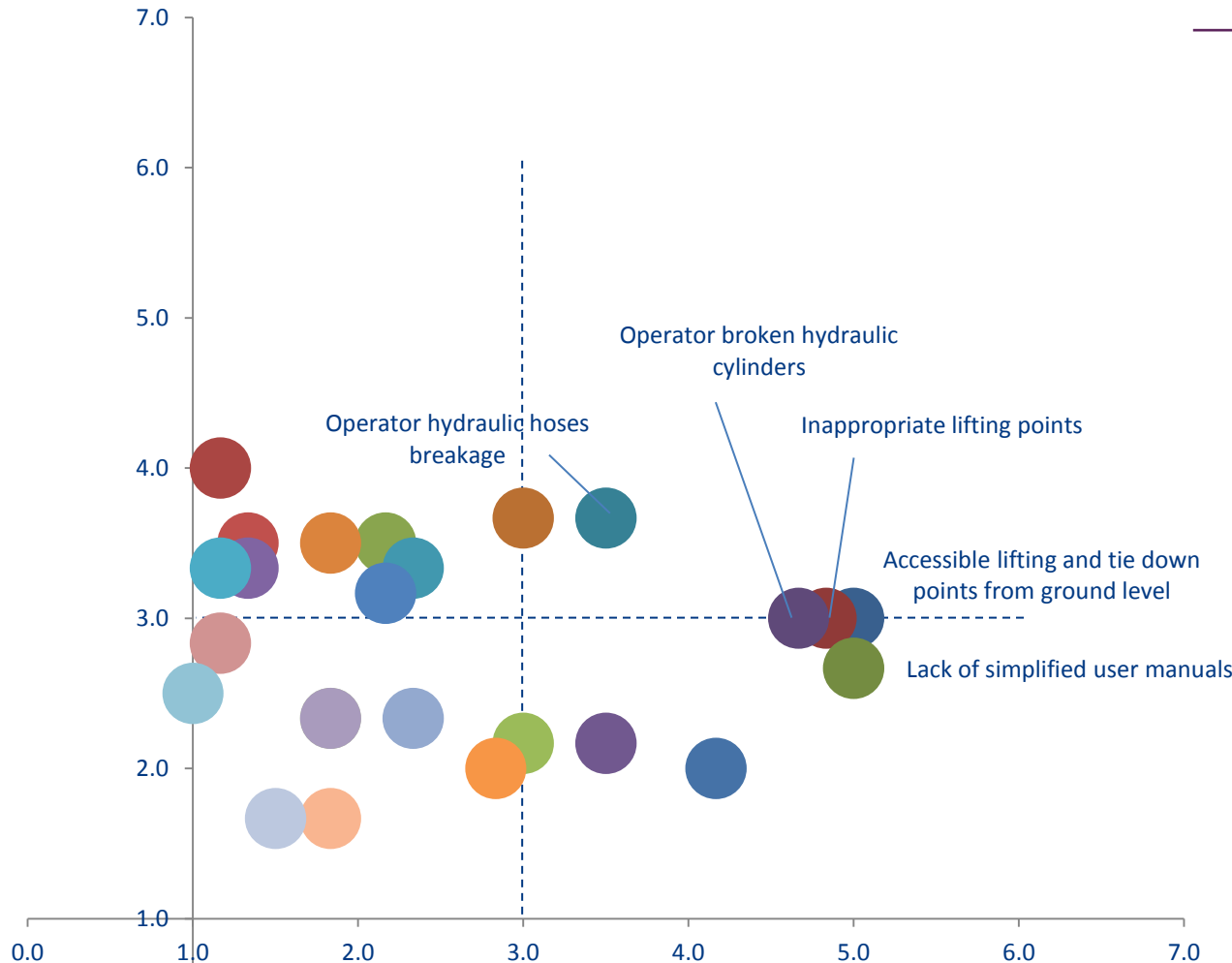
Damage events sorted according to significance

- Operators front visibility on dumpers (<10t)
- Inappropriate loading (overloading of the skip, unbalanced loading, high loading etc.)
- Machine operation with ROPS folded down
- Operator hydraulic hoses breakage
- Operations with seatbelts off
- Inappropriate tie down points
- Lack of simplified user manuals
- Inappropriate lifting points
- Unclear marking of lifting and tie down points
- Lack of daily maintenance at customer
- Operated broken tyres and belts
- Accessible lifting and tie down points from ground level
- Loading and unloading damages on bonnets and canopies
- Operator damages on bonnets and canopies
- Operator broken hydraulic cylinders
- Operator broken lights and accessories
- Lack of standards in colour and sound safety
- Lack of visible equipment measures on the machine
- Mark and indicators
- Loading and unloading damages on hydraulic parts



The workshop results – Skidsteers & Rollers

2. + 3. The Matrix



Damage events sorted according to significance

- Accessible lifting and tie down points from ground level
- Inappropriate lifting points
- Lack of simplified user manuals
- Inappropriate tie down points
- Operator broken hydraulic cylinders
- Operator hydraulic hoses breakage
- Unclear marking of lifting and tie down points
- Wrongly used fuel
- Operated broken tyres and belts
- Mark and indicators
- Lack of daily maintenance at customer
- Operator broken windows
- Operator damages on bonnets and canopies
- Lost keys
- Lack of visible equipment measures on the machine
- Clogged air filters
- Running out of fuel
- Lack of standards in colour and sound safety
- Operator broken lights and accessories
- Clogged fuel filter
- Loading and unloading damages on bonnets and canopies
- Loading and unloading damages on hydraulic parts
- Flat battery
- Misuse of emergency buttons
- Loading and unloading damages on lights and accessories

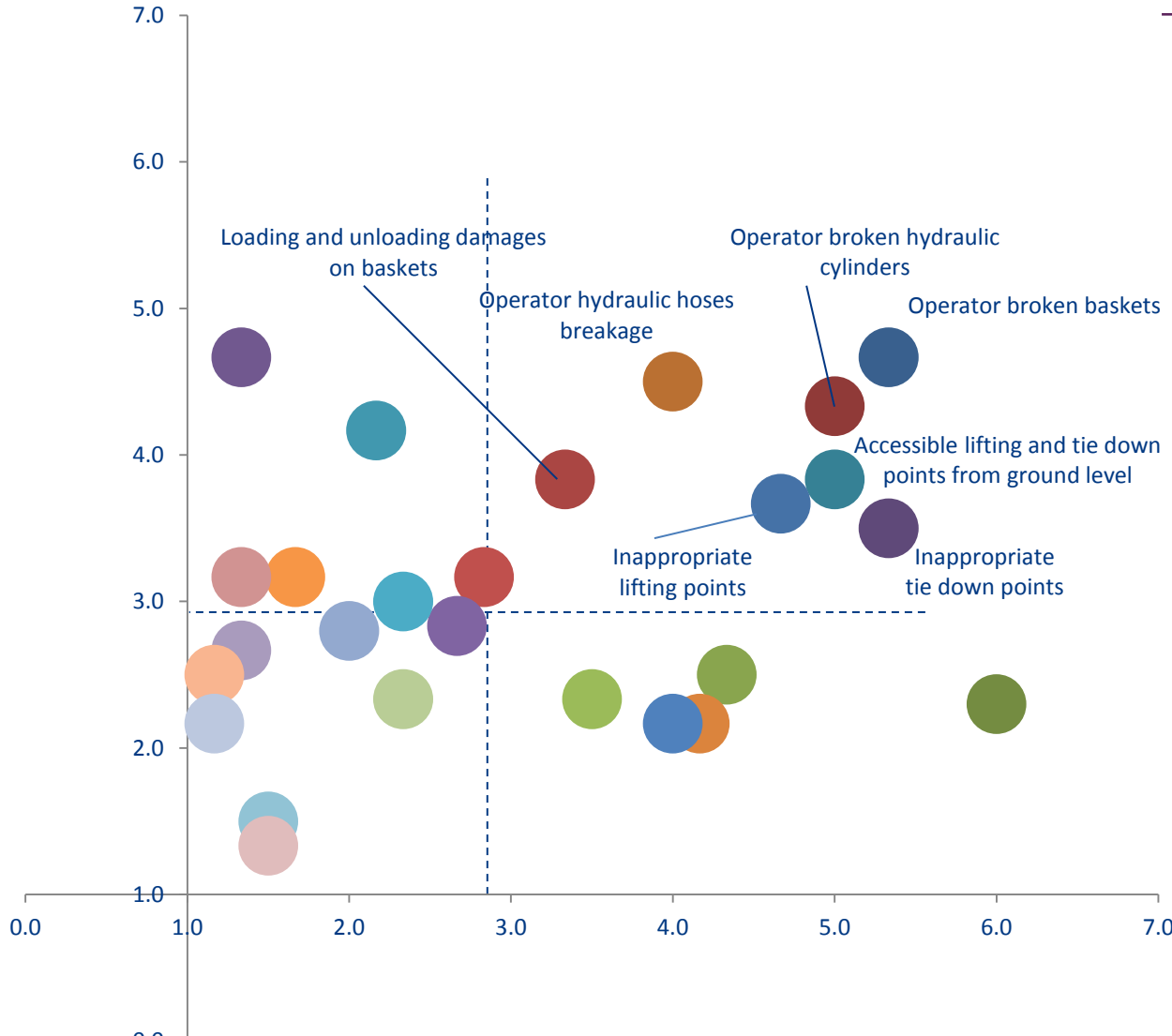
Note: Continuous evaluation scale between 1 and 6; detailed data and results in corresponding Excel



The workshop results – Booms

2. + 3. The Matrix

Damage events sorted according to significance



- Operator broken baskets (access)
- Operator broken hydraulic cylinders
- Lack of simplified user manuals
- Inappropriate tie down points
- Accessible lifting and tie down points from ground level
- Operator hydraulic hoses breakage
- Inappropriate lifting points
- Loading and unloading damages on baskets (access)
- Unclear marking of lifting and tie down points
- Wrongly used fuel
- Operator damages on bonnets and canopies
- Lack of standards in colour and sound safety
- Mark and indicators
- Loading and unloading damages on hydraulic parts
- Lack of visible equipment measures on the machine
- Lack of daily maintenance at customer
- Loading and unloading damages on bonnets and canopies
- Running out of fuel
- Misuse of emergency buttons
- Lost keys
- Loading and unloading damages on lights and accessories
- Flat battery
- Operated broken tyres and belts
- Clogged fuel filter
- Clogged air filters
- Operator broken lights and accessories

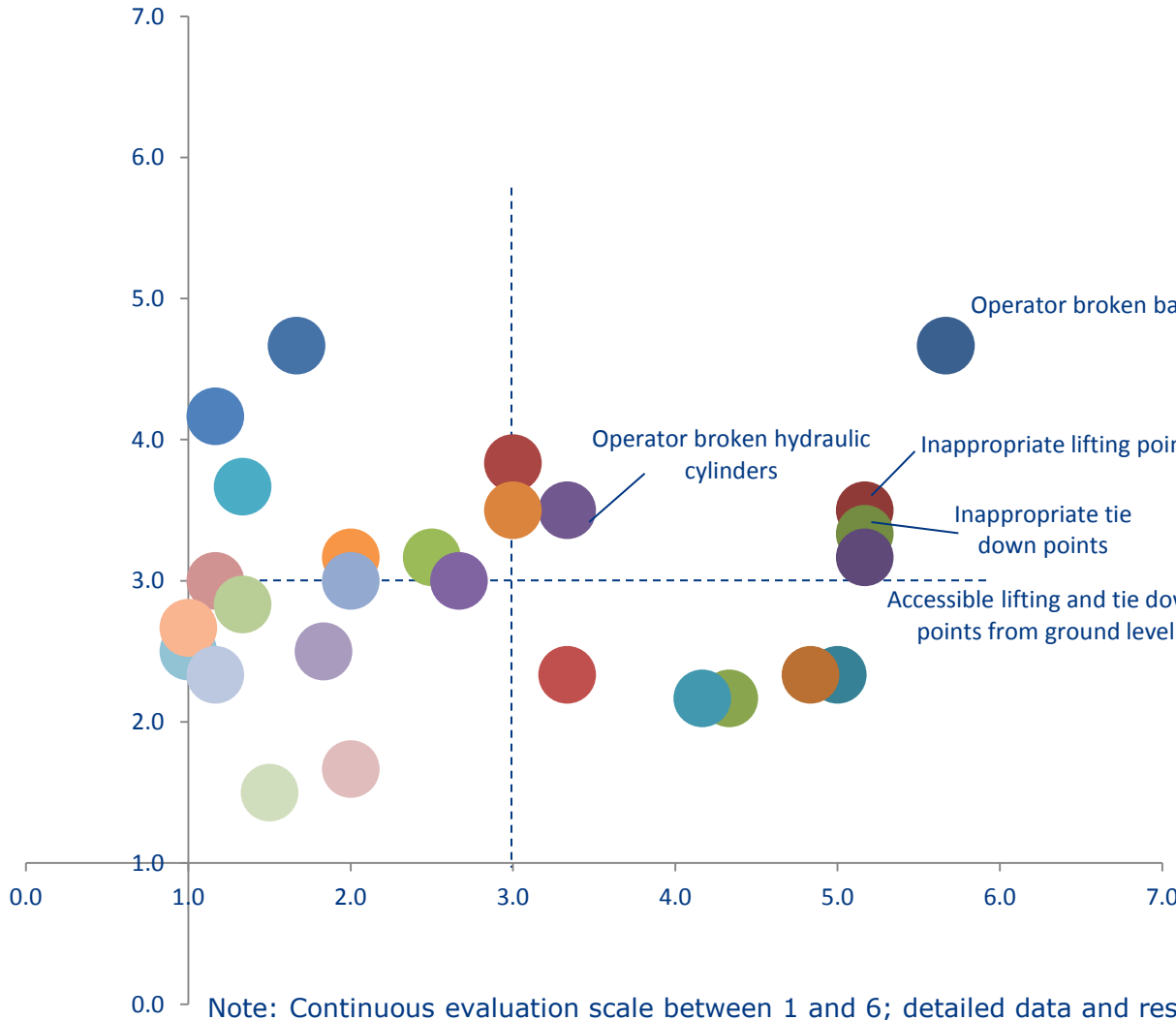
Note: Continuous evaluation scale between 1 and 6; detailed data and results in corresponding Excel



The workshop results – Scissors & Masts

2. + 3. The Matrix

Damage events sorted according to significance



- Operator broken baskets (access)
- Inappropriate lifting points
- Inappropriate tie down points
- Accessible lifting and tie down points from ground level
- Lack of simplified user manuals
- Unclear marking of lifting and tie down points
- Flat battery (power train for electrical machines)
- Operator hydraulic hoses breakage
- Mark and indicators
- Operator broken hydraulic cylinders
- Lack of standards in colour and sound safety
- Loading and unloading damages on baskets (access)
- Wrongly used fuel (only for diesel driven machines)
- Lack of visible equipment measures on the machine
- Loading and unloading damages on hydraulic parts
- Lack of daily maintenance at customer
- Running out of fuel (only for diesel driven machines)
- Loading and unloading damages on bonnets and canopies
- Operated broken tyres and belts
- Clogged air filters (only diesel driven machines)
- Lost keys